Contents

1.	Number System	2-15
2.	Factors and Multiples	16-37
3.	Whole Numbers	37-54
4.	Integers	54-63
5.	Fractions	64-91
6.	Simplification	91-98
7.	Decimals	98-107
8.	Algebraic Expressions	107-118
9.	Linear Equations	118-137
10.	Ratio, Proportion and Unitary Method	137-156
11.	Line Segment, Ray and Line	157-159
12.	Parallel Lines	159-161
13.	Angles and Their Measurement	161-164
14.	Constructions	165-170
15.	Polygons	170-171
16.	Triangles	171-174
17.	Quadrilaterals	174-176
18.	Circles	177
19.	Three-Dimensional Shapes	177-178
20.	Two-Dimensional Reflection Symmetry	178
21.	Concept of Perimeter and Area	179-192
22.	Data Handling	193-195
23.	Pictograph	196-199
24.	Bar Graph	199-201

EXERCISE 1A

1. (a) 8014 (b) 43062 (c) 203605 (d) 5020007
(e) 70400037 (f) 60504303 (g) 155020068 (h) 121220012

2. (a) Seventy four thousand six
(b) Eight lakh eight thousand eighty-six
(c) Forty-three lakh thirty thousand twenty-eight
(d) Two crore six lakh eight thousand thirteen
(e) Six crore twenty lakh four thousand seven hundred five
(f) Seven crore twenty-nine lakh six thousand nine
(g) Twenty-eight crore eight lakh eight thousand eight hundred
(h) Seven crore twenty-six lakh forty thousand nine hundred eight
(i) Five crore fifty lakh fifty thousand fifty.

3. (a) $2\times10000+6\times1000+6\times100+5\times10+7\times1$
(b) $4\times100000+9\times1000+8\times100+1\times10+6\times1$
(c) $1\times1000000+3\times100000+4\times1000+5\times100+8\times1$
(d) $4\times10000000+2\times1000000+5\times100000+2\times10000+7\times1000+3\times100+8\times10+2\times1$
(e) $8\times10000000+8\times100000+8\times1000+8\times1$
(f) $8\times10000000+2\times1000000+3\times10000+6\times100+2\times10$

4. (a) 53475 (b) 462352 (c) 30205806 (d) 8302903

5. Place value of 7 in 27650934 = 7000000
Place value of 7 in 27650934 = 7
Difference = 7000000 − 7
= 6999993

6. 79520986
→ 900
→ 9000000
Difference = 9000000 − 900
= 8999100

7. Greatest 7-digit number = 9999999
Smallest 7-digit number = 1000000
Total number of 7-digit numbers in all = 9999999 − 1000000 + 1
= 9000000

8. Greatest 6-digit number = 999999
Smallest 6-digit number = 100000
Total number of 6-digit numbers in all = 999999 − 100000 + 1
= 900000

9. Number of thousands to make a crore $= \frac{10000000}{1000} = 10000$ thousands

10. Number of thousands to make a lakh $= \frac{100000}{1000} = 100$ thousands

11. Required number $= 10000000 - 1 = 9999999$

12. Required number $= 9900000 - 1 = 9899999$

13. Required number $= 9547999 + 1 = 9548000$

14. Required number

$=$ Original number $-$ number obtained by reversing its digit

$= 837 - 738$

$= 99$

15. Arranging the digits given in descending order : 9, 6, 4, 3, 2, 0

Required largest number = 964320

16. All 3-digit numbers using 2, 3, 4 are :

234, 243, 324, 342, 423, 432

17. Arranging the digits given in ascending order : 0, 1, 3, 5, 7

Required smallest number = 10357

18.

	HM	TM	M	H Th	T Th	Th	H	T	O
(a)		3	0	1	0	5	0	6	3
(b)		5	2	2	0	5	0	0	6
(c)			5	0	0	5	0	0	5

19. International Place-value chart :

	HM	TM	M	H Th	T Th	Th	H	T	O
(a)				7	3	5	8	2	1
(b)			6	0	5	7	8	9	4
(c)		5	6	9	4	3	8	2	1
(d)		3	7	5	0	2	0	9	3
(e)		8	9	3	5	0	0	6	4
(f)		9	0	7	0	3	0	0	6

Number Names:

(a) Seven hundred thirty-five thousand eight hundred twenty-one

(b) Six million fifty-seven thousand eight hundred ninety-four

(c) Fifty-six million nine hundred forty-three thousand eight hundred twenty-one

(d) Thirty-seven million five hundred two thousand ninety-three

(e) Eighty-nine million three hundred fifty thousand sixty-four

(f) Ninety million seven hundred three thousand and six

EXERCISE 1B

1. (a) 2004578 $\boxed{>}$ 898976 (b) 4683025 $\boxed{<}$ 20346502
(c) 4365890 $\boxed{<}$ 4370263 (d) 20468790 $\boxed{<}$ 22354678
(e) 38697492 $\boxed{>}$ 8976523 (f) 58994602 $\boxed{<}$ 58995032

2. (a) 990357 < 9873426 < 9874012 < 24615019 < 24620010
(b) 5694437 < 5695440 < 56943201 < 56943300 < 56944000
(c) 700087 < 8014257 < 8014306 < 8015032 < 10012458
(d) 893245 < 893425 < 980134 < 1020216 < 1020304 < 1021403

3. (a) 102345680 > 63521047 > 63514759 > 7355014 > 7354206
(b) 23794206 > 23756819 > 5032790 > 5032786 > 987876
(c) 16060666 > 16007777 > 1808090 > 1808088 > 190909 > 181888
(d) 1712040 > 1704382 > 1702497 > 201200 > 200175 > 199988

EXERCISE 1C

1. Number of persons in first year = 13789509
Number of persons in second year = 12976498
Total number of persons during these years = 13789509 + 12976498
= 26766007

		1	1	1	1	1	1	
	C	TL	L	T	Th	Th	H	T	O
	1	3	7	8	9	5	0	9
+	1	2	9	7	6	4	9	8
	2	6	7	6	6	0	0	7

Hence, 26766007 persons visited the shrine during these two years.

2. Number of bags produced by I mill = 24809565
Number of bags produced by II mill = 18738576
Number of bags produced by III mill = 9564568
Total number of bags = 24809565 + 18738576 + 9564568
= 53112709

	C	TL	L	T	Th	Th	H	T	O
	2	4	8	0		9	5	6	5
	1	8	7	3		8	5	7	6
+		9	5	6		4	5	6	8
	5	3	1	1		2	7	0	9

Hence, 53112709 bags were produced by all the three factories during last year.

3. Required number = 37684955 + 3615045
= 41300000

```
  37684955
+  3615045
----------
  41300000
```

4. Votes recieved by first candidate = 687905
Votes recieved by second candidate = 495086
Votes recieved by third candidate = 93756
Total number of votes = 687905 + 495086 + 93756
= 1276747

```
  L T Th Th H T O
    6  8  7  9 0 5
    4  9  5  0 8 6
+   0  9  3  7 5 6
-----------------
  1 2  7  6  7 4 7
```

Now, number of invalid votes = 13849
Number of persons who did not vote = 25467
Number of votes registered
= 1276747 + 13849 + 25467
= 1316063

```
  TL L T Th Th H T O
   1 2  7  6  7 4 7
      0  1  3  8 4 9
+     0  2  5  4 6 7
--------------------
   1 3  1  6  0 6 3
```

Hence, 1316063 votes were registered.

5. Number of bulbs produced in first year = 8765435
(a) Number of bulbs produced in next year = 8765435 + 1378689
= 10144124

```
  CTL L T Th Th H T O
    8  7  6  5  4 3 5
+   1  3  7  8  6 8 9
---------------------
  1  0  1  4  4 1 2 4
```

Hence, 10144124 bulbs were produced during the second year.

(b) Total number of bulbs produced = 8765435 + 10144124
= 18909559

```
  CTL L T Th Th H T O
    8  7  6  5  4 3 5
+   1  0  1  4  4 1 2 4
---------------------
  1  8  9  0  9 5 5 9
```

Hence, 18909559 bulbs were produced during the two years.

6. Sale during the first year = ` 20956480
Sale during the next year
= ` 20956480 + ` 6709570
= ` 27666050

```
  C TL L T Th Th H T O
    2  0  9  5  6 4 8 0
+   6  7  0  9  5 7 0
---------------------
  2  7  6  6  6 0 5 0
```

Total sale during these two years = ` 20956480 + ` 27666050
= ` 48622530

```
  C TL L T Th Th H T O
    2  0  9  5  6 4 8 0
+   2  7  6  6  6 0 5 0
---------------------
  4  8  6  2  2 5 3 0
```

Hence, the sale receipt of two company during these two years was ` 48622530.

7. Total population in town = 28756304
Number of females = 16987059
Number of males = 28756304 − 16987059
= 11769245
Hence, 11769245 males are in the town.

C	TL	L	T	Th	Th	H	T	O
	2	8	7	5	6	3	0	4
−	1	6	9	8	7	0	5	9
	1	1	7	6	9	2	4	5

8. Required number = 10000000 − 5643879
= 4356121

C	TL	L	T	Th	Th	H	T	O
1	0	0	0	0	0	0	0	0
−	5	6	4	3	8	7	9	
	4	3	5	6	1	2	1	

9. Required number = 11010101 − 2635967
= 8374134

C	TL	L	T	Th	Th	H	T	O
1	1	0	1	0	1	0	1	
−	2	6	3	5	9	6	7	
	8	3	7	4	1	3	4	

10. Sum of two numbers = 10750308
One number = 8967519
Other number = 10750308 − 8967519
= 1782789

C	TL	L	T	Th	Th	H	T	O
1	0	7	5	0	3	0	8	
−	8	9	6	7	5	1	9	
	1	7	8	2	7	8	9	

11. Required number = 13246510 − 4658642
= 8587868

C	TL	L	T	Th	Th	H	T	O
1	3	2	4	6	5	1	0	
−	4	6	5	8	6	4	2	
	8	5	8	7	8	6	8	

12. Rajat had money = ` 20000000
He spent money = ` 13607085
Money left with him
= ` 20000000 − ` 13607085
= ` 6392915
Hence, ` 6392915 is left with Rajat.

C	TL	L	T	Th	Th	H	T	O
	2	0	0	0	0	0	0	0
−	1	3	6	0	7	0	8	5
	6	3	9	2	9	1	5	

13. Total amount = ` 10672540
Wife got money = ` 4836980
Son got money = ` 3964790
Money got by daughter
= ` {10672540 − (4836980 + 3964790)}
= ` (10672540 − 8801770)
= ` 1870770
Hence, daughter received an amount of ` 1870770.

TL	L	T	Th	Th	H	T	O
4	8	3	6	9	8	0	
+ 3	9	6	4	7	9	0	
8	8	0	1	7	7	0	

C	TL	L	T	Th	Th	H	T	O
1	0	6	7	2	5	4	0	
−	8	8	0	1	7	7	0	
	1	8	7	0	7	7	0	

14. Cost of 1 table = ` 1525

Cost of 525 tables = ` (1525 × 525)

= ` 800625

Hence, the cost of 525 tables is ` 800625.

```
  1525
 ×525
 7625
3050×
7625××
800625
```

15. Number of pens produced in 1 day = 6985

Number of pens produced in 343 days = 6985 × 343

= 2395855

Hence, 2395855 pens will be produced in 343 days.

```
  6985
 ×343
 20955
27940 ×
20955 ××
2395855
```

16. We know, 1 year = 12 months

15 years = (12 × 15) months

= 180 months

Money saved in 1 month = ` 7645

Money saved in 180 months = ` (7645 × 180)

= ` 1376100

Hence, Mr. Gupta will save ` 1376100 in 15 years.

```
  7645
 ×180
 0000
61 160 ×
7645 ××
1376100
```

17. Distance covered in 1 hour = 1275 km

Distance covered in 52 hours = (1275 × 52) km

= 66300 km

Hence, helicopter will cover 66300 km in 52 hours.

```
  1275
  ×52
 2550
6375 ×
66300
```

18. Product of two numbers = 13421408

One number = 364

Other number = 13421408 ÷ 364

= 36872

```
      36872
364)13421408
  −1092
    2501
  −2184
    3174
  −2912
    2620
  −2548
     728
    −728
       ×
```

19. Cost of 36 flats = ` 68251500

Cost of 1 flat = ` (68251500 ÷ 36)

= ` 1895875

Hence, the cost of each flat is ` 1895875.

```
      1895875
36 ) 68251500
    −36
     322
    −288
      345
     −324
       211
      −180
        315
       −288
         270
        −252
          180
         −180
           ×
```

20. Mass of cylinder filled with gas = 32 kg 650 g

Mass of empty cylinder = 15 kg 280 g

Mass of gas = 32 kg 650 g − 15 kg 280 g

= 17 kg 370 g

Hence, 17 kg 370 g of the gas is contained in cylinder.

```
  kg   g
  32  650
−15  280
------------
  17  370
```

21. Cloth needed to make 1 Kurta = 3 m 75 cm

Cloth needed to make 12 such Shirt (Kurtas)

= 3 m 75 cm × 12

= 45 m

Hence, 45 m long cloth will be required to make 12 shirts.

```
  m  cm
  3  75
  ×  12
------------
  7  50
 37  5×
------------
 45  00
```

22. Cloth needed to make 8 trousers = 14 m 80 cm

Cloth needed to make 1 trousers = 14 m 80 cm ÷ 8

= 1 m 85 cm

6 m = 6 × 100 cm = 600 cm

600 + 80 = 680 cm

Hence, 1 m 85 cm long cloth will be required to make each trouser.

```
    1 m
8 ) 14 m
   −8
    6 m
```

```
     85 cm
8 ) 680 cm
   −64
     40
    −40
     ×
```

23. Mass of a box = 2 kg 750 g
Mass of 14 boxes = 2 kg 750 g × 14
= 38 kg 500 g
Hence, the total mass of 14 boxes is 38 kg 500 g.

kg	g
2	750
×	14
11	000
27	50×
38	500

24. Mass of 8 packets = 10 kg 600 g
Mass of 1 packet = 10 kg 600 g ÷ 8
= 1 kg 325 g
2 kg = 2 × 1000 g = 2000 g
2000 g + 600 g = 2600 g
Hence, the mass of each packet is 1 kg 325 g.

$$8\overline{)\,10\text{ kg}}\ 1\text{ kg},\quad -8,\quad 2\text{ kg}$$

$$8\overline{)\,2600\text{ g}}\ 325\text{ g},\quad -24,\quad 20,\quad -16,\quad 40,\quad -40,\quad \times$$

25. Total length of wire = 30 m
Number of pieces = 6
Length of each piece = 30 m ÷ 6 = 5 m
Hence, length of each piece is 5 m.

$$6\overline{)\,30\text{ m}}\ 5\text{ m},\quad -30,\quad \times$$

EXERCISE 1D

1. (a) In 27, the ones digit is $7 > 5$.
the required rounded number = 30
(b) In 185, the ones digit is $5 = 5$.
the required rounded number = 190
(c) In 2778, the ones digit is $8 > 5$.
the required rounded number = 2780
(d) In 27489, the ones digit is $9 > 5$.
the required rounded number = 27490

2. (a) In 924, the tens digit is $2 < 5$.
the required rounded number = 900
(b) In 2158, the tens digit is $5 = 5$.
the required rounded number = 2200
(c) In 54237, the tens digit is $3 < 5$.
the required rounded number = 54200
(d) In 89376, the tens digit is $7 > 5$.
the required rounded number = 89400

3. (a) In 875, the hundreds digit is $8 > 5$.
the required rounded number = 1000

(b) In 5937, the hundreds digit is $9 > 5$.
the required rounded number = 6000

(c) In 27826, the hundreds digit is $8 > 5$.
the required rounded number = 28000

(d) In 37473, the hundreds digit is $4 < 5$.
the required rounded number = 37000

4. (a) In 28321, thousands digit is $8 > 5$.
the required rounded number = 30000

(b) In 47423, thousands digit is $7 > 5$.
the required rounded number = 50000

(c) In 23680, thousands digit is $3 < 5$.
the required rounded number = 20000

(d) In 381529, thousands digit is $1 < 5$.
the required rounded number = 380000

5. (a) 46 estimated to the nearest ten = 50 ($\because$ $6 > 5$)
23 estimated to the nearest ten = 20 ($\because$ $3 < 5$)
Hence, the required estimation = $(50 + 20) = 70$

(b) 54 estimated to the nearest ten = 50 ($\because$ $4 < 5$)
87 estimated to the nearest ten = 90 ($\because$ $7 > 5$)
Hence, the required estimation = $50 + 90 = 140$

(c) 12 estimated to the nearest ten = 10 ($\because$ $2 < 5$)
58 estimated to the nearest ten = 60 ($\because$ $8 > 5$)
Hence, the required estimation = $10 + 60 = 70$

(d) 538 estimated to the nearest ten = 540 ($\because$ $8 > 5$)
276 estimated to the nearest ten = 280 ($\because$ $6 > 5$)
Hence, the required estimation = $540 + 280 = 820$

(e) 356 estimated to the nearest ten = 360 ($\because$ $6 > 5$)
275 estimated to the nearest ten = 280 ($\because$ $5 = 5$)
Hence, the required estimation = $360 + 280 = 640$

(f) 463 estimated to the nearest ten = 460 ($\because$ $3 < 5$)
182 estimated to the nearest ten = 180 ($\because$ $2 < 5$)
Hence, the required estimation = $460 + 180 = 640$

6. (a) 170 estimated to the nearest hundred = 200 ($\because$ $7 > 5$)
395 estimated to the nearest hundred = 400 ($\because$ $9 > 5$)
Hence, the required estimation = $200 + 400 = 600$

(b) 236 estimated to the nearest hundred = 200 ($\because$ $3 < 5$)
689 estimated to the nearest hundred = 700 ($\because$ $8 > 5$)
Hence, the required estimation = $200 + 700 = 900$

(c) 458 estimated to the nearest hundred = 500 ($\because$ 5 = 5)
324 estimated to the nearest hundred = 300 ($\because$ 2 < 5)
Hence, the required estimation = 500 + 300 = 800

(d) 5130 estimated to the nearest hundred = 5100 ($\because$ 3 < 5)
1410 estimated to the nearest hundred = 1400 ($\because$ 1 < 5)
Hence, the required estimation = 5100 + 1400 = 6500

(e) 3280 estimated to the nearest hundred = 3300 ($\because$ 8 > 5)
4395 estimated to the nearest hundred = 4400 ($\because$ 9 > 5)
Hence, the required estimation = 3300 + 4400 = 7700

(f) 10083 estimated to the nearest hundred = 10100 ($\because$ 8 > 5)
29380 estimated to the nearest hundred = 29400 ($\because$ 8 > 5)
Hence, the required estimation = 10100 + 29400 = 39500

7. (a) 32836 estimated to the nearest thousand = 33000 ($\because$ 8 > 5)
16466 estimated to the nearest thousand = 16000 ($\because$ 4 < 5)
Hence, the required estimation = 33000 + 16000 = 49000

(b) 46703 estimated to the nearest thousand = 47000 ($\because$ 7 > 5)
11375 estimated to the nearest thousand = 11000 ($\because$ 3 < 5)
Hence, the required estimation = 47000 + 11000 = 58000

(c) 10083 estimated to the nearest thousand = 10000 ($\because$ 0 < 5)
29380 estimated to the nearest thousand = 29000 ($\because$ 3 < 5)
Hence, the required estimation = 10000 + 29000 = 39000

8. (a) 97 estimated to the nearest ten = 100 ($\because$ 7 > 5)
38 estimated to the nearest ten = 40 ($\because$ 8 > 5)
Hence, the required estimation = 100 − 40 = 60

(b) 53 estimated to the nearest ten = 50 ($\because$ 3 < 5)
18 estimated to the nearest ten = 20 ($\because$ 8 > 5)
Hence, the required estimation = 50 − 20 = 30

(c) 409 estimated to the nearest ten = 410 ($\because$ 9 > 5)
148 estimated to the nearest ten = 150 ($\because$ 8 > 5)
Hence, the required estimation = 410 − 150 = 260

9. (a) 957 estimated to the nearest hundred = 1000 ($\because$ 5 = 5)
578 estimated to the nearest hundred = 600 ($\because$ 7 > 5)
Hence, the required estimation = 1000 − 600 = 400

(b) 678 estimated to the nearest hundred = 700 ($\because$ 7 > 5)
215 estimated to the nearest hundred = 200 ($\because$ 1 < 5)
Hence, the required estimation = 700 − 200 = 500

(c) 5612 estimated to the nearest hundred = 5600 ($\because$ $1 < 5$)
3095 estimated to the nearest hundred = 3100 ($\because$ $9 > 5$)
Hence, the required estimation = $5600 - 3100 = 2500$

10. (a) 47005 estimated to the nearest thousand = 47000 ($\because$ $0 < 5$)
39488 estimated to the nearest thousand = 39000 ($\because$ $4 < 5$)
Hence, the required estimation = $47000 - 39000 = 8000$

(b) 35863 estimated to the nearest thousand = 36000 ($\because$ $5 = 5$)
27677 estimated to the nearest thousand = 28000 ($\because$ $6 > 5$)
Hence, the required estimation = $36000 - 28000 = 8000$

(c) 7258 estimated to the nearest thousand = 7000 ($\because$ $2 < 5$)
2429 estimated to the nearest thousand = 2000 ($\because$ $4 < 5$)
Hence, the required estimation = $7000 - 2000 = 5000$

EXERCISE 1E

1. (a) 57 estimated to the nearest ten = 60
42 estimated to the nearest ten = 40
Hence, the required estimation = $60 \times 40 = 2400$

(b) 44 estimated to the nearest ten = 40
38 estimated to the nearest ten = 40
Hence, the required estimation = $40 \times 40 = 1600$

(c) 37 estimated to the nearest ten = 40
52 estimated to the nearest ten = 50
Hence, the required estimation = $40 \times 50 = 2000$

(d) 61 estimated to the nearest ten = 60
85 estimated to the nearest ten = 90
Hence, the required estimation = $60 \times 90 = 5400$

(e) 53 estimated to the nearest ten = 50
47 estimated to the nearest ten = 50
Hence, the required estimation = $50 \times 50 = 2500$

(f) 12 estimated to the nearest ten = 10
25 estimated to the nearest ten = 30
Hence, the required estimation = $10 \times 30 = 300$

2. (a) 423 estimated to the nearest hundred = 400
158 estimated to the nearest hundred = 200
Hence, the required estimation = $400 \times 200 = 80000$

(b) 376 estimated to the nearest hundred = 400
123 estimated to the nearest hundred = 100
Hence, the required estimation = $400 \times 100 = 40000$

(c) 264 estimated to the nearest hundred = 300
147 estimated to the nearest hundred = 100
Hence, the required estimation = $300 \times 100 = 30000$

3. (a) 359 estimated upwards = 400
76 estimated downwards = 70
Hence, the estimated product = $400 \times 70 = 28000$

(b) 267 estimated upwards = 300
146 estimated downwards = 100
Hence, the estimated product = $300 \times 100 = 30000$

(c) 183 estimated upwards = 200
154 estimated downwards = 100
Hence, the estimated product = $200 \times 100 = 20000$

4. (a) 578 estimated downwards = 500
369 estimated upwards = 400
Hence, the estimated product = $500 \times 400 = 200000$

(b) 472 estimated downwards = 400
76 estimated upwards = 100
Hence, the estimated product = $400 \times 100 = 40000$

(c) 356 estimated downwards = 300
278 estimated upwards = 300
Hence, the estimated product = $300 \times 300 = 90000$

EXERCISE 1F

1. $83 \div 17$ is approximately equal to $80 \div 20 = 4$
2. $75 \div 23$ is approximately equal to $80 \div 20 = 4$
3. $87 \div 28$ is approximately equal to $90 \div 30 = 3$
4. $725 \div 23$ is approximately equal to $700 \div 20 = 35$
5. $275 \div 25$ is approximately equal to $300 \div 30 = 10$
6. $193 \div 24$ is approximately equal to $200 \div 20 = 10$
7. $929 \div 29$ is approximately equal to $900 \div 30 = 30$
8. $633 \div 33$ is approximately equal to $600 \div 30 = 20$
9. $868 \div 38$ is approximately equal to $900 \div 40 = 22.5 (\approx 23)$
10. $858 \div 39$ is approximately equal to $900 \div 40 = 22.5 (\approx 23)$

EXERCISE 1G

1. (a) $3 = 1 + 1 + 1 =$ III
(b) $7 = 5 + 1 + 1 =$ VII
(c) $15 = 10 + 5 =$ XV
(d) $28 = 10 + 10 + 5 + 1 + 1 + 1 =$ XXVIII
(e) $39 = 10 + 10 + 10 + (10 - 1) =$ XXXIX
(f) $45 = (50 - 10) + 5 =$ XLV

(g) $56 = 50 + 5 + 1 = LVI$

(h) $63 = 50 + 10 + 1 + 1 + 1 = LXIII$

(i) $72 = 50 + 10 + 10 + 1 + 1 = LXXII$

(j) $80 = 50 + 10 + 10 + 10 = LXXX$

(k) $92 = (100 - 10) + 1 + 1 = XCII$

(l) $97 = (100 - 10) + 5 + 1 + 1 = XCVII$

(m) $99 = (100 - 10) + (10 - 1) = XCIX$

(n) $110 = 100 + 10 = CX$

(o) $125 = 100 + 10 + 10 + 5 = CXXV$

2. (a) $154 = 100 + 50 + (5 - 1) = CLIV$

(b) $185 = 100 + 50 + 10 + 10 + 10 + 5 = CLXXXV$

(c) $230 = 100 + 100 + 10 + 10 + 10 = CCXXX$

(d) $343 = 100 + 100 + 100 + (50 - 10) + 1 + 1 + 1 = CCCXLIII$

(e) $485 = (500 - 100) + 50 + 10 + 10 + 10 + 5 = CDLXXXV$

(f) $595 = 500 + (100 - 10) + 5 = DXCV$

(g) $613 = 500 + 100 + 10 + 1 + 1 + 1 = DCXIII$

(h) $757 = 500 + 100 + 100 + 50 + 5 + 1 + 1 = DCCLVII$

3. (a) $XXVII = 10 + 10 + 5 + 1 + 1 = 27$

(b) $XXXIV = 10 + 10 + 10 + (5 - 1) = 34$

(c) $XLV = (50 - 10) + 5 = 45$

(d) $LIV = 50 + (5 - 1) = 54$

(e) $LXXXIV = 50 + 10 + 10 + 10 + (5 - 1) = 84$

(f) $XCI = (100 - 10) + 1 = 91$

(g) $XCVI = (100 - 10) + 5 + 1 = 96$

(h) $CXI = 100 + 10 + 1 = 111$

(i) $CLIV = 100 + 50 + (5 - 1) = 154$

(j) $CCXXIV = 100 + 100 + 10 + 10 + (5 - 1) = 224$

(k) $CCCLXV = 100 + 100 + 100 + 50 + 10 + 5 = 365$

(l) $CDXIV = (500 - 100) + 10 + (5 - 1) = 414$

(m) $CDLXIV = (500 - 100) + 50 + 10 + (5 - 1) = 464$

(n) $DVI = 500 + 5 + 1 = 506$

(o) $DCCLXVI = 500 + 100 + 100 + 50 + 10 + 5 + 1 = 766$

4. (a) V is never subtracted.

VC is wrong.

(b) I is subtracted from V and X only.

IL is wrong.

(c) V is never repeated.

VVII is wrong.

(d) IX cannot occur to the left of X.

IXX is wrong.

EXERCISE 1H

1. (b)

2. Place value of 5 in 78653421 = 50000

Face value of 5 in 78653421 = 5

Difference = 50000 − 5 = 49995

(c) is correct.

3. (a) is correct.

4. 48632950

└→ 600000 (Place value of 6)

(c) is correct.

5. Greatest 7-digit number = 9999999

Smallest 7-digit number = 1000000

Number of 7-digit numbers = 9999999 − 1000000 + 1 = 9000000

(b) is correct.

6. Greatest 4-digit number = 9999

Smallest 4-digit number = 1000

Number of 4-digit numbers = 9999 − 1000 + 1 = 9000

(b) is correct.

7. 1000000 − 1 = 999999

(b) is correct.

8. Greatest 8-digit number = 99999999

Smallest 8-digit number = 10000000

Number of 8-digit numbers = 99999999 − 10000000 + 1 = 90000000

(c) is correct.

9. (c) **10.** (a)

HOTS

- CMXCIX = (1000 – 100) + (100 – 10) + (10 – 1)
  = 900 + 90 + 9 = 999

VALUE BASED

- Meenu saves every month = ` 859

  Her saving in one year = 12 × ` 859 (∵ 1 year = 12 months)

  = ` 10308

  ` 10308 estimated to the nearest hundred = ` 10300

  Hence, estimated amount of money saved by her in one year is ` 10300.

EXERCISE 2A

1. (a) 20 : 1, 2, 4, 5, 10, 20
(b) 36 : 1, 2, 3, 4, 6, 9, 12, 18, 36
(c) 60 : 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
(d) 75 : 1, 3, 5, 15, 25, 75

2. (a) 17 : 17, 34, 51, 68, 85
(b) 23 : 23, 46, 69, 92, 115
(c) 65 : 65, 130, 195, 260, 325
(d) 70 : 70, 140, 210, 280, 350

3. (a) 42 is exactly divisible by 2, so it is an even number.
(b) 47 is not divisible by 2, so it is an odd number.
(c) 60 is exactly divisible by 2, so it is an even number.
(d) 68 is exactly divisible by 2, so it is an even number.
(e) 79 is not divisible by 2, so it is an odd number.
(f) 174 is exactly divisible by 2, so it is an even number.
(g) 231 is not divisible by 2, so it is an odd number.
(h) 352 is exactly divisible by 2, so it is an even number.

4. **Prime number :** The numbers having exactly two factors (1 and number itself) are called prime numbers.
For example : 2, 3, 5, 7, 11, 13, 17, 19, 23, 29.

5. (a) 11, 13, 17, 19, 23, 29 (b) 37, 41, 43, 47, 53, 59
(c) 67, 71, 73, 79 (d) 83, 89, 97

6. (a) 2 (b) 2 (c) 3

7. (a) 31 has factors 1 and 31, so it is a prime number.
(b) 51 has factors 1, 3, 17 and 51, so it is not a prime number.
(c) 93 has factors 1, 3, 31 and 93, so it is not a prime number.
(d) 96 has factors 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96, so it is not a prime number.

8. 90, 91, 92, 93, 94, 95, 96

9. **Composite numbers :** The numbers which have more than two factors are called composite numbers.
Yes, a composite number can be odd. Smallest odd composite number is 9.

10. **Twin primes :** If the difference between any two prime numbers is 2, then such pair of prime numbers are called twin primes.
Pair of twin primes between 50 and 100 are :
(59, 61), (71, 73)

11. Co-primes : Two numbers are said to be co-primes if they do not have a common factor other than 1.

(2, 3), (3, 5), (6, 7), (4, 9), (8, 15) are five pairs of co-primes.

No, co-prime are not always prime.

Example : 9, 10 are co-primes, while none of 9 and 10 is prime number.

12. (a) $36 = 7 + 29$ (b) $42 = 5 + 37$ (c) $84 = 17 + 67$ (d) $98 = 79 + 19$

13. (a) $31 = 5 + 7 + 19$ (b) $35 = 5 + 7 + 23$

(c) $49 = 3 + 5 + 41$ (d) $63 = 7 + 13 + 43$

14. (a) $36 = 17 + 19$ (b) $84 = 41 + 43$

(c) $120 = 59 + 61$ (d) $144 = 71 + 73$

15. (b)

EXERCISE 2B

1. (a) In 168, ones digit is 8, which is divisible by 2.
168 is divisible by 2.

(b) In 8370, ones digit is 0, which is divisible by 2.
8370 is divisible by 2.

(c) In 63921, ones digit is 1, which is not divisible by 2.
63921 is not divisible by 2.

(d) In 367314, ones digit is 4, which is divisible by 2.
367314 is divisible by 2.

2. (a) Sum of digits $= 5 + 3 + 3 = 11$, which is not divisible by 3.
533 is not divisible by 3.

(b) Sum of digits $= 2 + 0 + 7 + 0 + 1 = 10$, which is not divisible by 3.
20701 is not divisible by 3.

(c) Sum of digits $= 1 + 0 + 0 + 3 + 8 = 12$, which is divisible by 3.
10038 is divisible by 3.

(d) Sum of digits $= 8 + 7 + 2 + 6 + 4 + 5 = 32$, which is not divisible by 3.
872645 is not divisible by 3.

3. (a) In 738, 38 is not divisible by 4.
738 is not divisible by 4.

(b) In 3314, 14 is not divisible by 4.
3314 is not divisible by 4.

(c) In 72712, 12 is divisible by 4.
72712 is divisible by 4.

(d) In 720832, 32 is divisible by 4.
720832 is divisible by 4.

4. (a) In 2850, ones digit is 0.
2850 is divisible by 5.
(b) In 27485, ones digits is 5.
27485 is divisible by 5.
(c) In 28506, ones digit is 6.
28506 is not divisible by 5.
(d) In 834505, ones digit is 5.
834505 is divisible by 5.

5. (a) 3030 is divisible by both 2 and 3.
3030 is divisible by 6.
(b) 17852 is divisible by 2 but not by 3.
17852 is not divisible by 6.
(c) 951480 is divisible by both 2 and 3.
951480 is divisible by 6.
(d) 6839452 is divisible by 2 but not by 3.
6839452 is not divisible by 6.

6. (a) Clearly, $(2\times 7-11)=3$, which is not divisible by 7.
117 is not divisible by 7.
(b) Clearly, $(82-12)=70$, which is divisible by 7.
826 is divisible by 7.
(c) Clearly, $(602-2)=600$, which is not divisible by 7.
6021 is not divisible by 7.
(d) Clearly, $(2536-16)=2520$, which is divisible by 7.
25368 is divisible by 7.

7. (a) In 9364, 364 is not divisible by 8.
9364 is not divisible by 8.
(b) In 901674, 674 is not divisible by 8.
901674 is not divisible by 8.
(c) In 36792, 792 is divisible by 8.
36792 is divisible by 8.
(d) In 1790184, 184 is divisible by 8.
1790184 is divisible by 8.

8. (a) Sum of digits $=3+3+3+3=12$, which is not divisible by 9.
3333 is not divisible by 9.
(b) Sum of digits $=2+3+5+8=18$, which is divisible by 9.
2358 is divisible by 9.
(c) Sum of digits $=9+8+7+1+2=27$, which is divisible by 9.
98712 is divisible by 9.

(d) Sum of digits = $3+2+6+9+9+9=38$, which is not divisible by 9.
326999 is not divisible by 9.

9. (a) 6870 has 0 in its ones place.
68370 is divisible by 10.

(b) 52325 has 5 in its ones place.
52325 is not divisible by 10.

(c) 44550 has 0 in its ones place.
44550 is divisible by 10.

(d) 43238 has 8 in its ones place.
43238 is not divisible by 10.

10. (a) In 7678,
Sum of digits in odd place = $8+6=14$
Sum of digits in even place = $7+7=14$
Difference of the two sums = $14-14=0$
7678 is divisible by 11.

(b) In 66311,
Sum of digits in odd place = $1+3+6=10$
Sum of digits in even place = $1+6=7$
Difference of the two sums = $10-7=3$
66311 is not divisible by 11.

(c) In 901351,
Sum of digits in odd place = $1+3+0=4$
Sum of digits in even place = $5+1+9=15$
Difference of the two sums = $15-4=11$
901351 is divisible by 11.

(d) In 8790322,
Sum of digits in odd place = $2+3+9+8=22$
Sum of digits in even place = $2+0+7=9$
Difference of the two sums = $22-9=13$
8790322 is not divisible by 11.

11. (a) If $27*4$ is divisible by 3, then the sum of its digits will be divisible by 3.

Sum of digits = $2+7+*+4$
$=13+*$

Here, the first multiple of 3 greater than 13 is 15.

So, $13+*=15$
$*=15-13$
$*=2$

(b) $8*711$ is divisible by 3, then the sum of its digits will be divisible by 3.

Sum of digits $= 8+*+7+1+1$

$= 17+*$

Here, the first multiple of 3 greater than 17 is 18.

So, $17+* = 18$

$* = 18-17$

$* = 1$

(c) If $53*46$ is divisible by 3, then the sum of its digits will be divisible by 3.

Sum of digits $= 5+3+*+4+6$

$= 18+*$

Here, 18 is already a multiple of 3.

So, $18+* = 18$

$* = 18-18$

$* = 0$

(d) $6*1054$ is divisible by 3, then the sum of its digits will be divisible by 3.

Sum of digits $= 6+*+1+0+5+4$

$= 16+*$

Here, the first multiple of 3 greater than 16 is 18.

So, $16+* = 18$

$* = 18-16$

$* = 2$

12. (a) If $65*5$ is divisible by 9, then the sum of its digits will be divisible by 9.

Sum of digits $= 6+5+*+5$

$= 16+*$

Here, the first multiple of 9 greater than 16 is 18.

So, $16+* = 18$

$* = 18-16$

$* = 2$

(b) If $6702*$ is divisible by 9, then the sum of its digits will be divisible by 9.

Sum of digits $= 6+7+0+2+*$

$= 15+*$

Here, the first multiple of 9, greater than 15 is 18.

So, $15 + * = 18$

$* = 18 - 15$

$* = 3$

(c) If $2*135$ is divisible by 9, then the sum of digits of its will be divisible by 9.

Sum of digits $= 2 + * + 1 + 3 + 5$

$= 11 + *$

Here, the first multiple of 9 greater than 11 is 18.

So, $11 + * = 18$

$* = 18 - 11$

$* = 7$

(d) If $6678*1$ is divisible by 9, then the sum of its digits will be divisible by 9.

Sum of digits $= 6 + 6 + 7 + 8 + * + 1$

$= 28 + *$

Here, the first multiple of 9 greater than 28 is 36.

So, $28 + * = 36$

$* = 36 - 28$

$* = 8$

13. (a) 103 has factors : 1 and 103 only.
103 is a prime number.

(b) 137 has factors : 1 and 137 only.
137 is a prime number.

(c) 161 has factors : 1, 7, 23 and 161.
161 is not a prime number.

(d) 179 has factors : 1 and 179 only.
179 is a prime number.

14. (a) 6 (b) 12 (c) 24 (d) 12

15. (a) F (b) T (c) F (d) T

EXERCISE 2C

1.

2	28
2	14
7	7
	1

$28 = 2 \times 2 \times 7$

$= 2^2 \times 7$

2.

2	40
2	20
2	10
5	5
	1

$40 = 2 \times 2 \times 2 \times 5$

$= 2^3 \times 5$

3.

5	85
17	17
	1

$85 = 5 \times 17$

4.

2	96
2	48
2	24
2	12
2	6
3	3
	1

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$

$= 2^5 \times 3$

5.

2	120
2	60
2	30
3	15
5	5
	1

$120 = 2 \times 2 \times 2 \times 3 \times 5$

$= 2^3 \times 3 \times 5$

6.

2	140
2	70
5	35
7	7
	1

$140 = 2 \times 2 \times 5 \times 7$

$= 2^2 \times 5 \times 7$

7.

3	375
5	125
5	25
5	5
	1

$375 = 3 \times 5 \times 5 \times 5$

$= 3 \times 5^3$

8.

2	480
2	240
2	120
2	60
2	30
3	15
5	5
	1

$480 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5$

$= 2^5 \times 3 \times 5$

9.

5	625
5	125
5	25
5	5
	1

$625 = 5 \times 5 \times 5 \times 5$

$= 5^4$

10.

2	980
2	490
5	245
7	49
7	7
	1

$980 = 2 \times 2 \times 5 \times 7 \times 7$

$= 2^2 \times 5 \times 7^2$

11.

2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$1024 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 2^{10}$

12.

5	3125
5	625
5	125
5	25
5	5
	1

$3125 = 5 \times 5 \times 5 \times 5 \times 5$

$= 5^5$

13.

3	4335
5	1445
17	289
17	17
	1

$4335 = 3 \times 5 \times 17 \times 17$

$= 3 \times 5 \times 17^2$

14.

3	4641
7	1547
13	221
17	17
	1

$4641 = 3 \times 7 \times 13 \times 17$

15.

3	2907
3	969
17	323
19	19
	1

$2907 = 3 \times 3 \times 17 \times 19$

$= 3^2 \times 17 \times 19$

16.

2	8712
2	4356
2	2178
3	1089
3	363
11	121
11	11
	1

$8712 = 2 \times 2 \times 2 \times 3 \times 3 \times 11 \times 11$

$= 2^3 \times 3^2 \times 11^2$

17.

3	1323
3	441
3	147
7	49
7	7
	1

$1323 = 3 \times 3 \times 3 \times 7 \times 7$

$= 3^3 \times 7^2$

18.

7	9317
11	1331
11	121
11	11
	1

$9317 = 7 \times 11 \times 11 \times 11$

$= 7 \times 11^3$

19.

2	8712
2	4356
2	2178
3	1089
3	363
11	121
11	11
	1

$8712 = 2 \times 2 \times 2 \times 3 \times 3 \times 11 \times 11$

$= 2^3 \times 3^2 \times 11^2$

20.

2	17424
2	8712
2	4356
2	2178
3	1089
3	363
11	121
11	11
	1

$17424 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 11 \times 11$

$= 2^4 \times 3^2 \times 11^2$

EXERCISE 2D

1. (a)

5	25
5	5
	1

3	15
5	5
	1

$25 = 5 \times 5 = 5^2$

$15 = 3 \times 5$

HCF = 5

(b)

2	16
2	8
2	4
2	2
	1

2	56
2	28
2	14
7	7
	1

$16 = 2 \times 2 \times 2 \times 2 = 2^4$

$56 = 2 \times 2 \times 2 \times 7 = 2^3 \times 7$

HCF $= 2^3 = 8$

(c)

2	24
2	12
2	6
3	3
	1

2	42
3	21
7	7
	1

$24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3$

$42 = 2 \times 3 \times 7$

HCF $= 2 \times 3 = 6$

(d)

2	16
2	8
2	4
2	2
	1

2	18
3	9
3	3
	1

$16 = 2 \times 2 \times 2 \times 2 = 2^4$

$18 = 2 \times 3 \times 3 = 2 \times 3^2$

HCF $= 2$

(e)

3	33
11	11
	1

3	99
3	33
11	11
	1

$33 = 3 \times 11$

$99 = 3 \times 3 \times 11 = 3^2 \times 11$

HCF $= 3 \times 11 = 33$

(f)

5	25
5	5
	1

3	45
3	15
5	5
	1

$25 = 5 \times 5 = 5^2$

$45 = 3 \times 3 \times 5 = 3^2 \times 5$

HCF = 5

(g)

2	18
3	9
3	3
	1

3	45
3	15
5	5
	1

2	72
2	36
2	18
3	9
3	3
	1

$18 = 2 \times 3 \times 3 = 2 \times 3^2$

$45 = 3 \times 3 \times 5 = 3^2 \times 5$

$72 = 2 \times 2 \times 2 \times 3 \times 3$

$= 2^3 \times 3^2$

HCF $= 3^2 = 9$

(h)

3	21
7	7
	1

2	42
3	21
7	7
	1

2	70
5	35
7	7
	1

$21 = 3 \times 7$

$42 = 2 \times 3 \times 7$

$70 = 2 \times 5 \times 7$

HCF = 7

2. (a)

$$\begin{array}{r} 60\overline{)\ 80\ (1} \\ -60 \\ \hline 20\overline{)\ 60\ (3} \\ -60 \\ \hline \times \end{array}$$

HCF = 20

(b)

$$\begin{array}{r} 140\overline{)\ 168\ (1} \\ -140 \\ \hline 28\overline{)\ 140\ (5} \\ -140 \\ \hline \times \end{array}$$

HCF = 28

(c) $72\overline{)\ 84}\,(1$
-72
$12\overline{)\ 72}\,(6$
-72
$\times$

HCF = 12

(d) $60\overline{)\ 96}\,(1$
-60
$36\overline{)\ 60}\,(1$
-36
$24\overline{)\ 36}\,(1$
-24
$12\overline{)\ 24}\,(2$
-24
$\times$

$12\overline{)150}\,(12$
-12
30
-24
$6\overline{)\ 12}\,(2$
-12
$\times$

HCF = 6

(e) $49\overline{)\ 91}\,(1$
-49
$42\overline{)\ 49}\,(1$
-42
$7\overline{)\ 42}\,(6$
-42
$\times$

$7\overline{)112}\,(16$
-7
42
-42
$\times$

HCF = 7

(f) $75\overline{)100}\,(1$
-75
$25\overline{)\ 75}\,(3$
-75
$\times$

$25\overline{)140}\,(5$
-125
$15\overline{)\ 25}\,(1$
-15
$10\overline{)\ 15}\,(1$
-10
$5\overline{)\ 10}\,(2$
-10
$\times$

HCF = 5

(g) $72\overline{)\ 144}\,(2$
-144
$\times$

$72\overline{)\ 252}\,(3$
-216
$36\overline{)\ 72}\,(2$
-72
$\times$

HCF = 36

(h) $144\overline{)180}(1$ $\quad$ $36\overline{)192}(5$

-144 $\quad$ -180

$36\overline{)144}(4$ $\quad$ $12\overline{)36}(3$

-144 $\quad$ -36

$\times$ $\quad$ $\times$

HCF = 12

3. (a)

59	59
	1

97	97
	1

$59 = 1 \times 59$

$97 = 1 \times 97$

HCF of 59 and 97 is 1.

So, these are co-primes.

(b)

5	385
7	77
11	11
	1

3	621
3	207
3	69
23	23
	1

$385 = 5 \times 7 \times 11$

$621 = 3 \times 3 \times 3 \times 23$

There is no common factor of 385 and 621.

So, these are co-primes.

(c)

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

3	945
3	315
3	105
5	35
7	7
	1

$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$945 = 3 \times 3 \times 3 \times 5 \times 7$

There is no common factor of 512 and 945.

So, these are co-primes.

(d)

7	161
23	23
	1

2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

$161 = 7 \times 23$

$192 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$

There is no common factor of 161 and 192.

So, these are co-primes.

(e)

7	343
7	49
7	7
	1

2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

$343 = 7 \times 7 \times 7$

$432 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

There is no common factor of 343 and 432.

So, these are co-primes.

(f)

7	847
11	121
11	11
	1

2	1014
3	507
13	169
13	13
	1

$847 = 7 \times 11 \times 11$

$1014 = 2 \times 3 \times 13 \times 13$

There is no common factor of 847 and 1014.

So, these are co-primes.

4. Clearly, we must find the greatest number which devides $(445-4)$, $(572-5)$ and $(699-6)$ exactly.

So, required number = HCF of 441, 567 and 693.

$$\begin{array}{r|l} 441\overline{)\,567\,(} & 1 \\ -441 & \\ \hline 126\overline{)\,441\,(} & 3 \\ -378 & \\ \hline 63\overline{)\,126\,(} & 2 \\ -126 & \\ \hline \times & \end{array} \qquad \begin{array}{r|l} 63\overline{)\,693\,(} & 11 \\ -63 & \\ \hline 63 & \\ -63 & \\ \hline \times & \end{array}$$

Hence, the required number = 63.

5. Clearly, we must find the greatest number which devides $(615-6)$ and $(963-6)$ exactly.

So, required number = HCF of 609 and 957.

$$\begin{array}{r|l} 609\overline{)\,957\,(} & 1 \\ -609 & \\ \hline 348\overline{)\,609\,(} & 1 \\ -348 & \\ \hline 261\overline{)\,348\,(} & 1 \\ -261 & \\ \hline 87\overline{)\,261\,(} & 3 \\ -261 & \\ \hline \times & \end{array}$$

Hence, required number = 87.

6. Clearly, we must find the greatest number which devides $(2011-9)$ and $(2623-5)$ exactly.

So, required number = HCF of 2002 and 2618.

$$\begin{array}{r|l} 2002\overline{)\,2618\,(} & 1 \\ -2002 & \\ \hline 616\overline{)\,2002\,(} & 3 \\ -1848 & \\ \hline 154\overline{)\,616\,(} & 4 \\ -616 & \\ \hline \times & \end{array}$$

Hence, required number = 154.

7. (a) $\frac{161}{207}$

For, reducing the given fraction to the lowest terms, we divide its numerator and the denominator by their HCF.

Now, we find the HCF of 161 and 207 as under.

$$
\begin{array}{r}
161\overline{)\,207\,(1} \\
-161 \\
\hline
46\overline{)\,161\,(3} \\
-138 \\
\hline
23\overline{)\,46\,(2} \\
-46 \\
\hline
\times
\end{array}
$$

Hence, HCF of 161 and 207 is 23.

Now, dividing the numerator and the denominator of the given fraction by 23, we get

$$\frac{161 \div 23}{207 \div 23} = \frac{7}{9}$$

(b) $\frac{296}{481}$

For, reducing the given fraction to the lowest terms, we divide its numerator and the denominator by their HCF.

Now, we find the HCF of 296 and 481 as under.

$$
\begin{array}{r}
296\overline{)\,481\,(1} \\
-296 \\
\hline
185\overline{)\,296\,(1} \\
-185 \\
\hline
111\overline{)\,185\,(1} \\
-111 \\
\hline
74\overline{)\,111\,(1} \\
-74 \\
\hline
37\overline{)\,74\,(2} \\
-74 \\
\hline
\times
\end{array}
$$

Hence, HCF of 296 and 481 is 37.

Now, dividing the numerator and the denominator of the given fraction by 37.

$$\frac{296 \div 37}{481 \div 37} = \frac{8}{13}$$

(c) $\frac{517}{799}$

For, reducing the given fraction to the lowest terms, we divide its numerator and the denominator by their HCF.

Now, we find the HCF of 517 and 799 as under.

$$
\begin{array}{r}
517\overline{)\,799\,(1} \\
-517 \\
\hline
282\overline{)\,517\,(1} \\
-282 \\
\hline
235\overline{)\,282\,(1} \\
-235 \\
\hline
47\overline{)\,235\,(5} \\
-235 \\
\hline
\times
\end{array}
$$

Hence, HCF of 517 and 799 is 47.

Now, dividing the numerator and the denominator of the given fraction by 47, we get

$$\frac{517 \div 47}{799 \div 47} = \frac{11}{17}$$

8. The capacity of the container which can measure the milk of given containers = HCF of 403 *l*, 434 *l* and 465 *l*.

First we find the HCF of 403 and 434.

$$
\begin{array}{r}
403\overline{)\,434\,(1} \\
-403 \\
\hline
31\overline{)\,403\,(13} \\
-31 \\
\hline
93 \\
-93 \\
\hline
\times
\end{array}
$$

Hence, HCF of 403 and 434 = 31.

Now, we find the HCF of 31 and 465.

$$
\begin{array}{r}
31\overline{)\,465\,(15} \\
-31 \\
\hline
155 \\
-155 \\
\hline
\times
\end{array}
$$

Hence, HCF of 31 and 465 = 31.

Thus, the HCF of 403, 434 and 465 = 31

Hence, the capacity of container = 31 *l*.

9. Least possible number of tiles = HCF of 18 m 72 cm and 13 m 20 cm.
18 m 72 cm = 18 × 100 cm + 72 cm = 1800 cm + 72 cm = 1872 cm
13 m 20 cm = 13 × 100 cm + 20 cm = 1300 cm + 20 cm = 1320 cm
Now, we find HCF of 1872 cm and 1320 cm.

$$
\begin{array}{l}
1320\overline{)\,1857}(1 \\
\quad -1320 \\
\hline
\quad 552\overline{)\,1320}(2 \\
\quad\quad -1104 \\
\hline
\quad\quad 216\overline{)\,552}(2 \\
\quad\quad\quad -432 \\
\hline
\quad\quad\quad 120\overline{)\,216}(1 \\
\quad\quad\quad\quad -120 \\
\hline
\quad\quad\quad\quad 96\overline{)\,120}(1 \\
\quad\quad\quad\quad\quad -96 \\
\hline
\quad\quad\quad\quad\quad 24\overline{)\,96}(4 \\
\quad\quad\quad\quad\quad\quad -96 \\
\hline
\quad\quad\quad\quad\quad\quad \times
\end{array}
$$

Hence, HCF of 1320 and 1872 = 24.

$$\text{Possible number of tiles} = \frac{\text{Area of rectangular courtyard}}{\text{Area of square covering maximum area}}$$

$$= \frac{1872 \times 1320}{24 \times 24} \text{ tiles} = 4290 \text{ tiles}$$

EXERCISE 2E

1. (a)

3 | 15
5 | 5
| 1

2 | 20
2 | 10
5 | 5
| 1

$15 = 3 \times 5$

$20 = 2 \times 2 \times 5 = 2^2 \times 5$

LCM $= 2^2 \times 3 \times 5 = 60$

(b)

2 | 18
3 | 9
3 | 3
| 1

2 | 30
3 | 15
5 | 5
| 1

$18 = 2 \times 3 \times 3 = 2 \times 3^2$

$30 = 2 \times 3 \times 5$

LCM $= 2 \times 3^2 \times 5 = 90$

(c)

7 | 7
| 1

2 | 14
7 | 7
| 1

2 | 28
2 | 14
7 | 7
| 1

$7 = 1 \times 7$

$14 = 2 \times 7$

$28 = 2 \times 2 \times 7 = 2^2 \times 7$

LCM $= 2^2 \times 7 = 28$

(d)

2 | 28
2 | 14
7 | 7
| 1

2 | 70
5 | 35
7 | 7
| 1

2 | 84
2 | 42
3 | 21
7 | 7
| 1

$28 = 2 \times 2 \times 7 = 2^2 \times 7$

$70 = 2 \times 5 \times 7$

$84 = 2 \times 2 \times 3 \times 7 = 2^2 \times 3 \times 7$

LCM $= 2^2 \times 3 \times 5 \times 7 = 420$

(e)

2 | 18	2 | 36	2 | 60	2 | 72
3 | 9	2 | 18	2 | 30	2 | 36
3 | 3	3 | 9	3 | 15	2 | 18
1	3 | 3	5 | 5	3 | 9
	1	1	3 | 3
			1

$18 = 2\times 3\times 3 = 2\times 3^2$

$36 = 2\times 2\times 3\times 3 = 2^2\times 3^2$

$60 = 2\times 2\times 3\times 5 = 2^2\times 3\times 5$

$72 = 2\times 2\times 2\times 3\times 3 = 2^3\times 3^2$

$\text{LCM} = 2^3\times 3^2\times 5 = 360$

(f)

2 | 20	5 | 25	2 | 30	2 | 50
2 | 10	5 | 5	3 | 15	5 | 25
5 | 5	1	5 | 5	5 | 5
1		1	1

$20 = 2\times 2\times 5 = 2^2\times 5$

$25 = 5\times 5 = 5^2$

$30 = 2\times 3\times 5$

$50 = 2\times 5\times 5 = 2\times 5^2$

$\text{LCM} = 2^2\times 3\times 5^2 = 300$

(g)

2 | 48	2 | 56	3 | 105	3 | 225
2 | 24	2 | 28	5 | 35	3 | 75
2 | 12	2 | 14	7 | 7	5 | 25
2 | 6	7 | 7	1	5 | 5
3 | 3	1		1
1			

$48 = 2\times 2\times 2\times 2\times 3 = 2^4\times 3$

$56 = 2\times 2\times 2\times 7 = 2^3\times 7$

$105 = 3\times 5\times 7$

$225 = 3\times 3\times 5\times 5 = 3^2\times 5^2$

$\text{LCM} = 2^4\times 3^2\times 5^2\times 7 = 25200$

(h)

2 | 8	2 | 12	2 | 20	2 | 30	2 | 80
2 | 4	2 | 6	2 | 10	3 | 15	2 | 40
2 | 2	3 | 3	5 | 5	5 | 5	2 | 20
1	1	1	1	2 | 10
				5 | 5
				1

$8 = 2\times 2\times 2 = 2^3$

$12 = 2\times 2\times 3 = 2^2\times 3$

$20 = 2\times 2\times 5 = 2^2\times 5$

$30 = 2\times 3\times 5$

$80 = 2\times 2\times 2\times 2\times 5 = 2^4\times 5$

$\text{LCM} = 2^4\times 3\times 5 = 240$

(i)

3 | 9	2 | 12	2 | 18	2 | 24	3 | 27
3 | 3	2 | 6	3 | 9	2 | 12	3 | 9
1	3 | 3	3 | 3	2 | 6	3 | 3
	1	1	3 | 3	1
			1	

$9 = 3\times 3 = 3^2$

$12 = 2\times 2\times 3 = 2^2\times 3$

$18 = 2 \times 3 \times 3 = 2 \times 3^2$

$24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3$

$27 = 3 \times 3 \times 3 = 3^3$

LCM $= 2^3 \times 3^3 = 216$

(j)

5	35
7	7
	1

3	105
5	35
7	7
	1

2	140
2	70
5	35
7	7
	1

2	280
2	140
2	70
5	35
7	7
	1

$35 = 5 \times 7$

$105 = 3 \times 5 \times 7$

$140 = 2 \times 2 \times 5 \times 7 = 2^2 \times 5 \times 7$

$280 = 2 \times 2 \times 2 \times 5 \times 7 = 2^3 \times 5 \times 7$

LCM $= 2^3 \times 3 \times 5 \times 7 = 840$

2. (a) Clearly,

HCF of 117 and 221 = 13

LCM of 117 and 221 = $13 \times 3 \times 3 \times 17$

$= 1989$

3	117, 221
3	39, 221
13	13, 221
17	1, 17
	1, 1

(b) Clearly,

HCF of 234 and 572 = 2×13

$= 26$

LCM of 234 and 572 = $2 \times 2 \times 3 \times 3 \times 11 \times 13$

$= 5148$

2	234, 572
2	117, 286
3	117, 143
3	39, 143
11	13, 143
13	13, 13
	1, 1

(c) Clearly,

HCF of 693 and 1078 = 7×11

$= 77$

LCM of 693 and 1078 = $2 \times 3 \times 3 \times 7 \times 7 \times 11$

$= 9702$

2	693, 1078
3	693, 539
3	231, 539
7	77, 539
7	11, 77
11	11, 11
	1, 1

(d) Clearly,

HCF of 145 and 232 = 29

LCM of 145 and 232 = $2 \times 2 \times 2 \times 5 \times 29$

$= 1160$

2	145, 232
2	145, 116
2	145, 58
5	145, 29
29	29, 29
	1, 1

3. (a) Product of numbers = $87 \times 145 = 12615$

Now, we find LCM and HCF of the given numbers,

HCF of 87 and 145 = 29

LCM of 87 and 145 = $3 \times 5 \times 29$

$= 435$

Now, HCF × LCM = 29×435

$= 12625$

= Product of numbers **Verified.**

3	87, 145
5	29, 145
29	29, 29
	1, 1

(b) Product of numbers = $186 \times 403 = 74958$

Now, we find HCF and LCM of given numbers,

HCF of 186 and 403 = 31

LCM of 186 and 403 = $2 \times 3 \times 13 \times 31$

$= 2418$

Now, HCF × LCM = 31×2418

$= 74958$

= Product of numbers **Verified.**

2	186, 403
3	93, 403
13	31, 403
31	31, 31
	1, 1

(c) Product of numbers = $490 \times 1155 = 565950$

Now, we find LCM and HCF of the given numbers,

HCF of 490 and 1155 = $5 \times 7 = 35$

LCM of 490 and 1155 = $2 \times 3 \times 5 \times 7 \times 7 \times 11$

$= 16170$

Now, HCF × LCM = 35×16170

$= 565950$

= Product of numbers

Verified.

2	490, 1155
3	245, 1155
5	245, 385
7	49, 77
7	7, 11
11	1, 11
	1, 1

4. HCF = 131

LCM = 8253

One number = 917

$$\text{Other number} = \frac{\text{HCF} \times \text{LCM}}{\text{One number}} = \frac{131 \times 8253}{917} = 1179$$

5. HCF = 145

LCM = 2175

One number = 725

$$\text{Other number} = \frac{\text{HCF} \times \text{LCM}}{\text{One number}}$$

$$= \frac{145 \times 2175}{725} = 435$$

6. Product of two numbers = 2160

Their HCF = 12

$$\text{LCM} = \frac{\text{Product of numbers}}{\text{HCF}} = \frac{2160}{12} = 180$$

7. Product of two numbers = 2560

Their HCF = 320

$$\text{HCF} = \frac{\text{Product of numbers}}{\text{LCM}} = \frac{2560}{320} = 8$$

8. First, we find the LCM of 25, 40 and 60.

LCM of 25, 40 and 60 = $2\times 2\times 2\times 3\times 5\times 5$

$= 600$

Hence, required number = $600 + 9$

$= 609$

2	25, 40, 60
2	25, 20, 30
2	25, 10, 15
3	25, 5, 15
5	25, 5, 5
5	5, 1, 1
	1, 1, 1

9. First, we find the LCM of 9, 12, 15, 18 and 24.

LCM of 9, 12, 15, 18 and 24

$= 2\times 2\times 2\times 3\times 3\times 5$

$= 360$

Hence, required number = 360

Greatest 5-digit number = 99999

Greatest 5-digit number divisible by 360

$= 99999 - 279$

$= 99720$

2	9, 12, 15, 18, 24
2	9, 6, 15, 9, 12
2	9, 3, 15, 9, 6
3	9, 3, 15, 9, 3
3	3, 1, 5, 3, 1
5	1, 1, 5, 1, 1
	1, 1, 1, 1, 1

$$\begin{array}{r|l} 360 & 99999 \;(277 \\ -720 & \\ \hline 2799 & \\ -2520 & \\ \hline 2799 & \\ -2520 & \\ \hline 279 & \end{array}$$

10. First, we find the LCM of 16, 18, 24 and 30.

LCM of 16, 18, 24 and 30

$= 2\times 2\times 2\times 2\times 3\times 3\times 5$

$= 720$

Now, smallest 5-digit number = 10000

2	16, 18, 24, 30
2	8, 9, 12, 15
2	4, 9, 6, 15
2	2, 9, 3, 15
3	1, 9, 3, 15
3	1, 3, 1, 5
5	1, 1, 1, 5
	1, 1, 1, 1

$$
\begin{array}{r|l}
720 & 10000 \\
 & -720 \\
\hline
 & 2800 \\
 & -2160 \\
\hline
 & 640
\end{array}
\quad 13
$$

So, the required number $= 720 \times (13 + 1)$

$= 720 \times 14$

$= 10080$

11. Length of first rod = 45 cm
Length of second rod = 50 cm
Length of third rod = 75 cm
Least length of rope = LCM of 45 cm, 50 cm and 75 cm.
We find the LCM of 45, 50 and 75 as under.

2	45, 50, 75
3	45, 25, 75
3	15, 25, 25
5	5, 25, 25
5	1, 5, 5
	1, 1, 1

LCM of 45, 50 and 75 $= 2 \times 3 \times 3 \times 5 \times 5$

$= 450$

Hence, the least least length of rope = 450 cm or 4 m 50 cm

12. First we will find LCM of 9, 12 and 15.

2	9, 12, 15
2	9, 6, 15
3	9, 3, 15
3	3, 1, 5
5	1, 1, 5
	1, 1, 1

LCM of 9, 12 and 15 $= 2 \times 2 \times 3 \times 3 \times 5$

$= 180$

Hence, the bells will start tolling together after 180 minutes or 3 hours.

13. First we find LCM of 48, 72 and 108.

2	48, 72, 108
2	24, 36, 54
2	12, 18, 27
2	6, 9, 27
3	3, 9, 27
3	1, 3, 9
3	1, 1, 3
	1, 1, 1

LCM of 48, 72 and 108 $= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$= 432$

$$432 \text{ seconds} = \frac{432}{60} \text{ minutes}$$

$= 7$ minutes 12 seconds

Hence, the traffic lights will start changing simultaneously after 7 minutes and 12 seconds.

EXERCISE 2F

1. (c) **2.** (d) **3.** (a) **4.** (b)
5. (a) **6.** (c) **7.** (c) **8.** (d)
9. (c) **10.** (b) **11.** (c)

12. $144\overline{)198}\,(1$
-144
$54\overline{)144}\,(2$
-108
$36\overline{)54}\,(1$
-36
$18\overline{)36}\,(2$
-36
$\times$

HCF = 18

(c) is correct.

13. $48\overline{)96}\,(2$
-96
$\times$

(b) is correct.

14. $289\overline{)391}\,(1$
-289
$102\overline{)289}\,(2$
-204
$85\overline{)102}\,(1$
-85
$17\overline{)85}\,(5$
-85
$\times$

HCF = 17

$\frac{289 \div 17}{391 \div 17} = \frac{17}{23}$

(d) is correct.

15. LCM of 24, 36, 40
$= 2 \times 2 \times 2 \times 3 \times 3 \times 5$
$= 360$

2	24, 36, 40
2	12, 18, 20
2	6, 9, 10
3	3, 9, 5
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

(c) is correct.

16. LCM of 12, 15, 20 and 27
$= 2 \times 2 \times 3 \times 3 \times 3 \times 5$
$= 540$

2	12, 15, 20, 27
	6, 15, 10, 27
	3, 15, 5, 27
	1, 5, 5, 9
	1, 5, 5, 3
	1, 5, 5, 1
	1, 1, 1, 1

(d) is correct.

17. Required number will be the HCF of $(134 - 2)$ and $(167 - 2)$

$132\overline{)165}\,(1$
-132
$33\overline{)132}\,(4$
-132
$\times$

HCF = 33

(d) is correct.

18. LCM of 15, 20, 24, 32 and 36
$= 2\times 2\times 2\times 2\times 2\times 3\times 3\times 5$
$= 1440$
(c) is correct.

2	15, 20, 24, 32, 36
2	15, 10, 12, 16, 18
2	15, 5, 6, 8, 9
2	15, 5, 3, 4, 9
2	15, 5, 3, 2, 9
3	15, 5, 3, 1, 9
3	5, 5, 1, 1, 3
5	5, 5, 1, 1, 1
	1, 1, 1, 1, 1

19. $\text{LCM} = \dfrac{\text{Product of numbers}}{\text{HCF}} = \dfrac{2160}{12} = 180$
(c) is correct.

20. $\text{Other number} = \dfrac{\text{HCF}\times\text{LCM}}{\text{One number}} = \dfrac{145\times 2175}{725} = 435$
(b) is correct.

HOTS

- LCM of 2 and 3 = 6
  LCM of 3 and 4 = 12
  Product of both LCMs = 6 × 12
  = 72
  Number = 72 – 68 = 4
  Hence, the required number is 4.

2	2, 3
3	1, 3
	1, 1

LCM = 2 × 3
= 6

2	3, 4
2	3, 2
3	3, 1
	1, 1

LCM = 2 × 2 × 3
= 12

VALUE BASED

- HCF of 228 and 285 = 57
  Number of apples in each box = 228 ÷ 57
  = 4
  Number of oranges in each box = 285 ÷ 57
  = 5

```
228)285(1
  -228
  ----
   57)228(4
     -228
     ----
      ×
```

Hence, 57 boxes are required and each box contained 4 apples and 5 oranges.

Chapter 3 Whole Numbers

EXERCISE 3A

1. The successor of 20999 = 20999 + 1 = 21000
Successor of 21000 = 21000 + 1 = 21001
Successor of 21001 = 21001 + 2 = 21002
Hence, next three whole numbers after 20999 are 21000, 21001, 21002.

2. The predecessor of 550001 = 550001 − 1 = 550000
Predecessor of 550000 = 550000 − 1 = 549999
Predecessor of 549999 = 549999 − 1 = 549998

3. Number of whole numbers between 1005 and 7512 = 7512 − 1005 − 1
= 6506

4. Smallest whole number = 0

5. (a) Successor of 2099 = 2099 + 1 = 2100
(b) Successor of 32000 = 32000 + 1 = 32001
(c) Successor of 91469 = 91469 + 1 = 91470
(d) Successor of 504351 = 504351 + 1 = 504352
(e) Successor of 253524 = 253524 + 1 = 253525
(f) Successor of 100000 = 100000 + 1 = 100001
(g) Successor of 2481999 = 2481999 + 1 = 2482000
(h) Successor of 8989899 = 8989899 + 1 = 8989900

6. (a) Predecessor of 111 = 111 − 1 = 110
(b) Predecessor of 19900 = 19900 − 1 = 19899
(c) Predecessor of 20099 = 20099 − 1 = 20098
(d) Predecessor of 320000 = 320000 − 1 = 319999
(e) Predecessor of 91469 = 91469 − 1 = 91468
(f) Predecessor of 504351 = 504351 − 1 = 504350
(g) Predecessor of 235324 = 235324 − 1 = 235323
(h) Predecessor of 1000000 = 1000000 − 1 = 999999

7. The precedessor of 7510001 = 7510001 − 1 = 7510000
precedessor of 7510000 = 7510000 − 1 = 7509999
precedessor of 7509999 = 7509999 − 1 = 7509998

8. (a) F (b) T (c) F (d) T
(e) F (f) T (g) F (h) T
(i) F (j) F (k) F (l) T

EXERCISE 3B

1. (a) 263 + 567 = 567 + **263** (b) 468 + 6002 = 6002 + **468**
(c) 4691 + **489** = 489 + 4691 (d) 6047 + 0 = **6047**
(e) 35105 + (475 + 997) = 475 + (35105 + **997**)

2. (a) 16509 + 491 = 17000
491 + 16509 = 17000
16509 + 491 = 491 + 16509
(b) 2359 + 641 = 3000
641 + 2359 = 3000
2359 + 641 = 641 + 2359

(c) $19753 + 3647 = 23400$

$3647 + 19753 = 23400$

$19753 + 3647 = 3647 + 19753$

3. $(2657 + 387) + 2478 = 3044 + 2478 = 5522$

$2657 + (387 + 2478) = 2657 + 2865 = 5522$

Yes, these two sums are equal.

Property name → Associative property of addition.

4. (a) $953 + 707 + 647 = (953 + 707) + 647$

$= 1660 + 647$

$= 2307$

(b) $1983 + 647 + 217 + 353 = (1983 + 217) + (647 + 353)$

$= 2200 + 1000$

$= 3200$

(c) $3259 + 10001 + 2641 + 9999 = (3259 + 2641) + (10001 + 9999)$

$= 5900 + 20000$

$= 25900$

(d) $15409 + 278 + 691 + 422 = (15409 + 691) + (278 + 422)$

$= 16100 + 700$

$= 16800$

(e) $2 + 3 + 4 + 5 + 45 + 46 + 47 + 48$

$= (2 + 48) + (3 + 47) + (4 + 46) + (5 + 45)$

$= 50 + 50 + 50 + 50$

$= 200$

(f) $1 + 2 + 3 + 4 + 96 + 97 + 98 + 99$

$= (1 + 99) + (2 + 98) + (3 + 97) + (4 + 96)$

$= 100 + 100 + 100 + 100$

$= 400$

5. (a) $10578 + 99999$

$= 10578 + (100000 - 1)$

$= (10578 + 100000) - 1$

$= 110578 - 1$

$= 110577$

(b) $6784 + 9999$

$= 6784 + (10000 - 1)$

$= (6784 + 10000) - 1$

$= 16784 - 1$

$= 16783$

6. For any whole numbers a, b and c,

$(a + b) + c = a + (b + c)$ is true by the associative and commutative law's of addition of whole numbers.

7. (a) From the magic square,

8	A	6
B	5	C
D	E	2

$\longrightarrow$

8	1	6
3	5	7
4	9	2

Sum of digits placed at diagonal
$= 8 + 5 + 2$
$= 15$

$A = 15 - (8 + 6) = 15 - 14 = 1$
$E = 15 - (A + 5) = 15 - (1 + 5) = 15 - 6 = 9$
$D = 15 - (E + 2) = 15 - (9 + 2) = 15 - 11 = 4$
$B = 15 - (8 + D) = 15 - (8 + 4) = 15 - 12 = 3$
$C = 15 - (6 + 2) = 15 - 8 = 7$

(b) From the magic square,

10	5	12
C	A	7
D	13	B

$\longrightarrow$

10	5	12
11	9	7
6	13	8

Sum of the digits placed placed in first horizontal row $= 10 + 5 + 12$
$= 27$

$A = 27 - (5 + 13) = 27 - 18 = 9$
$B = 27 - (12 + 7) = 27 - 19 = 8$
$C = 27 - (A + 7) = 27 - (9 + 7) = 27 - 16 = 11$
$D = 27 - (13 + B) = 27 - (13 + 8) = 27 - 21 = 6$

(c) Sum of the digits placed at diagonal $= 4 + 14 + 9 + 19$
$= 46$
$A = 46 - (18 + 17 + 4)$
$= 46 - 39 = 7$

A	18	17	4
F	G	14	11
D	9	10	B
19	E	C	16

$\longrightarrow$

7	18	17	4
8	13	14	11
12	9	10	15
19	6	5	16

$B = 46 - (4 + 11 + 16) = 46 - 31 = 15$
$C = 46 - (17 + 14 + 10) = 46 - 41 = 5$
$D = 46 - (9 + 10 + B) = 46 - (19 + 15) = 46 - 34 = 12$
$E = 46 - (19 + C + 16) = 46 - (35 + 5) = 46 - 40 = 6$
$F = 46 - (A + D + 19) = 46 - (7 + 12 + 19) = 46 - 38 = 8$
$G = 46 - (F + 14 + 11) = 46 - (8 + 25) = 46 - 33 = 13$

(d) Sum of the digits placed at diagonal $= 2 + 12 + 7 + 17$
$= 38$
$A = 38 - (2 + 15 + 16)$
$= 38 - 33 = 5$
$B = 38 - (2 + 9 + 14)$
$= 38 - 25 = 13$

2	15	16	A
9	12	D	C
B	E	7	10
14	F	G	17

$\longrightarrow$

2	15	16	5
9	12	11	6
13	8	7	10
14	3	4	17

$C = 38 - (A + 10 + 17) = 38 - (5 + 27) = 38 - 32 = 5$
$D = 38 - (9 + 12 + C) = 38 - (21 + 6) = 38 - 27 = 11$

$E = 38 - (B + 7 + 10) = 38 - (13 + 17) = 38 - 30 = 8$

$F = 38 - (15 + 12 + E) = 38 - (27 + 8) = 38 - 35 = 3$

$G = 38 - (16 + D + 7) = 38 - (23 + 11) = 38 - 34 = 4$

8. (a) T (b) F (c) T

EXERCISE 3C

1. Note, here we will use

Difference + Subtrahend = Minuend to check the result is correct.

(a) $57839 - 2983 = 54856$

Checking :

$54856 + 2983 = 57839$

(b) $6237 - 694 = 5543$

Checking :

$5543 + 694 = 6237$

(c) $21205 - 10899 = 10306$

Checking :

$10306 + 10899 = 21205$

(d) $400000 - 98798 = 301202$

Checking :

$301202 + 98798 = 400000$

2. (a)
$$\begin{array}{r} 5813 \\ -\ 1562 \\ \hline 4251 \end{array}$$

(b)
$$\begin{array}{r} 3942 \\ -\ 2575 \\ \hline 1367 \end{array}$$

(c)
$$\begin{array}{r} 1000000 \\ -\ 29571 \\ \hline 970429 \end{array}$$

(d)
$$\begin{array}{r} 5001003 \\ -\ 156987 \\ \hline 4844016 \end{array}$$

3. (a) $573 - 9 = 573 - (10 - 1) = 573 - 10 + 1 = 563 + 1 = 564$

(b) $6742 - 99 = 6742 - (100 - 1) = 6742 - 100 + 1 = 6642 + 1 = 6643$

(c) $9750 - 999 = 9750 - (1000 - 1) = 9750 - 1000 + 1 = 8750 + 1 = 8751$

(d) $24006 - 9999 = 24006 - (10000 - 1) = 24006 - 10000 + 1$

$= 14006 + 1 = 14007$

4. Smallest 7-digit number = 1000000

Largest 4-digit number = 9999

Difference = $1000000 - 9999$

$= 990001$

5. (a) $n + 4 = 9$

Here, n is subtrahend.

So, Subtrahend = Minuend − Difference

$n = 9 - 4$

$n = 5$

(b) $n - 18 = 39$

Here, n is minuend.

So, Minuend = Difference + Subtrahend

$n = 39 + 18$

$n = 57$

(c) $n + 35 = 101$

Here, n is subtrahend.

So, Subtrahend = Minuend − Difference

$= 101 - 35$

$= 66$

(d) $n - 20568 = 21403$

Here, n is minuend.

So, Minuend = Difference + Subtrahend

$= 21403 + 20568$

$= 41971$

6. Amount of money in account = ` 136000

Amount of money withdrew = ` 73129

Money was left in account = ` 136000 − ` 73129

= ` 62871

Hence, ` 62871 was left in account of Mohan.

7. Total amount of money = ` 100000

Cost of TV set = ` 38750

Cost of refrigerator = ` 23890

Cost of jewellery = ` 35560

So, Mrs Sharma spent money = ` 38750 + ` 23890 + ` 35560

= ` 98200

Amount of money was left with her = ` 100000 − ` 98200

= ` 1800

Hence, ` 1800 was left with Mrs Sharma.

8. Total population of the town = 110500

New births = 3608

Number of persons died = 8973

Population at the end of year = 110500 + 3608 − 8973

= 114108 − 8973

= 105135

Hence, the population of town at the end of the year was 105135.

EXERCISE 3D

1. (a) $1369 \times 0 = 0$ (b) $246 \times 1 = 246$

(c) $286 \times 753 = 753 \times 286$ (d) $593 \times 188 = 188 \times 593$

(e) $13 \times 100 \times 1000 = 1300000$ (f) $38 \times (91 \times 37) = 91 \times (38 \times 37)$

(g) $68 \times 95 = 68 \times 100 - 68 \times 5$ (h) $59 \times 66 + 59 \times 34 = 59 \times (66 + 34)$

2. (a) Multiplicative property of zero
(b) Multiplicative identity
(c) Closure property for multiplication
(d) Commutative property for multiplication
(e) Associative property for multiplication
(f) Distributive property for multiplication over subtraction.

3. (a) $647\times13+647\times7$
$=647(13+7)$ (by distributive law over addition)
$=647\times20$
$=12940$

(b) $7459\times999+7459$
$=7459(999+1)$ (by distributive law over addition)
$=7459\times1000$
$=7459000$

(c) $569\times17+569\times13+569\times70$
$=569(17+13+70)$ (by distributive law over addition)
$=569\times100$
$=56900$

(d) $8759\times94+8759\times6$
$=8759(94+6)$ (by distributive law over addition)
$=8759\times100$
$=875900$

(e) $16825\times16825-16825\times6825$
$=16825(16825-6825)$
(by distributive law over subtraction)
$=16825\times10000$
$=168250000$

(f) $9870\times561-9870\times461$
$=9870(561-461)$ (by distributive law over subtraction)
$=9870\times100$
$=987000$

4. (a) $4\times927\times25=927\times(4\times25)$
$=927\times100$
$=92700$

(b) $2\times1658\times50=1658\times(2\times50)$
$=1658\times100$
$=165800$

(c) $574\times625\times16$
$=574\times(625\times16)$
$=574\times10000$
$=5740000$

(d) $250\times60\times50\times8$
$=(250\times8)\times(60\times50)$
$=2000\times3000$
$=6000000$

(e) $8\times125\times40\times25$
$=(8\times125)\times(40\times25)$
$=1000\times1000$
$=1000000$

(f) $625\times20\times8\times50$
$=(625\times8)\times(20\times50)$
$=5000\times1000$
$=5000000$

5. (a) $580\times64=(600-20)\times64$
$=600\times64-20\times64$
$=600(60+4)-20\times(60+4)$
$=600\times60+600\times4-20\times60-20\times4$
$=36000+2400-1200-80$
$=38400-1280$
$=37120$

(b) $947\times96=(950-3)\times96$
$=950\times96-3\times96$
$=950\times(100-4)-3\times(100-4)$
$=950\times100-950\times4-3\times100+3\times4$
$=95000-3800-300+12$
$=95012-4100$
$=90912$

(c) $740\times105=740\times(100+5)$
$=740\times100+740\times5$
$=74000+3700$
$=77700$

(d) $439\times997=439\times(1000-3)$
$=439\times1000-439\times3$
$=(440-1)\times1000-(440-1)\times3$
$=440\times1000-1\times1000-440\times3+1\times3$
$=440000-1000-1320+3$
$=440003-2320$
$=437683$

(e) $996\times367=(1000-4)\times367$
$=1000\times367-4\times367$
$=367000-4(370-3)$
$=367000-4\times370+4\times3$
$=367000-1480+12$
$=367012-1480$
$=365532$

(f) $1553 \times 198 = 1553 \times (200 - 2)$

$= 1553 \times 200 - 1553 \times 2$

$= (1550 + 3) \times 200 - (1550 + 3) \times 2$

$= 1550 \times 200 + 3 \times 200 - 1550 \times 2 - 3 \times 2$

$= 310000 + 600 - 3100 - 6$

$= 310600 - 3106$

$= 307494$

(g) $472 \times 1097 = 472 \times (1100 - 3)$

$= 472 \times 1100 - 472 \times 3$

$= (480 - 8) \times 1100 - (480 - 8) \times 3$

$= 480 \times 1100 - 8 \times 1100 - 480 \times 3 + 8 \times 3$

$= 528000 - 8800 - 1440 + 24$

$= 528024 - 10240$

$= 517784$

(h) $245 \times 1008 = 245 \times (1000 + 8)$

$= 245 \times 1000 + 245 \times 8$

$= 245000 + (250 - 5) \times 8$

$= 245000 + 250 \times 8 - 5 \times 8$

$= 245000 + 2000 - 40$

$= 247000 - 40$

$= 246960$

6. (a) 3576×9

$= 3576 \times (10 - 1)$

$= 3576 \times 10 - 3576 \times 1$

(using distributive law)

$= 35760 - 3576$

$= 32184$

(b) 847×99

$= 847 \times (100 - 1)$

$= 847 \times 100 - 847 \times 1$

(using distributive law)

$= 84700 - 847$

$= 83853$

(c) $2437 \times 999 = 2437 \times (1000 - 1)$

$= 2437 \times 1000 - 2437 \times 1$ (using distributive law)

$= 2437000 - 2437$

$= 2434563$

7. (a)

3709	
× 89	
33381	multiplication by 9
296720	multiplication by 80
330101	multiplication by 89

(b)

458	
× 67	
3206	multiplication by 7
27480	multiplication by 6
30686	multiplication by 67

(c)
$$\begin{array}{r} 15208 \\ \times 542 \\ \hline 30416 \\ 608320 \\ 7604000 \\ \hline 8242736 \end{array}$$
multiplication by 2
multiplication by 40
multiplication by 500
multiplication by 542

(d)
$$\begin{array}{r} 4617 \\ \times 234 \\ \hline 18468 \\ 138510 \\ 923400 \\ \hline 1080378 \end{array}$$
multiplication by 4
multiplication by 30
multiplication by 200
multiplication by 234

8. If the product of two whole numbers is 0, it means at least one of the given numbers is 0.

9. Total number of houses = 197

Cost of construction of 1 house = ` 4,50,000

$$\begin{aligned} \text{Total cost} &= ` (450000 \times 197) \\ &= ` \{450000 \times (200 - 3)\} \\ &= ` \{450000 \times 200 - 450000 \times 3\} \\ &= ` 90000000 - 1350000 \\ &= ` 88650000 \end{aligned}$$

Hence, the cost of 197 houses is ` 88650000.

10. Distance covered in 1 hour = 75 km

$$\begin{aligned} \text{Distance covered in 98 hours} &= (75 \times 98)\,\text{km} \\ &= \{75 \times (100 - 2)\}\,\text{km} \\ &= \{75 \times 100 - 75 \times 2\}\,\text{km} \\ &= (7500 - 150)\,\text{km} \\ &= 7350\,\text{km} \end{aligned}$$

Hence, truck will cover 7350 km in 98 hours.

11. Total number of TVs = 150

Cost of 1 TV set = ` 24350

$$\begin{aligned} \text{Cost of 150 TVs} &= ` (24350 \times 150) \\ &= ` \{24350 \times (100 + 50)\} \\ &= ` \{24350 \times 100 + 24350 \times 50\} \\ &= ` 2435000 + 1217500 \\ &= ` 3652500 \end{aligned}$$

Hence, cost of all the sets of TVs will be ` 3652500.

12. (a) Given, $a \times a = a$ (where $a \neq 0$)

$a^2 = a$

Dividing both sides by a

$a = 1$

Hence, for $a = 1$, $a \times a = a$ will be true.

(b) even (c) odd

EXERCISE 3E

1. (a) Dividend = 1968

Divisor = 16

So, Quotient = 123

Checking :

Quotient × Divisor = 123 × 16

= 1968

= Dividend

$$\begin{array}{r} 123 \\ 16\overline{)\,1968} \\ -16 \\ \hline 36 \\ -32 \\ \hline 48 \\ -48 \\ \hline \times \end{array}$$

(b) Dividend = 11844

Divisor = 12

So, Quotient = 987

Checking :

Quotient × Divisor = 987 × 12

= 11844

= Dividend

$$\begin{array}{r} 987 \\ 12\overline{)\,11844} \\ -108 \\ \hline 104 \\ -96 \\ \hline 84 \\ -84 \\ \hline \times \end{array}$$

(c) Dividend = 1875

Divisor = 25

So, Quotient = 75

Checking :

Quotient × Divisor = 75 × 25

= 1875

= Dividend

$$\begin{array}{r} 75 \\ 25\overline{)\,1875} \\ -175 \\ \hline 125 \\ -125 \\ \hline \times \end{array}$$

(d) Dividend = 20864

Divisor = 32

So, Quotient = 652

Checking :

Quotient × Divisor = 652 × 32

= 20864

= Dividend

$$\begin{array}{r} 652 \\ 32\overline{)\,20864} \\ -192 \\ \hline 166 \\ -160 \\ \hline 64 \\ -64 \\ \hline \times \end{array}$$

(e) Dividend = 34419
Divisor = 149
So, Quotient = 231
Checking :
Quotient × Divisor = 231 × 149
= 34419
= Dividend

```
      231
149 ) 34419
     -298
      461
     -447
      149
     -149
      ×
```

(f) Dividend = 39039
Divisor = 1001
So, Quotient = 39
Checking :
Quotient × Divisor = 39 × 1001
= 39039
= Dividend

```
       39
1001 ) 39039
      -3003
       9009
      -9009
       ×
```

2. (a) Dividend = 42897
Divisor = 34
So, Quotient = 1261
Remainder = 23
Checking :
Quotient × Divisor + Remainder
= 1261 × 34 + 23
= 42874 + 23
= 42897
= Dividend

```
      1261
34 ) 42897
     -34
      88
     -68
      209
     -204
       57
      -34
       23
```

(b) Dividend = 57284
Divisor = 53
So, Quotient = 1080
Remainder = 44
Checking :
Quotient × Divisor + Remainder
= 1080 × 53 + 44
= 57240 + 44
= 57284
= Dividend

```
      1080
53 ) 57284
     -53
      428
     -424
       44
```

(c) Dividend = 190245
Divisor = 67
So, Quotient = 2839
Remainder = 32

Checking :

Quotient × Divisor + Remainder
= 2839 × 67 + 32
= 190213 + 32
= 190245 = Dividend

```
      2839
67 ) 190245
    -134
     562
    -536
     264
    -201
      635
     -603
       32
```

(d) Dividend = 281963
Divisor = 85
So, Quotient = 3317
Remainder = 18

Checking :

Quotient × Divisor + Remainder
= 3317 × 85 + 18
= 281945 + 18
= 281963
= Dividend

```
      3317
85 ) 281963
    -255
     269
    -255
      146
      -85
       613
      -595
        18
```

(e) Dividend = 23025
Divisor = 1000
So, Quotient = 23
Remainder = 25

Checking :

Quotient × Divisor + Remainder
= 23 × 1000 + 25
= 23000 + 25
= 23025 = Dividend

```
       23
1000 ) 23025
     -2000
      3025
     -3000
        25
```

(f) Dividend = 5737479
Divisor = 68
So, Quotient = 84374
Remainder = 47

Checking :

Quotient × Divisor + Remainder
= 84374 × 68 + 47
= 5737432 + 47
= 5737479 = Dividend

```
      84374
68 ) 5737479
    -544
     297
    -272
     254
    -204
      507
     -476
       319
      -272
        47
```

3. (a) $5217 \div 1 = 5217$ (b) $0 \div 89 = 0$

(c) $6250 \div 10 = 625$ (d) $23 \div 0 =$ Meaning less

(e) $240 \div 8 = 30$ (f) $2700 \div 9 = 300$

4. Smallest 6-digit number = 100000

Here, $83 \times 1204 = 99932$

and $83 \times 1205 = 100015$

Hence, 100015 is least 6-digit number exactly divisible by 83.

$$
\begin{array}{r}
1204 \\
83\overline{)100000} \\
-83 \\
\hline
170 \\
-166 \\
\hline
400 \\
-332 \\
\hline
68
\end{array}
$$

5. Largest 5-digit number = 99999

Here, $99999 - 90 = 99909$ will be exactly divisible by 653.

Checking :

(Quotient × Divisor) + Remainder

$= (153 \times 653) + 90$

$= 99909 + 90$

$= 99999$

$=$ Dividend

$$
\begin{array}{r}
153 \\
653\overline{)99999} \\
-653 \\
\hline
3469 \\
-3265 \\
\hline
2049 \\
-1959 \\
\hline
90
\end{array}
$$

6. Largest 4-digit number = 9999

Here, $9999 - 9 = 9990$ will be the largest 4-digit number exactly divisible by 15.

$$
\begin{array}{r}
666 \\
15\overline{)9999} \\
-90 \\
\hline
99 \\
-90 \\
\hline
99 \\
-90 \\
\hline
9
\end{array}
$$

7. Given, $n \div n = n$

$$\frac{n}{n} = n$$

$$1 = n$$

or $n = 1$

Hence, for $n = 1$, $n \div n = n$ will be true.

8. Product of two numbers = 504347

One number = 317

One number × other number = 504347

317 × other number = 504347

$$\text{other number} = \frac{504347}{317} = 1591$$

Hence, the other number is 1591.

9. Dividend = 59761

Quotient = 189

Remainder = 37

Dividend = Quotient × Divisor + Remainder

$59761 = 189 \times \text{Divisor} + 37$

$189 \times \text{Divisor} = 59761 - 37$

$189 \times \text{Divisor} = 59724$

$\text{Divisor} = 59724 \div 189 = 316$

```
      316
189 ) 59724
     -567
     ----
      302
     -189
     ----
      1134
     -1134
     -----
       ×
```

10. Dividend = 55390

Divisor = 299

Remainder = 75

By division algorithm we have

Dividend = (Divisor × Quotient) + Remainder

$55390 = (299 \times \text{Quotient}) + 75$

$55390 - 75 = 299 \times \text{Quotient}$

$\text{Quotient} = 55315 \div 299$

$= 185$

Hence, the quotient is 185.

```
      185
299 ) 55315
     -299
     ----
      2541
     -2392
     -----
      1495
     -1495
     -----
       ×
```

11.

```
      156
87 ) 13601
     -87
     ---
      490
     -435
     ----
      551
     -522
     ----
       29
```

Remainder = 29

Hence, 29 should be subtracted from 13601 to make it exactly divisible by 87.

12. Here, $23 \times 45 = 1035$

$23 \times 46 = 1058$

$1035 < 1056 < 1058$

Hence $1058 - 1056 = 2$ should be added to 1056 to make it exactly divisible by 23.

```
      45
23 ) 1056
     -92
     ---
      136
     -115
     ----
       21
```

13. Cost of 23 colour television sets = ` 570055
Cost of 1 colour television set = ` (570055 ÷ 23)
= ` 24785
Hence, the cost of each TV set is ` 24785.

```
    24785
23)570055
  -46
   110
   -92
    180
   -161
     195
    -184
      115
     -115
       0
```

14. If cost is ` 29, then number of bananas = 1 dozen
If cost is ` 1392, then number of bananas = 1392 ÷ 29 dozen
= 48 dozen
Hence, 48 dozen bananas can be purchased for ` 1392.

```
    48
29)1392
  -116
    232
   -232
     ×
```

15. Total number of tree = 19625
Number of rows = 157
Number of trees in each row = 19625 ÷ 157 trees
= 125 trees
Hence, 125 trees are there in each row.

```
    125
157)19625
  -157
    392
   -314
     785
    -785
      ×
```

EXERCISE 3F

1. (c) **2.** (b) **3.** (b) **4.** (b)
5. (a) **6.** (b)

7. Smallest 4-digit number = 1000
Here, 1000 − 1 = 999 is exactly divisible by 9.
Hence, 9 × (111 + 1) = 9 × 112 = 1008
1008 is least 4-digit number exactly divisible by 9.
(d) is correct.

```
   111
9)1000
  -9
   10
  -9
    10
   -9
     1
```

8. Here, $23 \times 437 = 10051$

and $23 \times 438 = 10074$

We have, $10051 < 10056 < 10074$

Hence, $10074 - 10056 = 18$ will be added to 10056 to make it exactly divisible by 23.

(b) is correct.

$$\begin{array}{r} 437 \\ 23\overline{)10056} \\ -92 \\ \hline 85 \\ -69 \\ \hline 166 \\ -161 \\ \hline 5 \end{array}$$

9. Required whole numbers $= 1203 - 1018 - 1 = 184$

(c) is correct.

10. Divisor $= 46$

Quotient $= 11$

Remainder $= 15$

Required number will be dividend.

$$\text{Dividend} = \text{Quotient} \times \text{Divisor} + \text{Remainder}$$
$$= 11 \times 46 + 15$$
$$= 506 + 15 = 521$$

(b) is correct.

11. $\text{Divisor} = \dfrac{\text{Dividend} - \text{Remainder}}{\text{Quotient}}$

Dividend $= 199$

Quotient $= 16$

Remainder $= 7$

$\text{Divisor} = \dfrac{199 - 7}{16} = \dfrac{192}{16} = 12$

(c) is correct.

12. Let the required number be A.

$$7589 - A = 3434$$
$$A = 7589 - 3434$$
$$A = 4155$$

(c) is correct.

13. $587 \times 99 = 587 \times (100 - 1) = 587 \times 100 - 587$

$= 58700 - 587 = 58113$

(c) is correct.

14. $4 \times 538 \times 25 = (4 \times 25) \times 538$

$= 100 \times 538 = 53800$

(c) is correct.

15. $24679 \times 92 + 24679 \times 8 = 24679(92 + 8)$

$= 24679 \times 100$

$= 2467900$

(c) is correct.

HOTS

- Rekha's off is every 4th day
  Kamal's off is every 3rd day
  Next off of both is 4×3 = 12th day
  = 4th June + 12 days
  = 16th June
  Hence, they have a next day off together is 16th June.

VALUE BASED

- The monthly earning of Mr. Verma = ` 28,800
  Monthly saving = ` 4,800
  He save in one year = 12 × ` 4,800 (∵ 1 year = 12 months)
  = ` 57,600
  He donates per month = ` 1500
  He donates in one year = 12 × ` 1500
  = ` 18,000

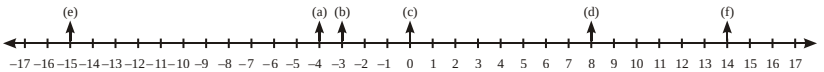
Chapter 4 Integers

EXERCISE 4A

1. (a) A decrease of 6 (b) A gain of ` 8
(c) Losing a weight of 7 kg (d) 15 km below sea level
(e) 4°C above freezing point (f) A withdrawal of ` 500
(g) Spending ` 800 (h) Going 10 m to the west
(i) −52 (j) 43

2. (a) + ` 700 (b) − ` 900 (c) −9°C (d) −8
(e) +5 km (f) −6 km (g) + ` 400 (h) − ` 200

3.



4. (a) 0 (b) −2 (c) 3 (d) 7
(e) −415 (f) 9

5. (a) -6 (b) -2 (c) -28 (d) -25

(e) -785 (f) -666

6. (a) Integers between -5 and $0 = -4, -3, -2, -1$

(b) Integers between 0 and $6 = 1, 2, 3, 4, 5$

(c) Integers between -7 and $-5 = -6$

(d) Integers between -3 and $3 = -2, -1, 0, 1, 2$

7. (a) $0 \boxed{<} 6$ (b) $0 \boxed{>} -5$ (c) $-4 \boxed{<} -1$ (d) $11 \boxed{>} -25$

(e) $-325 \boxed{<} -139$ (f) $-5 \boxed{<} 5$

8. (a) $-100 < -23 < -6 < -1 < 0 < 12$

Increasing order $= -100, -23, -6, -1, 0, 12$

(b) $-501 < -363 < -17 < 15 < 165$

Increasing order $= -501, -363, -17, 15, 165$

(c) $-106 < -81 < -16 < -2 < 0 < 16 < 21$

Increasing order $= -106, -81, -16, -2, 0, 16, 21$

(d) $-7 < -2 < 0 < 5 < 8$

Increasing order $= -7, -2, 0, 5, 8$

9. (a) $36 > 0 > -5 > -71 > -81$

Decreasing order $= 36, 0, -5, -71, -81$

(b) $36 > 7 > 0 > -3 > -9 > -132$

Decreasing order $= 36, 7, 0, -3, -9, -132$

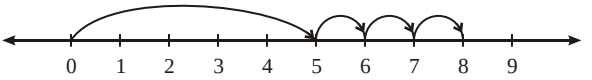
(c) $413 > 102 > -7 > -365 > -515$

Decreasing order $= 413, 102, -7, -365, -515$

(d) $51 > 0 > -2 > -8 > -53$

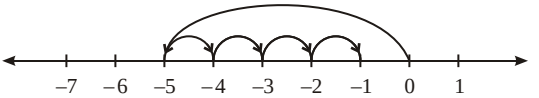
Decreasing order $= 51, 0, -2, -8, -53$

10. (a)



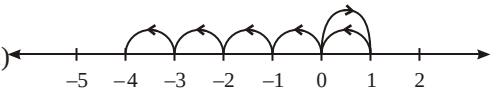
$5 + 3 = 8$

(b)

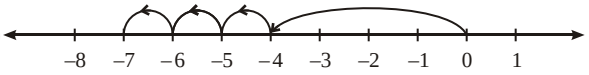


$-5 + 4 = -1$

(c)



$1 - 5 = -4$

(d) 

$-4-3=-7$

11. (a) F (b) T (c) F (d) T (e) F (f) F (g) F (h) F (i) T

12. (a) $|0|=0$ (b) $-|-3|=-3$ (c) $|-9|=9$ (d) $|15|=15$

(e) $|-36|=36$ (f) $|7-4|=|3|=3$

(g) $8-|-7|=8-7=1$ (h) $7+|-3|=7+3=10$

13. (a) Five negative integers less than -20 are :

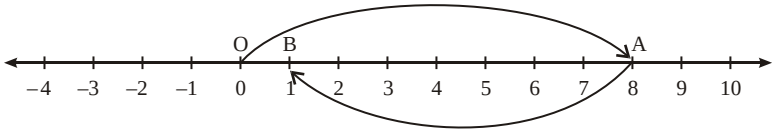
$-21, -22, -23, -24, -25$

(b) Five negative integers greater than -7 are :

$-6, -5, -4, -3, -2$

EXERCISE 4B

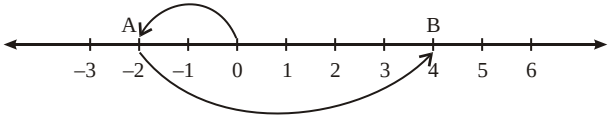
1. (a) On number line, we start from 0 and move 8 steps to the right to reach at point *A*. Now, starting from *A*, we move 7 steps to the left and reach at point *B*, as shown below.



And *B* represents the integer 1.

$8+(-7)=1$

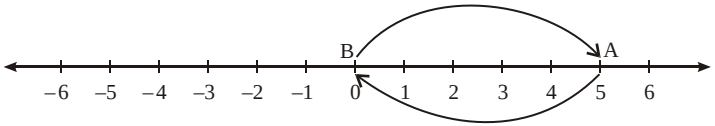
(b) On number line, we start from 0 and move 2 steps to the left to reach at point *A*. Now, starting from *A*, we move 6 steps to the right and reach at point *B*.



And *B* represents the integer 4.

$(-2)+6=4$

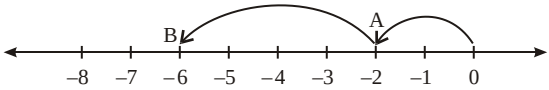
(c) On number line, we start from 0 and move 5 steps to the right to reach at point *A*. Now, starting from *A*, we move 5 steps to the left and reach at point *B*.



And B represents the integer 0.

$$5 + (-5) = 0$$

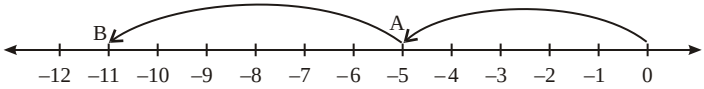
(d) On number line, we start from 0 and move 2 steps to the left to reach at point A. Now, starting from A, we move 4 steps to the left and reach at point B.



And B represents the integer -6.

$$(-2) + (-4) = -6$$

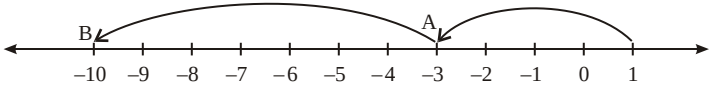
(e) On number line, we start from 0 and move 5 steps to the left to reach at point A. Now, start from point A, we move 6 steps again to the left and reach at point B.



And B represents the integer -11.

$$(-5) + (-6) = -11$$

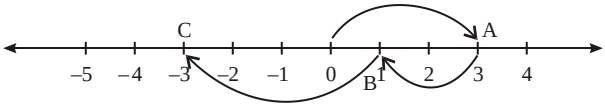
(f) On number line, we start from 0 and move 3 steps to the left to reach at point A. Now, start from A, we move 7 steps again to the left and reach at point B.



And B represents the integer -10.

$$(-3) + (-7) = -10$$

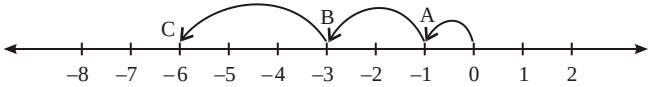
(g) On number line, we start from 0 and move 3 steps to the right to reach at point A. Now, start from point A, we move 2 steps to left and reach at point B. Again starting from point B, we move 4 steps again to the left and reach at point C.



And C represents the integer -3.

$$3 + (-2) + (-4) = -3$$

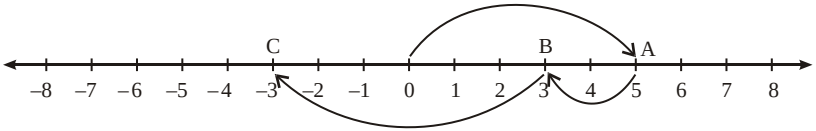
(h) On number line, we start from 0 and move 1 step to the left to reach at point A. Now, start from point A, we move 2 steps again to the left and reach at point B. Again starting from point B, we move 3 steps again to the left and reach to the point C.



And C represents the integer -6.

$$(-1)+(-2)+(-3)=-6$$

(i) On number line, we start from 0 and move 5 steps to the right to reach at point A. Now, starting from point A, move 2 steps to the left and reach at point B. Again starting from point B, we move 6 steps to the left and reach to the point C.



And C represents the integer -3.

$$5+(-2)+(-6)=-3$$

2. (a) $(-9)+16=7$ (b) $(-7)+(-8)=-15$

(c) $(-3)+(-9)=-12$ (d) $2+(-12)=-10$

(e) $8+(-17)=-9$ (f) $(-13)+25=12$

3. (a) $-256 + -78 = -334$ (b) $-37 + -578 = -615$ (c) $-2056 + -789 = -2845$ (d) $-4685 + -2078 = -6763$

4. (a) $-307 + 89 = -218$ (b) $+287 - 96 = 191$ (c) $-205 + 413 = 208$ (d) $-394 + 198 = -196$

5. (a) $\{(-18)+25\}+(-37)$
$=7+(-37)=-30$

(b) $(-36)+100$
$=64$

(c) $(-36)+1027=991$

(d) $137+(-354)=-217$

(e) $1001+(-13)=988$

(f) $(-3057)+199=-2858$

(g) $(-389)+(-1032)=-1421$

(h) $3002+(-888)=2114$

(i) $\{(-51)+(-203)\}+36+(-28)$
$=\{(-254)+36\}+(-28)$
$=(-218)+(-28)$
$=-246$

(j) $\{(-312)+39\}+192$
$=(-273)+192$
$=-81$

6. (a) Additive inverse of $-57=57$

(b) Additive inverse of $183=-183$

(c) Additive inverse of $0=0$

(d) Additive inverse of $-1001=1001$

(e) Additive inverse of $2054 = -2054$

(f) Additive inverse of $-3000 = 3000$

7. (a) Successor of $-5 = -5 + 1 = -4$

(b) Successor of $70 = 70 + 1 = 71$

(c) Successor of $-99 = -99 + 1 = -98$

(d) Successor of $201 = 201 + 1 = 202$

(e) Successor of $-500 = -500 + 1 = -499$

(f) Successor of $-799 = -799 + 1 = -798$

8. (a) Predecessor of $-8 = -8 - 1 = -9$

(b) Predecessor of $79 = 79 - 1 = 78$

(c) Predecessor of $120 = 120 - 1 = 119$

(d) Predecessor of $-141 = -141 - 1 = -142$

(e) Predecessor of $-300 = -300 - 1 = -301$

(f) Predecessor of $-450 = -450 - 1 = -451$

9. (a) $\{(-7) + (-9)\} + \{12 + (-16)\} = (-16) + (-4) = -20$

(b) $\{37 + (-23)\} + \{(-65) + 9\} + (-12) = 14 + \{(-56) + (-12)\}$

$= 14 + (-68)$

$= -54$

(c) $\{1056 + (-798)\} + (-38) + \{44 + (-1)\} = 258 + \{(-38) + 43\}$

$= 258 + 5$

$= 263$

(d) $\{(-145) + 79\} + (-265) + \{(-41) + 2\} = (-66) + (-265) + (-39)$

$= -370$

10. Total cost price of all erasers = ` 30 + ` 25 = ` 55

Total cost price of all pencils = ` 90

Total cost price of erasers and pencils = ` 55 + ` 90 = ` 145

Selling price of erasers = ` 20

Selling price of pencils = ` 70

Total selling price = ` 20 + ` 70 = ` 90

Here, Total cost price > Total selling price

So, there is loss.

Loss = ` 145 − ` 90 = ` 55

11. (a) F (b) F (c) T (d) F (e) T (f) F

EXERCISE 4C

1. (a) $0 - (-92) = 92$ (b) $0 - 219 = -219$

(c) $-37 - 68 = -105$ (d) $25 - (-15) = 25 + 15 = 40$

(e) $-34-18=-52$

(f) $-43-(-28)=-43+28=-15$

(g) $6250-(-3012)=6250+3012=9262$

(h) $-271-6240=-6511$

(i) $-287-(-2768)=-287+2768=2481$

2. $\{-8-(-68)\}+(-36)=(-8+68)+(-36)$

$=60+(-36)$

$=24$

3. $\{33+(-47)\}-(-84)=-14-(-84)$

$=-14+84$

$=70$

4. $\{136+(-272)\}-\{(-250)+138\}=(136-272)-(-250+138)$

$=-136-(-112)$

$=-136+112$

$=-24$

5. $-23-(-1050+813)=-23-(-237)$

$=-23+237$

$=214$

6. $34-(-72)=34+72=106$

$(-72)-34=-72-34=-106$

$\because \quad 106>-106$

Hence, $34-(-72)>(-72)-34$

7. Sum of two integers $=-13$

One number $=170$

170 + other number $=-13$

other number $=-13-170$

$=-183$

8. Sum of two integers $=65$

One integer $=-47$

-47 + other integer $=65$

other integer $=65+47$

$=112$

9. (a) $[-13-(-17)]+[-22-(-40)]=(-13+17)+(-22+40)$

$=4+18$

$=22$

(b) $[37-(-8)]+[11-(-30)]=(37+8)+(11+30)$

$=45+41$

$=86$

10. (a) True (b) False (c) False (d) True (e) True

EXERCISE 4D

1. (a) $14\times 8=112$

(b) $19\times(-6)=-(19\times 6)=-114$

(c) $32\times(-12)=-(32\times 12)=-384$

(d) $(-16)\times 15=-(16\times 15)=-240$

(e) $-44\times 14=-(44\times 14)=-616$

(f) $37\times(-13)=-(37\times 13)=-481$

(g) $-97\times 0=0$

(h) $0\times(-58)=0$

(i) $(-14)\times(-7)=14\times 7=98$

(j) $(-647)\times(-6)=647\times 6=3882$

(k) $125\times(-5)=-(125\times 5)=-625$

(l) $(-382)\times(-162)=382\times 162=61884$

2. (a) $2\times(-5)\times(-6)=2\times 5\times 6=10\times 6=60$

(b) $(-8)\times 3\times 5=-(8\times 3\times 5)=-(24\times 5)=-120$

(c) $(-2)\times 3\times(-4)=2\times 3\times 4=6\times 4=24$

(d) $(-3)\times(-7)\times(-6)=-(3\times 7\times 6)=-(21\times 6)=-126$

(e) $(-8)\times(-3)\times(-9)=-(8\times 3\times 9)=-(24\times 9)=-216$

(f) $8\times 7\times(-10)=-(8\times 7\times 10)=-(56\times 10)=-560$

3. (a) $\{(-8)\times(-63)\}\times 9=(8\times 63)\times 9=504\times 9=4536$

(b) $18\times(-27)\times 30=(18\times 30)\times(-27)=540\times(-27)$

$=-(540\times 27)=-14580$

(c) $(-15)\times(-47)\times(-19)=(15\times 47)\times(-19)$

$=705\times(-19)$

$=-13395$

4. (a) $8\times(-12)+7\times(-12)=(-12)\times(8+7)$

$=(-12)\times 15=-(12\times 15)=-180$

(b) $(-9)\times 6+(-9)\times 4=(-9)\times(6+4)=(-9)\times 10=-(9\times 10)=-90$

(c) $(-15)\times(-14)+(-15)\times(-6)=(-15)\times\{(-14)+(-6)\}$

$=(-15)\times(-14-6)=(-15)\times(-20)$

$=15\times 20=300$

(d) $30\times(-22)+30\times14=30\times\{(-22)+14\}=30\times(-22+14)$
$=30\times(-8)=-(30\times8)=-240$

(e) $(-36)\times72+(-36)\times28=(-36)\times[72+28]$
$=(-36)\times100=(-36\times100)=-3600$

(f) $43\times(-33)+43\times(-17)=43\times\{(-33)+(-17)\}=43\times(-33-17)$
$=43\times(-50)=-(43\times50)=-2150$

5. (a) False (b) True (c) False (d) True

EXERCISE 4E

1. (a) $(-68)\div17=\frac{-68}{17}=-4$ (b) $(-70)\div14=\frac{-70}{14}=-5$

(c) $95\div(-19)=\frac{95}{-19}=-5$ (d) $117\div(-13)=\frac{117}{-13}=-9$

(e) $(-161)\div23=\frac{-161}{23}=-7$ (f) $(-144)\div12=\frac{-144}{12}=-12$

(g) $(-147)\div(-21)=\frac{-147}{-21}=7$ (h) $(-72)\div(-18)=\frac{-72}{-18}=4$

(i) $3176\div(-1)=\frac{3176}{-1}=-3176$ (j) $4000\div(-100)=\frac{4000}{-100}=-40$

(k) $1256\div(-1256)=\frac{1256}{-1256}=-1$ (l) $0\div(-365)=\frac{0}{-365}=0$

2. (a) Required number $=(-5)\times15=-(5\times15)=-75$

(b) Required number $=70\div(-5)=\frac{70}{-5}=-14$

(c) Required number $=(-91)\div(-7)=\frac{-91}{-7}=13$

(d) Required number $=17\times(-3)=-(17\times3)=-51$

(e) Required number $=(-1)\times37=-(1\times37)=-37$

(f) Required number $=1\div(-1)=\frac{1}{-1}=-1$

(g) Required number $=1\times(-143)=-(1\times143)=-143$

(h) Required number $=135\times(-1)=-(135\times1)=-135$

(i) Required number $=278\times0=0$

3. (a) T (b) F (c) T (d) F (e) T (f) T (g) T (h) F (i) T

EXERCISE 4F

1. $(-3)-2=-3-2=-5$
(c) is correct.

2. $(-7)-2=-7-2=-9$
(a) is correct.

3. $(-5)+4=-5+4=-1$

(c) is correct.

4. $7+|-3|=7+3=10$

(b) is correct.

5. $(-18)+1=-18+1=-17$

(c) is correct.

6. $(-16)-1=-16-1=-17$

(b) is correct.

7. Additive inverse of $-5=-(-5)$

$=5$

(a) is correct.

8. $5-(-8)=5+8=13$

(b) is correct.

9. $(-12)-(-5)=-12+5=-7$

(b) is correct.

10. $8+(-8)=8-8=0$

(c) is correct.

11. $6-(-4)=6+4=10$

(c) is correct.

12. $\{(-7)+(-9)\}+\{12+(-16)\}$

$=(-7-9)+(12-16)$

$=(-16)+(-4)=-20$

(a) is correct.

13. $(-6)\times 9=-(6\times 9)=-54$

(b) is correct.

14. $(-9)\times 6+(-9)\times 4$

$=(-9)\times(6+4)$

$=(-9)\times 10$

$=-(9\times 10)=-90$

(a) is correct.

15. $36\div(-9)=\dfrac{36}{-9}=-4$

(b) is correct.

HOTS

- Both are at same distance.

VALUE BASED

- Free drink → every 8 th customer
  Free snack → every 12 th customer
  Free ice cream → every 15 th customer

2	8, 12, 15
2	4, 6, 15
2	2, 3, 15
3	1, 3, 15
5	1, 1, 5
	1, 1, 1

(i) Customer was the first to receive all the three items
= LCM of 8, 12, 15
LCM = 2 × 2 × 2 × 3 × 5 = 120

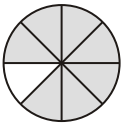
120 th customer was the first to receive all the three items.

(ii) Total customers walked into the restaurant = 385
Total customers of them received all three free items
= 120 th , 240 th , 360 th = 3 customers
Hence, 3 customers of them received all three free items.

EXERCISE 5A

1. (a) $\frac{1}{4}$ (b) $\frac{2}{3}$ (c) $\frac{3}{4}$ (d) $\frac{4}{9}$

(e) $\frac{3}{8}$ (f) $\frac{3}{10}$

2. 

3. Two whole rectangle is not divided into 4 equal parts.

So, the shaded part is not equal to $\frac{1}{4}$.

4. (a) one-eighth = $\frac{1}{8}$ (b) two-fifths = $\frac{2}{5}$

(c) three-fourths = $\frac{3}{4}$ (d) three-tenths = $\frac{3}{10}$

(e) four-sevenths = $\frac{4}{7}$ (f) five-sixths = $\frac{5}{6}$

(g) seven-twelths = $\frac{7}{12}$ (h) eight-ninths = $\frac{8}{9}$

5. (a) Numerator = 2, denominator = 5

(b) Numerator = 7, denominator = 12

(c) Numerator = 9, denominator = 17

(d) Numerator = 11, denominator = 19

(e) Numerator = 8, denominator = 1

6. (a) $\frac{4}{9}$ (b) $\frac{7}{10}$ (c) $\frac{11}{14}$ (d) $\frac{15}{43}$

7. (a) $\frac{1}{4}$ = one-fourths (b) $\frac{1}{2}$ = one-half

(c) $\frac{3}{4}$ = three-fourths (d) $\frac{2}{3}$ = two-third

(e) $\frac{4}{5}$ = four-fifths (f) $\frac{5}{9}$ = five-ninths

(g) $\frac{6}{11}$ = six-eleventh (h) $\frac{8}{15}$ = eight-fifteenths

(i) $\frac{9}{13}$ = nine-thirteenths (j) $\frac{1}{17}$ = one-seventeenths

8. 1 hour = 60 minutes

Fraction of 15 minutes from 60 minutes = $\frac{15}{60} = \frac{1}{4}$

9. (a) $\frac{3}{4} \times 16$ books = 12 books

(b) $\frac{3}{4} \times 28$ pens = 21 pens

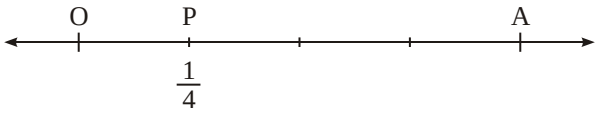
(c) $\frac{3}{4} \times 32$ chocolates = 24 chocolates

(d) $\frac{2}{3} \times 15$ marbles = 10 marbles

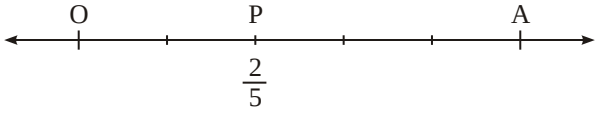
(e) $\frac{2}{3} \times 27$ note-books = 18 note-books

(f) $\frac{2}{3} \times 36$ pencils = 24 pencils

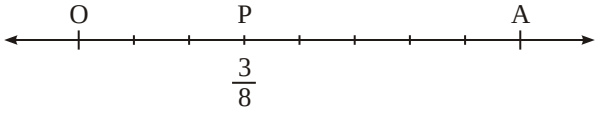
10. (a)



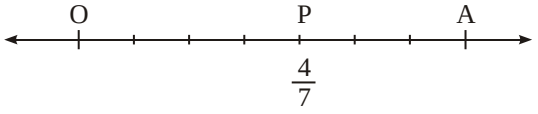
(b)



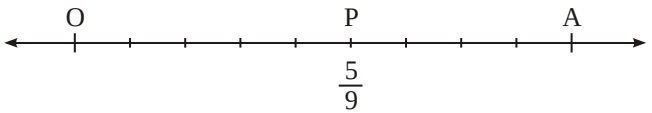
(c)



(d)



(e)



EXERCISE 5B

1. Proper fractions are : $\frac{1}{3}, \frac{4}{5}, \frac{3}{11}, \frac{11}{25}$

2. Improper fractions are : $\frac{7}{5}, \frac{10}{3}, \frac{19}{12}, \frac{23}{23}, 2, \frac{38}{27}$

3. Five improper fractions with numerator 13 are given below :

$$\frac{13}{2}, \frac{13}{3}, \frac{13}{4}, \frac{13}{5}, \frac{13}{6}$$

4. Five improper fractions with denominator 5 are given below :

$$\frac{6}{5}, \frac{7}{5}, \frac{8}{5}, \frac{9}{5}, \frac{11}{5}$$

5. (a) $3\frac{5}{11} = \frac{(3\times 11)+5}{11} = \frac{33+5}{11} = \frac{38}{11}$

(b) $5\frac{5}{7} = \frac{(5\times 7)+5}{7} = \frac{35+5}{7} = \frac{40}{7}$

(c) $9\frac{3}{8} = \frac{(9\times 8)+3}{8} = \frac{72+3}{8} = \frac{75}{8}$

(d) $6\frac{3}{10} = \frac{(6\times 10)+3}{10} = \frac{60+3}{10} = \frac{63}{10}$

(e) $8\frac{8}{13} = \frac{(8\times 13)+8}{13} = \frac{104+8}{13} = \frac{112}{13}$

(f) $10\frac{9}{14} = \frac{(10\times 14)+9}{14} = \frac{140+9}{14} = \frac{149}{14}$

(g) $51\frac{2}{3} = \frac{(51\times 3)+2}{3} = \frac{153+2}{3} = \frac{155}{3}$

(h) $12\frac{7}{15} = \frac{(12\times 15)+7}{15} = \frac{180+7}{15} = \frac{187}{15}$

6. (a) On dividing 62 by 7, we get
quotient = 8 and remainder = 6

$$\frac{62}{7} = 8+\frac{6}{7} = 8\frac{6}{7}$$

$$\begin{array}{r} 8 \\ 7\overline{)\,62} \\ -56 \\ \hline 6 \end{array}$$

(b) On dividing 17 by 5, we get
quotient = 3 and remainder = 2

$$\frac{17}{5} = 3+\frac{2}{5} = 3\frac{2}{5}$$

$$\begin{array}{r} 3 \\ 5\overline{)\,17} \\ -15 \\ \hline 2 \end{array}$$

(c) On dividing 81 by 11, we get
quotient = 7 and remainder = 4

$$\frac{81}{11} = 7 + \frac{4}{11} = 7\frac{4}{11}$$

$$\begin{array}{r|l} 11 & 81 \\ & -77 \\ \hline & 4 \end{array}$$

(d) On dividing 87 by 16, we get
quotient = 5 and remainder = 7

$$\frac{87}{16} = 5 + \frac{7}{16} = 5\frac{7}{16}$$

$$\begin{array}{r|l} 16 & 87 \\ & -80 \\ \hline & 7 \end{array}$$

(e) On dividing 95 by 13, we get
quotient = 7 and remainder = 4

$$\frac{95}{13} = 7 + \frac{4}{13} = 7\frac{4}{13}$$

$$\begin{array}{r|l} 13 & 95 \\ & -91 \\ \hline & 4 \end{array}$$

(f) On dividing 117 by 20, we get
quotient = 5 and remainder = 17

$$\frac{117}{20} = 5 + \frac{17}{20} = 5\frac{17}{20}$$

$$\begin{array}{r|l} 20 & 117 \\ & -100 \\ \hline & 17 \end{array}$$

(g) On dividing 101 by 8, we get
quotient = 12 and remainder = 5

$$\frac{101}{8} = 12 + \frac{5}{8} = 12\frac{5}{8}$$

$$\begin{array}{r|l} 8 & 101 \\ & -8 \\ \hline & 21 \\ & -16 \\ \hline & 5 \end{array}$$

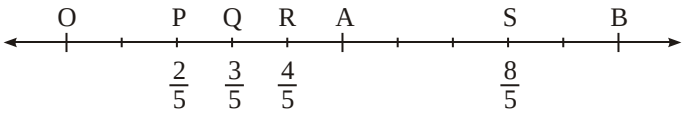
(h) On dividing 103 by 12, we get
quotient = 8 and remainder = 7

$$\frac{103}{12} = 8 + \frac{7}{12} = 8\frac{7}{12}$$

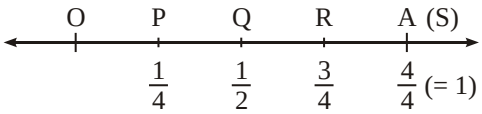
$$\begin{array}{r|l} 12 & 103 \\ & -96 \\ \hline & 7 \end{array}$$

7. (a) $\frac{3}{4}$ $\boxed{<}$ 1 (b) 1 $\boxed{>}$ $\frac{6}{7}$ (c) $\frac{6}{6}$ $\boxed{=}$ 1 (d) $\frac{11}{5}$ $\boxed{>}$ 1

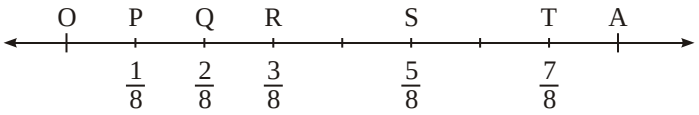
8. (a) Let $P = \frac{2}{5}$, $Q = \frac{3}{5}$, $R = \frac{4}{5}$, $S = \frac{8}{5} = 1\frac{3}{5}$



(b) Let $P = \frac{1}{4}$, $Q = \frac{1}{2}$, $R = \frac{3}{4}$, $S = \frac{4}{4} = 1$



(c) Let $P = \frac{1}{8}$, $Q = \frac{2}{8}$, $R = \frac{3}{8}$, $S = \frac{5}{8}$, $T = \frac{7}{8}$



EXERCISE 5C

1. (a) $\frac{3}{7} = \frac{3\times2}{7\times2} = \frac{3\times3}{7\times3} = \frac{3\times4}{7\times4} = \frac{3\times5}{7\times5} = \frac{3\times6}{7\times6}$

$\frac{3}{7} = \frac{6}{14} = \frac{9}{21} = \frac{12}{28} = \frac{15}{35} = \frac{18}{42}$

(b) $\frac{2}{3} = \frac{2\times2}{3\times2} = \frac{2\times3}{3\times3} = \frac{2\times4}{3\times4} = \frac{2\times5}{3\times5} = \frac{2\times6}{3\times6}$

$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} = \frac{10}{15} = \frac{12}{18}$

(c) $\frac{4}{5} = \frac{4\times2}{5\times2} = \frac{4\times3}{5\times3} = \frac{4\times4}{5\times4} = \frac{4\times5}{5\times5} = \frac{4\times6}{5\times6}$

$\frac{4}{5} = \frac{8}{10} = \frac{12}{15} = \frac{16}{20} = \frac{20}{25} = \frac{24}{30}$

(d) $\frac{5}{8} = \frac{5\times2}{8\times2} = \frac{5\times3}{8\times3} = \frac{5\times4}{8\times4} = \frac{5\times5}{8\times5} = \frac{5\times6}{8\times6}$

$\frac{5}{8} = \frac{10}{16} = \frac{15}{24} = \frac{20}{32} = \frac{25}{40} = \frac{30}{48}$

(e) $\frac{5}{12} = \frac{5\times2}{12\times2} = \frac{5\times3}{12\times3} = \frac{5\times4}{12\times4} = \frac{5\times5}{12\times5} = \frac{5\times6}{12\times6}$

$\frac{5}{12} = \frac{10}{24} = \frac{15}{36} = \frac{20}{48} = \frac{25}{60} = \frac{30}{72}$

(f) $\frac{6}{11} = \frac{6\times2}{11\times2} = \frac{6\times3}{11\times3} = \frac{6\times4}{11\times4} = \frac{6\times5}{11\times5} = \frac{6\times6}{11\times6}$

$\frac{6}{11} = \frac{12}{22} = \frac{18}{33} = \frac{24}{44} = \frac{30}{55} = \frac{36}{66}$

(g) $\frac{7}{9} = \frac{7\times2}{9\times2} = \frac{7\times3}{9\times3} = \frac{7\times4}{9\times4} = \frac{7\times5}{9\times5} = \frac{7\times6}{9\times6}$

$\frac{7}{9} = \frac{14}{18} = \frac{21}{27} = \frac{28}{36} = \frac{35}{45} = \frac{42}{54}$

(h) $\frac{7}{10} = \frac{7\times2}{10\times2} = \frac{7\times3}{10\times3} = \frac{7\times4}{10\times4} = \frac{7\times5}{10\times5} = \frac{7\times6}{10\times6}$

$\frac{7}{10} = \frac{14}{20} = \frac{21}{30} = \frac{28}{40} = \frac{35}{50} = \frac{42}{60}$

2. (a) $\frac{2}{9} \times \frac{14}{63}$

2×63 and 9×14

$126 = 126$

Hence, $\frac{2}{9} = \frac{14}{63}$

(b) $\frac{1}{3} \times \frac{9}{24}$

1×24 and 3×9

$24 < 27$

Hence, $\frac{1}{3} < \frac{9}{24}$

(c) $\frac{2}{3} \times \frac{33}{22}$

2×22 and 3×33

$44 < 99$

Hence, $\frac{2}{3} < \frac{33}{22}$

(d) $\frac{4}{7} \times \frac{16}{21}$

4×21 and 7×16

$84 < 112$

Hence, $\frac{4}{7} < \frac{16}{21}$

(e) $\frac{3}{8} \times \frac{15}{40}$

3×40 and 8×15

$120 = 120$

Hence, $\frac{3}{8} = \frac{15}{40}$

(f) $\frac{5}{6} \times \frac{20}{24}$

5×24 and 6×20

$120 = 120$

Hence, $\frac{5}{6} = \frac{20}{24}$

3. (a) $\frac{3}{5} = \frac{24}{\square}$

Clearly, $24 = 3 \times 8$

So, we multiply the denominator also by 8.

$$\frac{3}{5} = \frac{3 \times 8}{5 \times 8} = \frac{24}{40}$$

Hence, the required fraction is $\frac{24}{40}$.

(b) $\frac{3}{5} = \frac{\square}{30}$

Clearly, $30 = 5 \times 6$

So, we multiply the numerator also by 6.

$$\frac{3}{5} = \frac{3 \times 6}{5 \times 6} = \frac{18}{30}$$

Hence, the required fraction is $\frac{18}{30}$.

4. (a) $\frac{5}{9} = \frac{35}{\square}$

Clearly, $35 = 5 \times 7$

So, we multiply the denominator also by 7.

$$\frac{5}{9} = \frac{5\times 7}{9\times 7} = \frac{35}{63}$$

Hence, the required fraction is $\frac{35}{63}$.

(b) $\frac{5}{9} = \frac{\square}{54}$

Clearly, $54 = 9\times 6$

So, we multiply the numerator also by 6.

$$\frac{5}{9} = \frac{5\times 6}{9\times 6} = \frac{30}{54}$$

Hence, the required fraction is $\frac{30}{54}$.

5. (a) $\frac{6}{11} = \frac{60}{\square}$

Clearly, $60 = 6\times 10$

So, we multiply the denominator also by 10.

$$\frac{6}{11} = \frac{6\times 10}{11\times 10} = \frac{60}{110}$$

Hence, the required fraction is $\frac{60}{110}$.

(b) $\frac{6}{11} = \frac{\square}{77}$

Clearly, $77 = 11\times 7$

So, we multiply the numerator also by 7.

$$\frac{6}{11} = \frac{6\times 7}{11\times 7} = \frac{42}{77}$$

Hence, the required fraction is $\frac{42}{77}$.

6. (a) $\frac{36}{48} = \frac{\square}{4}$

Clearly, $4 = 48\div 12$

So, we devide the numerator also by 12.

$$\frac{36}{48} = \frac{36\div 12}{48\div 12} = \frac{3}{4}$$

Hence, the required fraction is $\frac{3}{4}$.

(b) $\frac{36}{48} = \frac{9}{\square}$

Clearly, $9 = 36 \div 4$

So, we devide the denominator also by 4.

$$\frac{36}{48} = \frac{36 \div 4}{48 \div 4} = \frac{9}{12}$$

Hence, the required fraction is $\frac{9}{12}$.

7. (a) $\frac{56}{70} = \frac{\square}{10}$

Clearly, $10 = 70 \div 7$

So, we multiply the numerator also by 6.

$$\frac{56}{70} = \frac{56 \div 7}{70 \div 7} = \frac{8}{10}$$

Hence, the required fraction is $\frac{8}{10}$.

(b) $\frac{56}{70} = \frac{4}{\square}$

Clearly, $4 = 56 \div 14$

So, we devide the denominator also by 14.

$$\frac{56}{70} = \frac{56 \div 14}{70 \div 14} = \frac{4}{5}$$

Hence, the required fraction is $\frac{4}{5}$.

8. (a) Here, numerator = 8 and denominator = 15

Factors of 8 = 1, 2, 4, 8

Factors of 15 = 1, 3, 5, 15

Common factor of 8 and 15 is 1 only.

HCF of 8 and 15 = 1

Hence, $\frac{8}{15}$ is in the simplest form.

(b) Here, numerator = 8 and denominator = 11

Factors of 8 = 1, 2, 4, 8

Factors of 11 = 1, 11

Common factor of 8 and 11 is 1 only.

HCF of 8 and 11 = 1

Hence, $\frac{8}{11}$ is in the simplest form.

(c) Here, numerator = 9 and denominator = 14

Factors of 9 = 1, 3, 9

Factors of 14 = 1, 2, 7, 14

Common factor of 9 and 14 is 1 only.

HCF of 9 and 14 = 1

Hence, $\frac{9}{14}$ is in the simplest form.

(d) Here, numerator = 21 and denominator = 10

Factors of 21 = 1, 3, 7, 21

Factors of 10 = 1, 2, 5, 10

Common factor of 21 and 10 is 1 only.

HCF of 21 and 10 = 1

Hence, $\frac{21}{10}$ is in the simplest form.

9. (a) HCF of 48 and 60 $= 2 \times 2 \times 3$

$= 12$

$$\frac{48}{60} = \frac{48 \div 12}{60 \div 12} = \frac{4}{5}$$

2	48, 60
2	24, 30
3	12, 15
	4, 5

(b) HCF of 9 and 15 = 3

$$\frac{9}{15} = \frac{9 \div 3}{15 \div 3} = \frac{3}{5}$$

3	9, 15
	3, 5

(c) HCF of 72 and 90 $= 2 \times 3 \times 3$

$= 18$

$$\frac{72}{90} = \frac{72 \div 18}{90 \div 18} = \frac{4}{5}$$

2	72, 90
3	36, 45
3	12, 15
	4, 5

(d) HCF of 84 and 98 $= 2 \times 7$

$= 14$

$$\frac{84}{98} = \frac{84 \div 14}{98 \div 14} = \frac{6}{7}$$

2	84, 98
7	42, 49
	6, 7

10. (a) $\frac{3}{5} = \frac{3 \times 7}{5 \times 7} = \frac{21}{35}$ (b) $\frac{2}{7} = \frac{2 \times 4}{7 \times 4} = \frac{8}{28}$

(c) $\frac{5}{8} = \frac{5 \times 4}{8 \times 4} = \frac{20}{32}$ (d) $\frac{42}{54} = \frac{42 \div 6}{54 \div 6} = \frac{7}{9}$

EXERCISE 5D

1. **Like fractions :** Fractions having the same denominator are called like fractions.

Example : $\frac{3}{8}, \frac{4}{8}, \frac{5}{8}, \frac{2}{8}, \frac{7}{8}$.

Unlike fractions : Fractions having different denominator are called unlike fractions.

Example : $\frac{3}{7}, \frac{5}{8}, \frac{6}{11}, \frac{10}{19}, \frac{4}{5}$.

2. LCM of 5, 10, 15 and 30 $= 2 \times 3 \times 5$
$= 30$

2	5, 10, 15, 30
3	5, 5, 15, 15
5	5, 5, 5, 5
	1, 1, 1, 1

$$\frac{3}{5} = \frac{3\times 6}{5\times 6} = \frac{18}{30}, \frac{7}{10} = \frac{7\times 3}{10\times 3} = \frac{21}{30},$$
$$\frac{8}{15} = \frac{8\times 2}{15\times 2} = \frac{16}{30}, \frac{11}{30} = \frac{11\times 1}{30\times 1} = \frac{11}{30}$$

Hence, the required like fractions are $\frac{18}{30}, \frac{21}{30}, \frac{16}{30}$ and $\frac{11}{30}$.

3. (a) $\frac{3}{7} \boxed{<} \frac{6}{7}$ (b) $\frac{8}{9} \boxed{>} \frac{5}{9}$ (c) $\frac{9}{10} \boxed{>} \frac{7}{10}$ (d) $\frac{11}{20} \boxed{<} \frac{17}{20}$

4. (a) $\frac{4}{11} \boxed{<} \frac{4}{9}$ (b) $\frac{3}{4} \boxed{>} \frac{3}{5}$ (c) $\frac{7}{8} \boxed{>} \frac{7}{10}$ (d) $\frac{11}{14} \boxed{>} \frac{11}{15}$

5. (a) LCM of 8 and 6 $= 2 \times 2 \times 2 \times 3 = 24$

2	8, 6
	4, 3
	2, 3
	1, 3
	1, 1

Now, we convert each one of given fractions into an equivalent fraction having 24 as denominator.

$$\frac{3}{8} = \frac{3\times 3}{8\times 3} = \frac{9}{24} \text{ and } \frac{5}{6} = \frac{5\times 4}{6\times 4} = \frac{20}{24}$$

Clearly, $\frac{9}{24} < \frac{20}{24}$

Hence, $\frac{3}{8} < \frac{5}{6}$

(b) LCM of 3 and 9 $= 3 \times 3 = 9$

3	3, 9
	1, 3
	1, 1

Now, we convert each one of given fractions into an equivalent fraction having 9 as denominator.

$$\frac{2}{3} = \frac{2\times 3}{3\times 3} = \frac{6}{9} \text{ and } \frac{4}{9} = \frac{4\times 1}{9\times 1} = \frac{4}{9}$$

Clearly, $\frac{6}{9} > \frac{4}{9}$

Hence, $\frac{2}{3} > \frac{4}{9}$

(c) LCM of 5 and 7 = 5×7

$= 35$

5	5, 7
7	1, 7
	1, 1

Now, we convert each one of given fractions into an equivalent fraction having 35 as denominator.

$$\frac{4}{5} = \frac{4 \times 7}{5 \times 7} = \frac{28}{35} \text{ and } \frac{5}{7} = \frac{5 \times 5}{7 \times 5} = \frac{25}{35}$$

Clearly, $\frac{28}{35} > \frac{25}{35}$

Hence, $\frac{4}{5} > \frac{5}{7}$

(d) LCM of 11 and 7 = $7 \times 11 = 77$

7	11, 7
11	11, 1
	1, 1

Now, we convert each one of given fractions into an equivalent fraction having 77 as denominator.

$$\frac{7}{11} = \frac{7 \times 7}{11 \times 7} = \frac{49}{77} \text{ and } \frac{6}{7} = \frac{6 \times 11}{7 \times 11} = \frac{66}{77}$$

Clearly, $\frac{49}{77} < \frac{66}{77}$

Hence, $\frac{7}{11} < \frac{6}{7}$

(e) LCM of 6 and 11 = $2 \times 3 \times 11 = 66$

2	6, 11
	3, 11
	1, 11
	1, 1

Now, we convert each one of given fractions into an equivalent fraction with denominator as 66.

$$\frac{5}{6} = \frac{5 \times 11}{6 \times 11} = \frac{55}{66} \text{ and } \frac{9}{11} = \frac{9 \times 6}{11 \times 6} = \frac{54}{66}$$

Clearly, $\frac{55}{66} > \frac{54}{66}$

Hence, $\frac{5}{6} > \frac{9}{11}$

(f) LCM of 4 and 6 = $2 \times 2 \times 3 = 12$

2	4, 6
	2, 3
	1, 3
	1, 1

Now, we convert each one of given fractions into an equivalent fraction having 12 as denominator.

$$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12} \text{ and } \frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$$

Clearly, $\frac{9}{12} < \frac{10}{12}$

Hence, $\frac{3}{4} < \frac{5}{6}$

(g) LCM of 5 and 10 = $2 \times 5 = 10$

Now, we convert each one of given fractions into an equivalent fraction having 10 as denominator.

$$\frac{4}{5} = \frac{4 \times 2}{5 \times 2} = \frac{8}{10} \text{ and } \frac{7}{10} = \frac{7 \times 1}{10 \times 1} = \frac{7}{10}$$

Clearly, $\frac{8}{10} > \frac{7}{10}$

Hence, $\frac{4}{5} > \frac{7}{10}$

(h) LCM of 8 and 12 = $2 \times 2 \times 2 \times 3 = 24$

Now, we convert each one of given fractions into an equivalent fraction having 24 as denominator.

$$\frac{5}{8} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24} \text{ and } \frac{7}{12} = \frac{7 \times 2}{12 \times 2} = \frac{14}{24}$$

2	8, 12
2	4, 6
2	2, 3
3	1, 3
	1, 1

Clearly, $\frac{15}{24} > \frac{14}{24}$

Hence, $\frac{5}{8} > \frac{7}{12}$

(i) LCM of 8 and 10 = $2 \times 2 \times 2 \times 5 = 40$

Now, we convert each one of given fractions into a equivalent fraction having 40 as denominator.

$$\frac{7}{8} = \frac{7 \times 5}{8 \times 5} = \frac{35}{40} \text{ and } \frac{9}{10} = \frac{9 \times 4}{10 \times 4} = \frac{36}{40}$$

2	8, 10
	4, 5
	2, 5
	1, 5
	1, 1

Clearly, $\frac{35}{40} < \frac{36}{40}$

Hence, $\frac{7}{8} < \frac{9}{10}$

(j) LCM of 13 and 4 = $2 \times 2 \times 13 = 52$

Now, we convert each one of given fractions into an equivalent fraction having 52 as denominator.

$$\frac{6}{13} = \frac{6 \times 4}{13 \times 4} = \frac{24}{52} \text{ and } \frac{3}{4} = \frac{3 \times 13}{4 \times 13} = \frac{39}{52}$$

2	13, 4
	13, 2
	13, 1
	1, 1

Clearly, $\frac{24}{52} < \frac{39}{52}$

Hence, $\frac{6}{13} < \frac{3}{4}$

(k) LCM of 9 and 6 $= 2 \times 3 \times 3 = 18$

2	9, 6
	9, 3
	3, 1
	1, 1

Now, we convert each one of the fractions into an equivalent fraction having 18 as denominator.

$$\frac{4}{9} = \frac{4 \times 2}{9 \times 2} = \frac{8}{18} \text{ and } \frac{5}{6} = \frac{5 \times 3}{6 \times 3} = \frac{15}{18}$$

Clearly, $\frac{8}{18} < \frac{15}{18}$

Hence, $\frac{4}{9} < \frac{5}{6}$

(l) LCM of 12 and 15 $= 2 \times 2 \times 3 \times 5 = 60$

2	12, 15
2	6, 15
3	3, 15
5	1, 5
	1, 1

Now, we convert each one of given fractions into an equivalent fraction having 60 as denominator.

$$\frac{11}{12} = \frac{11 \times 5}{12 \times 5} = \frac{55}{60} \text{ and } \frac{13}{15} = \frac{13 \times 4}{15 \times 4} = \frac{52}{60}$$

Clearly, $\frac{55}{60} > \frac{52}{60}$

Hence, $\frac{11}{12} > \frac{13}{15}$

6. (a) LCM of 2, 4, 6 and 8 $= 2 \times 2 \times 2 \times 3 = 24$

2	2, 4, 6, 8
	1, 2, 3, 4
	1, 1, 3, 2
	1, 1, 3, 1
	1, 1, 1, 1

So, we convert each of the given fractions into an equivalent fraction with denominator 24.

$$\frac{1}{2} = \frac{1 \times 12}{2 \times 12} = \frac{12}{24}; \frac{3}{4} = \frac{3 \times 6}{4 \times 6} = \frac{18}{24};$$

$$\frac{5}{6} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24}; \frac{7}{8} = \frac{7 \times 3}{8 \times 3} = \frac{21}{24}$$

Clearly, $\frac{12}{18} < \frac{18}{24} < \frac{20}{24} < \frac{21}{24}$

$$\frac{1}{2} < \frac{3}{4} < \frac{5}{6} < \frac{7}{8}$$

Hence, the given fractions in ascending order are $\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}$.

(b) LCM of 3, 6, 9 and 18 $= 2 \times 3 \times 3 = 18$

2	3, 6, 9, 18
	3, 3, 9, 9
	1, 1, 3, 3
	1, 1, 1, 1

So, we convert each of the given fractions into an equivalent fraction with denominator 18.

$$\frac{2}{3} = \frac{2 \times 6}{3 \times 6} = \frac{12}{18}; \frac{5}{6} = \frac{5 \times 3}{6 \times 3} = \frac{15}{18};$$

$$\frac{7}{9} = \frac{7 \times 2}{9 \times 2} = \frac{14}{18}; \frac{11}{18} = \frac{11 \times 1}{18 \times 1} = \frac{11}{18}$$

Clearly, $\frac{11}{18} < \frac{12}{18} < \frac{14}{18} < \frac{15}{18}$

$\frac{11}{18} < \frac{2}{3} < \frac{7}{9} < \frac{5}{6}$

Hence, the given fractions in ascending order are $\frac{11}{18}, \frac{2}{3}, \frac{7}{9}, \frac{5}{6}$.

(c) LCM of 4, 8, 16 and $32 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

So, we convert each of the given fractions into an equivalent fraction with denominator 32.

2	4, 8, 16, 32
2	2, 4, 8, 16
2	1, 2, 4, 8
2	1, 1, 2, 4
2	1, 1, 1, 2
	1, 1, 1, 1

$\frac{3}{4} = \frac{3 \times 8}{4 \times 8} = \frac{24}{32}; \frac{7}{8} = \frac{7 \times 4}{8 \times 4} = \frac{28}{32};$

$\frac{11}{16} = \frac{11 \times 2}{16 \times 2} = \frac{22}{32}; \frac{23}{32} = \frac{23 \times 1}{32 \times 1} = \frac{23}{32}$

Clearly, $\frac{22}{32} < \frac{23}{32} < \frac{24}{32} < \frac{28}{32}$

$\frac{11}{16} < \frac{23}{32} < \frac{3}{4} < \frac{7}{8}$

Hence, the given fractions in ascending order are $\frac{11}{16}, \frac{23}{32}, \frac{3}{4}, \frac{7}{8}$.

7. (a) LCM of 4, 8, 12 and $24 = 2 \times 2 \times 2 \times 3 = 24$

So, we convert each of the given fractions into an equivalent fraction with denominator 24.

2	4, 8, 12, 24
	2, 4, 6, 12
	1, 2, 3, 6
	1, 1, 3, 3
	1, 1, 1, 1

$\frac{3}{4} = \frac{3 \times 6}{4 \times 6} = \frac{18}{24}; \frac{5}{8} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24};$

$\frac{11}{12} = \frac{11 \times 2}{12 \times 2} = \frac{22}{24}; \frac{17}{24} = \frac{17 \times 1}{24 \times 1} = \frac{17}{24}$

Clearly, $\frac{22}{24} > \frac{18}{24} > \frac{17}{24} > \frac{15}{24}$

$\frac{11}{12} > \frac{3}{4} > \frac{17}{24} > \frac{5}{8}$

Hence, the decending order of the given fractions is $\frac{11}{12}, \frac{3}{4}, \frac{17}{24}, \frac{5}{8}$.

(b) LCM of 9, 12, 18, $36 = 2 \times 2 \times 3 \times 3 = 36$

So, we convert each of the given fractions into an equivalent fraction with denominator 36.

2	9, 12, 18, 36
	9, 6, 9, 18
	9, 3, 9, 9
	3, 1, 3, 3
	1, 1, 1, 1

$\frac{7}{9} = \frac{7 \times 4}{9 \times 4} = \frac{28}{36}; \frac{5}{12} = \frac{5 \times 3}{12 \times 3} = \frac{15}{36};$

$\frac{11}{18} = \frac{11 \times 2}{18 \times 2} = \frac{22}{36}; \frac{17}{36} = \frac{17 \times 1}{36 \times 1} = \frac{17}{36}$

Clearly, $\frac{28}{36} > \frac{22}{36} > \frac{17}{36} > \frac{15}{36}$

$\frac{7}{9} > \frac{11}{18} > \frac{17}{36} > \frac{5}{12}$

Hence, the decending order of the given fractions is $\frac{7}{9}, \frac{11}{18}, \frac{17}{36}, \frac{5}{12}$.

(c) LCM of 7, 14, 21 and 42 $= 2 \times 3 \times 7 = 42$

So, we convert each of the given fractions into an equivalent fraction with denominator 42.

2	7, 14, 21, 42
3	7, 7, 21, 21
7	7, 7, 7, 7
	1, 1, 1, 1

$\frac{5}{7} = \frac{5 \times 6}{7 \times 6} = \frac{30}{42}; \frac{9}{14} = \frac{9 \times 3}{14 \times 3} = \frac{27}{42};$

$\frac{17}{21} = \frac{17 \times 2}{21 \times 2} = \frac{34}{42}; \frac{31}{42} = \frac{31 \times 1}{42 \times 1} = \frac{31}{42}$

Clearly, $\frac{34}{42} > \frac{31}{42} > \frac{30}{42} > \frac{27}{42}$

$\frac{17}{21} > \frac{31}{42} > \frac{5}{7} > \frac{9}{14}$

Hence, the decending order of the given fractions is $\frac{17}{21}, \frac{31}{42}, \frac{5}{7}, \frac{9}{14}$.

8. Part of book read by Manju $= \frac{30}{100} = \frac{3}{10}$

Part of book read by Nidhi $= \frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$

(Converting into equivalent fraction with denominator 10)

Clearly, $\frac{3}{10} < \frac{4}{10}$

$\frac{3}{10} < \frac{2}{5}$

Hence, Nidhi read more part of book.

9. Time taken by Rajat $= \frac{2}{3}$ hours

Time taken by Mohit $= \frac{3}{4}$ hours

Converting the given fractions into equivalent fraction,

$\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}; \frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$ (LCM of 3 and 4 = 12)

Clearly, $\frac{8}{12} < \frac{9}{12}$

$\frac{2}{3} < \frac{3}{4}$

Hence, Mohit exercised for longer time.

10. Fraction of students passed in VI A $= \frac{20}{25} = \frac{4}{5}$

Fraction of students passed in VI B $= \frac{24}{30} = \frac{4}{5}$

Clearly, $\frac{20}{25} = \frac{24}{30}$

Hence, both sections gave the same result.

EXERCISE 5E

1. (a) $\frac{4}{9} + \frac{8}{9} = \frac{4+8}{9} = \frac{12}{9} = \frac{12 \div 3}{9 \div 3} = \frac{4}{3} = 1\frac{1}{3}$

(b) $1\frac{3}{5} + 2\frac{4}{5} = \frac{8}{5} + \frac{14}{5} = \frac{8+14}{5} = \frac{22}{5} = 4\frac{2}{5}$

(c) $\frac{5}{8} + \frac{1}{8} = \frac{5+1}{8} = \frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$

(d) LCM of 12 and 16 = 48

2	12, 16
	6, 8
	3, 4
	3, 2
	3, 1
	1, 1

Now, $\frac{7}{12} = \frac{7 \times 4}{12 \times 4} = \frac{28}{48}; \frac{9}{16} = \frac{9 \times 3}{16 \times 3} = \frac{27}{48}$

$\frac{7}{12} + \frac{9}{16} = \frac{28}{48} + \frac{27}{48}$

$= \frac{28+27}{48} = \frac{55}{48} = 1\frac{7}{48}$

(e) LCM of 9 and $6 = 2 \times 3 \times 3 = 18$

2	9, 6
3	9, 3
3	3, 1
	1, 1

Now, $\frac{2}{9} = \frac{2 \times 2}{9 \times 2} = \frac{4}{18}; \frac{5}{6} = \frac{5 \times 3}{6 \times 3} = \frac{15}{18}$

$\frac{2}{9} + \frac{5}{6} = \frac{4}{18} + \frac{15}{18} = \frac{4+15}{18} = \frac{19}{18} = 1\frac{1}{18}$

(f) $2\frac{3}{4} + 5\frac{5}{6} = \frac{11}{4} + \frac{35}{6}$

2	4, 6
	2, 3
	1, 3
	1, 1

LCM of 4 and $6 = 2 \times 2 \times 3 = 12$

$\frac{11}{4} = \frac{11 \times 3}{4 \times 3} = \frac{33}{12}; \frac{35}{6} = \frac{35 \times 2}{6 \times 2} = \frac{70}{12}$

$$2\frac{3}{4}+5\frac{5}{6}=\frac{33}{12}+\frac{70}{12}=\frac{33+70}{12}=\frac{103}{12}=8\frac{7}{12}$$

(g) $2\frac{7}{10}+3\frac{8}{15}=\frac{27}{10}+\frac{53}{15}$

LCM of 10 and 15 $=2\times3\times5=30$

2	10, 15
3	5, 15
5	5, 5
	1, 1

$$\frac{27}{10}=\frac{27\times3}{10\times3}=\frac{81}{30};\ \frac{53}{15}=\frac{53\times2}{15\times2}=\frac{106}{30}$$

$$2\frac{7}{10}+3\frac{8}{15}=\frac{81}{30}+\frac{106}{30}=\frac{81+106}{30}=\frac{187}{30}=6\frac{7}{30}$$

(h) $3\frac{2}{3}+1\frac{5}{6}+2=\frac{11}{3}+\frac{11}{6}+2$

2	3, 6
	3, 3
	1, 1

LCM of 3 and $6=6$

$$\frac{11}{3}=\frac{11\times2}{3\times2}=\frac{22}{6};\ \frac{11}{6}=\frac{11\times1}{6\times1}=\frac{11}{6};\ \frac{2}{1}=\frac{2\times6}{1\times6}=\frac{12}{6}$$

$$3\frac{2}{3}+1\frac{5}{6}+2=\frac{22}{6}+\frac{11}{6}+\frac{12}{6}$$

$$=\frac{22+11+12}{6}=\frac{45}{6}=\frac{15}{2}=7\frac{1}{2}$$

(i) $3\frac{1}{3}+4\frac{1}{4}+6\frac{1}{6}=\frac{10}{3}+\frac{17}{4}+\frac{37}{6}$

LCM of 3, 4 and $6=2\times2\times3=12$

2	3, 4, 6
	3, 2, 3
	3, 1, 3
	1, 1, 1

$$\frac{10}{3}=\frac{10\times4}{3\times4}=\frac{40}{12};\ \frac{17}{4}=\frac{17\times3}{4\times3}=\frac{51}{12};$$

$$\frac{37}{6}=\frac{37\times2}{6\times2}=\frac{74}{12}$$

$$3\frac{1}{3}+4\frac{1}{4}+6\frac{1}{6}=\frac{40}{12}+\frac{51}{12}+\frac{74}{12}$$

$$=\frac{40+51+74}{12}=\frac{165}{12}=\frac{55}{4}=13\frac{3}{4}$$

(j) $2+\frac{3}{4}+1\frac{5}{8}+3\frac{7}{16}=2+\frac{3}{4}+\frac{13}{8}+\frac{55}{16}$

LCM of 4, 8 and $16=2\times2\times2\times2=16$

2	4, 8, 16
	2, 4, 8
	1, 2, 4
	1, 1, 2
	1, 1, 1

$$\frac{2}{1}=\frac{2\times16}{1\times16}=\frac{32}{16};\ \frac{3}{4}=\frac{3\times4}{4\times4}=\frac{12}{16};$$

$$\frac{13}{8}=\frac{13\times2}{8\times2}=\frac{26}{16};\ \frac{55}{16}=\frac{55\times1}{16\times1}=\frac{55}{16}$$

$$2+\frac{3}{4}+1\frac{5}{8}+3\frac{7}{16}=\frac{32}{16}+\frac{12}{16}+\frac{26}{16}+\frac{55}{16}$$

$$=\frac{32+12+26+55}{16}=\frac{125}{16}=7\frac{13}{16}$$

(k) $2\frac{1}{3}+1\frac{1}{4}+2\frac{5}{6}+3\frac{7}{12}=\frac{7}{3}+\frac{5}{4}+\frac{17}{6}+\frac{43}{12}$

LCM of 3, 4, 6 and $12 = 2\times2\times3=12$

2	3, 4, 6, 12
2	3, 2, 3, 6
3	3, 1, 3, 3
	1, 1, 1, 1

$$\frac{7}{3}=\frac{7\times4}{3\times4}=\frac{28}{12};\ \frac{5}{4}=\frac{5\times3}{4\times3}=\frac{15}{12};$$

$$\frac{17}{6}=\frac{17\times2}{6\times2}=\frac{34}{12};\ \frac{43}{12}=\frac{43\times1}{12\times1}=\frac{43}{12}$$

$$2\frac{1}{3}+1\frac{1}{4}+2\frac{5}{6}+3\frac{7}{12}=\frac{28}{12}+\frac{15}{12}+\frac{34}{12}+\frac{43}{12}$$

$$=\frac{28+15+34+43}{12}=\frac{120}{12}=10$$

(l) $\frac{2}{3}+3\frac{1}{6}+4\frac{2}{9}+2\frac{5}{18}=\frac{2}{3}+\frac{19}{6}+\frac{38}{9}+\frac{41}{18}$

LCM of 3, 6, 9 and $18 = 2\times3\times3=18$

2	3, 6, 9, 18
	3, 3, 9, 9
	1, 1, 3, 3
	1, 1, 1, 1

$$\frac{2}{3}=\frac{2\times6}{3\times6}=\frac{12}{18};\ \frac{19}{6}=\frac{19\times3}{6\times3}=\frac{57}{18};$$

$$\frac{38}{9}=\frac{38\times2}{9\times2}=\frac{76}{18};\ \frac{41}{18}=\frac{41\times1}{18\times1}=\frac{41}{18}$$

$$\frac{2}{3}+3\frac{1}{6}+4\frac{2}{9}+2\frac{5}{18}=\frac{12}{18}+\frac{57}{18}+\frac{76}{18}+\frac{41}{18}$$

$$=\frac{12+57+76+41}{18}=\frac{186}{18}=\frac{93}{9}=\frac{31}{3}=10\frac{1}{3}$$

2. Cost of note-book = ` $3\frac{2}{5}$

Cost of pen = ` $2\frac{7}{10}$

2	5, 10
	5, 5
	1, 1

Total cost of both articles = ` $\left(3\frac{2}{5}+2\frac{7}{10}\right)$

$$=\text{`}\left(\frac{17}{5}+\frac{27}{10}\right)=\text{`}\left(\frac{17\times2}{5\times2}+\frac{27}{10}\right)$$

$$=\text{`}\left(\frac{34}{10}+\frac{27}{10}\right)=\text{`}\left(\frac{34+27}{10}\right)=\text{`}\ \frac{61}{10}=\text{`}\ 6\frac{1}{10}$$

Hence, the cost of both articles is ` $6\frac{1}{10}$.

3. Length of cloth for Kurta $= 4\frac{1}{2}$ m

Length of cloth for Pyjamas $= 2\frac{2}{3}$ m

2	2, 3
3	1, 3
	1, 1

Total length of cloth $= \left(4\frac{1}{2} + 2\frac{2}{3}\right)$ m

$$= \left(\frac{9}{2} + \frac{8}{3}\right) \text{m} = \left(\frac{9 \times 3}{2 \times 3} + \frac{8 \times 2}{3 \times 2}\right) \text{m}$$

$$= \left(\frac{27}{6} + \frac{16}{6}\right) \text{m} = \frac{27 + 16}{6} \text{ m} = \frac{43}{6} \text{ m} = 7\frac{1}{6} \text{ m}$$

Hence, he purchase $7\frac{1}{6}$ m long cloth.

4. Weight of empty gas cylinder $= 16\frac{4}{5}$ kg

Weight of gas $= 14\frac{2}{3}$ kg

Total weight of the cylinder filled with gas $= \left(16\frac{4}{5} + 14\frac{2}{3}\right)$ kg

$$= \left(\frac{84}{5} + \frac{44}{3}\right) \text{kg}$$

$$= \left(\frac{84 \times 3}{5 \times 3} + \frac{44 \times 5}{3 \times 5}\right) \text{kg}$$

$$= \left(\frac{252}{15} + \frac{220}{15}\right) \text{kg}$$

$$= \frac{252 + 220}{15} \text{ kg}$$

$$= \frac{472}{15} \text{ kg} = 31\frac{7}{15} \text{ kg}$$

Hence, the weight of the cylinder filled with gas is $31\frac{7}{15}$ kg.

5. Distance covered by auto-rickshaw $= 4\frac{3}{4}$ km

Distance covered by foot $= 1\frac{1}{2}$ km

Distance covered by Mohan = Distance between his house and school

$$= \left(4\frac{3}{4} + 1\frac{1}{2}\right)\text{km} = \left(\frac{19}{4} + \frac{3}{2}\right)\text{km}$$

$$= \left(\frac{19}{4} + \frac{3\times 2}{2\times 2}\right)\text{km} = \left(\frac{19}{4} + \frac{6}{4}\right)\text{km}$$

$$= \frac{19+6}{4}\,\text{km} = \frac{19+6}{4}\,\text{km}$$

$$= \frac{25}{4}\,\text{km} = 6\frac{1}{4}\,\text{km}$$

Hence, Distance of house from the school is $6\frac{1}{4}$ km.

EXERCISE 5F

1. (a) $\frac{7}{12} - \frac{5}{12} = \frac{7-5}{12} = \frac{2}{12} = \frac{1}{6}$

(b) $4\frac{3}{7} - 2\frac{4}{7} = \frac{31}{7} - \frac{18}{7} = \frac{31-18}{7} = \frac{13}{7} = 1\frac{6}{7}$

(c) $\frac{1}{2} - \frac{3}{8} = \frac{1\times 4}{2\times 4} - \frac{3}{8} = \frac{4}{8} - \frac{3}{8} = \frac{4-3}{8} = \frac{1}{8}$

(d) LCM of 6 and 9 $= 2\times 3\times 3 = 18$

2	6, 9
3	3, 9
3	1, 3
	1, 1

$$\frac{5}{6} = \frac{5\times 3}{6\times 3} = \frac{15}{18} \text{ and } \frac{4}{9} = \frac{4\times 2}{9\times 2} = \frac{8}{18}$$

$$\frac{5}{6} - \frac{4}{9} = \frac{15}{18} - \frac{8}{18} = \frac{15-8}{18} = \frac{7}{18}$$

(e) $3\frac{5}{8} - 2\frac{5}{12} = \frac{29}{8} - \frac{29}{12}$

LCM of 8 and 12 $= 2\times 2\times 2\times 3 = 24$

2	8, 12
	4, 6
	2, 3
	1, 3
	1, 1

$$\frac{29}{8} = \frac{29\times 3}{8\times 3} = \frac{87}{24} \text{ and } \frac{29}{12} = \frac{29\times 2}{12\times 2} = \frac{58}{24}$$

$$3\frac{5}{8} - 2\frac{5}{12} = \frac{87}{24} - \frac{58}{24} = \frac{87-58}{24} = \frac{29}{24} = 1\frac{5}{24}$$

(f) $2\frac{3}{10} - 1\frac{7}{15} = \frac{23}{10} - \frac{22}{15}$

LCM of 10 and 15 $= 2\times 3\times 5 = 30$

2	10, 15
	5, 15
	5, 5
	1, 1

$$\frac{23}{10} = \frac{23\times 3}{10\times 3} = \frac{69}{30} \text{ and } \frac{22}{15} = \frac{22\times 2}{15\times 2} = \frac{44}{30}$$

$$2\frac{3}{10}-1\frac{7}{15}=\frac{69}{30}-\frac{44}{30}=\frac{69-44}{30}=\frac{25}{30}=\frac{5}{6}$$

(g) $6\frac{2}{3}-3\frac{3}{4}=\frac{20}{3}-\frac{15}{4}$

LCM of 3 and 4 $=4\times3=12$(Since, 3 and 4 are co-primes)

$$\frac{20}{3}=\frac{20\times4}{3\times4}=\frac{80}{12}\text{ and }\frac{15}{4}=\frac{15\times3}{4\times3}=\frac{45}{12}$$

$$6\frac{2}{3}-3\frac{3}{4}=\frac{80}{12}-\frac{45}{12}=\frac{80-45}{12}=\frac{35}{12}=2\frac{11}{12}$$

(h) $10-6\frac{3}{8}=\frac{10}{1}-\frac{51}{8}$

2	1, 8
2	1, 4
2	1, 2
	1, 1

$$\frac{10}{1}=\frac{10\times8}{1\times8}=\frac{80}{8}$$ (Since, 1 and 8 are co-primes)

$$10-6\frac{3}{8}=\frac{80}{8}-\frac{51}{8}=\frac{80-51}{8}=\frac{29}{8}=3\frac{5}{8}$$

(i) $7-5\frac{2}{3}=\frac{7}{1}-\frac{17}{3}$

$$\frac{7}{1}=\frac{7\times3}{1\times3}=\frac{21}{3}$$ (Since, 1 and 3 are co-primes)

$$7-5\frac{2}{3}=\frac{21}{3}-\frac{17}{3}=\frac{21-17}{3}=\frac{4}{3}=1\frac{1}{3}$$

2. (a) $2+\frac{11}{15}-\frac{5}{9}$

3	15, 9
	5, 3
	5, 1
	1, 1

LCM of 15 and $9=3\times3\times5=45$

$$\frac{2}{1}=\frac{2\times45}{1\times45}=\frac{90}{45};\ \frac{11}{15}=\frac{11\times3}{15\times3}=\frac{33}{45};$$

$$\frac{5}{9}=\frac{5\times5}{9\times5}=\frac{25}{45}$$

$$2+\frac{11}{15}-\frac{5}{9}=\frac{90}{45}+\frac{33}{45}-\frac{25}{45}=\frac{90+33-25}{45}$$

$$=\frac{123-25}{45}=\frac{98}{45}=2\frac{8}{45}$$

(b) $\frac{5}{6}-\frac{4}{9}+\frac{2}{3}$

2	6, 9, 3
	3, 9, 3
	1, 3, 1
	1, 1, 1

LCM of 6, 9 and $3=2\times3\times3=18$

$$\frac{5}{6}=\frac{5\times3}{6\times3}=\frac{15}{18};\ \frac{4}{9}=\frac{4\times2}{9\times2}=\frac{8}{18};$$

$$\frac{2}{3}=\frac{2\times6}{3\times6}=\frac{12}{18}$$

$$\frac{5}{6}-\frac{4}{9}+\frac{2}{3}=\frac{15}{18}-\frac{8}{18}+\frac{12}{18}$$

$$=\frac{15-8+12}{18}=\frac{7+12}{18}=\frac{19}{18}=1\frac{1}{18}$$

(c) $\frac{5}{8}+\frac{3}{4}-\frac{7}{12}$

LCM of 8, 4 and 12 $= 2\times 2\times 2\times 3 = 24$

2	8, 4, 12
2	4, 2, 6
2	2, 1, 3
3	1, 1, 3
	1, 1, 1

$$\frac{5}{8}=\frac{5\times 3}{8\times 3}=\frac{15}{24};\ \frac{3}{4}=\frac{3\times 6}{4\times 6}=\frac{18}{24};$$

$$\frac{7}{12}=\frac{7\times 2}{12\times 2}=\frac{14}{24}$$

$$\frac{5}{8}+\frac{3}{4}-\frac{7}{12}=\frac{15}{24}+\frac{18}{24}-\frac{14}{24}$$

$$=\frac{15+18-14}{24}=\frac{33-14}{24}=\frac{19}{24}$$

(d) $8\frac{5}{6}-3\frac{3}{8}+2\frac{7}{12}=\frac{53}{6}-\frac{27}{8}+\frac{31}{12}$

LCM of 6, 8 and 12 $= 2\times 2\times 2\times 3 = 24$

2	6, 8, 12
	3, 4, 6
	3, 2, 3
	3, 1, 3
	1, 1, 1

$$\frac{53}{6}=\frac{53\times 4}{6\times 4}=\frac{212}{24};\ \frac{27}{8}=\frac{27\times 3}{8\times 3}=\frac{81}{24};$$

$$\frac{31}{12}=\frac{31\times 2}{12\times 2}=\frac{62}{24}$$

$$8\frac{5}{6}-3\frac{3}{8}+2\frac{7}{12}=\frac{212}{24}-\frac{81}{24}+\frac{62}{24}$$

$$=\frac{212-81+62}{24}=\frac{131+62}{24}=\frac{193}{24}=8\frac{1}{24}$$

(e) $5\frac{3}{4}-4\frac{5}{12}+3\frac{1}{6}=\frac{23}{4}-\frac{53}{12}+\frac{19}{6}$

LCM of 4, 12 and 6 $= 2\times 2\times 3 = 12$

2	4, 12, 6
	2, 6, 3
	1, 3, 3
	1, 1, 1

$$\frac{23}{4}=\frac{23\times 3}{4\times 3}=\frac{69}{12};\ \frac{19}{6}=\frac{19\times 2}{6\times 2}=\frac{38}{12}$$

$$5\frac{3}{4}-4\frac{5}{12}+3\frac{1}{6}=\frac{69}{12}-\frac{53}{12}+\frac{38}{12}=\frac{69-53+38}{12}$$

$$=\frac{16+38}{12}=\frac{54}{12}=\frac{9}{2}=4\frac{1}{2}$$

(f) $6\frac{1}{6}-5\frac{1}{5}+3\frac{1}{3}=\frac{37}{6}-\frac{26}{5}+\frac{10}{3}$

LCM of 6, 5 and 3 $=2\times3\times5=30$

2	6, 5, 3
	3, 5, 3
	1, 5, 1
	1, 1, 1

$$\frac{37}{6}=\frac{37\times5}{6\times5}=\frac{185}{30};\ \frac{26}{5}=\frac{26\times6}{5\times6}=\frac{156}{30};$$

$$\frac{10}{3}=\frac{10\times10}{3\times10}=\frac{100}{30}$$

$$6\frac{1}{6}-5\frac{1}{5}+3\frac{1}{3}=\frac{185}{30}-\frac{156}{30}+\frac{100}{30}$$

$$=\frac{185-156+100}{30}=\frac{29+100}{30}$$

$$=\frac{129}{30}=\frac{43}{10}=4\frac{3}{10}$$

(g) $8-3\frac{1}{2}-2\frac{1}{4}=\frac{8}{1}-\frac{7}{2}-\frac{9}{4}$

LCM of 2 and 4 $=2\times2=4$

2	2, 4
2	1, 2
	1, 1

$$\frac{8}{1}=\frac{8\times4}{1\times4}=\frac{32}{4};\ \frac{7}{2}=\frac{7\times2}{2\times2}=\frac{14}{4}$$

$$8-3\frac{1}{2}-2\frac{1}{4}=\frac{32}{4}-\frac{14}{4}-\frac{9}{4}=\frac{32-14-9}{4}$$

$$=\frac{32-23}{4}=\frac{9}{4}=2\frac{1}{4}$$

(h) $3+1\frac{1}{5}+\frac{2}{3}-\frac{7}{15}=\frac{3}{1}+\frac{6}{5}+\frac{2}{3}-\frac{7}{15}$

LCM of 5, 3 and 15 $=3\times5=15$

3	5, 3, 15
	5, 1, 5
	1, 1, 1

$$\frac{3}{1}=\frac{3\times15}{1\times15}=\frac{45}{15};\ \frac{6}{5}=\frac{6\times3}{5\times3}=\frac{18}{15};$$

$$\frac{2}{3}=\frac{2\times5}{3\times5}=\frac{10}{15};\ \frac{7}{15}=\frac{7\times1}{15\times1}=\frac{7}{15}$$

$$3+1\frac{1}{5}+\frac{2}{3}-\frac{7}{15}=\frac{45}{15}+\frac{18}{15}+\frac{10}{15}-\frac{7}{15}$$

$$=\frac{45+18+10-7}{15}=\frac{73-7}{15}=\frac{66}{15}=\frac{22}{5}=4\frac{2}{5}$$

(i) $2+5\frac{7}{10}-3\frac{14}{15}=\frac{2}{1}+\frac{57}{10}-\frac{59}{15}$

LCM of 10 and 15 $=2\times3\times5=30$

2	10, 15
	5, 15
	5, 5
	1, 1

$$\frac{2}{1}=\frac{2\times30}{1\times30}=\frac{60}{30};\ \frac{57}{10}=\frac{57\times3}{10\times3}=\frac{171}{30};$$

$$\frac{59}{15}=\frac{59\times 2}{15\times 2}=\frac{118}{30}$$

$$2+5\frac{7}{10}-3\frac{14}{15}=\frac{60}{30}+\frac{171}{30}-\frac{118}{30}$$

$$=\frac{60+171-118}{30}=\frac{231-118}{30}$$

$$=\frac{113}{30}=3\frac{23}{30}$$

3. Required fraction $=8\frac{1}{5}-6\frac{7}{15}=\frac{41}{5}-\frac{97}{15}$

$$=\frac{41\times 3}{5\times 3}-\frac{97}{15}=\frac{123}{15}-\frac{97}{15}$$

$$=\frac{123-97}{15}=\frac{26}{15}=1\frac{11}{15}$$

3	5, 15
5	5, 5
	1, 1

LCM of 3 and 5 = 3×5
$=15$

4. Required fraction $=19-9\frac{2}{3}=\frac{19}{1}-\frac{29}{3}$

$$=\frac{19\times 3}{1\times 3}-\frac{29}{3}$$ (Since, 1 and 3 are co-primes)

$$=\frac{57}{3}-\frac{29}{3}=\frac{57-29}{3}=\frac{28}{3}=9\frac{1}{3}$$

5. Required fraction $=\left(5\frac{5}{6}+4\frac{1}{9}\right)-\left(3\frac{5}{9}+3\frac{1}{3}\right)$

$$=\left(\frac{35}{6}+\frac{37}{9}\right)-\left(\frac{32}{9}+\frac{10}{3}\right)$$

$$=\left(\frac{35\times 3}{6\times 3}+\frac{37\times 2}{9\times 2}\right)-\left(\frac{32\times 2}{9\times 2}+\frac{10\times 6}{3\times 6}\right)$$

$$=\left(\frac{105}{18}+\frac{74}{18}\right)-\left(\frac{64}{18}+\frac{60}{18}\right)$$

$$=\frac{105+74}{18}-\frac{64+60}{18}=\frac{179}{18}-\frac{124}{18}$$

$$=\frac{179-124}{18}=\frac{55}{18}=3\frac{1}{18}$$

2	6, 9, 3
3	3, 9, 3
3	1, 3, 1
	1, 1, 1

LCM of 6, 9 and 3
$=2\times 3\times 3$
$=18$

6. Given $\frac{3}{4}$ and $\frac{5}{7}$

$$\frac{3}{4}=\frac{3\times 7}{4\times 7}=\frac{21}{28};\ \frac{5}{7}=\frac{5\times 4}{7\times 4}=\frac{20}{28}$$ (Since, 4 and 7 are co-primes)

Clearly, $\frac{21}{28} > \frac{20}{28}$

$\frac{3}{4} > \frac{5}{7}$

Now, $\frac{3}{4} - \frac{5}{7} = \frac{21}{28} - \frac{20}{28} = \frac{21-20}{28} = \frac{1}{28}$

Hene, $\frac{3}{4}$ is greater by $\frac{1}{28}$.

7. Total duration of film show $= 3\frac{1}{3}$ hours

Duration of advertisements $= 1\frac{3}{4}$ hours

Duration of the film $= \left(3\frac{1}{3} - 1\frac{3}{4}\right)$ hours $= \left(\frac{10}{3} - \frac{7}{4}\right)$ hours

$= \left(\frac{10\times 4}{3\times 4} - \frac{7\times 3}{4\times 3}\right)$ hours (Since, 3 and 4 are co-primes)

$= \left(\frac{40}{12} - \frac{21}{12}\right)$ hours $= \frac{40-21}{12}$ hours

$= \frac{19}{12}$ hours $= 1\frac{7}{12}$ hours

Hence, actual duration of the film is $1\frac{7}{12}$ hours or 1 hour 35 minutes.

8. Total amount of milk $= 7\frac{1}{2}$ litres

Amount of milk was consumed $= 5\frac{3}{4}$ litres

Amount of milk was left $= \left(7\frac{1}{2} - 5\frac{3}{4}\right)$ litres

$= \left(\frac{15}{2} - \frac{23}{4}\right)$ litres $= \left(\frac{15\times 2}{2\times 2} - \frac{23}{4}\right)$ litres

$= \left(\frac{30}{4} - \frac{23}{4}\right)$ litres $= \frac{30-23}{4}$ litres

$= \frac{7}{4}$ litres $= 1\frac{3}{4}$ litres

Hence, $1\frac{3}{4}$ litres or 1 litre 750 ml of milk is left with Mrs. Dua.

9. Total length of ribbon $= 2\frac{3}{4}$ m

Length of one piece $= \frac{5}{8}$ m

Length of other piece $= \left(2\frac{3}{4} - \frac{5}{8}\right)$m $= \left(\frac{11}{4} - \frac{5}{8}\right)$m

$= \left(\frac{11 \times 2}{4 \times 2} - \frac{5}{8}\right)$m $= \left(\frac{22}{8} - \frac{5}{8}\right)$m

$= \frac{22-5}{8}$ m $= \frac{17}{8}$ m $= 2\frac{1}{8}$ m

Hence, the length of other piece is $2\frac{1}{8}$ m.

10. Total amount of money = ` $137\frac{1}{2}$

Amount of money was spent on food = ` $56\frac{3}{4}$

Amount of money is left now = ` $\left(137\frac{1}{2} - 56\frac{3}{4}\right) =$ ` $\left(\frac{275}{2} - \frac{227}{4}\right)$

$=$ ` $\left(\frac{275 \times 2}{2 \times 2} - \frac{227}{4}\right)$

$=$ ` $\left(\frac{550}{4} - \frac{227}{4}\right) =$ ` $\frac{550-227}{4}$

$=$ ` $\frac{323}{4} =$ ` $80\frac{3}{4}$

Hence, ` $80\frac{3}{4}$ is left now.

EXERCISE 5G

1. HCF of 24 and $36 = 2 \times 2 \times 3 = 12$

$$\frac{24}{36} = \frac{24 \div 12}{36 \div 12} = \frac{2}{3}$$

(b) is correct.

2	24, 36
2	12, 18
3	6, 9
	2, 3

2. (c)

3. (c)

4. $\frac{45}{60} = \frac{3}{x}$

$\because$ $45 = 3 \times 15$

$$60 = x \times 15$$
$$x = 4$$

(a) is correct.

5. (c)

6. (d)

7. (b)

8. (a)

9. $4\frac{3}{5} = \frac{(4\times 5)+3}{5} = \frac{20+3}{5} = \frac{23}{5}$

(b) is correct.

10. $\frac{34}{7} = 34 \div 7$

$$\frac{34}{7} = 4\frac{6}{7}$$

$$\begin{array}{r|l} 7 & 34 \\ -28 & \\ \hline 6 & \end{array}\quad 4$$

(c) is correct.

11. $\frac{5}{8}+\frac{1}{8} = \frac{5+1}{8} = \frac{6}{8} = \frac{3}{4}$

(b) is correct.

12. $\frac{5}{8}-\frac{1}{8} = \frac{5-1}{8} = \frac{4}{8} = \frac{1}{2}$

(b) is correct.

13. $3\frac{3}{4}-2\frac{1}{4} = \frac{15}{4}-\frac{9}{4} = \frac{15-9}{4} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}$

(a) is correct.

14. $\frac{5}{6}+\frac{2}{3}-\frac{4}{9}$

2	6, 3, 9
3	3, 3, 9
3	1, 1, 3
	1, 1, 1

LCM of 6, 3 and $9 = 2\times 3\times 3 = 18$

$$\frac{5}{6} = \frac{5\times 3}{6\times 3} = \frac{15}{18};\ \frac{2}{3} = \frac{2\times 6}{3\times 6} = \frac{12}{18};\ \frac{4}{9} = \frac{4\times 2}{9\times 2} = \frac{8}{18}$$

$$\frac{5}{6}+\frac{2}{3}-\frac{4}{9} = \frac{15}{18}+\frac{12}{18}-\frac{8}{18} = \frac{15+12-8}{18}$$

$$= \frac{27-8}{18} = \frac{19}{18} = 1\frac{1}{18}$$

(d) is correct.

15. Given, $3\frac{1}{3}$ and $\frac{33}{10}$

$\frac{10}{3}$ and $\frac{33}{10}$

$$\frac{10}{3} \quad \frac{33}{10}$$

$10 \times 10 = 100$ and $3 \times 33 = 99$

$\because \quad 100 > 99$

$$\frac{10}{3} > \frac{33}{10} \quad \text{or} \quad 3\frac{1}{3} > \frac{33}{10}$$

(a) is correct.

HOTS

- Seema completes her homework in the morning $= \frac{2}{5}$

  She completes her homework in the evening $= \frac{3}{10}$

  She completes her homework $= \frac{2}{5} + \frac{3}{10} = \frac{4+3}{10} = \frac{7}{10}$

  Homework left $= 1 - \frac{7}{10} = \frac{1}{1} - \frac{7}{10} = \frac{10-7}{10} = \frac{3}{10}$

  Hence, her $\frac{3}{10}$ of homework is left.

VALUE BASED

- Varsha has sandwiches = 2

  No. of girls = (Varsha + Geeta + Sonia) = 3

  Each girl get $= \frac{1}{3}$ of 2

  $= \frac{1}{3} \times 2 = \frac{2}{3}$

Chapter 6 Simplification

EXERCISE 6A

1. $13 - (12 - 6 \div 3) = 13 - (12 - 2)$ [performing division]

$= 13 - 10$ [performing subtraction]

$= 3$ [performing subtraction]

2. $21 - 12 \div 3 \times 2 = 21 - 4 \times 2$ [removing ÷]

$= 21 - 8$ [removing ×]

$= 13$ [removing −]

3. $16+8\div4-2\times3=16+2-2\times3$ [removing ÷]

$=16+2-6$ [removing ×]

$=18-6$ [performing subtraction]

$=12$ [performing subtraction]

4. $36-[18-\{14-(15-4\div2\times2)\}]$

$=36-[18-\{14-(15-2\times2)\}]$ [removing ÷]

$=36-[18-\{14-(15-4)\}]$ [removing ×]

$=36-[18-\{14-11\}]$ [removing parentheses]

$=36-[18-3]$ [removing braces]

$=36-15$ [removing square brackets]

$=21$

5. $19-[4+\{16-(12-2)\}]=19-[4+\{16-10\}]$ [removing parentheses]

$=19-[4+6]$ [removing braces]

$=19-10$ [removing square brackets]

$=9$ [performing subtraction]

6. $27-[18-\{16-(5-\overline{4-1})\}]$

$=27-[18-\{16-(5-3)\}]$ [removing bar]

$=27-[18-\{16-2\}]$ [removing parentheses]

$=27-[18-14]$ [removing braces]

$=27-4$ [removing square brackets]

$=23$ [performing subtraction]

7. $\left(\frac{2}{3}+\frac{4}{9}\right)\div\text{of}\ \frac{3}{5}\div1\frac{2}{3}\times1\frac{1}{4}-\frac{1}{3}$

$=\frac{6+4}{9}\ \text{of}\ \frac{3}{5}\div\frac{5}{3}\times\frac{5}{4}-\frac{1}{3}$ [removing parentheses]

$=\frac{10}{9}\times\frac{3}{5}\div\frac{5}{3}\times\frac{5}{4}-\frac{1}{3}$ [removing 'of']

$=\frac{10}{9}\times\frac{3}{5}\times\frac{3}{5}\times\frac{5}{4}-\frac{1}{3}$ [reciprocal of $\frac{5}{3}$]

$=\frac{1}{2}-\frac{1}{3}$ [removing ×]

$=\frac{3-2}{6}=\frac{1}{6}$ [performing subtraction]

8. $4\frac{4}{5} \div \frac{3}{5} \text{ of } 5 + \frac{4}{5} \times \frac{3}{10} - \frac{1}{5} = \frac{24}{5} \div \frac{3}{5} \times 5 + \frac{4}{5} \times \frac{3}{10} - \frac{1}{5}$ [removing 'of ']

$= \frac{24}{5} \div 3 + \frac{6}{25} - \frac{1}{5}$ [removing '×']

$= \frac{8}{5} + \frac{6}{25} - \frac{1}{5}$ [removing '÷']

$= \frac{40 + 6 - 5}{25} = \frac{41}{25}$

$= 1\frac{16}{25}$ [performing addition and subtraction]

9. $5\frac{1}{7} - \left\{3\frac{3}{10} \div \left(2\frac{4}{5} - \frac{7}{10}\right)\right\} = \frac{36}{7} - \left\{\frac{33}{10} \div \left(\frac{14}{5} - \frac{7}{10}\right)\right\}$

$= \frac{36}{7} - \left\{\frac{33}{10} \div \frac{28 - 7}{10}\right\}$ [removing parentheses]

$= \frac{36}{7} - \left\{\frac{33}{10} \div \frac{21}{10}\right\}$

$= \frac{36}{7} - \left\{\frac{33}{10} \times \frac{10}{21}\right\}$ [removing '÷']

$= \frac{36}{7} - \frac{11}{7}$ [removing braces]

$= \frac{36 - 11}{7} = \frac{25}{7} = 3\frac{4}{7}$ [performing subtraction]

10. $7\frac{1}{3} \div \frac{2}{3} \text{ of } 2\frac{1}{5} + 1\frac{3}{8} \div 2\frac{3}{4} - 1\frac{1}{2}$

$= \frac{22}{3} \div \left(2\frac{2}{3} \times \frac{11}{5}\right) + \frac{11}{8} \div \frac{11}{4} - \frac{3}{2}$ [removing 'of ']

$= \frac{22}{3} \div \frac{22}{15} + \frac{11}{8} \div \frac{11}{4} - \frac{3}{2}$

$= \frac{22}{3} \times \frac{15}{22} + \frac{11}{8} \times \frac{4}{11} - \frac{3}{2}$ [removing '÷']

$= 5 \times \frac{1}{2} - \frac{3}{2}$ [removing '×']

$= \frac{10 + 1 - 3}{2} = \frac{8}{2}$ [performing addition and subtraction]

$= 4$

11. $1\frac{5}{6}+\left\{2\frac{2}{3}-\left[3\frac{3}{4}\left(3\frac{4}{5}\div 9\frac{1}{2}\right)\right]\right\}=\frac{11}{6}+\left\{3-\left[\frac{15}{4}\left(\frac{19}{5}\div\frac{19}{2}\right)\right]\right\}$

$=\frac{11}{6}+\left\{3-\left[\frac{15}{4}\left(\frac{19}{5}\times\frac{2}{19}\right)\right]\right\}$ [removing '÷']

$=\frac{11}{6}+\left\{3-\left[\frac{15}{4}\times\frac{2}{5}\right]\right\}$ [removing parentheses]

$=\frac{11}{6}+\left\{3-\frac{3}{2}\right\}$ [removing braces]

$=\frac{11}{6}+\frac{16-9}{6}$ [removing square brackets]

$=\frac{11}{6}+\frac{7}{6}=\frac{11+7}{6}=\frac{18}{6}=3$ [performing addition]

12. $9\frac{3}{4}\div\left\{2\frac{1}{6}+\left[4\frac{1}{3}-\left(1\frac{1}{2}+1\frac{3}{4}\right)\right]\right\}$

$=\frac{39}{4}\div\left\{\frac{13}{6}+\left[\frac{13}{3}-\left(\frac{3}{2}+\frac{7}{4}\right)\right]\right\}$

$=\frac{39}{4}\div\left\{\frac{13}{6}+\left[\frac{13}{3}-\frac{6+7}{4}\right]\right\}$ [removing parentheses]

$=\frac{39}{4}\div\left\{\frac{13}{6}+\left[\frac{13}{3}-\frac{13}{4}\right]\right\}$

$=\frac{39}{4}\div\left\{\frac{13}{6}+\frac{52-39}{12}\right\}$ [removing braces]

$=\frac{39}{4}\div\left\{\frac{13}{6}+\frac{13}{12}\right\}$

$=\frac{39}{4}\div\frac{26+13}{12}$ [removing square brackets]

$=\frac{39}{4}\div\frac{39}{12}=\frac{39}{4}\times\frac{12}{39}$ [removing '÷']

$=3$ [removing '×']

13. $4\frac{1}{10}-\left\{2\frac{1}{2}-\left[\frac{5}{6}-\left(\frac{2}{5}+\frac{3}{10}-\frac{4}{15}\right)\right]\right\}$

$=\frac{41}{10}-\left\{\frac{5}{2}-\left[\frac{5}{6}-\left(\frac{2}{5}+\frac{3}{10}-\frac{4}{15}\right)\right]\right\}$

$$= \frac{41}{10} - \left\{ \frac{5}{2} - \left(\frac{5}{6} - \frac{12+9-8}{30} \right) \right\} \quad \text{[removing parentheses]}$$

$$= \frac{41}{10} - \left\{ \frac{5}{2} - \left(\frac{5}{6} - \frac{13}{30} \right) \right\}$$

$$= \frac{41}{10} - \left\{ \frac{5}{2} - \frac{25-13}{30} \right\} \quad \text{[removing braces]}$$

$$= \frac{41}{10} - \left\{ \frac{5}{2} - \frac{12}{30} \right\}$$

$$= \frac{41}{10} - \frac{75-12}{30} \quad \text{[removing square brackets]}$$

$$= \frac{41}{10} - \frac{63}{30} = \frac{41}{10} - \frac{21}{10}$$

$$= \frac{41-21}{10} \quad \text{[performing subtraction]}$$

$$= \frac{20}{10} = 2$$

14. $7\frac{1}{2} - \left\{ 2\frac{1}{4} - \left(1\frac{1}{4} - \frac{1}{2}\left(3 - \overline{\frac{1}{3} - \frac{1}{6}} \right) \right) \right\}$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \left(\frac{5}{4} - \frac{1}{2}\left(3 - \frac{2-1}{6} \right) \right) \right\} \quad \text{[removing bar]}$$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \left(\frac{5}{4} - \frac{1}{2}\left(3 - \frac{1}{6} \right) \right) \right\}$$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \left(\frac{5}{4} - \frac{1}{2}\left(\frac{9-1}{6} \right) \right) \right\}$$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \left(\frac{5}{4} - \frac{1}{2} \times \frac{8}{6} \right) \right\} \quad \text{[removing parentheses]}$$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \left(\frac{5}{4} - \frac{2}{3} \right) \right\}$$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \frac{15-8}{12} \right\} \quad \text{[removing braces]}$$

$$= \frac{15}{2} - \left\{ \frac{9}{4} - \frac{7}{12} \right\}$$

$$= \frac{15}{2} - \frac{27-7}{12} \quad \text{[removing square brackets]}$$

$$= \frac{15}{2} - \frac{20}{12} = \frac{15}{2} - \frac{5}{3} = \frac{45-10}{6} \quad \text{[performing subtraction]}$$

$$= \frac{35}{6} = 5\frac{5}{6}$$

15. $4\frac{4}{5} - \left\{2\frac{1}{5} - \frac{1}{2}\left(1\frac{1}{4} - \overline{\frac{1}{3} - \frac{1}{6}}\right)\right\} = \frac{24}{5} - \left\{\frac{11}{5} - \frac{1}{2}\left(\frac{5}{4} - \overline{\frac{1}{3} - \frac{1}{6}}\right)\right\}$

$$= \frac{24}{5} - \left\{\frac{11}{5} - \frac{1}{2}\left(\frac{5}{4} - \frac{2-1}{6}\right)\right\} \quad \text{[removing bar]}$$

$$= \frac{24}{5} - \left\{\frac{11}{5} - \frac{1}{2}\left(\frac{5}{4} - \frac{1}{6}\right)\right\}$$

$$= \frac{24}{5} - \left\{\frac{11}{5} - \frac{1}{2} \times \frac{15-2}{12}\right\} \quad \text{[removing braces]}$$

$$= \frac{24}{5} - \left\{\frac{11}{5} - \frac{1}{2} \times \frac{13}{12}\right\}$$

$$= \frac{24}{5} - \left\{\frac{11}{5} - \frac{13}{24}\right\}$$

$$= \frac{24}{5} - \frac{264-65}{120} \quad \text{[removing square brackets]}$$

$$= \frac{24}{5} - \frac{199}{120} = \frac{576-199}{120} \quad \text{[performing subtraction]}$$

$$= \frac{377}{120}$$

EXERCISE 6B

1. $13-(12-6\div 3) = 13-(12-2)$ [removing ÷]

$= 13-10$ [removing parentheses]

$= 3$ [performing subtraction]

(d) is correct.

2. $8+4\div 2\times 5 = 8+2\times 5$ [removing ÷]

$= 8+10$ [removing ×]

$= 18$ [performing addition]

(c) is correct.

3. $54\div 3 \text{ of } 6+9 = 54\div(3\times 6)+9$ [removing 'of']

$= 54\div 18+9$ [removing '×']

$= 3+9$ [removing '÷']

$= 12$ [performing addition]

(b) is correct.

4. $3640-14\div 7\times 2=3640-2\times 2$ [removing ÷]

$=3640-4$ [removing ×]

$=3636$ [performing subtraction]

(a) is correct.

5. $100\times 10-100+2000\div 100=1000-100+20$ [removing × and ÷]

$=900+20$ [performing subtraction]

$=920$ [performing addition]

(b) is correct.

6. $133+278\div 7-8\times 2=133+\frac{278}{7}-16$ [removing ÷ and ×]

$=\frac{931+278-112}{7}$

$=\frac{1209-112}{7}$

$=\frac{1097}{7}=156\frac{5}{7}$

(d) is correct.

7. $1001\div 11\text{of}\,13=1001\div(11\times 13)$ [removing 'of ']

$=1001\div 143$

$=7$ [removing '÷']

(a) is correct.

8. $8-[28\div\{34-(36-18\div 9\times 8)\}]$

$=8-[28\div\{34-(36-2\times 8)\}]$

$=8-[28\div\{34-(36-16)\}]$ [removing parentheses]

$=8-[28\div\{34-20\}]$ [removing braces]

$=8-[28\div 14]$ [removing square brackets]

$=8-2$

$=6$ [performing subtraction]

(a) is correct.

9. $27-[18-\{16-\overline{4-1}\})\}]=27-[18-\{16-3\}]$ [removing bar]

$=27-[18-3]$ [removing braces]

$=27-5$ [removing square brackets]

$=22$ [performing subtraction]

(d) is correct.

10. $32-[48\div\{36-(27-\overline{16-9})\}]$

$=32-[48\div\{36-(27-7)\}]$ [removing bar]

$= 32 - [48 \div \{36 - 20\}]$ [removing parentheses]

$= 32 - [48 \div 16]$ [removing braces]

$= 32 - 3$ [removing '÷']

$= 29$ [performing subtraction]

(a) is correct.

HOTS

- Mrs. Gupta buy apples $= 2$ kg

  Eaten by her children $= 1\frac{1}{4}$ kg $= \frac{5}{4}$ kg

  $$\text{Fruits left} = 2 - \frac{5}{4} = \frac{2}{1} - \frac{5}{4} = \frac{8-5}{4} = \frac{3}{4} \text{ kg}$$

  Hence, $\frac{3}{4}$ kg of apples are left.

VALUE BASED

- Vipin spends on the food items $= \frac{3}{10}$

  $$\text{On education} = \frac{4}{15}$$

  $$\text{On other expenses} = \frac{7}{30}$$

  $$\text{On donation} = \frac{1}{30}$$

  $$\text{Total spend} = \frac{3}{10} + \frac{4}{15} + \frac{7}{30} + \frac{1}{30}$$

  $$= \frac{9+8+7+1}{30} = \frac{25}{30} = \frac{5}{6}$$

  $$\text{Save money by him} = 1 - \frac{5}{6} = \frac{1}{1} - \frac{5}{6} = \frac{6-5}{6} = \frac{1}{6}$$

Chapter 7 Decimals

EXERCISE 7A

1. (a) 52.999 (b) 624.024 (c) 9.856 (d) 36.348
(e) 404.044 (f) 0.173 (g) 0.015

2. (a) Place value of $2 = 20$, Place value of $5 = 5$,

Place value of $9 = \frac{9}{10}$, Place value of $4 = \frac{4}{100}$

(b) Place value of 1 = 100, Place value of 6 = 60, Place value of 4 = 4,
Place value of 1 = $\frac{1}{10}$, Place value of 5 = $\frac{5}{100}$, Place value of 8 = $\frac{8}{1000}$

(c) Place value of 5 = 50, Place value of 7 = 7, Place value of 0 = 0,
Place value of 8 = $\frac{8}{100}$, Place value of 6 = $\frac{6}{1000}$

(d) Place value of 4 = 400, Place value of 0 = 0, Place value of 3 = 3,
Place value of 3 = $\frac{3}{10}$, Place value of 4 = $\frac{4}{100}$, Place value of 8 = $\frac{8}{1000}$

(e) Place value of 4 = 4000, Place value of 2 = 200, Place value of 6 = 60,
Place value of 0 = 0, Place value of 2 = $\frac{2}{10}$, Place value of 5 = $\frac{5}{100}$

(f) Place value of 2 = 200, Place value of 9 = 90, Place value of 7 = 7,
Place value of 3 = $\frac{3}{10}$, Place value of 0 = 0, Place value of 8 = $\frac{8}{1000}$

3. (a) $78.94 = (7\times10)+(8\times1)+\left(9\times\frac{1}{10}\right)+\left(4\times\frac{1}{100}\right)$

(b) $394.72 = (3\times100)+(9\times10)+(4\times1)+\left(7\times\frac{1}{10}\right)+\left(2\times\frac{1}{100}\right)$

(c) $35.786 = (3\times10)+(5\times1)+\left(7\times\frac{1}{10}\right)+\left(8\times\frac{1}{100}\right)+\left(6\times\frac{1}{1000}\right)$

(d) $0.183 = \left(1\times\frac{1}{10}\right)+\left(8\times\frac{1}{100}\right)+\left(3\times\frac{1}{1000}\right)$

(e) $7.005 = (7\times1)+\left(5\times\frac{1}{1000}\right)$

(f) 5726.83

$$= (5\times1000)+(7\times100)+(2\times10)+(6\times1)+\left(8\times\frac{1}{10}\right)+\left(3\times\frac{1}{100}\right)$$

4. (a) $50+7+\frac{8}{10}+\frac{7}{100}=57.87$

(b) $600+80+9+\frac{4}{10}+\frac{2}{100}+\frac{7}{1000}=689.427$

(c) $800+40+1+\frac{9}{10}+\frac{5}{100}=841.95$

(d) $500+4+\frac{6}{100}+\frac{8}{1000}=504.068$

(e) $700+5+\frac{9}{10}+\frac{5}{1000}=705.905$

(f) $20+8+\frac{3}{100}+\frac{7}{1000}=28.037$

5. (a) 0.600, 5.937, 2.360, 4.200 (b) 7.500, 64.230, 0.074

(c) 2.500, 0.630, 14.080, 1.637 (d) 1.60, 0.07, 3.58, 2.90

6. (a) 0.97 $\boxed{<}$ 1.07 (b) 3.85 $\boxed{>}$ 3.805

(c) 12.06 $\boxed{>}$ 12.006 (d) 8.34 $\boxed{<}$ 8.43

(e) 7.608 $\boxed{<}$ 7.68 (f) 84.23 $\boxed{>}$ 76.35

7. (a) 0.06 < 0.6 < 6.06 < 6.6 < 66.6

(b) 5.06 < 5.69 < 5.8 < 7.14 < 7.2

(c) 0.33 < 3.003 < 3.033 < 3.3 < 3.303

(d) 6.05 < 6.4 < 6.45 < 6.5 < 6.54

8. (a) 30.3 > 30.03 > 3.3 > 3.03 > 3.003

(b) 73.03 > 8.73 > 8.073 > 7.33 > 7.3

(c) 88.8 > 88.08 > 8.88 > 8.088 > 8.008

(d) 7.2 > 2.72 > 2.7 > 2.27 > 2.02 > 2.007

EXERCISE 7B

1. (a) $0.6=\frac{6}{10}=\frac{3}{5}$ (b) $.9=\frac{9}{10}$

(c) $0.15=\frac{15}{100}=\frac{3}{20}$ (d) $.08=\frac{8}{100}=\frac{2}{25}$

(e) $.053=\frac{53}{1000}$ (f) $0.48=\frac{48}{100}=\frac{12}{25}$

(g) $.224=\frac{224}{1000}=\frac{28}{125}$ (h) $0.125=\frac{125}{1000}=\frac{1}{8}$

2. (a) $6.4=\frac{64}{10}=\frac{32}{5}=6\frac{2}{5}$ (b) $8.36=\frac{836}{100}=\frac{209}{25}=8\frac{9}{25}$

(c) $16.5=\frac{165}{10}=\frac{33}{2}=16\frac{1}{2}$ (d) $25.06=\frac{2506}{100}=\frac{1253}{50}=25\frac{3}{50}$

(e) $7.004=\frac{7004}{1000}=\frac{1751}{250}=7\frac{1}{250}$ (f) $2.052=\frac{2052}{1000}=\frac{513}{250}=2\frac{13}{250}$

(g) $3.108=\frac{3108}{1000}=\frac{777}{250}=3\frac{27}{250}$ (h) $4.275=\frac{4275}{1000}=\frac{171}{40}=4\frac{11}{40}$

3. (a) $\frac{23}{10}=2.3$ (b) $\frac{167}{100}=1.67$ (c) $\frac{5413}{1000}=5.413$

(d) $\frac{1589}{100}=15.89$ (e) $\frac{21415}{1000}=21.415$

(f) $\frac{25}{4} = 6.25$

$$
\begin{array}{r|l}
4 & 25 \\
-24 & 6.25 \\
\hline
10 & \\
-8 & \\
\hline
20 & \\
-20 & \\
\hline
\times &
\end{array}
$$

(g) $\frac{7}{8} = 0.875$

$$
\begin{array}{r|l}
8 & 70 \\
-64 & 0.875 \\
\hline
60 & \\
-56 & \\
\hline
40 & \\
-40 & \\
\hline
\times &
\end{array}
$$

(h) $\frac{3}{40} = 0.075$

$$
\begin{array}{r|l}
40 & 300 \\
-280 & 0.075 \\
\hline
200 & \\
-200 & \\
\hline
\times &
\end{array}
$$

(i) $\frac{19}{20} = 0.95$

$$
\begin{array}{r|l}
20 & 190 \\
-180 & 0.95 \\
\hline
100 & \\
-100 & \\
\hline
\times &
\end{array}
$$

(j) $3\frac{3}{5} = \frac{3\times 5+3}{5} = \frac{15+3}{5}$

$= \frac{18}{5} = 3.6$

$$
\begin{array}{r|l}
5 & 18 \\
-15 & 3.6 \\
\hline
30 & \\
-30 & \\
\hline
\times &
\end{array}
$$

(k) $1\frac{4}{25} = \frac{1\times 25+4}{25}$

$= \frac{25+4}{25} = \frac{29}{25} = 1.16$

$$
\begin{array}{r|l}
25 & 29 \\
-25 & 1.16 \\
\hline
40 & \\
-25 & \\
\hline
150 & \\
-150 & \\
\hline
\times &
\end{array}
$$

(l) $2\frac{19}{40} = \frac{2\times 40+19}{40}$

$= \frac{80+19}{40}$

$= \frac{99}{40}$

$= 2.475$

$$
\begin{array}{r|l}
40 & 99 \\
-80 & 2.475 \\
\hline
190 & \\
-160 & \\
\hline
300 & \\
-200 & \\
\hline
200 & \\
-200 & \\
\hline
\times &
\end{array}
$$

4. (a) ` 18 and 25 paise = ` $18 + ` \frac{25}{100}$

$= ` 18 + ` 0.25$

$= ` 18.25$

(b) ` 9 and 8 paise = ` $9 + ` \frac{8}{100}$

$= ` 9 + ` 0.08$

$= ` 9.08$

(c) 32 paise = ` $\frac{32}{100} = ` 0.32$

(d) 5 paise = ` $\frac{5}{100} = ` 0.05$

5. (a) 15 kg and 850 g $= 15 \text{ kg} + \frac{850}{1000} \text{ kg}$

$= 15 \text{ kg} + 0.850 \text{ kg}$

$= 15.850 \text{ kg}$

(b) 8 kg and 96 g $= 8 \text{ kg} + \frac{96}{1000} \text{ kg}$

$= 8 \text{ kg} + 0.096 \text{ kg}$

$= 8.096 \text{ kg}$

(c) 540 g $= \frac{540}{1000} \text{ kg} = 0.540 \text{ kg}$

(d) 8 g $= \frac{8}{1000} \text{ kg} = 0.008 \text{ kg}$

6. (a) 8 kg 640 g $= 8 \text{ kg} + \frac{640}{1000} \text{ kg}$

$= 8 \text{ kg} + 0.640 \text{ kg}$

$= 8.640 \text{ kg}$

(b) 9 kg 37 g $= 9 \text{ kg} + \frac{37}{1000} \text{ kg}$

$= 9 \text{ kg} + 0.037 \text{ kg}$

$= 9.037 \text{ kg}$

(c) 6 kg and 8 g $= 6 \text{ kg} + \frac{8}{1000} \text{ kg}$

$= 6 \text{ kg} + 0.008 \text{ kg}$

$= 6.008 \text{ kg}$

7. (a) 4 km 365 m $= 4 \text{ km} + \frac{365}{1000} \text{ km}$

$= 4 \text{ km} + 0.365 \text{ km}$

$= 4.365 \text{ km}$

(b) 5 km 87 m $= 5 \text{ km} + \frac{87}{1000} \text{ km}$

$= 5 \text{ km} + 0.087 \text{ km}$

$= 5.087 \text{ km}$

(c) $3\text{ km }6\text{ m} = 3\text{ km} + \frac{6}{1000}\text{ km}$
$= 3\text{ km} + 0.006\text{ km}$
$= 3.006\text{ km}$

(d) $270\text{ m} = \frac{270}{1000}\text{ km}$
$= 0.270\text{ km}$

(e) $35\text{ m} = \frac{35}{1000}\text{ km} = 0.035\text{ km}$

(f) $6\text{ m} = \frac{6}{1000}\text{ km} = 0.006\text{ km}$

EXERCISE 7C

1. (a)
$$\begin{array}{r} 9.6 \\ 14.8 \\ 37 \\ +\ 5.9 \\ \hline 67.3 \end{array}$$

(b)
$$\begin{array}{r} 72.8 \\ 7.68 \\ 16.23 \\ +\ 0.7 \\ \hline 97.41 \end{array}$$

(c)
$$\begin{array}{r} 18.6 \\ 84.75 \\ 8.345 \\ +\ 9.7 \\ \hline 121.395 \end{array}$$

(d)
$$\begin{array}{r} 23.7 \\ 106.94 \\ 68.9 \\ +\ 29.5 \\ \hline 229.04 \end{array}$$

(e)
$$\begin{array}{r} 4.37 \\ 9.638 \\ 17.007 \\ +\ 6.8 \\ \hline 37.815 \end{array}$$

(f)
$$\begin{array}{r} 14.5 \\ 0.038 \\ 118.573 \\ +\ 6.84 \\ \hline 139.951 \end{array}$$

(g)
$$\begin{array}{r} 28.9 \\ 19.64 \\ 123.697 \\ +\ 0.354 \\ \hline 172.591 \end{array}$$

(h)
$$\begin{array}{r} 8.236 \\ 16.064 \\ 63.8 \\ +\ 27.53 \\ \hline 115.63 \end{array}$$

2. Length of cloth for salwar = 2.05 cm
Length of cloth for shirt = + 3.35 cm
Total length of cloth bought by Nisha = 5.40 cm
Hence, the total length of cloth bought by Nisha = 5.40 cm
= 5 m 40 cm

3. Mass of sugar = 45.080 kg
Mass of empty bag = + 0.950 kg
Total mass = 46.030 kg
Hence, the mass of the bag containing sugar = 46.030 kg
= 46 kg 30 g

4. Distance covered by taxi = 36.235 km
Distance covered by rickshaw = 4.085 km
Distance covered by on foot = + 1.080 km
Total distance covered = 41.400 km
Hence, total distance covered by Harsh is 41 km 400 m.

5. Cost of almirah = ₹ 11025.00
Spent on cartage = ₹ 172.50
Spent on repairing = ₹ + 64.80
Total money was spent = ₹ 11262.30
Hence, the cost of almirah is ` 11262.30.

6. Earning on first day = ₹ 32.60
Earning on second day = ₹ 56.80
Earning on third day = + ₹ 72.00
Total earning ₹ 161.40
Hence, total earning of rickshaw puller during these days is ` 161.40.

EXERCISE 7D

1. (a) 204.0 − 56.8 = 147.2
(b) 92.40 − 59.63 = 32.77
(c) 103.87 − 64.98 = 38.89
(d) 53.74 − 27.86 = 25.88

(e) 70.680 − 39.875 = 30.805
(f) 600.000 − 458.573 = 141.427
(g) 216.20 − 127.38 = 88.82
(h) 523.120 − 348.237 = 174.883

2. (a) 75.3 − 104.645 + 178.96 − 47.9
= (75.3 + 178.96) − (104.645 + 47.9)
= 254.26 − 152.545
= 101.715

75.30 + 178.96 = 254.26 and 104.645 + 47.900 = 152.545

254.260 − 152.545 = 101.715

(b) 76.3 − 7.666 − 6.77
= 76.3 − (7.666 + 6.77)
= 76.3 − 14.436
= 61.864

7.666 + 6.77 = 14.436 and 76.300 − 14.436 = 61.864

(c) 37.6 + 72.85 − 58.678 − 6.09
= (37.6 + 72.85) − (58.678 + 6.09)
= 110.45 − 64.738
= 45.682

37.6 + 72.85 = 110.45 and 58.678 + 6.090 = 64.768

110.450 − 64.768 = 45.682

(d) $213.4 - 56.84 - 11.87 - 16.087$

$= 213.4 - (56.84 + 11.87 + 16.087)$

$= 213.4 - 84.797$

$= 128.603$

$$\begin{array}{r} 56.840 \\ 11.870 \\ -16.087 \\ \hline 84.797 \end{array}$$

and

$$\begin{array}{r} 213.400 \\ -\ 84.797 \\ \hline 128.603 \end{array}$$

3. Required number $= 7.3 - 0.862$

$= 6.438$

$$\begin{array}{r} 7.300 \\ -\ 0.862 \\ \hline 6.438 \end{array}$$

4. Required number $= 91 - 74.5$

$= 16.5$

$$\begin{array}{r} 91.0 \\ -\ 74.5 \\ \hline 16.5 \end{array}$$

5. Required number $= 84.5 - 27.84$

$= 56.66$

$$\begin{array}{r} 84.50 \\ -27.84 \\ \hline 56.66 \end{array}$$

6. Required number $= 50 - 23.754$

$= 26.246$

$$\begin{array}{r} 50.000 \\ -\ 23.754 \\ \hline 26.246 \end{array}$$

7. Weight of fruits = 5.075 kg

Weight of vegetables = + 3.465 kg

Total weight of these contents = 8.540 kg

Weight of bag containing these contents = 9.000 kg

Total weight of contents = − 8.540 kg

Weight of empty bag = 0.460 kg

Hence, the weight of the empty bag is 460 g.

8. Distance covered by scooter = 10.065 km

Distance covered by scooter = + 3.075 km

Total distance covered by Geeta = 13.14 km

Total distance between Geeta's house and her office = 14.000 km

Distance covered by Geeta = − 13.140 km

Distance covered by walking = 0.860 km

Hence, distance covered by walking is 860 m.

9. Weight of bag of Usha = 6.080 kg

Weight of bag of Sudha = − 5.265 kg

Difference between both bags = 0.815 kg

Hence, Usha's bag is heavier by 815 g.

10. Cost of notebook = ₹ 19.75
Cost of pencil = ₹ 3.85
Cost of pen = + ₹ 8.35
Total cost of these items = ₹ 31.95

Sagar gave money to the shopkeeper = ₹ 50.00
Total cost of these items = + ₹ 31.95
Amount got back by Sagar = ₹ 18.05

Hence, Sagar got back an amount of ` 18.05.

EXERCISE 7E

1. (c) **2.** (d) **3.** (b) **4.** (a) **5.** (c)

6. $2\frac{12}{100} = 2 + \frac{12}{100}$
$= 2 + 0.12$
$= 2.12$
(a) is correct.

7. $4\frac{8}{100} = 4 + \frac{8}{100}$
$= 4 + 0.08$
$= 4.08$
(b) is correct.

8. $7.25 = \frac{725}{100} = \frac{29}{4} = 7\frac{1}{4}$
(b) is correct.

9. $\frac{8}{25} = 0.32$
(b) is correct.

$$\begin{array}{r|l} 25 & 80\ (0.32 \\ & -75 \\ \hline & 50 \\ & -50 \\ \hline & \times \end{array}$$

10. $9\frac{7}{8} = 9 + \frac{7}{8}$
$= 9 + 0.875$
$= 9.875$
(c) is correct.

$$\begin{array}{r|l} 8 & 70\ (0.875 \\ & -64 \\ \hline & 60 \\ & -56 \\ \hline & 40 \\ & -40 \\ \hline & \times \end{array}$$

11. $42.8 = \frac{428}{10}$
$= \frac{214}{5}$
$= 42\frac{4}{5}$
(a) is correct.

$$\begin{array}{r|l} 5 & 214\ (42 \\ & -20 \\ \hline & 14 \\ & -10 \\ \hline & 4 \end{array}$$

12. $8\frac{1}{25} = 8 + \frac{1}{25}$
$= 8 + 0.04$
$= 8.04$
(b) is correct.

$$\begin{array}{r|l} 25 & 100\ (0.04 \\ & -100 \\ \hline & \times \end{array}$$

13. $7 + \frac{6}{10} + \frac{5}{100} = 7 + 0.6 + 0.05$
$= 7.65$
(c) is correct.

14. $3+\frac{7}{100}=3+0.07=3.07$

(b) is correct.

15. $\frac{2}{100}+\frac{5}{10000}=0.02+0.0005$

$=0.0205$

(c) is correct.

HOTS

- Last digit of decimal number = hundredths place digit = 3

  Tenths place digit = hundredths place digit − 1

  $= 3-1=2$

  Other digit = Tenths place digit + 3

  $= 2+3=5$

  Decimal number = 5.23

VALUE BASED

- Shikha and Asha got money from their mother = ` 200

  Shikha's share = ` 200 ÷ 2 = ` 100

  Shikha spend money = ` 25.80 + ` 38.65

  = ` 64.45

  Shikha returned remaining money = ` 100 − ` 64.45

  = ` 35.55

Chapter 8 Algebraic Expressions

EXERCISE 8A

1. (a) x increased by $10 = x+10$

(b) y decreased by $5 = y-5$

(c) The difference of a and b, when $a > b = a-b$

(d) The product of x and y added to their sum $= (x+y)+xy$

(e) One-third of x multiplied by the sum of a and $b = \frac{1}{3}x(a+b)$

(f) 4 times x added to 6 times $y = 6y+4x$

(g) Sum of x and the quotient of y by $8 = x+\frac{y}{8}$

(h) x taken away from $9 = 9-x$

(i) 3 less than the quotient of x by $y = \frac{x}{y}-3$

(j) x multiplied by itself $= x^2$

(k) Twice x increased by $y = 2x + y$

(l) x minus twice $y = x - 2y$

(m) Thrice x added to y squared $= y^2 + 3x$

(n) The quotient of x by 7 is multiplied by $y = \frac{x}{7} \times y$

(o) x cubed less than y cubed $= y^3 - x^3$

2. Raj scores in English = 70 marks

Raj scores in Hindi = x marks

Total score = $(70 + x)$ marks

3. (a) $b \times b \times b \times$ 17 times $= b^{17}$

(b) $y \times y \times y \times$ 18 times $= y^{18}$

(c) $12 \times a \times a \times a \times a \times b \times b \times b \times b = 12a^4b^4$

(d) $5 \times x \times x \times y \times y \times y = 5x^2y^3$

(e) $8 \times z \times z \times z \times y \times y \times x = 8z^3y^2x$

4. (a) $4x^4 = 4 \times x \times x \times x \times x$

(b) $x^3y^5 = x \times x \times x \times y \times y \times y \times y \times y$

(c) $7xy^2z^3 = 7 \times x \times y \times y \times z \times z \times z$

(d) $15x^2y^2z^2 = 15 \times x \times x \times y \times y \times z \times z$

EXERCISE 8B

1. Given, $a = 2$ and $b = 3$, then

(a) $a^3 - b^3 = (2)^3 - (3)^3 = 8 - 27 = -19$

(b) $ab - b^2 = 2 \times 3 - (3)^2 = 6 - 9 = -3$

(c) $a^2 + ab = (2)^2 + 2 \times 3 = 4 + 6 = 10$

(d) $a + b = 2 + 3 = 5$

(e) $2a - 3b = 2 \times 2 - 3 \times 3 = 4 - 9 = -5$

(f) $5a^2 - 2ab = 5 \times (2)^2 - 2 \times 2 \times 3 = 5 \times 4 - 12 = 20 - 12 = 8$

2. Given, $x = 1$, $y = 2$ and $z = 5$, then

(a) $x^3 - y^3 - z^3 = (1)^3 - (2)^3 - (5)^3$

$= 1 - 8 - 125$

$= 1 - 133 = -132$

(b) $xy + yz - zx = 1 \times 2 + 2 \times 5 - 5 \times 1$

$= 2 + 10 - 5$

$= 12 - 5$

$= 7$

(c) $x^2 + y^2 + z^2 = (1)^2 + (2)^2 + (5)^2$

$= 1 + 4 + 25$

$= 30$

(d) $3x - 2y + 4z = 3 \times 1 - 2 \times 2 + 4 \times 5$

$= 3 - 4 + 20$

$= 23 - 4$

$= 19$

(e) $2x^2 - 3y^2 + z^2 = 2 \times (1)^2 - 3 \times (2)^2 + (5)^2$

$= 2 \times 1 - 3 \times 4 + 25$

$= 2 - 12 + 25$

$= 27 - 12$

$= 15$

(f) $2x^2 y - 5yz + xy^2 = 2 \times (1)^2 \times 2 - 5 \times 2 \times 5 + 1 \times (2)^2$

$= 2 \times 1 \times 2 - 50 + 1 \times 4$

$= 4 - 50 + 4$

$= 8 - 50$

$= -42$

3. Given, $p = -2$, $q = -1$ and $r = 3$, then

(a) $p - q - r = -2 - (-1) - 3$

$= -2 + 1 - 3$

$= -5 + 1$

$= -4$

(b) $p^4 + q^4 - r^4 = (-2)^4 + (-1)^4 - (3)^4$

$= 16 + 1 - 81$

$= 17 - 81$

$= -64$

(c) $p^2 + q^2 - r^2 = (-2)^2 + (-1)^2 - (3)^2$

$= 4 + 1 - 9$

$= 5 - 9$

$= -4$

(d) $2p^2 - q^2 + 3r^2 = 2 \times (-2)^2 - (-1)^2 + 3 \times (3)^2$

$= 2 \times 4 - 1 + 3 \times 9$

$= 8 - 1 + 27$

$= 35 - 1$

$= 34$

(e) $3p^2q + 5pq^2 + 2pqr$

$= 3\times(-2)^2\times(-1) + 5\times(-2)\times(-1)^2 + 2\times(-2)\times(-1)\times 3$

$= 3\times 4\times(-1) + 5\times(-2)\times 1 + 12$

$= -12 - 10 + 12$

$= -10$

(f) $p^3 + q^3 + r^3 + 3pqr = (-2)^3 + (-1)^3 + (3)^3 + 3\times(-2)\times(-1)\times 3$

$= -8 + (-1) + 27 + 18$

$= -8 - 1 + 27 + 18$

$= -9 + 45$

$= 36$

4. (a) Coefficient of x^3 in $x^3 = 1$

(b) Coefficient of z in $-7xz = -7x$

(c) Coefficient of x^2 in $-x^2 = -1$

(d) Coefficient of y^2 in $8xy^2z = 8xz$

5. (a) Numerical coefficient of $7xyz = 7$

(b) Numerical coefficient of $ab = 1$

(c) Numerical coefficient of $-6bc = -6$

(d) Numerical coefficient of $-2x^3y^2z = -2$

6. (a) Constant term of $2x^2 - 9 = -9$

(b) Constant term of $3x^2 + 5x + 8 = 8$

(c) Constant term of $z^3 - 2z^2 + z - \frac{8}{3} = -\frac{8}{3}$

(d) Constant term of $4y^2 - 5y + \frac{3}{5} = \frac{3}{5}$

7. (a) Monomial (b) Monomial (c) Monomial (d) Binomial
(e) Monomial (f) Trinomial (g) Binomial (h) Trinomial
(i) None

8. (a) $9x^3, -5z^4, 7x^3y, -xyz$ (b) $4x^5, -6y^4, 7x^2y, -9$

EXERCISE 8C

1. (a) $3x + 2y$

(b) $3x + 7x = (3 + 7)x$

$= 10x$

(c) $7y + (-9y) = 7y - 9y$

$= (7 - 9)y$

$= -2y$

(d) $2xy + 5xy + (-xy) = 2xy + 5xy - xy$

$= (2 + 5 - 1)xy$

$= 6xy$

(e) $2x^2 + (-3x^2) + 7x^2 = 2x^2 - 3x^2 + 7x^2$

$= (2 - 3 + 7)x^2$

$= 6x^2$

(f) $6a^3 + (-4a^3) + 10a^3 + (-8a^3) = 6a^3 - 4a^3 + 10a^3 - 8a^3$

$= (6 - 4 + 10 - 8)a^3 = 4a^3$

(g) $(x^2 - a^2) + (-5x^2 + 2a^2) + (-4x^2 + 4a^2)$

$= x^2 - a^2 - 5x^2 + 2a^2 - 4x^2 + 4a^2$

$= x^2 - 5x^2 - 4x^2 - a^2 + 2a^2 + 4a^2$

$= (1 - 5 - 4)x^2 + (-1 + 2 + 4)a^2$

$= -8x^2 + 5a^2$

(h) $7xyz + (-5xyz) + 9xyz + (-8xyz)$

$= 7xyz - 5xyz + 9xyz - 8xyz$

$= (7 - 5 + 9 - 8)xyz$

$= 3xyz$

2. (a)

$$\begin{array}{r} m^2 - 4m + 5 \\ -2m^2 + 6m - 6 \\ -\ m^2 - 2m - 7 \\ \hline -2m^2 \qquad -8 \end{array}$$

(b)

$$\begin{array}{r} 4xy - 5yz + zx \\ 5yz - 2xy + zx \\ 2xy - 3yz + zx \\ \hline 3xy - 6yz + zx \end{array}$$

(c)

$$\begin{array}{r} 2x^2 - 3xy + y^2 \\ -7x^2 - 5xy - 2y^2 \\ 4x^2 + xy - 6y^2 \\ \hline -x^2 - 7xy - 7y^2 \end{array}$$

3. (a) $(8a - 6ab + 5b) + (-6a - ab - 8b) + (-4a + 2ab + 3b)$

$= 8a - 6ab + 5b - 6a - ab - 8b - 4a + 2ab + 3b$

$= 8a - 6a - 4a - 6ab - ab + 2ab + 5b - 8b + 3b$

$= (8 - 6 - 4)a + (-6 - 1 + 2)ab + (5 - 8 + 3)b$

$= -2a - 5ab$

(b) $(3a - 2b + 5c) + (2a + 5b - 7c) + (-a - b + c)$

$= 3a - 2b + 5c + 2a + 5b - 7c - a - b + c$

$= 3a - 2a - a - 2b + 5b - b + 5c - 7c + c$

$= (3 + 2 - 1)a + (-2 + 5 - 1)b + (5 - 7 + 1)c$

$= 4a + 2b - c$

(c) $(2+x-x^2+6x^3)+(-6-2x+4x^2-3x^2)+(2+x^2)$
$+(3-x^3+4x-2x^2)$

$=2+x-x^2+6x^3-6-2x+4x^2-3x^2+2+x^2+3-x^3+4x-2x^2$

$=2-6+2+3+x-2x+4x-x^2+4x^2-3x^2+x^2-2x^2+6x^3-x^3$

$=(2-6+2+3)+(1-2+4)x+(-1+4-3+1)x^2+(-2+6-1)x^3$

$=1+3x+x^2+3x^3$

(d) $(x^3+y^3-z^3+3xyz)+(-x^3+y^3+z^3-6xyz)+(x^3-y^3-z^3-8xyz)$

$=x^3+y^3-z^3+3xyz-x^3+y^3+z^3-6xyz+x^3-y^3-z^3-8xyz$

$=x^3-x^3+x^3+y^3+y^3-y^3-z^3+z^3-z^3+3xyz-6xyz-8xyz$

$=(1-1+1)x^3+(1+1-1)y^3+(-1+1-1)z^3+(3-6-8)xyz$

$=x^3+y^3-z^3-11xyz$

(e) $(2x^2-8xy+7y^2-8xy^2)+(2xy^2+6xy-y^2+3x^2)+$
$(4y^2-xy-x^2+xy^2)$

$=2x^2-8xy+7y^2-8xy^2+2xy^2+6xy-y^2+3x^2+4y^2-xy-x^2+xy^2$

$=2x^2+3x^2-x^2-8xy+6xy-xy-8xy^2+2xy^2+xy^2+7y^2-y^2+4y^2$

$=(2+3-1)x^2+(-8+6-1)xy+(-8+2+1)xy^2+(7-1+4)y^2$

$=4x^2-3xy-5xy^2+10y^2$

(f) $(2x^3-3x^2+7x-8)+(-5x^3+2x^2-4x+1)+(3-6x+5x^2-x^3)$

$=2x^3-3x^2+7x-8-5x^3+2x^2-4x+1+3-6x+5x^2-x^3$

$=2x^3-5x^3-x^3-3x^2+2x^2+5x^2+7x-4x-6x-8+1+3$

$=(2-5-1)x^3+(-3+2+5)x^2+(7-4-6)x+(-8+1+3)$

$=-4x^3+4x^2-3x-4$

4. (a) $5b-3a$ (b) $2x-5x=-3x$

(c) $6xy-(-xy)=6xy+xy=7xy$ (d) $-7x^2-10x^2=-17x^2$

(e) $9y-(-7x)=9y+7x$

(f) $(b^2-a^2)-(a^2-b^2)=b^2-a^2-a^2+b^2=2b^2-2a^2$

5. (a)
$$\begin{array}{r} 5a-2b-3c \\ -2a+b+6d \\ \hline 7a-3b-3c-6d \end{array}$$

(b)
$$\begin{array}{r} 9x^2y^2-6xy+9 \\ -11x^3+7xy-6 \\ \hline 11x^3+9x^2y^2-13xy+15 \end{array}$$

(c)
$$\begin{array}{r} y^3-3xy^2-4x^2y \\ -y^3+6xy^2+2x^2y+x^3 \\ \hline 2y^3-9xy^2-6x^2y-x^3 \end{array}$$

(d)
$$\begin{array}{r} 4-5x+6x^2-8x^3 \\ -3+5x-7x^2+6x^3 \\ \hline 7-10x+13x^2-14x^3 \end{array}$$

(e) $7x^2 - 2xy - 4y^2$
$5x^2 - 3xy + y^2$
$2x^2 + xy - 5y^2$

(f) $-2a + 5b - 4c$
$a - 2b + 3c$
$-3a + 7b - c$

(g) $7\,3a \quad 4 \quad c$
$7\,5a \quad 2 \quad c$
$2 \quad 4 \quad 6 \quad c$

6. (a) $x^4 - 6x^3 + 2x - 7 + 7x^3 - x + 5x^2 + 2 - x^4$
$= x^4 - x^4 - 6x^3 + 7x^3 + 5x^2 + 2x - x - 7 + 2$
$= (1-1)x^4 + (-6+7)x^3 + 5x^2 + (2-1)x + (-7+2)$
$= x^3 + 5x^2 + x - 5$

(b) $2x^2 - xy + 6x - 4y + 5xy - 4x + 6x^2 + 3y$
$= 2x^2 + 5x^2 + 6x - 4x - xy + 5xy - 4y + 3y$
$= (2+6)x^2 + (6-4)x + (-1+5)xy + (-4+3)y$
$= 8x^2 + 2x + 4xy - y$

(c) $2p^3 - 3p^2 + 4p - 5 - 6p^3 + 2p^2 - 8p - 2 + 6p + 8$
$= 2p^3 - 6p^3 - 3p^2 + 2p^2 + 4p - 8p + 6p - 5 - 2 + 8$
$= (2-6)p^3 + (-3+2)p^2 + (4-8+6)p + (-5-2+8)$
$= -4p^3 - p^2 + 2p + 1$

7. $3x^2\,5\,2$
$5\,8\,x^2\,6$
$2\,x^2\,3\,8$ (On adding)
$9\,4x^2\,7x$
$6\,x^2\,4\,1x$ (On subtracting)

8. $(x^3 + 3x^2 - x + 1) - (5x^3 - 2x^2 + 6x + 7)$
$x^3 + 3x^2 - x + 1$
$5x^3 - 2x^2 + 6x + 7$
$-4x^3 + 5x^2 - 7x - 6$

9. Given, $A = 7x^2 + 5xy - 9y^2$; $B = -4x^2 + xy + 5y^2$; $C = 4y^2 - 3x^2 - 6xy$

According to question,

L.H.S. $= A + B + C$

$= (7x^2 + 5xy - 9y^2) + (-4x^2 + xy + 5y^2) + (4y^2 - 3x^2 - 6xy)$

$= 7x^2 + 5xy - 9y^2 - 4x^2 + xy + 5y^2 + 4y^2 - 3x^2 - 6xy$

$= 7x^2 - 4x^2 - 3x^2 + 5xy + xy - 6xy - 9y^2 + 5y^2 + 4y^2$

$= (7 - 4 - 3)x^2 + (5 + 1 - 6)xy + (-9 + 5 + 4)y^2$

$= 0 \times x^2 + 0 \times xy + 0 \times y^2$

$= 0 =$ R.H.S.

10.

$$\begin{array}{r} 5x - 4y + 6z \\ -8x + y - 2z \\ \hline -3x - 3y + 4z \\ \hline \end{array} \qquad \begin{array}{r} 12x - y + 3z \\ -3x + 5y - 8z \\ \hline 9x + 4y - 5z \\ \hline \end{array}$$

According to question,

$$\begin{array}{r} 9x + 4y - 5z \\ -3x - 3y + 4z \\ \hline 12x + 7y - 9z \\ \hline \end{array}$$

11. $1 - (2x - 3y - 4) = 1 - 2x + 3y + 4$

$= 1 + 4 - 1x + 3y$

$= 5 - 2x + 3y$

12. Required expression $= (2x - 3y + 4z) - (2x + 5y - 6z + 2)$

$= 2x - 3y + 4z - 2x - 5y + 6z - 2$

$= 2x - 2x - 3y - 5y + 4z + 6z - 2$

$= (2 - 2)x + (-3 - 5)y + (4 + 6)z - 2$

$= -8y + 10z - 2$

13. Required expression $= (a^3 - 4a^2 + 5a - 6) - (a^2 - 2a + 1)$

$= a^3 - 4a^2 + 5a - 6 - a^2 + 2a - 1$

$= a^3 - 4a^2 - a^2 + 5a + 2a - 6 - 1$

$= a^3 + (-4 - 1)a^2 + (5 + 2)a + (-6 - 1)$

$= a^3 - 5a^2 + 7a - 7$

14. Required expression $= (x-2y+3z)-(2x-4y-z)$

$= x-2y+3z-2x+4y+z$

$= x-2x-2y+4y+3z+z$

$= (1-2)x+(-2+4)y+(3+1)z$

$= -x+2y+4z$

15. Required expression $= (3x^2-5x+6)-(x^3-x^2+4x-1)$

$= 3x^2-5x+6-x^3+x^2-4x+1$

$= -x^3+3x^2+x^2-5x-4x+6+1$

$= -x^3+(3+1)x^2+(-5-4)x+(6+1)$

$= -x^3+4x^2-9x+7$

EXERCISE 8D

1. $4x-(3y-x+2z) = 4x-3y+x-2z$

$= 4x+x-3y-2z$

$= 5x-3y-2z$

2. $a-(b-2a) = a-b+2a$

$= a+2a-b = 3a-b$

3. $-3(a+b)+4(2a-3b)-(2a-b) = -3a-3b+8a-12b-2a+b$

$= -3a+8a-2a-3b-12b+b$

$= 3a-14b$

4. $(a^2+b^2+2ab)-(a^2+b^2-2ab) = a^2+b^2+2ab-a^2-b^2+2ab$

$= a^2-a^2+b^2-b^2+2ab+2ab$

$= 4ab$

5. $a-[2b-\{3a-(2b-3c)\}] = a-[2b-\{3a-2b+3c\}]$

$= a-[2b-3a+2b-3c]$

$= a-[-3a+2b+2b-3c]$

$= a+3a-2b-2b+3c$

$= 4a-4b+3c$

6. $-x+[5y-\{x-(5y-2x)\}] = -x+[5y-\{x-5y+2x\}]$

$= -x+[5y-\{x+2x-5y\}]$

$= -x+[5y-\{3x-5y\}]$

$= -x+[5y-3x+5y]$

$= -x+5y-3x+5y$

$= -x-3x+5y+5y$

$= -4x+10y$

7. $-2(x^2 - y^2 + xy) - 3(x^2 + y^2 - xy)$

$= -2x^2 + 2y^2 - 2xy - 3x^2 - 3y^2 + 3xy$

$= -2x^2 - 3x^2 + 2y^2 - 3y^2 - 2xy + 3xy$

$= -5x^2 - y^2 + xy$

8. $-4x^2 + \{(2x^2 - 3) - (4 - 3x^2)\} = -4x^2 + \{2x^2 - 3 - 4 + 3x^2\}$

$= -4x^2 + \{2x^2 + 3x^2 - 3 - 4\}$

$= -4x^2 + \{5x^2 - 7\}$

$= -4x^2 + 5x^2 - 7$

$= x^2 - 7$

9. $5a - [a^2 - \{2a(1 - a + 4a^2) - 3a(a^2 - 5a - 3)\}] - 8a$

$= 5a - [a^2 - \{2a - 2a^2 + 8a^3 - 3a^3 + 15a^2 + 9a\}] - 8a$

$= 5a - [a^2 - \{8a^3 - 3a^3 - 2a^2 + 15a^2 + 2a + 9a\}] - 8a$

$= 5a - [a^2 - \{5a^3 + 13a^2 + 11a\}] - 8a$

$= 5a - [a^2 - 5a^3 - 13a^2 - 11a] - 8a$

$= 5a - a^2 + 5a^3 + 13a^2 + 11a - 8a$

$= 5a^3 - a^2 + 13a^2 + 5a + 11a - 8a$

$= 5a^3 + 12a^2 + 8a$

10. $3 - [x - \{2y - (5x + y - 3) + 2x^2\} - (x^2 - 3y)]$

$= 3 - [x - \{2y - 5x - y + 3 + 2x^2\} - x^2 + 3y]$

$= 3 - [x - \{2x^2 - 5x + 2y - y + 3\} - x^2 + 3y]$

$= 3 - [x - \{2x^2 - 5x + y + 3\} - x^2 + 3y]$

$= 3 - [x - 2x^2 + 5x - y - 3 - x^2 + 3y]$

$= 3 - [-2x^2 - x^2 + x + 5x - y + 3y - 3]$

$= 3 - [-3x^2 + 6x + 2y - 3]$

$= 3 + 3x^2 - 6x - 2y + 3$

$= 3x^2 - 6x - 2y + 6$

11. $xy - [yz - zx - \{yx - (3y - xz) - (xy - zy)\}]$

$= xy - [yz - zx - \{yx - 3y + xz - xy + zy\}]$

$= xy - [yz - zx - \{-yx + yx - 3y + zy + xz\}]$

$= xy - [yz - zx - \{-3y + zy + xz\}]$

$= xy - [yz - zx + 3y - zy - xz\}]$

$= xy - [yz - zy - zx - xz + 3y\}]$

$= xy - [-2xz + 3y]$

$= xy + 2xz - 3y$

12. $2a - 3b - [3a - 2b - \{a - c - (a - 2b)\}]$

$= 2a - 3b - [3a - 2b - \{a - c - a + 2b\}]$

$= 2a - 3b - [3a - 2b - \{a - a + 2b - c\}]$

$= 2a - 3b - [3a - 2b - \{2b - c\}]$

$= 2a - 3b - [3a - 2b - 2b + c]$

$= 2a - 3b - 3a + 2b + 2b - c$

$= 2a - 3a - 3b + 2b + 2b - c = -a + b - c$

13. $-a - [a + \{a + b - 2a - (a - 2b)\} - b] = -a - [a + \{a + b - 2a - a + 2b\} - b]$

$= -a - [a + \{a - 2a - a + b + 2b\} - b]$

$= -a - [a + \{-2a + 3b\} - b]$

$= -a - [a - 2a + 3b - b]$

$= -a - [-a + 2b]$

$= -a + a - 2b = -2b$

14. $5x - [4y - \{7x - (3z - 2y) + 4z - 3(x + 3y - 2z)\}]$

$= 5x - [4y - \{7x - 3z + 2y + 4z - 3x - 9y + 6z\}]$

$= 5x - [4y - \{7x - 3x + 2y - 9y - 3z + 4z + 6z\}]$

$= 5x - [4y - \{4x - 7y + 7z\}]$

$= 5x - [4y - 4x + 7y - 7z]$

$= 5x - 4y + 4x - 7y + 7z$

$= 5x + 4x - 4y - 7y + 7z$

$= 9x - 11y + 7z$

15. $2a - [4b - \{4a - (3b - \overline{2a + 2b})\}] = 2a - [4b - \{4a - (3b - 2a - 2b)\}]$

$= 2a - [4b - \{4a - 3b + 2a + 2b\}]$

$= 2a - [4b - \{4a + 2a - 3b + 2b\}]$

$= 2a - [4b - \{6a - b\}]$

$= 2a - [4b - 6a + b]$

$= 2a - [-6a + 4b + b]$

$= 2a - [-6a + 5b]$

$= 2a + 6a - 5b$

$= 8a - 5b$

HOTS

- Beads scattered on the table = half of them = $\frac{1}{2}$

  On the bed = one-third = $\frac{1}{3}$

  On the floor = two-fifths = $\frac{2}{5}$

  Left beads = ten = 10

  Total number of beads of necklace $(x) = \frac{1}{2} + \frac{1}{3} + \frac{2}{5} + 10$

VALUE BASED

- Strength of the primary class = x

  Collected money = $15 \times x = 15x$

  Strength of the secondary class = y

  Collected money = $25 \times y = 25y$

  Total collected money = $15x + 25y$

EXERCISE 9A

1. Let the number be x, then

(a) $x - 5 = 3$ (b) $25 - x = 7$ (c) $x + 8 = 15$ (d) $5x = 40$

(e) $6x = x + 5$ (f) $4x - 3 = 17$ (g) $\frac{x}{8} = 7$ (h) $19 - 2x = 11$

(i) $x - 12 = 24$ (j) $3x - 5 = 16$

2. (a) Thrice the number y is 27.

(b) 8 less from the number x is 16.

(c) 3 less from twice the number x is 17.

(d) 13 increased by thrice the number x is 19.

(e) 14 times the number y decreased by 34 is 8.

(f) Twice the number z divided by 3 is 8.

3. (a) Given, $\frac{z}{7} = 8$

Putting $z = 56$

$\frac{56}{7} = 8$

$8 = 8$

LHS = RHS **Verified.**

(b) Given, $8 - 7y = 1$

Putting $y = 1$

$8 - 7 \times 1 = 1$

$8 - 7 = 1$

$1 = 1$

LHS = RHS **Verified.**

(c) Given, $5x - 8 = 2x - 2$

Putting $x = 2$

$5 \times 2 - 8 = 2 \times 2 - 2$

$10 - 8 = 4 - 2$

$2 = 2$

LHS = RHS **Verified.**

(d) Given, $3 + 2x = 9$

Putting $x = 3$

$3 + 2 \times 3 = 9$

$3 + 6 = 9$

$9 = 9$

LHS = RHS **Verified.**

(e) Given, $3x - 5 = 7$

Putting $x = 4$

$3 \times 4 - 5 = 7$

$12 - 5 = 7$

$7 = 7$

LHS = RHS **Verified.**

4. (a) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

[Note, the value of x can not be less than 7.]

x	LHS	RHS
8	$8 - 7 = 1$	10
9	$9 - 7 = 2$	10
11	$11 - 7 = 4$	10
13	$13 - 7 = 6$	10
15	$15 - 7 = 8$	10
17	$17 - 7 = 10$	10

Thus, when $x = 17$, we have : LHS = RHS.

$x = 17$ is the solution of the given equation.

(b) We try several values of y and find the values of LHS and the RHS. We stop when for a particular value of y, LHS = RHS.

y	LHS	RHS
1	$1 + 9 = 10$	13
2	$2 + 9 = 11$	13
3	$3 + 9 = 12$	13
4	$4 + 9 = 13$	13

Thus, when $y = 4$, we have : LHS = RHS.

$y = 4$ is the solution of the given equation.

(c) We try several values of y and find the values of LHS and the RHS. We stop when for a particular value of y, LHS = RHS.

[Note, $3 \times 10 = 30$ (< 36), so we will start with 10 because 30 is near to 36.]

y	LHS	RHS
10	$3\times 10 = 30$	36
11	$3\times 11 = 33$	36
12	$3\times 12 = 36$	36

Thus, when $y = 12$, we have : LHS = RHS.

$y = 12$ is the solution of the given equation.

(d) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

x	LHS	RHS
1	$4\times 1 = 4$	28
2	$4\times 2 = 8$	28
3	$4\times 3 = 12$	28
4	$4\times 4 = 16$	28
5	$4\times 5 = 20$	28
6	$4\times 6 = 24$	28
7	$4\times 7 = 28$	28

Thus, when $x = 7$, we have : LHS = RHS.

$x = 7$ is the solution of the given equation.

(e) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

x	LHS	RHS
1	$2\times 1-3 = -1$	9
2	$2\times 2-3 = 1$	9
3	$2\times 3-3 = 3$	9
4	$2\times 4-3 = 5$	9
6	$2\times 6-3 = 9$	9

Thus, when $x = 6$, we have : LHS = RHS.

$x = 6$ is the solution of the given equation.

(f) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

x	LHS	RHS
2	$11+2 = 13$	19
4	$11+4 = 15$	19
6	$11+6 = 17$	19
8	$11+8 = 19$	19

Thus, when $x = 8$, we have : LHS = RHS.

$x = 8$ is the solution of the given equation.

(g) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

x	LHS	RHS
2	$\frac{2}{3}$	4
4	$\frac{4}{3}$	4
6	$\frac{6}{3} = 2$	4
8	$\frac{8}{3}$	4
10	$\frac{10}{3}$	4
12	$\frac{12}{3} = 4$	4

Thus, when $x = 12$, we have : LHS = RHS.

$x = 12$ is the solution of the given equation.

(h) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

x	LHS	RHS
2	$\frac{2}{2} + 7 = 1 + 7 = 8$	11
4	$\frac{4}{2} + 7 = 2 + 7 = 9$	11
6	$\frac{6}{2} + 7 = 3 + 7 = 10$	11
8	$\frac{8}{2} + 7 = 4 + 7 = 11$	11

Thus, when $x = 8$, we have : LHS = RHS.

$x = 8$ is the solution of the given equation.

(i) We try several values of x and find the values of LHS and the RHS. We stop when for a particular value of x, LHS = RHS.

z	LHS	RHS
1	$1 - 3 = -2$	$2 \times 1 - 5 = 2 - 5 = -3$
2	$2 - 3 = -1$	$2 \times 2 - 5 = 4 - 5 = -1$

Thus, when $z = 2$, we have : LHS = RHS.

$z = 2$ is the solution of the given equation.

(j) We try several values of y and find the values of LHS and the RHS. We stop when for a particular value of y, LHS = RHS.

y	LHS	RHS
1	$2\times1+4=2+4=6$	$3\times1=3$
2	$2\times2+4=4+4=8$	$3\times2=6$
3	$2\times3+4=6+4=10$	$3\times3=9$
4	$2\times4+4=8+4=12$	$3\times4=12$

Thus, when $y=4$, we have : LHS = RHS.

$y=4$ is the solution of the given equation.

EXERCISE 9B

1. $x-2=-5$

$x-2+2=-5+2$ (adding 2 to both sides)

$x=-3$

Check : Substituting $x=-3$ in the given equation.

LHS $=-3-2=-5$ and RHS $=-5$

LHS = RHS, when $x=-3$

2. $x-7=6$

$x-7+7=6+7$ (adding 7 to both sides)

$x=13$

Check : Substituting $x=13$ in the given equation.

LHS $=13-7=6$ and RHS $=6$

LHS = RHS, when $x=13$

3. $x+3=-2$

$x+3-3=-2-3$ (substracting 3 from both sides)

$x=-5$

Check : Substituting $x=-5$ in the given equation.

LHS $=-3-2=-5$ and RHS $=-2$

LHS = RHS, when $x=-5$

4. $x+5=12$

$x+5-5=12-5$ (substracting 5 from both sides)

$x=7$

Check : Substituting $x=7$ in the given equation.

LHS $=7+5=12$ and RHS $=12$

LHS = RHS, when $x=7$

5. $4x + 7 = 15$

$4x + 7 - 7 = 15 - 7$ (substracting 7 from both sides)

$4x = 8$

$\frac{4x}{4} = \frac{8}{4}$ (dividing both sides by 4)

$x = 2$

Check : Substituting $x = 2$ in the given equation.

LHS $= 4 \times 2 + 7 = 8 + 7 = 15$ and RHS $= 15$

LHS = RHS, when $x = 2$

6. $3x - 5 = 13$

$3x - 5 + 5 = 13 + 5$ (adding 5 to both sides)

$3x = 18$

$\frac{3x}{3} = \frac{18}{3}$ (dividing both sides by 3)

$x = 6$

Check : Substituting $x = 6$ in the given equation.

LHS $= 3 \times 6 - 5 = 18 - 5 = 13$ and RHS $= 13$

LHS = RHS, when $x = 6$

7. $5x - 3 = x + 17$

$5x - 3 + 3 = x + 17 + 3$ (adding 3 to both sides)

$5x = x + 20$

$5x - x = x + 20 - x$ (substracting x from both sides)

$4x = 20$

$\frac{4x}{4} = \frac{20}{4}$ (dividing both sides by 4)

$x = 5$

Check : Substituting $x = 5$ in the given equation.

LHS $= 5 \times 5 - 3 = 25 - 3 = 22$ and RHS $= 5 + 17 = 22$

LHS = RHS, when $x = 5$

8. $\frac{x}{5} = 12$

$\frac{x}{5} \times 5 = 12 \times 5$ (multiplying both sides by 5)

$x = 60$

Check : Substituting $x = 60$ in the given equation.

$$\text{LHS} = \frac{60}{5} = 12 \text{ and RHS} = 60$$

$$\text{LHS} = \text{RHS, when } x = 60$$

9. $\frac{3x}{5} = 15$

$$\frac{3x}{5} \times 5 = 15 \times 5 \qquad \text{(multiplying both sides by 5)}$$

$$3x = 75$$

$$\frac{3x}{3} = \frac{75}{3} \qquad \text{(dividing both sides by 3)}$$

$$x = 25$$

Check : Substituting $x = 25$ in the given equation.

$$\text{LHS} = \frac{3 \times 25}{5} = 15 \text{ and RHS} = 15$$

$$\text{LHS} = \text{RHS, when } x = 25$$

10. $\frac{x}{4} - 8 = 1$

$$\frac{x}{4} - 8 + 8 = 1 + 8 \qquad \text{(adding 8 to both sides)}$$

$$\frac{x}{4} = 9$$

$$\frac{x}{4} \times 4 = 9 \times 4 \qquad \text{(multiplying both sides by 4)}$$

$$x = 36$$

Check : Substituting $x = 36$ in the given equation.

$$\text{LHS} = \frac{x}{4} - 8 = \frac{36}{4} - 8 = 9 - 8 = 1 \text{ and RHS} = 1$$

$$\text{LHS} = \text{RHS, when } x = 36$$

11. $2x - \frac{1}{2} = 3$

$$2x = 3 + \frac{1}{2} \qquad \text{(transposing } \frac{1}{2} \text{ to RHS)}$$

$$2x = \frac{6+1}{2}$$

$$2x = \frac{7}{2}$$

$$\frac{2x}{2} = \frac{7}{2 \times 2} \qquad \text{(dividing both sides by 2)}$$

$$x = \frac{7}{4}$$

Check : Substituting $x = \frac{7}{4}$ in the given equation.

$$\text{LHS} = 2 \times \frac{7}{4} - \frac{1}{2} = \frac{7}{2} - \frac{1}{2} = \frac{7-1}{2} = \frac{6}{2} = 3 \text{ and RHS} = 3$$

$$\text{LHS} = \text{RHS, when } x = 3$$

12. $\frac{x}{2} = \frac{x}{3} + 1$

$$\frac{x}{2} - \frac{x}{3} = 1 \qquad \text{(transposing } \frac{x}{3} \text{ to LHS)}$$

$$\frac{3x - 2x}{6} = 1$$

$$\frac{x}{6} = 1$$

$$\frac{x}{6} \times 6 = 1 \times 6 \qquad \text{(multiplying both sides by 6)}$$

$$x = 6$$

Check : Substituting $x = 6$ in the given equation.

$$\text{LHS} = \frac{6}{2} = 3 \text{ and RHS} = \frac{6}{3} + 1 = 2 + 1 = 3$$

$$\text{LHS} = \text{RHS, when } x = 6$$

13. $3(x + 6) = 24$

$$\frac{3(x+6)}{3} = \frac{24}{3} \qquad \text{(dividing both sides by 3)}$$

$$x + 6 = 8$$

$$x = 8 - 6 \qquad \text{(transposing 6 to RHS)}$$

$$x = 2$$

Check : Substituting $x = 2$ in the given equation.

$$\text{LHS} = 3(2 + 6) = 3 \times 8 = 24 \text{ and RHS} = 24$$

$$\text{LHS} = \text{RHS, when } x = 2$$

14. $6x + 5 = 2x + 17$

$$6x - 2x = 17 - 5 \qquad \text{(transposing } 2x \text{ to LHS and 5 to RHS)}$$

$$4x = 12$$

$$\frac{4x}{4} = \frac{12}{4} \qquad \text{(dividing both sides by 4)}$$

$$x = 3$$

Check : Substituting $x = 3$ in the given equation.

$$\text{LHS} = 6\times 3 + 5 = 18 + 5 = 23$$

and $$\text{RHS} = 2\times 3 + 17 = 6 + 17 = 23$$

$$\text{LHS} = \text{RHS, when } x = 3$$

15. $3(2-5x) - 2(1-6x) = 1$

$6 - 15x - 2 + 12x = 1$ (removing parentheses)

$-3x + 4 = 1$

$-3x = 1 - 4$ (transposing 4 to RHS)

$-3x = -3$

$x = 1$ (dividing both sides by -3)

Check : Substituting $x = 1$ in the given equation.

$$\text{LHS} = 3(2-5\times 1) - 2(1-6\times 1)$$
$$= 3(2-5) - 2(1-6)$$
$$= 3\times(-3) - 2\times(-5)$$
$$= -9 + 10 = 1$$

and $$\text{RHS} = 1$$

$$\text{LHS} = \text{RHS, when } x = 1$$

16. $3(x+6) + 2(x+3) = 64$

$3x + 18 + 2x + 6 = 64$ (removing parentheses)

$5x + 24 = 64$

$5x = 64 - 24$ (transposing 24 to RHS)

$5x = 40$

$\frac{5x}{5} = \frac{40}{5}$ (dividing both sides by 5)

$x = 8$

Check : Substituting $x = 8$ in the given equation.

$$\text{LHS} = 3(8+6) + 2(8+3)$$
$$= 3\times 14 + 2\times 11$$
$$= 42 + 22$$
$$= 64$$

and $$\text{RHS} = 64$$

$$\text{LHS} = \text{RHS, when } x = 8$$

17. $16(3x-5) - 10(4x-8) = 40$

$48x - 80 - 40x + 80 = 40$ (removing parentheses)

$8x = 40$

$$\frac{8x}{8} = \frac{40}{8} \qquad \text{(dividing both sides by 8)}$$

$$x = 5$$

Check : Substituting $x = 5$ in the given equation.

$$\text{LHS} = 16(3\times 5 - 5) - 10(4\times 5 - 8)$$
$$= 16(15 - 5) - 10(20 - 8)$$
$$= 16\times 10 - 10\times 12$$
$$= 160 - 120 = 40$$

and $\text{RHS} = 40$

$\text{LHS} = \text{RHS}$, when $x = 5$

18. $6(1 - 4x) + 7(2 + 5x) = 53$

$6 - 24x + 14 + 35x = 53$ (removing parentheses)

$11x + 20 = 53$

$11x = 53 - 20$ (transposing 20 to RHS)

$11x = 33$

$\frac{11x}{11} = \frac{33}{11}$ (dividing both sides by 11)

$x = 3$

Check : Substituting $x = 3$ in the given equation.

$$\text{LHS} = 6(1 - 4\times 3) + 7(2 + 5\times 3)$$
$$= 6(1 - 12) + 7(2 + 15)$$
$$= 6\times(-11) + 7\times 17$$
$$= -66 + 119 = 53$$

and $\text{RHS} = 53$

$\text{LHS} = \text{RHS}$, when $x = 3$

19. $5(x - 1) + 2(x + 3) + 6 = 0$

$5x - 5 + 2x + 6 + 6 = 0$ (removing parentheses)

$7x + 7 = 0$

$7x = -7$ (transposing 7 to RHS)

$x = -1$ (dividing both sides by 7)

Check : Substituting $x = -1$ in the given equation.

$$\text{LHS} = 5(-1 - 1) + 2(-1 + 3) + 6$$
$$= 5\times(-2) + 2\times 2 + 6$$
$$= -10 + 4 + 6$$
$$= 0$$

and $\text{RHS} = 0$

$\text{LHS} = \text{RHS}$, when $x = -1$

20. $\frac{3x}{10} - 4 = 14$

$$\frac{3x}{10} = 14 + 4 \qquad \text{(transposing 4 to RHS)}$$

$$\frac{3x}{10} = 18$$

$$\frac{3x}{10} \times 10 = 18 \times 10 \qquad \text{(multiplying both sides by 10)}$$

$$3x = 180$$

$$\frac{3x}{3} = \frac{180}{3} \qquad \text{(dividing both sides by 3)}$$

$$x = 60$$

Check : Substituting $x = 60$ in the given equation.

$$\text{LHS} = \frac{3 \times 60}{10} - 4$$

$$= 18 - 4$$

$$= 14$$

and $\text{RHS} = 14$

$\text{LHS} = \text{RHS}$, when $x = 60$

21. $\frac{3}{4}(x-1) = x - 3$

$$\frac{3}{4}(x-1) \times 4 = (x-3) \times 4 \qquad \text{(multiplying both sides by 4)}$$

$$3(x-1) = 4(x-3)$$

$$3x - 3 = 4x - 12 \quad \text{(removing parentheses)}$$

$$3x - 4x = -12 + 3 \quad \text{(transposing } -3 \text{ to RHS and } -12 \text{ to LHS)}$$

$$-x = -9 \qquad \text{(dividing both sides by } -1\text{)}$$

$$x = 9$$

Check : Substituting $x = 9$ in the given equation.

$$\text{LHS} = \frac{3}{4}(9-1) = \frac{3}{4} \times 8 = 6$$

and $\text{RHS} = 9 - 3 = 6$

$\text{LHS} = \text{RHS}$, when $x = 9$

22. $\frac{x-3}{5}-2=\frac{2x}{5}$

$\frac{x-3}{5}-\frac{2x}{5}=2$ (transposing -2 to RHS and $\frac{2x}{5}$ to LHS)

$\frac{x-3-2x}{5}=2$

$\frac{-x-3}{5}=2$

$\frac{-x-3}{5}\times 5=2\times 5$ (multiplying both sides by 5)

$-x-3=10$

$-x=10+3$ (transposing -3 to RHS)

$-x=13$

$x=-13$

Check : Substituting $x=-13$ in the given equation.

$$\text{LHS}=\frac{-13-3}{5}-2=\frac{-16}{5}-2=\frac{-16-10}{5}=\frac{-26}{5}$$

and $$\text{RHS}=\frac{2\times(-13)}{5}=\frac{-26}{5}$$

LHS = RHS, when $x=-13$

23. $\frac{n}{4}-5=\frac{n}{6}+\frac{1}{2}$

$\frac{n}{4}-\frac{n}{6}=\frac{1}{2}+5$ (transposing -5 to RHS and $\frac{n}{6}$ to LHS)

$\frac{3n-2n}{12}=\frac{1+10}{2}$

$\frac{n}{12}=\frac{11}{2}$

$\frac{n}{12}\times 12=\frac{11}{2}\times 12$ (multiplying both sides by 12)

$n=66$

Check : Substituting $n=66$ in the given equation.

$$\text{LHS}=\frac{66}{4}-5=\frac{33}{2}-5=\frac{33-10}{2}=\frac{23}{2}$$

and $$\text{RHS}=\frac{66}{6}+\frac{1}{2}=\frac{11}{1}+\frac{1}{2}=\frac{22+1}{2}=\frac{23}{2}$$

LHS = RHS, when $n=66$

24. $\frac{2m}{3}+8=\frac{m}{2}-1$

$$\frac{2m}{3}-\frac{m}{2}=-1-8 \qquad \text{(transposing 8 to RHS and } \frac{m}{2} \text{ to LHS)}$$

$$\frac{4m-3m}{6}=-9$$

$$\frac{m}{6}=-9$$

$$\frac{m}{6}\times 6=-9\times 6 \qquad \text{(multiplying both sides by 6)}$$

$$m=-54$$

Check : Substituting $m=-54$ in the given equation.

$$\text{LHS}=\frac{2\times(-54)}{3}+8=-36+8=-28$$

and $$\text{RHS}=\frac{-54}{2}-1=-27-1=-28$$

$$\text{LHS}=\text{RHS, when } m=-54$$

25. $\frac{2x}{5}-\frac{3}{2}=\frac{x}{2}+1$

$$\frac{2x}{5}-\frac{x}{2}=1+\frac{3}{2} \qquad \text{(transposing } -\frac{3}{2} \text{ to RHS and } \frac{x}{2} \text{ to LHS)}$$

$$\frac{4x-5x}{10}=\frac{2+3}{2}$$

$$\frac{-x}{10}=\frac{5}{2}$$

$$\frac{-x}{10}\times 10=\frac{5}{2}\times 10 \qquad \text{(multiplying both sides by 10)}$$

$$-x=25$$

$$x=-25 \qquad \text{(dividing both sides by } -1\text{)}$$

Check : Substituting $x=-25$ in the given equation.

$$\text{LHS}=\frac{2\times(-25)}{5}-\frac{3}{2}=-10-\frac{3}{2}=\frac{-20-3}{2}=\frac{-23}{2}$$

and $$\text{RHS}=\frac{-25}{2}+1=\frac{-25+2}{2}=\frac{-23}{2}$$

$$\text{LHS}=\text{RHS, when } x=-25$$

EXERCISE 9C

1. Let the three consecutive natural numbers be x, $(x+1)$ and $(x+2)$.

According to given condition,

$$x + x + 1 + x + 2 = 114$$
$$3x + 3 = 114$$
$$3x = 114 - 3$$
$$3x = 111$$
$$x = \frac{111}{3}$$
$$x = 37$$

So, $x = 37$, $x + 1 = 37 + 1 = 38$ and $x + 2 = 37 + 2 = 39$

Hence, the required three natural numbers are 37, 38 and 39.

2. Let the number be x.

According to given condition,

$$5x = x + 80$$
$$5x - x = 80$$
$$4x = 80$$
$$x = \frac{80}{4}$$
$$x = 20$$

Hence, the required number is 20.

3. Let the number be x.

According to given condition,

$$4x - 11 = 89$$
$$4x = 89 + 11$$
$$4x = 100$$
$$x = \frac{100}{4}$$
$$x = 25$$

Hence, 25 is required number.

4. Let the number be y.

According to given condition,

$$y + 9 = 36$$
$$y = 36 - 9$$
$$y = 27$$

Hence, the required number is 27.

5. Let the number be x and $5x$.

According to given condition,

$$5x - x = 132$$
$$4x = 132$$
$$x = \frac{132}{4}$$
$$x = 33$$

Hence, the required number are 33 and $5 \times 33 = 165$.

6. Let the one of the number be x and other is $3x$.

According to given condition,

$$3x + x = 124$$
$$4x = 124$$
$$x = \frac{124}{4}$$
$$x = 31$$

So, $x = 31$ and $3x = 3 \times 31 = 93$

Hence, the required numbers are 31 and 93.

7. Let the number be x.

According to given condition,

$$3x + 5 = 50$$
$$3x = 50 - 5$$
$$3x = 45$$
$$x = \frac{45}{3}$$
$$x = 15$$

Hence, the required number is 15.

8. Let the one of the numbers be x and other be y, where $x > y$.

According to given conditions,

$$x - y = 18$$
$$x = 18 + y$$

and

$$x + y = 92$$
$$18 + y + y = 92$$
$$18 + 2y = 92$$
$$2y = 92 - 18$$
$$2y = 74$$
$$y = \frac{74}{2}$$

$$y = 37$$

So, $x = 18 + y = 18 + 37 = 55$

Hence, the required numbers are 37 and 55.

9. Let the number be a.

According to given condition,

$$17a + 4 = 225$$
$$17a = 225 - 4$$
$$17a = 221$$
$$a = \frac{221}{17}$$
$$a = 13$$

Hence, required number is 13.

10. Let the three consecutive odd numbers be x, $(x + 2)$ and $(x + 4)$.

According to given condition,

$$x + x + 2 + x + 4 = 21$$
$$3x + 6 = 21$$
$$3x = 21 - 6$$
$$3x = 15$$
$$x = \frac{15}{3}$$
$$x = 5$$

So, $x = 5$ and $x + 2 = 5 + 2 = 7$, $x + 4 = 5 + 4 = 9$

Hence, the three consecutive odd numbers are 5, 7 and 9.

11. Let the two consecutive even numbers be x and $x + 2$.

According to given condition,

$$x + x + 2 = 74$$
$$2x + 2 = 74$$
$$2x = 74 - 2$$
$$2x = 72$$
$$x = \frac{72}{2}$$
$$x = 36$$

So, $x = 36$ and $x + 2 = 36 + 2 = 38$

Hence, two consecutive even numbers are 36 and 38.

12. Let the age of Asha be x years and the age of her mother be $(x + 27)$ years.

After 8 years.

Age of Asha = $(x + 8)$ years

Age of her mother $= (x + 27 + 8)$ years

$= (x + 35)$ years

According to given condition,

$$x + 35 = 2(x + 8)$$
$$x + 35 = 2x + 16$$
$$2x - x = 35 - 16$$
$$x = 19$$

Hence, the age of Asha $= 19$ years

the age of her mother $= (19 + 27)$ years $= 46$ years

13. Let the age of Reena's brother be x years and the age of Reena be $(x + 6)$ years.

According to given condition,

$$x + x + 6 = 28$$
$$2x + 6 = 28$$
$$2x = 28 - 6$$
$$2x = 22$$
$$x = \frac{22}{2}$$
$$x = 11$$

Hence, the age of Reena's brother $= 11$ years

the age of Reena $= 11 + 6$ years $= 17$ years

14. Let the age of Harsh be x years and the age of Sobit be $2x$ years.

According to given condition,

$$2x - x = 11$$
$$x = 11$$

Hence, the age of Harsh $= 11$ years

the age of Sobit $= 2 \times 11$ years $= 22$ years

15. Let the age of son be x years and the age of man be $3x$ years.

5 years ago,

The age of son $= (x - 5)$ years

The age of man $= (3x - 5)$ years

According to given condition,

$$3x - 5 = 4(x - 5)$$
$$3x - 5 = 4x - 20$$
$$3x - 4x = 20 - 5$$
$$x = 15$$

Hence, the age of Son = 15 years

the age of man = 3×15 years = 45 years

16. Let the age of son be x years and the age of man be $4x$ years.

After 16 years,

The age of son = $(x + 16)$ years

The age of man = $(4x + 16)$ years

According to given condition,

$$4x + 16 = 2(x + 16)$$
$$4x + 16 = 2x + 32$$
$$4x - 2x = 32 - 16$$
$$2x = 16$$
$$x = \frac{16}{2}$$
$$x = 8$$

Hence, the age of Son = 8 years

the age of man = 4×8 years = 32 years

17. Let the age of Neeraj be x years.

8 years ago, the age of Neeraj be = $(x - 8)$ years.

After 32 years, the age of Neeraj = $(x + 32)$ years.

According to given condition,

$$5(x - 8) = x + 32$$
$$5x - 40 = x + 32$$
$$5x - x = 32 + 40$$
$$4x = 72$$
$$x = \frac{72}{4} = 18$$

Hence, Neeraj is 18 years old today.

18. Let the age of Anuradha be x years.

Age of Anuradha after 16 years = $(x + 16)$ years.

According to given condition,

$$3x = x + 16$$
$$3x - x = 16$$
$$2x = 16$$
$$x = \frac{16}{2}$$
$$x = 8$$

Hence, Anuradha's present age is 8 years.

19. Let the breadth of the rectangular hall be x metres and the length be $(x+5)$ metres.

According to given condition,

$$\text{Perimeter} = 74 \text{ metres}$$
$$2[x+(x+5)] = 74$$
$$x + x + 5 = \frac{74}{2}$$
$$2x + 5 = 37$$
$$2x = 37 - 5$$
$$2x = 32$$
$$x = \frac{32}{2}$$
$$x = 16$$

Hence, the breadth of rectangular hall $= 16$ metres

and the length of rectangular hall $= 16 + 5$ metres $= 21$ metres

20. Let the breadth of the rectangular park be x metres and the length be $3x$ metres.

According to given condition,

$$\text{Perimeter} = 168 \text{ metres}$$
$$2(x+3x) = 168$$
$$2 \times 4x = 168$$
$$8x = 168$$
$$x = \frac{168}{8}$$
$$x = 21$$

Hence, the breadth of rectangular park $= 21$ metres

and the length of rectangular hall $= 3 \times 21$ metres $= 63$ metres

HOTS

- Number $= x$

  One-third of number $= \frac{1}{3}$ of $x = \frac{1}{3} \times x = \frac{x}{3}$

  One-half of one-third of number $= \frac{1}{2}$ of $\frac{x}{3} = \frac{1}{2} \times \frac{x}{3} = \frac{x}{6}$

  According to question, $\frac{x}{6} = 6$

  $$x = 6 \times 6$$
  $$x = 36$$

  Hence, the number is 36.

VALUE BASED

- Suppose the number of saplings planted by school B is x.
  Number of saplings planted by school $A = 45$
  According to question,

$$2x + 3 = 45$$
$$2x = 45 - 3 = 42$$
$$x = \frac{42}{2} \qquad x = 21$$

  Hence, 21 saplings planted by school B.

Chapter 10 Ratio, Proportion and Unitary Method

EXERCISE 10A

1. (a) $8 : 104 = \frac{8}{104} = \frac{8 \div 8}{104 \div 8}$ (HCF of 8 and 104 is 8)

$$= \frac{1}{13}$$

$$8 : 104 = 1 : 13$$

(b) $104 : 168 = \frac{104}{168} = \frac{104 \div 8}{168 \div 8}$ (HCF of 104 and 168 is 8)

$$= \frac{13}{21}$$

$$104 : 168 = 13 : 21$$

(c) $120 : 150 = \frac{120}{150} = \frac{120 \div 30}{150 \div 30}$ (HCF of 120 and 150 is 30)

$$= \frac{4}{5}$$

$$120 : 150 = 4 : 5$$

(d) $186 : 403 = \frac{186}{384} = \frac{186 \div 31}{384 \div 31}$ (HCF of 186 and 403 is 31)

$$= \frac{6}{13}$$

$$186 : 403 = 6 : 13$$

(e) $480 : 384 = \frac{480}{184} = \frac{480 \div 96}{184 \div 96}$ (HCF of 480 and 384 is 96)

$$= \frac{5}{4}$$

$$480 : 384 = 5 : 4$$

(f) $777 : 1147 = \frac{777}{1147} = \frac{777 \div 37}{1147 \div 37}$ (HCF of 777 and 1147 is 37)

$= \frac{21}{31}$

$777 : 1147 = 21 : 31$

2. (a) $24 : 36 = \frac{24}{36} = \frac{24 \div 12}{36 \div 12}$ (HCF of 8 and 104 is 8)

$= \frac{2}{3}$

$24 : 36 = 2 : 3$

(b) 84 paise : ` 3 = 84 paise : 3 × 100 paise

= 84 paise : 300 paise

$= \frac{84}{300} = \frac{84 \div 12}{300 \div 12}$ (HCF of 84 and 300 is 12)

$= \frac{7}{25}$

84 paise : ` 3 = 7 : 25

(c) 7 kg : 420 g = 7 × 1000 g : 420 g = 7000 g : 420 g

$= \frac{7000}{420} = \frac{7000 \div 140}{420 \div 140}$ (HCF of 7000 and 420 is 140)

$= \frac{50}{3}$

7 kg : 420 g = 50 : 3

(d) 48 *l* : 5 kl = 48 *l* : 5 × 1000 *l* = 48 *l* : 5000 *l*

$= \frac{48}{5000} = \frac{48 \div 8}{5000 \div 8}$ (HCF of 48 and 5000 is 8)

$= \frac{6}{625}$

48 *l* : 5 kl = 6 : 625

(e) 40 minutes : 2 hours = 40 minutes : 2 × 60 minutes

= 40 minutes : 120 minutes

$= \frac{40}{120} = \frac{40 \div 40}{120 \div 40}$ (HCF of 40 and 120 is 40)

$= \frac{1}{3}$

40 minutes : 2 hours = 1 : 3

(f) 2.4 km : 900 m = 2.4 × 1000 m : 900 m

= 2400 m : 900 m

$$= \frac{2400}{900} = \frac{2400 \div 300}{900 \div 300} \quad \text{(HCF of 2400 and 900 is 300)}$$

$$= \frac{8}{3}$$

2.4 km : 900 m = 8 : 3

3. (a) 3 m 5 cm : 35 cm = 3 × 100 m + 5 cm : 35 cm

$$= 300\,\text{cm} + 5\,\text{cm} : 35\,\text{cm} = 305\,\text{cm} : 35\,\text{cm}$$

$$= \frac{305}{35} = \frac{305 \div 5}{35 \div 5} \quad \text{(HCF of 305 and 5 is 5)}$$

$$= \frac{61}{7}$$

3 m 5 cm : 35 cm = 61 : 7

(b) ` 6.30 : ` 16.80 $= \frac{6.30}{16.80} = \frac{6.30 \div 120}{16.80 \div 120}$ (HCF of 630 and 1680 is 210)

$$= \frac{3}{8}$$

` 6.30 : ` 16.80 = 3 : 8

(c) 3 weeks : 30 days = 3 × 7 days : 30 days

$$= 21\,\text{days} : 30\,\text{days}$$

$$= \frac{21}{30} = \frac{21 \div 3}{30 \div 3} \quad \text{(HCF of 21 and 30 is 3)}$$

$$= \frac{7}{10}$$

3 weeks : 30 days = 7 : 10

(d) 1*l* 35 ml : 270 ml = 100 ml + 35 ml : 270 ml

$$= 1035\,\text{ml} : 270\,\text{ml}$$

$$= \frac{1035}{270} = \frac{1035 \div 45}{270 \div 45} \quad \text{(HCF of 1035 and 270 is 45)}$$

$$= \frac{23}{6}$$

1*l* 35 ml : 270 ml = 23 : 6

(e) 4 kg : 2 kg 500 g = 4 × 1000 g : 2 × 1000 g + 500 g

$$= 4000\,\text{g} : 2000\,\text{g} + 500\,\text{g} = 4000\,\text{g} : 2500\,\text{g}$$

$$= \frac{4000}{2500} = \frac{4000 \div 500}{2500 \div 500} \text{(HCF of 4000 and 2500 is 500)}$$

$$= \frac{8}{5}$$

4 kg : 2 kg 500 g = 8 : 5

(f) 48 min : 2 hours 40 min = 48 min : 2× 60 min + 40 min

$$= 48 \text{ min} : 120 \text{ min} + 40 \text{ min}$$

$$= 48 \text{ min} : 160 \text{ min}$$

$$= \frac{48}{160} = \frac{48 \div 16}{160 \div 16} \quad \text{(HCF of 48 and 160 is 16)}$$

$$= \frac{3}{10}$$

48 min : 2 hours 40 min = 3 : 10

4. Mr. Arya's monthly income = ` 16800

Mrs Arya's monthly income = ` 10500

Total income of both = ` 16800 + ` 10500 = ` 27300

(a) Ratio of Mr. Arya's income to his wife's income = ` 16800 : ` 10500

$$= \frac{16800}{10500} = \frac{16800 \div 2100}{10500 \div 2100} \quad (\because \text{HCF} = 2100)$$

$$= \frac{8}{5}$$

Hence, the required ratio of Mr. Arya's income to his wife's income is 8 : 5.

(b) Ratio of Mrs. Arya's income to her husband's income

$$= ` 10500 : ` 16800$$

$$= \frac{10500}{16800} = \frac{10500 \div 2100}{16800 \div 2100} \quad (\because \text{HCF} = 2100)$$

$$= \frac{5}{8}$$

Hence, the required ratio of Mrs. Arya's income to her husband's income is 5 : 8.

(c) Ratio of Mr. Arya's income to the total income of the two

$$= ` 16800 : ` 27300$$

$$= \frac{16800}{27300} = \frac{16800 \div 2100}{27300 \div 2100} \quad (\because \text{HCF} = 2100)$$

$$= \frac{8}{13}$$

Hence, the ratio of Mr. Arya's income to the total income of both is 8 : 13.

5. Raj's earning = ` 15300

His savings = ` 1224

His expenditure = ` 15300 − ` 1224 = ` 14076

(a) Ratio of his income and expenditure = ` 15300 : ` 14076

$$= \frac{15300}{14076} = \frac{15300 \div 612}{14076 \div 612} \quad (\because \text{HCF} = 612)$$

$$= \frac{25}{23}$$

Hence, the ratio of Raj's income and expenditure is 25 : 23.

(b) Ratio of his income and savings = ` 15300 ÷ ` 1224

$$= \frac{15300}{1224} = \frac{15300 \div 612}{1224 \div 612} \quad (\because \text{HCF} = 612)$$

$$= \frac{25}{2}$$

Hence, ratio of Raj's income and savings is 25 : 2.

(c) Ratio of his expenditure and savings = ` 14076 : ` 1224 $= \frac{14076}{1224}$

$$= \frac{14076 \div 612}{1224 \div 612} \quad (\because \text{HCF} = 612)$$

$$= \frac{23}{2}$$

Hence, ratio of Raj's income and savings is 23 : 2.

6. Ratio of boys and girls in the school = 9 : 5

Let the number of boys in the school be $9x$ and the number of girls be $5x$.

Then, $9x + 5x = 448$

$$14x = 448$$

$$x = \frac{448}{14}$$

$$x = 32$$

Number of girls in the school = $5 \times 32 = 160$ girls.

7. Ratio of number of male and female workers = 5 : 3

Let the number of male workers be $5x$ and female be $3x$.

Given, number of male workers = 115

$$5x = 115$$

$$x = \frac{115}{5}$$

$$x = 23$$

Number of female workers = $3 \times 23 = 69$ female workers.

8. Let Kunal gets $4x$ and Kavita gets $7x$ part of ` 77.

Now, $4x + 7x = 77$

$$11x = 77$$
$$x = \frac{77}{11}$$
$$x = 7$$

Hence, Kunal gets the part of money = ` $(4 \times 7) =$ ` 28

and Kavita gets the part of money = ` $(7 \times 7) =$ ` 49

9. Let X gets ` $2x$, $Y$ gets ` $3x$ and Z gets ` $5x$ part of the money.

Now, $2x + 3x + 5x = 1020$

$$10x = 1020$$
$$x = \frac{1020}{10}$$
$$x = 102$$

Hence, X gets the part of money = ` $(2 \times 102) =$ ` 204

Y gets the part of money = ` $(3 \times 102) =$ ` 306

Z gets the part of money = ` $(5 \times 102) =$ ` 510

10. Ratio of numbers = 11 : 12

Let the numbers be $11x$ and $12x$.

According to given condition,

$$11x + 12x = 460$$
$$23x = 460$$
$$x = \frac{460}{23}$$
$$x = 20$$

Hence, one number = $11 \times 20 = 220$

and other number = $12 \times 20 = 240$

11. Ratio of length and width of a field = 5 : 3

Let the length be $5x$ m and width be $3x$ of the field.

Given, width of the field = 42 metres

$$3x = 42$$
$$x = \frac{42}{3}$$
$$x = 14$$

Hence, length of field = 5×14 metres = 70 metres

12. Ratio of parts of segment = 4 : 3

Let the first of the segment be $4x$ and the other part be $3x$.

Given, total length of line segment = 35 cm

$$4x + 3x = 35$$

$$7x = 35$$

$$x = \frac{35}{7}$$

$$x = 5$$

Hence, length of first part $= 4 \times 5$ metres $= 20$ metres

length of other part $= 3 \times 5$ metres $= 15$ metres

13. Ratio of income to the expenditure $= 7 : 6$

Let the income of the family be $7x$ and expenditure be $6x$.

Given, income of family = ` 14000

$$7x = 14000$$

$$x = \frac{14000}{7}$$

$$x = 2000$$

Hence, expenditure of the family = ` (6×2000)

= ` 12000

Savings of the family = income − expenditure

= ` 14000 − ` 12000

= ` 2000

14. Ratio of zinc and copper in alloy $= 7 : 9$

Let the weight of zinc be $7x$ kg and the weight of copper be $9x$ kg in the alloy.

Given, the weight of copper in alloy $= 11.7$ kg

$$9x = 11.7 \text{ kg}$$

$$x = \frac{11.7}{9} \text{ kg}$$

$$x = 1.3 \text{ kg}$$

Hence, the weight of zinc in alloy $= (7 \times 1.3)$ kg $= 9.1$ kg

15. (a) We can write,

$$1 : 2 = \frac{1}{2} \text{ and } 13 : 27 = \frac{13}{27}$$

On converting unlike fractions into like fractions, we get

$$\frac{1}{2} = \frac{1 \times 27}{2 \times 27} = \frac{27}{54} \text{ and } \frac{13}{27} = \frac{13 \times 2}{27 \times 2} = \frac{26}{54}$$

(Since, LCM of 2 and 27 is 54)

Clearly, $\frac{27}{54} > \frac{26}{54}$, since $27 > 26$

or $\frac{1}{2} > \frac{13}{27}$

Hence, $1 : 2 > 13 : 27$

(b) We can write,

$$3 : 7 = \frac{3}{7} \text{ and } 4 : 9 = \frac{4}{9}$$

On converting unlike fractions into like fractions, we get

$$\frac{3}{7} = \frac{3 \times 9}{7 \times 9} = \frac{27}{63} \text{ and } \frac{4}{9} = \frac{4 \times 7}{9 \times 7} = \frac{28}{63}$$

(Since, LCM of 7 and 9 is 63)

Clearly, $\frac{27}{63} < \frac{28}{63}$, since $27 < 28$

or $\frac{3}{7} < \frac{4}{9}$

Hence, $3 : 7 < 4 : 9$

(c) We can write,

$$5 : 12 = \frac{5}{12} \text{ and } 17 : 30 = \frac{17}{30}$$

On converting unlike fractions into like fractions, we get

$$\frac{5}{12} = \frac{5 \times 5}{12 \times 5} = \frac{25}{60} \text{ and } \frac{17}{30} = \frac{17 \times 2}{30 \times 2} = \frac{34}{60}$$

(Since, LCM of 12 and 30 is 60)

Clearly, $\frac{25}{60} < \frac{34}{60}$, since $25 < 34$

or $\frac{5}{12} < \frac{17}{30}$

Hence, $5 : 12 < 17 : 30$

16. (a) $\frac{5}{7} = \frac{x}{28} = \frac{35}{y}$

Let $\frac{5}{7} = \frac{x}{28}$ $\quad 7x = 5 \times 28$ $\quad x = \frac{5 \times 28}{7} = 20$

$\frac{5}{7} = \frac{20}{28}$

Again, let $\frac{28}{28} = \frac{35}{y}$ $\quad 20y = 28 \times 35$ $\quad y = \frac{28 \times 35}{20} = 49$

$\frac{20}{28} = \frac{35}{49}$

Hene, $\frac{5}{7}=\frac{20}{28}=\frac{35}{49}$

(b) $\frac{24}{40}=\frac{x}{5}=\frac{12}{y}$

Let $\frac{24}{40}=\frac{x}{5}$ $\quad 40x=24\times 5$ $\quad x=\frac{24\times 5}{40}=3$

$\frac{24}{40}=\frac{3}{5}$

Again, let $\frac{3}{5}=\frac{12}{y}$ $\quad 3y=5\times 12$ $\quad y=\frac{5\times 12}{3}=20$

$\frac{3}{5}=\frac{12}{20}$

Hene, $\frac{24}{40}=\frac{3}{5}=\frac{12}{20}$

(c) $\frac{36}{63}=\frac{4}{x}=\frac{y}{21}$

Let $\frac{36}{63}=\frac{4}{x}$ $\quad 36x=63\times 4$ $\quad x=\frac{63\times 4}{36}=7$

$\frac{36}{63}=\frac{4}{7}$

Again, let $\frac{4}{7}=\frac{y}{21}$ $\quad 7y=4\times 21$ $\quad y=\frac{4\times 21}{7}=12$

$\frac{4}{7}=\frac{12}{21}$

Hene, $\frac{36}{63}=\frac{4}{7}=\frac{12}{21}$

EXERCISE 10B

1. (a) Product of extremes $=13\times 12=156$

Product of means $=15\times 18=270$

Product of extremes $\neq$ Product of means

Hence, 13, 15, 18, 12 are not in proportion.

(b) Product of extremes $=2\times 42=84$

Product of means $=7\times 12=84$

Product of extremes = Product of means

Hence, 2, 7, 12, 42 are in proportion.

(c) Product of extremes = $21 \times 40 = 840$

Product of means = $35 \times 24 = 840$

Product of extremes = Product of means

Hence, 21, 35, 24, 40 are in proportion.

(d) Product of extremes = $33 \times 96 = 3168$

Product of means = $121 \times 9 = 1089$

Product of extremes $\neq$ Product of means

Hence, 33, 121, 9, 96 are not in proportion.

(e) Product of extremes = $30 \times 35 = 1050$

Product of means = $25 \times 42 = 1050$

Product of extremes = Product of means

Hence, 30, 25, 42, 35 are in proportion.

(f) Product of extremes = $150 \times 300 = 45000$

Product of means = $200 \times 250 = 50000$

Product of extremes $\neq$ Product of means

Hence, 150, 200, 250, 300 are not in proportion.

2. (a) Product of extremes = $39 \times 235 = 9165$

Product of means = $65 \times 141 = 9165$

Product of extremes = Product of means **Verified.**

(b) Product of extremes = $60 \times 147 = 8820$

Product of means = $105 \times 84 = 8820$

Product of extremes = Product of means **Verified.**

(c) Product of extremes = $91 \times 136 = 12376$

Product of means = $104 \times 119 = 12376$

Product of extremes = Product of means **Verified.**

(d) Product of extremes = $108 \times 86 = 9288$

Product of means = $72 \times 129 = 9288$

Product of extremes = Product of means **Verified.**

3. (a) Product of extremes = Product of means

$$27 \times 84 = x \times 63$$

$$x = \frac{27 \times 84}{63}$$

$$x = 36$$

(b) Product of extremes = Product of means

$$55 \times 6 = 11 \times x$$

$$x = \frac{55 \times 6}{11}$$

$$x = 30$$

(c) Product of extremes = Product of means

$$x \times 116 = 92 \times 87$$

$$x = \frac{92 \times 87}{116}$$

$$x = 69$$

(d) Product of extremes = Product of means

$$51 \times x = 85 \times 57$$

$$x = \frac{85 \times 57}{51}$$

$$x = 95$$

4. (a) $2 \text{ kg} : 80 \text{ kg} = \frac{2 \text{ kg}}{80 \text{ kg}} = \frac{2}{80} = \frac{1}{40}$

$25 \text{ g} : 625 \text{ g} = \frac{25 \text{ g}}{625 \text{ g}} = \frac{25}{625} = \frac{1}{25}$

$\because \quad \frac{1}{40} \neq \frac{1}{25}$

Hence, 2 kg : 80 kg and 25 g : 625 g are not in proportion.

(b) $25 \text{ cm} : 1 \text{ m} = \frac{25 \text{ cm}}{1 \text{ m}} = \frac{25 \text{ cm}}{100 \text{ cm}} = \frac{25}{100} = \frac{1}{4}$

` 40 : ` 160 $= \frac{` 40}{` 160} = \frac{40}{160} = \frac{1}{4}$

$\because \quad \frac{1}{4} = \frac{1}{4}$

Hence, 25 cm : 1 m and ` 40 : ` 160 are in proportion.

(c) $200 \text{ ml} : 2.5\ l = \frac{200 \text{ ml}}{2.5\ l} = \frac{200 \text{ ml}}{2500 \text{ ml}} = \frac{200}{2500} = \frac{2}{25}$

` 40 : ` 500 $= \frac{` 40}{` 500} = \frac{40}{500} = \frac{2}{25}$

$\because \quad \frac{2}{25} = \frac{2}{25}$

Hence, 200 ml : 2.5 *l* and ` 40 : ` 500 are in proportion.

(d) $52 \text{ litres} : 91 \text{ litres} = \frac{52 \text{ litres}}{91 \text{ litres}} = \frac{52}{91} = \frac{4}{7}$

$16 \text{ bottles} : 28 \text{ bottles} = \frac{16 \text{ bottles}}{28 \text{ bottles}} = \frac{16}{28} = \frac{4}{7}$

$\because \quad \frac{4}{7} = \frac{4}{7}$

Hence, 52 litres : 91 litres and 16 bottles : 28 bottles are in proportion.

5. (a) $36 : 45 = \frac{36}{45} = \frac{4}{5}$

$80 : 100 = \frac{80}{100} = \frac{4}{5}$

Hence, it is true.

(b) $51 : 68 = \frac{51}{68} = \frac{3}{4}$

$85 : 102 = \frac{85}{102} = \frac{5}{6}$

Hence, it is false.

(c) The ratio of two quantities is defined only when they are in same unit. Hence, it is false.

(d) $45 \text{ km} : 60 \text{ km} = \frac{45 \text{ km}}{60 \text{ km}} = \frac{45}{60} = \frac{3}{4}$

$12 \text{ h} : 15 \text{ h} = \frac{12 \text{ h}}{15 \text{ h}} = \frac{12}{15} = \frac{4}{5}$

Hence, it is false.

(e) $81 \text{ kg} : 45 \text{ kg} = \frac{81 \text{ kg}}{45 \text{ kg}} = \frac{81}{45} = \frac{9}{5}$

$18 \text{ men} : 10 \text{ men} = \frac{18 \text{ men}}{10 \text{ men}} = \frac{18}{10} = \frac{9}{5}$

Hence, it is true.

(f) $30 \text{ bags} : 18 \text{ bags} = \frac{30 \text{ bags}}{18 \text{ bags}} = \frac{30}{18} = \frac{5}{3}$

` 450 : ` 270 $= \frac{\text{` } 450}{\text{` } 270} = \frac{450}{270} = \frac{5}{3}$

Hence, it is true.

6. We know, if a, b, c are in continued proportion, then

$$b^2 = ac$$

(a) $a = 36, b = 90, c = 225$

$b^2 = (90)^2 = 90 \times 90 = 8100$

$ac = 36 \times 225 = 8100$

$b^2 = ac$

Hence, 36, 90, 225 are in continued proportion.

(b) $a = 16, b = 84, c = 441$

$b^2 = (84)^2 = 84 \times 84 = 7056$

$$ac = 16 \times 441 = 7056$$

$$b^2 = ac$$

Hence, 16, 84, 441 are in continued proportion.

(c) $a = 48, b = 60, c = 75$

$$b^2 = (60)^2 = 60 \times 60 = 3600$$

$$ac = 48 \times 75 = 3600$$

$$b^2 = ac$$

Hence, 48, 60, 75 are in continued proportion.

7. Let the third term be x.

So, $20 : 28 :: x : 49$

Product of extremes = Product of means

$$20 \times 49 = 28 \times x$$

$$x = \frac{20 \times 49}{28}$$

$$x = 35$$

Hence, the 3rd term is 35.

8. Let the 2nd term be x.

So, $12 : x :: 8 : 14$

Product of extremes = Product of means

$$12 \times 14 = x \times 8$$

$$x = \frac{12 \times 14}{8}$$

$$x = 21$$

Hence, the 2nd term is 21.

EXERCISE 10C

1. Cost of 9 kg of rice = ` 327.60

Cost of 1 kg of rice = ` $\frac{327.60}{9}$ = ` 36.40

So, Cost of 50 kg of rice = ` $(36.40 \times 50)$ = ` 1820

Hence, the cost of 50 kg of rice will be ` 1820.

2. Cost of 14 m of cloth = ` 1890

Cost of 1 m of cloth = ` $\frac{1890}{14}$ = ` 135

So, Cost of 6 m of cloth = ` $(135 \times 6)$ = ` 810

Hence, the cost of 6 m of cloth will be ` 810.

3. Cost of 12 soaps (1 dozen) = ` 285.60

Cost of 1 soap = $` \frac{285.60}{12} = ` 23.80$

So, Cost of 15 such soaps = $` (23.80 \times 15) = ` 357.00$

Hence, the cost of 15 soaps will be ` 357.00.

4. Distance covered by car in 12 *l* of diesel = 222 km

Distance covered by car in 1 *l* of diesel = $\frac{222}{12}$ km = 18.5 km

So, distance covered by car in 22 *l* of diesel = (18.5×22) km = 407 km

Hence, 407 km will be covered by car in 22 *l* of diesel.

5. Charge for carring 25 tonnes of weight = ` 540

Charge for carring 1 tonn of weight = $` \frac{540}{25} = ` 21.60$

So, charge for carring 35 tonnes of weight = $` (21.60 \times 35) = ` 756$

Hence, the transport company will charge ` 756 to carry 35 tonnes of weight.

6. 22.5 m of a uniform iron rod weighs = 85.5 kg

1 m of a uniform iron rod weighs = $\frac{85.5}{22.5}$ kg = 3.8 kg

So, 5 m of a uniform iron rod weighs = (3.8×5) kg = 19 kg

Hence, the weight of 5 m of the same rod will be 19 kg.

7. 15 tins contain the oil = 234 kg

1 tins contains the oil = $\frac{234}{15}$ kg = 15.6 kg

So, 10 tins contain the oil = (15.6×10) kg = 156 kg

Hence, 10 tins will contain 156 kg of oil.

8. Number of bananas purchased for ` 104 = 4 dozen bananas

$= (4 \times 12)$ bananas

Number of bananas purchased for = $` \left(\frac{4 \times 12}{104}\right)$ bananas = $\frac{6}{13}$ bananas

So, number of bananas purchased for ` 6.50 = $\left(\frac{6}{13} \times 6.50\right)$ bananas

= 3 bananas

Hence, 3 bananas can be purchased for ` 6.50.

9. Number of chairs bought for ` 22770 = 18 chairs

Number of chairs bought for ` 1 = $\frac{18}{22770}$ chairs

So, number of chairs bought for ` 10120 = $\left(\frac{18}{22770} \times 10120\right)$ chairs

= 8 chairs

Hence, 8 cahirs can be bought for ` 10120.

10. Number of inland letters bought for ` 87.50 = 35

Number of inland letters bought for ` 1 = $\frac{35}{87.50}$

So, number of inland letters bought for ` 315 = $\frac{35}{87.50} \times 315 = 126$

Hence, 126 inland letters can be bought for ` 315.

11. Weight of copper in 4.5 g of an alloy = 3.5 g

Weight of copper in 1 g of alloy = $\frac{3.5}{4.5}$ g = $\frac{7}{9}$ g

So, weight of copper in 18.9 g of a alloy $\left(\frac{7}{9} \times 18.9\right)$ g = 14.7 g

Hence, there will be 14.7 g of copper in 18.9 g of alloy.

12. Number of boxes needed for 6000 pens = 48

Number of boxes needed for 1 pen = $\frac{48}{6000}$

So, number of boxes needed for 1875 pens = $\frac{48}{6000} \times 1875 = 15$

Hence, 15 boxes will be needed for 1875 pens.

13. 24 workers can build the wall in = 15 days.

1 workers can build the wall in = (15× 24) days

So, 9 workers can build the wall in = $\left(\frac{15 \times 24}{9}\right)$ days = 40 days

Hence, 9 workers will take 40 days to build the wall.

14. Number of men to finish a piece of work in 26 days = 40

Number of men to finish a piece of work in 1 day = 40× 26

So, number of men to finish a piece of work in 16 days = $\frac{40 \times 26}{16} = 65$

Hence, 65 men will be needed to finish the piece of work in 16 days.

15. The provisions of 550 men for = 28 days
The provisions of 1 man for = (28×550) days
So, provisions of 700 men for = $\left(\frac{28 \times 550}{700}\right)$ days = 22 days
Hence, the provisions will be lasted for 22 days.

16. (a) Car travels 195 km in = 3 hours
Car travels 1 km in = $\frac{3}{195}$ hours
So, car will travel 520 km in = $\left(\frac{3}{195} \times 520\right)$ hours = 8 hours
Hence, car will take 8 hours to travel 520 km.

(b) Distance covered by car in 3 hours = 195 km
Distance covered by car in 1 hour = $\frac{195}{3}$ km = 65 km
So, distance covered by car in 7 hours = (65×7) km = 455 km
Hence, car will travel 455 km in 7 hours with the same speed.

17. (a) Labourer earns in 12 days = ` 1980
Labourer earns in 1 days = ` $\frac{1980}{12}$ = ` 165
So, labourer earn in 7 days = ` $(165 \times 7)$ = ` 1155
Hence, the labourer will earn ` 1155 in 7 days.

(b) Labourer earns ` 1980 in = 12 days
Labourer earns ` 1 in = $\frac{12}{1980}$ days
So, labourer earns ` 2640 = $\left(\frac{12}{1980} \times 2640\right)$ days = 16 days
Hence, the labourer will earn ` 2640 in 16 days.

18. (a) Weight of 65 books = 13 kg
Weight of 1 book = $\frac{13}{65}$ kg
So, weight of 80 such books = $\left(\frac{13}{65} \times 80\right)$ kg = 16 kg
Hence, the weight of 80 books is 16 kg.

(b) Number of books weighing 13 kg = 65 book
Number of books weighing 1 kg = $\frac{65}{13}$ books = 5 books
So, number of books weighing 6.4 kg = (5×6.4) books = 32 books
Hence, 32 books weigh 6.4 kg.

EXERCISE 10D

1. $92 : 115 = \frac{92}{115} = \frac{92 \div 23}{115 \div 23}$ (HCF of 92 and 115 is 23)

$= \frac{4}{5}$

(d) is correct.

2. Product of extremes = Product of means

$4 \times 35 = 5 \times x$

$x = \frac{4 \times 35}{5}$

$x = 28$

(c) is correct.

3. Product of extremes = Product of means

$57 \times 85 = x \times 51$

$x = \frac{57 \times 85}{51}$

$x = 95$

(a) is correct.

4. Product of extremes = Product of means

$25 \times x = 35 \times 45$

$x = \frac{35 \times 45}{25}$

$x = 63$

(a) is correct.

5. (b)

6. (b)

7. Let the number of boys be $12x$ and number of girls be $5x$.

Given, number of girls = 840

$5x = 840$

$x = \frac{840}{5} = 168$

Total strength of school $= 12x + 5x = 17x$

$= 17 \times 168$

$= 2856$

(c) is correct.

8. Let the sides of triangle be x, $3x$ and $5x$.

Given, Perimeter of triangle = 90 cm

$\because$ sum of all sides = 90 cm

$$x + 3x + 5x = 90 \text{ cm}$$

$$9x = 90 \text{ cm}$$

$$x = \frac{90}{9} \text{ cm} = 10 \text{ cm}$$

Largest side = $5x = 5 \times 10 \text{ cm} = 50 \text{ cm}$

(b) is correct.

9. Let the share of A be $8x$ and the share of B be $11x$.

$$8x + 11x = ` 760$$

$$19x = ` 760$$

$$x = ` \frac{760}{19} = ` 40$$

B's share = $11x = ` (11 \times 40) = ` 440$

(a) is correct.

10. Let the first number be $5x$ and other number be $7x$.

$\because$ Sum of these numbers = 252

$$5x + 7x = 252$$

$$12x = 252$$

$$x = \frac{252}{12} = 21$$

Larger number = $7x = 7 \times 21 = 147$

(d) is correct.

11. Car covers in 6 l of petrol = 111 km

Car covers in 1 l of petrol = $\frac{111}{6}$ km = 18.5 km

So, car covers in 10 l of petrol = (18.5×10) km

= 185 km

(b) is correct.

12. Number of men to finish the piece of work in 26 days = 40

Number of men to finish the piece of work in 1 day = (40×26)

So, number of men to finish the piece of work in 20 days = $\frac{40 \times 26}{20} = 52$

(a) is correct.

13. Cost of 12 pens = ` 138

Cost of 1 pen = $` \frac{138}{12} = ` \frac{23}{2}$

So, cost of 14 pens = $` \left(\frac{23}{2} \times 14\right) = ` 161$

(b) is correct.

14. 24 workers build a wall in = 15 days

1 worker builds a wall in = (15×24) days

So, 8 workers build a wall in = $\frac{15 \times 24}{8}$ days = 45 days

(b) is correct.

15. 550 men had provisions for = 28 days

1 man had provisions for = (28×550) days

= 15400 days

So, 700 men will have provisions for = $\frac{15400}{700}$ days = 22 days

(a) is correct.

16. Let the angles of triangle be $3x$, x and $2x$.

$$1 + 2 + 3 = 180°$$
$$3x + x + 2x = 180°$$
$$6x = 180°$$
$$x = \frac{180°}{6} = 30°$$

Largest angle = $3 \times 30° = 90°$

(c) is correct.

17. Let the 3rd term of be x.

$$12 : 21 :: x : 14$$
$$12 \times 14 = 21 \times x$$
$$x = \frac{12 \times 14}{21} = 8$$

(d) is correct.

18. 10 boys can dig the pitch in = 12 hours

1 boy can dig the pitch in = (12×10) hours

So, 8 boy can dig the pitch in = $\frac{12 \times 10}{8}$ hours = 15 hours

(b) is correct.

19. Let the length of rectangle be $5x$ and breadth be $4x$.

Given, width of rectangle = 36 m

$$4x = 36\,\text{m}$$

$$x = \frac{36}{4}\,\text{m} = 9\,\text{m}$$

Length of field = (5×9) m = 45 m

(b) is correct.

20. Speed of bus = $\frac{195}{3}$ km/hour = 65 km/hour

Speed of train = $\frac{300}{4}$ km/hour = 75 km/hour

Ratio of both speeds = $\frac{65\,\text{km/h}}{75\,\text{km/h}} = \frac{65}{75} = \frac{13}{15}$

(a) is correct.

HOTS

- Out of 180 people like apples = 24

  Out of 1 people like apples = $\frac{24}{180}$

  Out of 270 people like apples = $\frac{24}{180} \times 270 = 36$

  Out of 12 apple lovers like oranges = 5

  Out of 1 apple lovers like oranges = $\frac{5}{12}$

  Out of 36 apple lovers like oranges = $\frac{5}{12} \times 36 = 15$

  Hence, 15 people like oranges.

VALUE BASED

- The cost of 5 kg of mangoes = ` 300

  The cost of 1 kg of mangoes = $\frac{\text{`}\ 300}{5}$

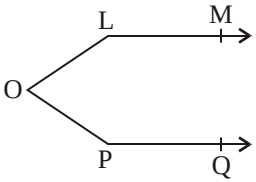
  The cost of 12 kg of mangoes = $\frac{\text{`}\ 300}{5} \times 12$ = ` 720

  Hence, the cost of 12 kg of mangoes ` 720.

EXERCISE 11A

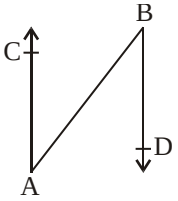
1. (a) Line segments = $\overline{OL}, \overline{OP}$

Rays = $\overrightarrow{LM}, \overrightarrow{PQ}$



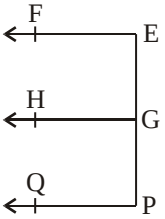
(b) Line segments = $\overline{AB}$

Rays = $\overrightarrow{AC}, \overrightarrow{BD}$



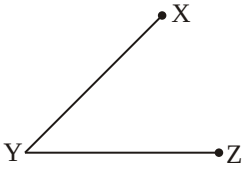
(c) Line segments = $\overline{GE}, \overline{GP}, \overline{EP}$

Rays = $\overrightarrow{EF}, \overrightarrow{GH}, \overrightarrow{PQ}$

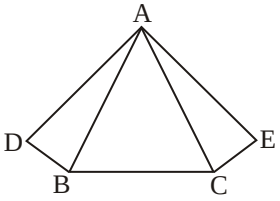


2. (a) $\overline{PQ}, \overline{PR}, \overline{PS}, \overline{QR}, \overline{QS}, \overline{RS}$

(b) $\overline{XY}, \overline{YZ}$



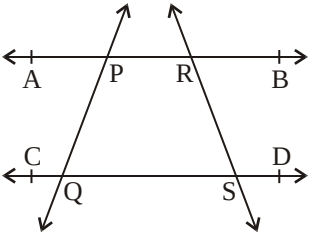
(c) $\overline{AD}, \overline{AB}, \overline{AC}, \overline{AE}, \overline{DB}, \overline{BC}, \overline{CE}$



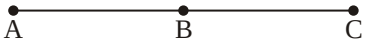
3. (a) $\overline{PR}, \overline{PQ}, \overline{RS}, \overline{QS}$

(b) $\overrightarrow{PA}, \overrightarrow{QC}, \overrightarrow{RB}, \overrightarrow{SD}$

(c) $\overline{PR}$ and $\overline{QS}$



4. Three or more points in a plane are said to be collinear if they all lie on the same line.



(a) One only (b) Three line segments : $\overline{AB}, \overline{BC}, \overline{AC}$

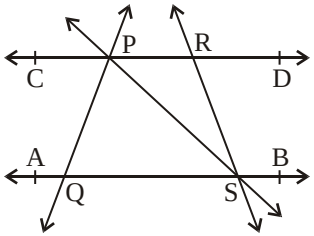
5. (a) A, Q, S, B

(b) A, C, B

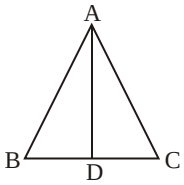
(c) $\overleftrightarrow{AB}, \overleftrightarrow{PS}, \overleftrightarrow{RS}$

(d) $\overleftrightarrow{CD}, \overleftrightarrow{PQ}, \overleftrightarrow{PS}$

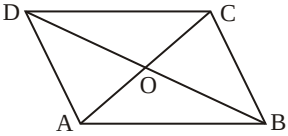
(e) $(\overleftrightarrow{AB}, \overleftrightarrow{PS}), (\overleftrightarrow{AB}, \overleftrightarrow{RS}), (\overleftrightarrow{CD}, \overleftrightarrow{RS}),$ $(\overleftrightarrow{CD}, \overleftrightarrow{PS})$



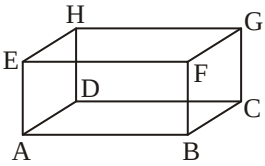
6. (a) Six line segments : $\overline{AB}, \overline{AC}, \overline{AD}, \overline{BD}, \overline{BC}, \overline{DC}$



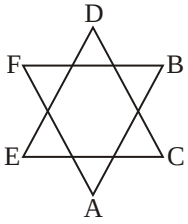
(b) Ten line segments : $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}, \overline{OA}, \overline{OC}, \overline{OD}, \overline{OB}, \overline{AC}, \overline{BD}$



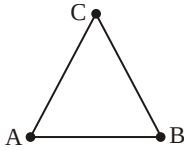
(c) Twelve line segments : $\overline{AB}, \overline{BC}, \overline{AD}, \overline{DC}, \overline{FB}, \overline{FG}, \overline{GC}, \overline{EF}, \overline{EH}$ $\overline{HG}, \overline{EA}, \overline{HD}$



(d) Six line segments : $\overline{AB}, \overline{FA}, \overline{FB}, \overline{DE}, \overline{DC}, \overline{EC}$



7. Lines, $\overleftrightarrow{AB}$, $\overleftrightarrow{BC}$, $\overleftrightarrow{AC}$, so there can be drawn three lines with noncollinear points A, B, C.



8. (a) True (b) True (c) True (d) True (e) False

9. (a) F (b) T (c) T (d) F (e) F (f) F (g) F (h) T (i) F (j) F (k) T (l) T (m) T

10. (a) cannot (b) definite (c) definite (d) one (e) no

EXERCISE 11B

1. (a) **2.** (c) **3.** (b) **4.** (d) **5.** (b)
6. (b) **7.** (a) **8.** (a) **9.** (c) **10.** (c)

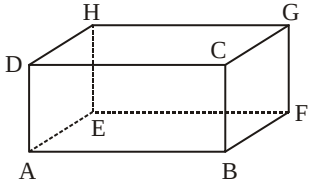
HOTS

- No, two lines cannot intersect at more than one point?

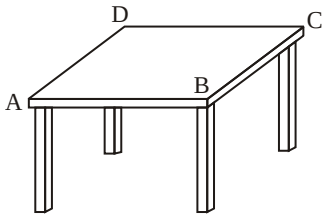
Chapter 12 Parallel Lines

EXERCISE 12

1. $(AB \,||\, EF \,||\, DC \,||\, HG)$, $(DA \,||\, HE \,||\, CB \,||\, GF)$, $(DH \,||\, CG \,||\, AE \,||\, BF)$

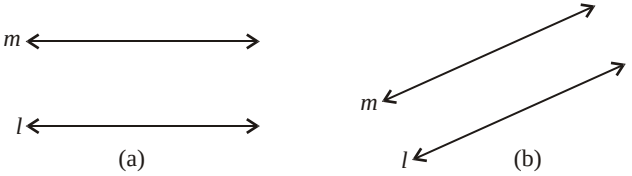


2. (AB, DC), (AD, BC)

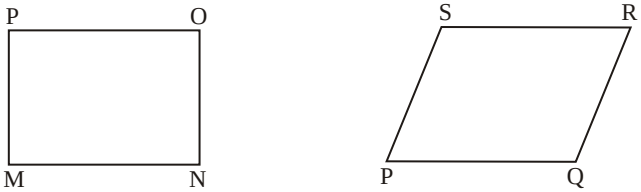


3. (a) Distance between parallel lines l and m is 1.2 cm.

(b) Distance between parallel lines l and m is 1 cm.



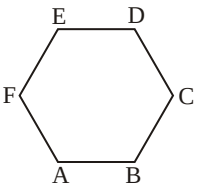
4. (a) $(MN \,||\, PO), (PM \,||\, ON)$ (b) $(PQ \,||\, SR), (PS \,||\, QR)$



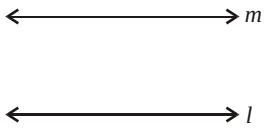
(c) $(PQ \,||\, YZ)$

(d) $(LQ \,||\, MP \,||\, NO)$, $(LM \,||\, QP)$ and $(MN \,||\, PO)$

(e) $(AB \,||\, ED)$, $(FA \,||\, DC)$, $(EF \,||\, CB)$

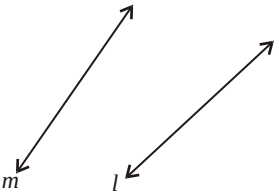


5. (a) Perpendicular distance between the parallel lines l and m is same everywhere. So, l and m are parallel lines.



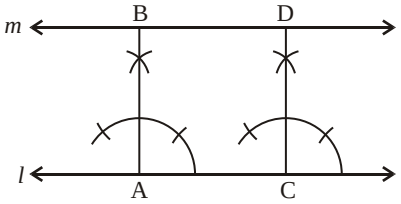
(a)

(b) Perpendicular distance between the parallel lines l and m is not same everywhere.
So, l and m are not parallel lines.

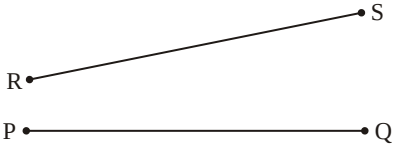


(b)

6. In fig., $l \,||\, m$ and
AB l and CD l
$\because l \,||\, m$, so perpendicular distances between them should be same everywhere.
$AB = CD$
$\because$ $AB = 2.3$ cm
$CD = 2.3$ cm



7. No, the segments PQ and RS do not intersect.



And PQ and RS are not parallel because corresponding lines will interest when produced in one direction.

8. (a) False (b) False (c) True (d) True

HOTS

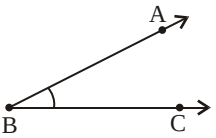
- Intersecting lines → $A, E, F, H, K, L, M, N, T, V, W, X, Y, Z$.
  Parallel lines → E, F, H

Chapter 13 Angles and Their Measurement

EXERCISE 13A

1. (i) Scissors, (b) a pair of compass, (iii) tongs and (iv) hands of clock

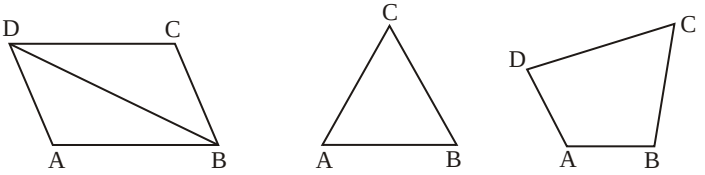
2. Vertex = B
Arms = $\overset{¾\rightarrow}{BA}$ and $\overset{¾\rightarrow}{BC}$



3. (a) 8 angles : *ABD*, *BAD*, *ADB*, *DBC*, *BDC*, *DCB*, *ABC*, *ADC*

(b) 3 angles : *BAC*, *ACB*, *ABC*

(c) 4 angles : *BAD*, *ABC*, *BCD*, *CDA*

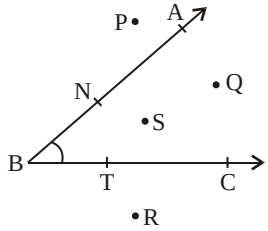


(a) (b) (c)

4. (a) Interior of points of $ABC = Q, S$

(b) Exterior of points of $ABC = P, R$

(c) Points lie on $ABC = A, B, C, T, N$



5. (a) *ERB* (b) *RSC* (c) *FSD*

6. (a) False (b) True (c) False (d) True
(e) False

EXERCISE 13B

1. (a) Complete angle (b) Acute angle
(c) Reflex angle (d) Straight angle
(e) Right angle (f) Obtuse angle

2. (a) Acute (b) Zero (c) Acute (d) Acute
(e) Obtuse (f) Obtuse (g) Complete (h) Reflex
(i) Right (j) Obtuse (k) Obtuse (*l*) Acute

3. (a) One right angle $= 1 \times 90° = 90°$

(b) Two right angle $= 2 \times 90° = 180°$

(c) Three right angle $= 3 \times 90° = 270°$

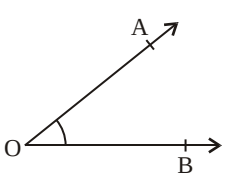
(d) Four right angle $= 4 \times 90° = 360°$

(e) $\frac{2}{3}$ right angle $= \frac{2}{3} \times 90° = 60°$

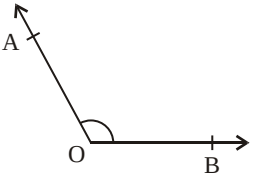
(f) $1\frac{1}{2}$ right angle $= \frac{3}{2} \times 90° = 135°$

4. (a) 90° (b) 180° (c) 90° (d) 0°

5.



Acute angle



Obtuse Angle

Straight Angle

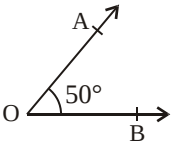
EXERCISE 13C

1. (a) $PQR = 75°$ (b) $FED = 135°$

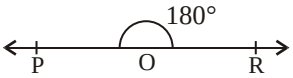
(c) $BOA = 45°$ (d) $GHI = 75°$

(e) $LMN = 55°$ (f) $TSR = 135°$

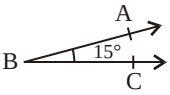
2. (a)



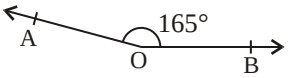
(b)



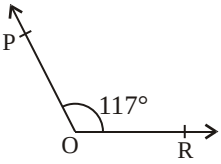
(c)



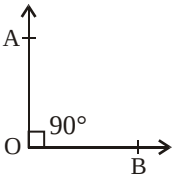
(d)



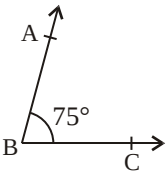
(e)



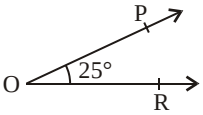
(f)



(g)



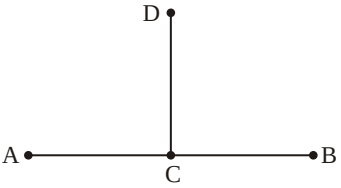
(h)



3. Draw $AB = 6$ cm. Take a point C on it such that $AC = 4$ cm. Now, place the protractor on AB in such away that its centre is exactly on the point C and its base line lies along AB.

Holding the protractor fixed, mark with a pencil a point N on the paper against 90° mark of the protractor.

Remove the protractor and with scale (ruler), draw a line passing through C on D.

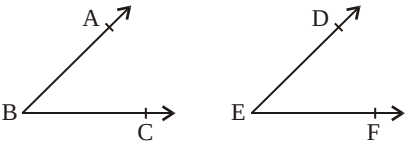


Then, CD AB at C.

4. Place the protractor on BC in such away that its centre is exactly on the point B and its base line lies along $\overset{¾\rightarrow}{BC}$. Holding the protractor fixed and read the angle unit.

Hence, $ABC = 45°$

Now, draw a ray $\overset{¾\rightarrow}{EF}$ equal to $\overset{¾\rightarrow}{BC}$ and place the protractor on EF in such away that its centre



is exactly on the point E and its base line lies along $\overset{¾\rightarrow}{EF}$. Holding the protractor fixed, mark with a pencil a point D on the paper agains 45° mark of the protractor.

Remove the protractor and with scale, draw a line passing through E and D.

Hence, DEF is the required angle equal to ABC.

EXERCISE 13D

1. (b) **2.** (c) **3.** (d) **4.** (b) **5.** (c) **6.** (d) **7.** (c)

8. $\frac{3}{2}$ right angles $= \frac{3}{2} \times 90° = 135°$

(b) is correct.

9. 2 right angles $= 2 \times 90° = 180°$

(b) is correct.

10. (b)

HOTS

- (i) Half of a revolution → Straight angle
  (ii) The complete revolution → Complete angle
  (iii) Between $\frac{1}{4}$ and $\frac{1}{2}$ of a revolution → Obtuse angle
  (iv) Three-fourths of a revolution → Reflex angle

EXERCISE 14A

1. Steps of construction :

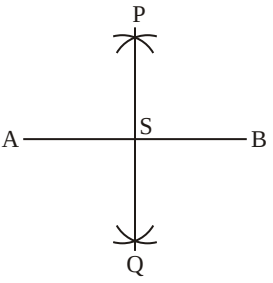
(a) Draw a line segment $AB = 5.6$ cm.

(b) With A as centre and radius more than half AB, draw arcs, one on each side of AB.

(c) With A as centre and the same radius as before, draw arcs, cutting the previously drawn arcs P and Q respectively.

(d) Join PQ meeting AB at S.

Then, PQ is the perpendicular bisector of AB.



2. Steps of construction :

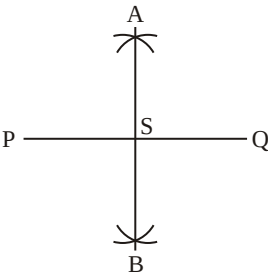
(a) Draw a line segment $PQ = 6.2$ cm.

(b) With P as centre and radius more than half PQ, draw arcs, one on each side of PQ.

(c) With Q as centre and the same radius as before, draw arcs, cutting the previously drawn arcs A and B respectively.

(d) Join AB meeting PQ at S.

Then, AB is the perpendicular bisector of PQ.



3. Steps of construction :

(a) With the help of protractor, draw an angle of 50° (say ABC).

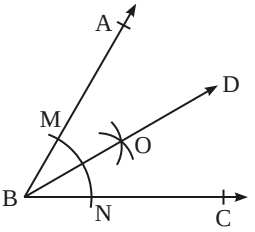
(b) With B as centre and any convenient radius, draw an are cutting BC and BA at N and M respectively.

(c) With centre N and radius more than half MN, draw an arc.

(d) With centre M and the same radius as before, draw another arc cutting the previously drawn arc at a point O.

(e) Join BO and produce it to any point D.

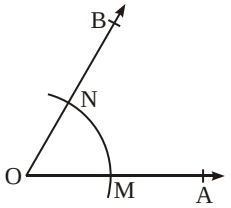
Then, ray BD bisects ABC.

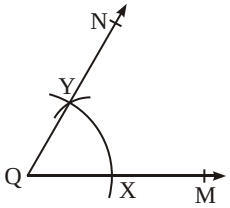


4. Steps of construction :

(a) Draw a ray OM.

(b) With O as centre and any radius, draw an arc cutting OA and OB at M and N respectively.





(c) With Q as centre and same radius, draw an arc cutting QM at X.

(d) With X as centre and radius as MN, cut the arc through X at Y.

(e) Join QY and produce it to any point N.

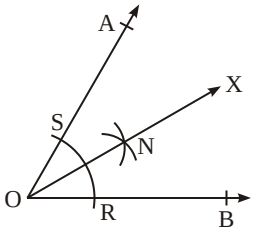
Then, MQN is the required angle equal to AOB.

5. Steps of construction :

(a) Draw $AOB = 85°$ at O.

(b) With O as centre and any convenient radius, draw an arc cutting OB and OA at R and S respectively.

(c) With centre R and radius more than $\frac{1}{2}RS$, draw an arc.



(d) With centre S and the same radius as before, draw another arc, cutting the previously drawn arc at a point N.

(e) Join ON and produce it to any point X.

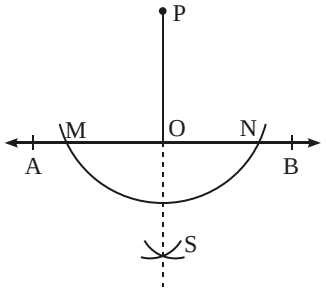
Then, ray OX bisects AOB.

6. Steps of construction :

Let AB be the given line and P be a point outside it.

(a) With P as centre and a convenient radius, draw an arc intersecting AB at M and N.

(b) With M as centre and a radius greater than $\frac{1}{2}MN$, draw an arc.



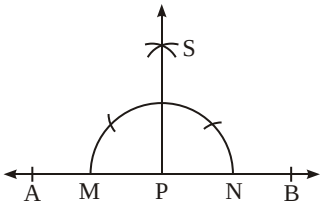
(c) With N as centre and the same radius, draw another arc cutting the previously drawn arc at S.

(d) Join PS meeting AB at O.

Then, PO is the required perpendicular on AB.

7. Steps of construction :

Let AB be the given line and P be a point on it.



(a) With centre P and any conveninent radius, draw a semicircle to intersect AB at M and N.

(b) With centre M and any radius more than MP, draw an arc.

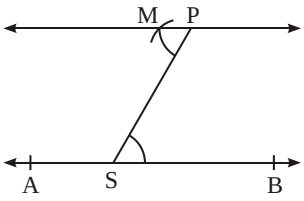
(c) With centre N and the same radius, draw another arc cutting the previously drawn arc at S.

(d) Join PS.

Then, SP AB.

8. Steps of construction :

Let AB be the given line and P be a given point outside it.



(a) Take any point S on AB.

(b) Join SP.

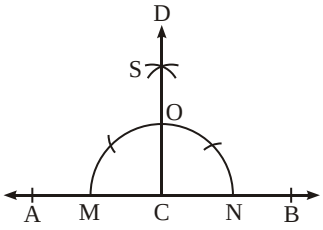
(c) Draw MPS such that $MPS = PSB$ as shown in the figure.

(d) Extend MP on both sides.

Then, the line MP passes through the point P and $MP \parallel AB$.

9. See the solution of question 1.

10. Steps of construction :



(a) Draw a line segment $AB = 6$ cm.

(b) With centre A and radius 2.5 cm, draw an arc cutting AB at point C.

(c) Now, with centre C and any convenient radius, draw a semicircle cutting AB at M and N.

(d) With centre M and radius more than $\frac{1}{2}MC$, draw an arc.

(e) With centre N and same radius, draw another arc cutting previously drawn arc at point S.

(f) Joint CS and extend it to any point D.

Then, CD AB.

EXERCISE 14B

1. See the examples 1 and 3 of 14B and do yourself.

2. See the example 4 of 14B and do yourself.

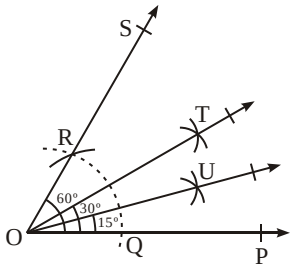
3. (a) Steps of construction :

(i) Draw a ray OP.

(ii) With O as centre and any suitable radius, draw an arc cutting OP at a point Q.

(iii) With Q as centre and the same radius as before, draw another arc to cut the previous arc at R.

(iv) Join OR and produce it to S. Now, $POS = 60°$.



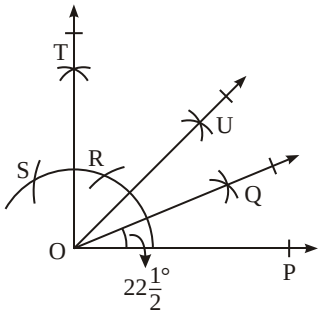
(v) Draw the bisector OT of POS. Then, $POT = 30°$.

(vi) Now, draw the bisector OU of POT.
Then, $POU = 15°$.

(b) Steps of construction :

(i) See all the steps in example 4 on page 150to construct $POU = 45°$.

(ii) Draw bisector OQ of POU,
Then, $POQ = 22\frac{1}{2}°$



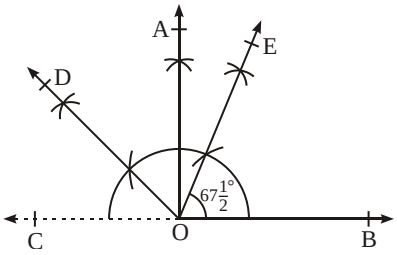
(c) See example 4 on page 150.

(d) Steps of construction :

(i) Draw $BOA = 90°$ and extend ray OB to point C in opposite direction.

(ii) Now, draw bisector OD of COA $(= 90°)$. Then, $DOA = 45°$.

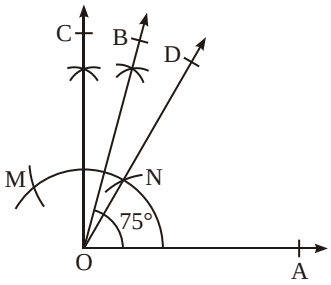
(iii) We have $BOD = 135°$ $(= BOA + DOA = 90° + 45°)$.
Draw bisector OE of BOD.
Then, $BOE = 67\frac{1}{2}°$



(e) Steps of construction :

(i) Draw $AOC = 90°$ and $AOD = 60°$.

(ii) Draw bisector OB of DOC.



Then, $AOC = 90°$ and

$AOD = 60°$

$$DOC = 90° - 60°$$
$$= 30°$$

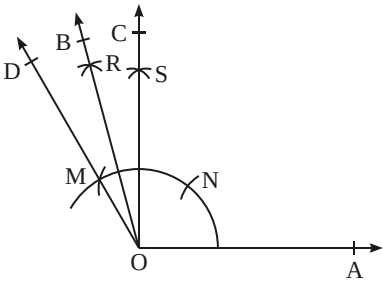
$\because$ $$DOB = \frac{1}{2} DOC$$
$$= \frac{1}{2} \times 30° = 15°$$

$$AOB = AOD + DOB$$
$$= 60° + 15°$$
$$= 75°$$

(f) Steps of construction :

(i) Draw $AOC = 90°$ and $AOD = 120°$.

(ii) Draw bisector OB of COD,



Then, $AOC = 90°$ and

$AOD = 120°$

$$DOC = 120° - 90°$$
$$= 30°$$

$\because$ $$COB = \frac{1}{2} COD = \frac{1}{2} \times 30° = 15°$$

$$AOB = AOC + COB$$
$$= 90° + 15° = 105°$$

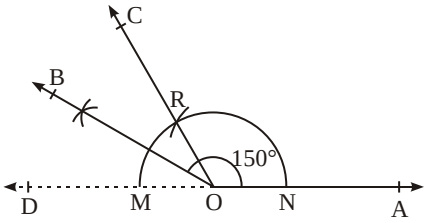
(g) See solution of part (e) of question 3.

(h) Steps of construction :

(i) Draw a ray OA and extent it to point D in opposite direction.

(ii) With centre O and convenient radius draw semicircle cutting the rays at M and N.

(iii) With centre M and same radius, draw an arc to cut the semicircle at R.



(iv) Join OR at produce it to C.

(v) Now, draw bisector OB of COD.

Then, $AOB = AOC + COB$

$= 120° + 30°$

$= 150°$

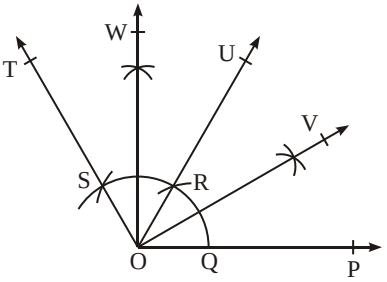
4. See example 2 on page 149.

5. Steps of construction :

(a) Draw $POT = 120°$ as instructed in example 2.

(b) Draw bisector OV of POU.

(c) Again, draw bisector OW of UOT.



Therefore,

$POT = 120°$

$= POV + VOU + UPW + WOT$

6. Do yourself.

HOTS

- Yes, the perpendicular bisector of a line segment is a line of symmetry as it divides it into two equal parts and is perpendicular to it.

Chapter 15 Polygons

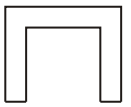
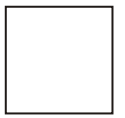
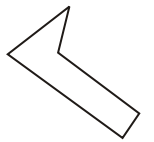
EXERCISE 15

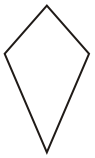
1. (a) simple closed figure (b) non-simple closed figure

(c) open figure (d) simple closed figure

(e) complex closed figure (f) open figure

(g) non-simple closed figure (h) complex closed figure

2. (a)  (b)  (c)  (f) 

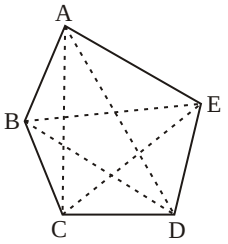
3. (a)  (b) 

4. (a) Hexagon (b) Triangle (c) Octagon (d) Quadrilateral

5. (a) closed figure (b) 4, 4 (c) 3, 3 (d) quadrilateral
(e) triangle (f) two

HOTS

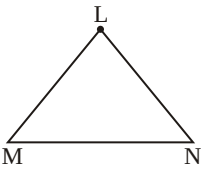
- Diagonals → *AC, AD, BD, BE, CA, CE, DB, DA, EB, EC*



Chapter 16 Triangles

EXERCISE 16A

1. We get 'triangle'.
(a) the side opposite to $N = LM$
(b) the angle opposite to the side $MN =$ L
(c) the vertex opposite to the side $NL = M$
(d) the side opposite to the vertex $M = LN$



2. Let the measure of other two equal angles be x.

$1 = 110°, \quad 2 = \quad 3 = x$

We know that the sum of the angles of a triangle is 180°.

$$1 + \quad 2 + \quad 3 = 180°$$
$$110° + x + x = 180°$$
$$2x = 180° - 110°$$
$$2x = 70°$$
$$x = \frac{70°}{2}$$
$$x = 35°$$

Hence, the measure of each of equal angles is 35°.

3. We have, $1 = 90°, \quad 2 = 50°$

Let the other acute angle be x.

We know, the sum of all the angles of a triangle is 180°.

$$1 + \quad 2 + \quad 3 = 180°$$
$$90° + 50° + x = 180°$$

$$140° + x = 180°$$
$$x = 180° - 140°$$
$$x = 40°$$

Hence, the other acute angle of triangle is 40°.

4. Let the third angle be x.

We have, $1 = 72°$, $2 = 58°$

We know, the sum of all the angles of a triangle is 180°.

$$1 + 2 + 3 = 180°$$
$$72° + 58° + x = 180°$$
$$130° + x = 180°$$
$$x = 180° - 130°$$
$$x = 50°$$

Hence, the third angle of triangle is 50°.

5. Let the angles be x, $3x$ and $5x$.

We know, the sum of all the angles of a triangle is 180°.

$$1 + 2 + 3 = 180°$$
$$x + 3x + 5x = 180°$$
$$9x = 180°$$
$$x = \frac{180°}{9}$$
$$x = 20°$$

Hence, $1 = 20°$, $2 = 3 \times 20° = 60°$, $3 = 5 \times 20° = 100°$

6. Given, in ΔABC,

$$3 \quad A = 4 \quad B = 6 \quad C$$

$\because$ $$3 \quad A = 6 \quad C$$
$$A = \frac{6}{3} \quad C = 2 \quad C$$

$\because$ $$4 \quad B = 6 \quad C$$
$$B = \frac{6}{4} \quad C = \frac{3}{2} \quad C$$

We know, that the sum of the angles of a triangle is 180°.

$$A + B + C = 180°$$
$$2 \quad C + \frac{3}{2} \quad C + C = 180°$$
$$\frac{4 \quad C + 3 \quad C + 2 \quad C}{2} = 180°$$
$$9 \quad C = 180° \times 2$$

$$C = \frac{180° \times 2}{9}$$

$$C = 40°$$

Hence, $A = 2 \times 40° = 80°$

$$B = \frac{3}{2} \times 40° = 60°$$

$$C = 40°$$

7. Consider the triangle be ΔABC.

In ΔABC,

$$A = B + C \quad \text{(given)}$$

We know that the sum of the angles of a triangle is 180°.

$$A + B + C = 180°$$

$$A + A = 180°$$

$$2A = 180°$$

$$A = \frac{180°}{2}$$

$$A = 90°$$

Hence, one of the angles of trianle ABC is 90°. So, it is a right triangle.

8. (a) Isosceles (b) Isosceles (c) Scalene (d) Equilateral
(e) Equilateral (f) Isosceles (g) Scalene

9. (a) Obtuse (b) Acute (c) Right (d) Obtuse

10. (a) perimeter (b) equal (c) 60° (d) different
(e) 180° (f) 3, 3, 3

EXERCISE 16B

1. Let the angles of triangle be $2x$, $3x$ and $4x$.

$$1 + 2 + 3 = 180°$$

$$2x + 3x + 4x = 180°$$

$$9x = 180°$$

$$x = \frac{180°}{9} = 20°$$

Largest angle $= 4 \times 20° = 80°$

(b) is correct.

2. (c) **3.** (b) **4.** (c)

5. Let the third angle be x.

$$1 + 2 + 3 = 180°$$

$$30° + 25° + x = 180°$$

$$55° + x = 180°$$
$$x = 180° - 55°$$
$$x = 125°$$

(d) is correct.

6. Let the sides of triangle be $3x$, $2x$ and $5x$.

Perimeter of triangle = 30 cm (given)

$$3x + 2x + 5x = 30 \text{ cm}$$
$$10x = 30 \text{ cm}$$
$$x = \frac{30}{10} \text{ cm}$$
$$x = 3 \text{ cm}$$

Length of longst side $= 5 \times 3 = 15$ cm

(b) is correct.

7. (c)

8. Let the equal angles measure x.

$$1 + 2 + 3 = 180°$$
$$x + 70° + 70° = 180°$$
$$x = 180° - 140°$$
$$x = 40°$$

(c) is correct.

9. (d) **10.** (c)

HOTS

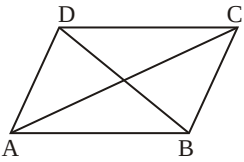
- In equilateral triangle all sides are equal but in isosceles one, two sides are equal.

Chapter 17 Quadrilaterals

EXERCISE 17A

1. (a) two pairs of adjacent angles

$= (A, B), (B, C)$



(b) two pairs of adjacent sides

$= (AB, BC), (AD, DC)$

(c) two pairs of opposite angles

$= (A, C), (B, D)$

(d) two pairs of opposite sides $= (AB, DC), (AD, BC)$

(e) its diagonals $= AC, BD$

2. Let the sides of the parallelogram be $4x$ and $3x$.

Perimeter of parallelogram $= 2(l + b)$

$\because \quad 2(l + b) = 56\text{ cm}$

$2(4x + 3x) = 56\text{ cm}$

$2 \times 7x = 56\text{ cm}$

$14x = 56\text{ cm}$

$x = \frac{56}{14}\text{ cm}$

$x = 4\text{ cm}$

Hence, length of parallelogram $= 4 \times 4\text{ cm} = 16\text{ cm}$

breadth of parallelogram $= 3 \times 4\text{ cm} = 12\text{ cm}$

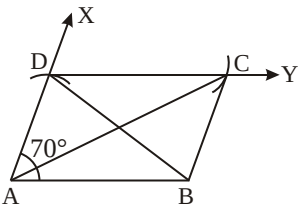
3. Steps of construction :

(a) Draw $AB = 6.5$ cm

(b) Draw $BAX = 70°$ at point A.

(c) With centre A and radius of 4.8 cm, draw an arc cutting AX at point D.

(d) Now, from point D, draw line DY parallel to AB.



(e) With centre D and radius 6.5 cm ($= AB$), draw an arc cutting DY at point C.

(f) Join BC.

Hence, $ABCD$ is required parallelogram.

And diagonal $AC = 9.5$ cm

diagonal $BD = 6.8$ cm

4. (a) The diagonals are unequal and the adjacent sides are equal = Rhombus

(b) The diagonals are equal and the adjacent sides are equal = Square

(c) The diagonals are equal and the adjacent sides are unequal = Rectangle

5. (a) The opposite sides of a square are parallel, so it is a parallelogram.

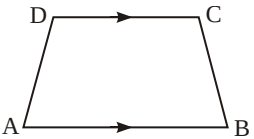
(b) A parallelogram with each angle a right angle becomes a rectangle.

(c) A rhombus with each angle a right angle becomes a square.

(d) A rectangle with sides equal becomes a square.

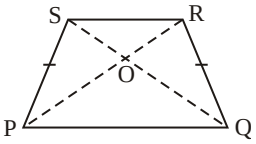
6. A quadrilateral in which one and only one pair of parallel sides is called a trapezium.

In the adjacent figure, $ABCD$ is a trapezium in which $AB \,||\, DC$.



A trapezium is said to be an isosceles trapezium if its nonparallel sides are equal.

In the adjoining figure, $PQRS$ is an isosceles trapezium in which $PQ \parallel SR$ and $PS = QR$.



7. (a) False (b) False (c) False

8. According to given conditions,

(i) Sides are equal in length. (ii) Angles are equal in measure.

Hence, this regular quadrilateral is a square.

EXERCISE 17B

1. (d) **2.** (d) **3.** (b) **4.** (c) **5.** (b) **6.** (b) **7.** (c) **8.** (c)

9. Let the fourth angle of quadrilateral be x.

$\because \quad \angle 1 + \angle 2 + \angle 3 + \angle 4 = 360°$

$80° + 70° + 120° + x = 360°$

$270° + x = 360°$

$x = 360° - 270°$

$x = 90°$

(c) is correct.

10. Let the angles be $3x$, $4x$, $5x$ and $6x$.

$\because \quad \angle 1 + \angle 2 + \angle 3 + \angle 4 = 360°$

$3x + 4x + 5x + 6x = 360°$

$18x = 360°$

$x = \frac{360°}{18}$

$x = 20°$

Largest angle $= 6 \times 20° = 120°$

(b) is correct.

HOTS

- $\because$ Two adjacent angles of a parallelogram are equal.

  All angles are equal.

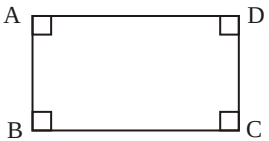
  $\frac{360°}{4} = 90°$

  $\angle A = \angle B, \quad \angle B = \angle C, \quad \angle C = \angle D, \quad \angle D = \angle A$

  $\angle A = \angle B = \angle C = \angle D = 90°$

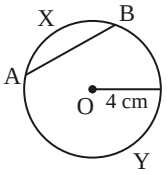
  Hence, measure of each angle is 90°.

  Another name of parallelogram is rectangle.

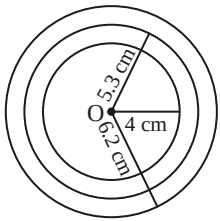


EXERCISE 18

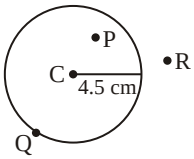
1.



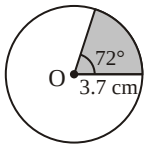
2.



3.



4.



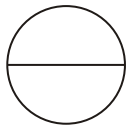
5. (a) > (b) > (c) < (d) >

6. (a) arc (b) chord (c) at the centre, on the circle (d) passes through (e) sector

7. (a) True (b) False (c) False (d) True (e) False

HOTS

- ∵ Diameter of a circle is divide it equally into two parts.
  By dividing the field by drawing its diameter.



EXERCISE 19

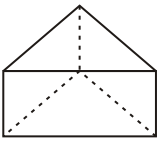
1. (i) (c) (ii) (b) (iii) (d) (iv) (c) (v) (d) (vi) (b)

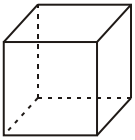
2. (a) cube (b) sphere (c) opposite (d) 6, 12, 8
(e) solid (f) 3, 6 (g) 4, 8 (h) 6, 3, 2, 9

3. (a) A brick, a book, a chalk box, a matchbox
(b) Circular pillar, circular pipe, measuring jar, test tube
(c) Ice-cream cone, clown's cap, conical tent, conical vessel

HOTS

- Triangular Prism → 3 rectangles of same size and 2 two triangles of same size.
- Cube → 6 identical squares.



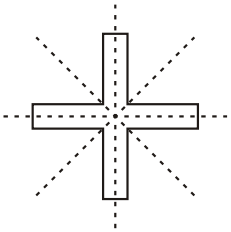


Chapter 20 Two-Dimensional Reflection Symmetry

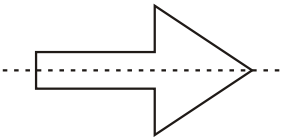
EXERCISE 20

1. (i) (c) (ii) (d) (iii) (a) (iv) (b) (v) (d) (vi) (a) (vii) (a) (viii) (c)

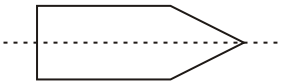
2. (a)



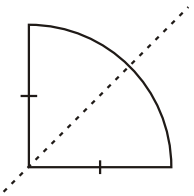
(b)



(c)



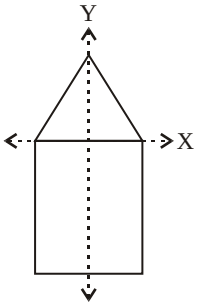
(d)



3. (a) True (b) True (c) True (d) False
(e) True (f) True (g) True

HOTS

- *'Y'* is the mirror line.



EXERCISE 21A

1. (a) Perimeter of rectangle $= 2(l + b)$
$= 2(6.5\text{ m} + 4.8\text{ m})$
$= 2 \times 11.3\text{ m}$
$= 22.6\text{ m or }22\text{ m }6\text{ dm}$

(b) Perimeter of rectangle $= 2(l + b)$
$= 2(3.25\text{ m} + 2.50\text{ m})$
$= 2 \times 5.75\text{ m}$
$= 11.50\text{ m or }11\text{ m }50\text{ cm}$

(c) Perimeter of rectangle $= 2(l + b)$
$= 2(14.2\text{ cm} + 6.8\text{ cm})$
$= 2 \times 21\text{cm} = 42\text{ cm}$

2. (a) Perimeter of square $= 4 \times \text{side}$
$= 4 \times 6.4\text{ cm} = 25.6\text{ cm}$

(b) Perimeter of square $= 4 \times \text{side}$
$= 4 \times 5.5\text{ m} = 22\text{ m}$

(c) Perimeter of square $= 4 \times \text{side}$
$= 4 \times 3.5\text{ m} = 14\text{ m}$

3. Let the side of square be x m.
$\because$ Perimeter of square $= 36\text{ m}$
$4 \times \text{side} = 36\text{ m}$
$4 \times x = 36\text{ m}$
$x = \frac{36}{4}\text{ m}$
$x = 9\text{ m}$
Hence, the side of square is 9 m.

4. Length of rectangle $= 54$ m
Breadth of rectangle $= 21$m
$\because$ Perimeter of rectangle $= 2(l + b) = 2(54 + 21)\text{ m}$
$= 2 \times 75\text{ m} = 150\text{ m}$
Cost of fencing the rectangular field = ` (15×150)
= ` 2250

5. Let the length of rectangle be $5x$ and breadth be $3x$.
$\because$ Perimeter of rectangle $= 128\text{ m}$

$$2(l+b)=128\,\text{m}$$
$$2(5x+3x)=128\,\text{m}$$
$$2\times 8x=128\,\text{m}$$
$$x=\frac{128}{16}\,\text{m}$$
$$x=8\,\text{m}$$

Hence, length $=5\times 8\,\text{m}=40\,\text{m}$

Breadth $=3\times 8\,\text{m}=24\,\text{m}$

6. Perimeter of rectangular field $=\dfrac{\text{Total cost}}{\text{Cost per / m}}=\dfrac{1540}{14}\,\text{m}=110\,\text{m}$

Given, $b=23\,\text{m}$

$\because$ Perimeter of rectangular field $=110\,\text{m}$

$$2(l+b)=110\,\text{m}$$
$$2(l+23\,\text{m})=110\,\text{m}$$
$$l+23\,\text{m}=\frac{110}{2}\,\text{m}$$
$$l+23\,\text{m}=55\,\text{m}$$
$$l=55\,\text{m}-23\,\text{m}$$
$$l=32\,\text{m}$$

Hence, the length of rectangular field is 32 m.

7. Perimeter of rectangular field $=\dfrac{\text{Total cost}}{\text{Cost per / m}}$

$$=\frac{3300}{25}\,\text{m}\ =132\,\text{m}$$

According to given condition,

Let the length of rectangle be $7x$ and breadth be $4x$.

$\because$ Perimeter of rectangular field $=132\,\text{m}$

$$2(l+b)=132\,\text{m}$$
$$2(7x+4x)=132\,\text{m}$$
$$11x=\frac{132}{2}\,\text{m}$$
$$11x=66\,\text{m}$$
$$x=\frac{66}{11}\,\text{m}$$
$$x=6\,\text{m}$$

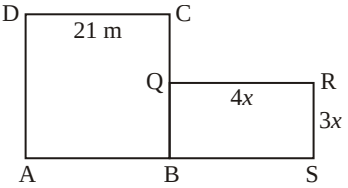
Hence, length $=7\times 6\,\text{m}=42\,\text{m}$

Breadth $=4\times 6\,\text{m}=24\,\text{m}$

8. Side of square = 21 m

Perimeter of square = $4 \times 21\text{ m} = 84\text{ m}$

Now, let the length of rectangle be $4x$ and breadth be $3x$.



But,

$$\text{Perimeter of rectangle} = 2(l + b) = 84\text{ m}$$

$$2(4x + 3x) = 84\text{ m}$$

$$2 \times 7x = 84\text{ m}$$

$$14x = 84\text{ m}$$

$$x = \frac{84}{14}\text{ m}$$

$$x = 6\text{ m}$$

Hence, length of rectangular field = $4 \times 6\text{ m} = 24\text{ m}$

Breadth of rectangular field = $3 \times 6\text{ m} = 18\text{ m}$

9. $\text{Perimeter of square} = \dfrac{\text{Total cost of fencing}}{\text{Cost per m}}$

$$4 \times \text{side} = \frac{5760}{45}\text{ m}$$

$$4 \times \text{side} = 128\text{ m}$$

$$\text{side} = \frac{128}{4}\text{ m}$$

$$\text{side} = 32\text{ m}$$

Hence, the length of each side of field is 32 m.

10. (a) Perimeter of given triangle = Sum of all sides

$= 7.8\text{ cm} + 6.5\text{ cm} + 5.9\text{ cm} = 20.2\text{ cm}$

(b) Perimeter equilateral triangle = $3 \times$ side

$= 3 \times 8.3\text{ cm} = 24.9\text{ cm}$

(c) Perimeter of isoscales triangle = Sum of all sides

$= 8.5\text{ cm} + 8.5\text{ cm} + 7\text{ cm}$

$= 24\text{ cm}$

11. (a) Perimeter of regular pentagon = $5 \times$ side

$= 5 \times 10\text{ cm} = 50\text{ cm}$

(b) Perimeter of regular octagon $= 8 \times$ side

$= 8 \times 6.5$ cm $= 52$ cm

(c) Perimeter of regular decagon $= 10 \times$ side

$= 10 \times 4.6$ cm

$= 46$ cm

12. (a) Perimeter of given figure $= 4 \times 18$ cm $= 72$ cm

(b) Perimeter of given figure

$= 8\,\text{cm} + 16\,\text{cm} + 16\,\text{cm} + 4\,\text{cm} + 4\,\text{cm} + 12\,\text{cm} + 12\,\text{cm}$

$= 72$ cm

(c) Perimeter of given figure $= 27\,\text{cm} + 35\,\text{cm} + 35\,\text{cm} + 45\,\text{cm}$

$= 142$ cm

EXERCISE 21B

1. (a) Diameter of given circle $= 28$ cm

So, its radius $= \frac{28}{2}$ cm $= 14$ cm

Circumference of circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 14$ cm $= 88$ cm

(b) Diameter of given circle $= 49$ cm

So, its radius $= \frac{49}{2}$ cm

Circumference of circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times \frac{49}{2}$ cm

$= 154$ cm

(c) Diameter of given circle $= 7.7$ cm

So, its radius $= \frac{7.7}{2}$ m

Circumference of circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times \frac{7.7}{2}$ m

$= 24.2$ m

2. (a) Radius of the given circle $= 35$ cm

Circumference of circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 35$ cm

$= 220$ cm

(b) Radius of the given circle = 12.6 cm

Circumference of circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 12.6 \text{ cm} = 79.2 \text{ cm}$$

(c) Radius of the given circle = 4.2 cm

Circumference of circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 4.2 \text{ cm} = 26.4 \text{ cm}$$

3. Let the radius of wheel is r.

$\because$ Circumference of wheel = 264 cm

$$\pi d = 264 \text{ cm}$$

$$\frac{22}{7} \times d = 264 \text{ cm}$$

$$d = \frac{264 \times 7}{22} \text{ cm}$$

$$d = 84 \text{ cm}$$

Hence, the diameter of circle is 84 cm.

4. Let the radius of wheel be r.

$\because$ Circumference of the wheel = 176 cm

$$2\pi r = 176 \text{ cm}$$

$$2 \times \frac{22}{7} \times r = 176 \text{ cm}$$

$$r = \frac{176 \times 7}{2 \times 22} \text{ cm}$$

$$r = 28 \text{ cm}$$

Hence, the radius of the wheel is 28 cm.

5. Diameter of wheel of car = 70 cm

So, Its radius = $\frac{70}{2}$ cm = 35 cm

Circumference of wheel = $2\pi r$

$$= 2 \times \frac{22}{7} \times 35 \text{ cm} = 220 \text{ cm}$$

$$\text{Number of revolution} = \frac{\text{Total distance}}{\text{Circumference}}$$

$$= \frac{1.65 \text{ km}}{220 \text{ cm}} = \frac{1.65 \times 1000 \text{ cm}}{220 \text{ cm}}$$

$$= 750 \text{ revolutions}$$

6. Diameter of the wheel = 77 cm

Circumference of wheel = πd

$$= \frac{22}{7} \times 77 \text{ cm} = 242 \text{ cm}$$

$\because$ Distance covered in 1 revolution = 242 cm

Distance covered in 500 revolution = 242×500 cm

$= 121000$ cm or 1210 m

EXERCISE 21C

1. Figure contains 14 complete squares and 1 half part of square.

So, its area $= \left[(14 \times 1) + \left(1 \times \frac{1}{2}\right)\right]$ sq cm

$= \left(14 + \frac{1}{2}\right)$ sq cm $= 14.5$ sq cm.

2. Figure contains 14 complete squares.

So, its area $= (14 \times 1)$ sq cm $= 14$ sq cm

3. Figure contains 9 complete squares and 6 half parts of square.

So, its area $= \left[(9 \times 1) + \left(6 \times \frac{1}{2}\right)\right]$ sq cm

$= (9 + 3)$ sq cm

$= 12$ sq cm

4. Figure contains 6 complete squares and 4 half parts of square.

So, its area $= \left[(6 \times 1) + \left(4 \times \frac{1}{2}\right)\right]$ sq cm

$= (6 + 2)$ sq cm

$= 8$ sq cm

5. Figure contains 4 complete squares, 8 more than half parts of square and 4 less than half parts of square.

So, its area $= [(4 \times 1) + (8 \times 1)]$ sq cm

$= (4 + 8)$ sq cm

$= 12$ sq cm

6. Figure contains 12 complete squares, 4 more than half parts of square and 4 less than half parts of square.

So, its area $= [(12 \times 1) + (4 \times 1)]$ sq cm

$= (12 + 4)$ sq cm

$= 16$ sq cm

EXERCISE 21D

1. (a) Area of given rectangle $= l \times b$

$= (2.5 \times 3)\ \text{km}^2$

$= 7.5\ \text{km}^2$

(b) Area of given rectangle $= l \times b$

$= (4.05 \times 50)\ \text{cm}^2$

$= 20250\ \text{cm}^2$

(c) Area of given rectangle $= l \times b$

$= (14.5 \times 6.8)\ \text{m}^2$

$= 98.6\ \text{m}^2$

(d) Area of given rectangle $= (11 \times 8)\ \text{m}^2$

$= 88\ \text{m}^2$

(e) Area of given rectangle $= l \times b$

$= (35 \times 15)\ \text{cm}^2 = 525\ \text{cm}^2$

2. Length $= 3$ m 25 cm $= 3.25$ m

Breadth $= 2$ m 20 cm $= 2.20$ m

Area of top of table $= l \times b$

$= (3.25 \times 2.20)\ \text{m}^2 = 7.15\ \text{m}^2$

Hence, the area of top of table is $7.15\ \text{m}^2$.

3. Side of square plot $= 16$ m

Area of square plot $=$ side $\times$ side

$= (16 \times 16)\ \text{m}^2$

$= 256\ \text{m}^2$

4. Length $= 13$ m and breadth $= 9$ m.

Area of the floor of the room $= (13 \times 9)\ \text{m}^2$

$= 117\ \text{m}^2$

Area of carpet required $= 117\ \text{m}^2$

Widgth of carpet $= 75$ cm $= 0.75$ m

$$\text{Length of carpet} = \frac{\text{area of carpet}}{\text{width of carpet}} = \left(\frac{117}{0.75}\right)\text{m} = 156\ \text{m}$$

Rate of carpeting $=$ ` 65

Cost of carpeting $=$ ` $(65 \times 156) =$ ` 10140

Hence, the total cost of carpeting is ` 10140.

5. Length of lane = 150 m and its breadth = 9 m

Area of lane = $l \times b$

$= (150 \times 9)\ m^2 = 1350\ m^2$

$= 1350 \times 10000\ cm^2$

Now, length of each brick = 22.5 cm and its breadth = 7.5 cm

Area of each brick = $l \times b$

$= (22.5 \times 7.5)\ cm^2$

$= 168.75\ cm^2$

$$\text{Number of bricks} = \frac{\text{Area of lane}}{\text{Area of each brick}}$$

$$= \frac{1350 \times 10000}{168.75} \text{ bricks}$$

$= 80000$ bricks

6. Length of carpet = 20 m 75 cm = 20.75 and its breadth = 50 cm = 0.50 m

Area of carpet = $l \times b$

$= (20.75 \times 0.50)\ m^2$

$= 10.375\ m^2$

$1\ m^2$ costs = ` 150

$10.375\ m^2$ cost = ` $(150 \times 10.375)$ = ` 1556.25

Hence, the cost of carpet is ` 1556.25.

7. Length of sheet of paper = 3 m 24 cm = 324 cm

and its breadth = 1 m 72 cm = 172 cm

Area of sheet of paper = $l \times b$

$= (324 \times 172)\ cm^2$

$= 55728\ cm^2$

Length of piece of paper = 18 cm and its breadth = 12 cm

Area of piece of paper = $l \times b = (18 \times 12)\ cm^2$

$= 216\ cm^2$

$$\text{the number of envelope} = \frac{\text{Area of sheet of paper}}{\text{Area of piece of paper}}$$

$$= \frac{55728}{216} \text{ envelopes}$$

$= 258$ envelopes

Hence, 258 envelopes can be made.

8. Length of room = 12.5 m and its breadth = 8 m

Area of room = $l \times b$

$= (12.5 \times 8)\ m^2 = 100\ m^2$

Side of carpet measures = 8 m

Area of carpet = side × side

$= 8 \times 8\ m^2 = 64\ m^2$

Area of floor, which is not carpeted = Area of room − Area of carpet

$= (100 - 64)\ m^2$

$= 36\ m^2$

Hence, area of flood, which is not carpeted is $36\ m^2$.

9. Let the width of rectangle be *b*.

Length of rectangle = 26 cm

$\because$ Area of rectangle = $390\ cm^2$

$$l \times b = 390\ cm^2$$

$$26\ cm \times b = 390\ cm^2$$

$$b = \frac{390}{26}\ cm$$

$$b = 15\ cm$$

Now, perimeter of rectangle = $2(l + b)$

$= 2(26 + 15)$ cm

$= 2 \times 41$ cm $= 82$ cm

Hence, the width of rectangle is 15 cm and perimeter is 82 cm.

10. Let the length of rectangle be *l*.

Breadth = 25 cm

$\because$ Area of rectangle = $800\ cm^2$

$$l \times b = 800\ cm^2$$

$$l \times 25\ cm = 800\ cm^2$$

$$l = \frac{800}{25}\ cm$$

$$l = 32\ cm$$

Now, perimeter of rectangle = $2(l + b)$

$= 2(32 + 25)$ cm

$= 2 \times 57$ cm $= 114$ cm

Hence, the perimeter of rectangle is 114 cm.

11. Length of wall = 4 m = 400 cm and its breadth = 3 m = 3 × 100 = 300 cm

$$\text{Area of wall} = l \times b = (400 \times 300)\,\text{cm}^2$$
$$= 120000\,\text{cm}^2$$

Now, length of each tile = 12 cm, and its breadth = 10 cm

$$\text{Area of 1 tile} = l \times b$$
$$= (12 \times 10)\,\text{cm}^2$$
$$= 120\,\text{cm}^2$$

$$\text{Number of tiles} = \frac{\text{Area of wall}}{\text{Area of 1 tile}}$$
$$= \frac{120000}{120}\ \text{tiles} = 1000\ \text{tiles}$$

∵ Cost of 1 tile = ` 22.50

Cost of 1000 tiles = ` (22.50 × 1000) = ` 22500

Hence, the cost of all tiles is ` 22500.

12. $$\text{Area of rectangular field} = \frac{\text{Total cost of cultivation}}{\text{Cost per square metre}}$$
$$= \frac{51000}{25}\ \text{m}^2$$
$$= 2040\ \text{m}^2$$

Width of the field = 40 m

$$\text{Length of the rectangular field} = \frac{\text{Area}}{\text{Width}} = \frac{2040}{40}\ \text{m} = 51\ \text{m}$$

Now, perimeter of the field = $2(l + b)$
$$= 2(51 + 40)\ \text{m} = 182\ \text{m}$$

∵ Cost of fencing the field = ` 50 per metre

Total cost of fencing the field = ` (50 × 182) = ` 9100

13. Let the length of rectangular park be $5x$ and breadth be $3x$.

Perimeter of the field = 120 m

$$2(l + b) = 120\ \text{m}$$
$$2(5x + 3x) = 120\ \text{m}$$
$$2 \times 8x = 120\ \text{m}$$
$$16x = 120\ \text{m}$$
$$x = \frac{120}{16}\ \text{m}$$
$$x = 7.5\ \text{m}$$

So, length of field = 5×7.5 m = 37.5 m and breadth = 3×7.5 m = 22.5

Now, area of the park $= l \times b$

$$= 37.5 \times 22.5\ \text{m}^2$$

$$= 843.75\ \text{m}^2$$

14. Let the breadth of rectangular plot be b.

Side of square plot = 64 m

Length of rectangular plot = 70 m

According to given condition,

$\because$ Perimeter of rectangular plot = Perimeter of square plot

$$2(l + b) = 4 \times \text{side}$$

$$2(70\ \text{m} + b) = 4 \times 64\ \text{m}$$

$$140\ \text{m} + 2b = 256\ \text{m}$$

$$2b = 256\ \text{m} - 140\ \text{m}$$

$$2b = 116\ \text{m}$$

$$b = 58\ \text{m}$$

Hence, the breadth of the field is 58 m.

Now, Area of rectangular plot $= l \times b$

$$= 70 \times 58\ \text{m}^2$$

$$= 4060\ \text{m}^2$$

And, area of square plot $= s \times s$

$$= 64 \times 64\ \text{m}^2$$

$$= 4096\ \text{m}^2$$

Clearly, $4096\ \text{m}^2 > 4060\ \text{m}^2$

Hence, area of square plot > area of rectangular plot

Difference between both areas $= (4096 - 4060)\ \text{m}^2 = 36\ \text{m}^2$

Hence, square plot has more area by 36 m^2.

15. Diagonal of square $= 8\sqrt{2}$ cm

$$\text{side} \times \sqrt{2} = 8\sqrt{2}\ \text{cm}$$

$$\text{side} = \frac{8\sqrt{2}}{\sqrt{2}}\ \text{cm}$$

$$\text{side} = 8\ \text{cm}$$

Now, area of square = side × side

$$= 8 \times 8\ \text{cm}^2$$

$$= 64\ \text{cm}^2$$

EXERCISE 21E

1. Perimeter of rectangular field $= \dfrac{\text{Total cost of fencing}}{\text{Cost per metre}}$

$$2(l+b) = \frac{2400}{30}\text{ m}$$
$$2(24\text{ m} + b) = 80\text{ m}$$
$$48\text{ m} + 2b = 80\text{ m}$$
$$2b = 80\text{ m} - 48\text{ m}$$
$$2b = 32\text{ m}$$
$$b = \frac{32}{2}\text{ m}$$
$$b = 16\text{ m}$$

(b) is correct.

2. Perimeter of rectangular field $= 2(l+b)$
$$= 2(34+18)\text{ m}$$
$$= 2\times 52\text{ m}$$
$$= 104\text{ m}$$

$\because$ Cost of fencing = ` 22.50 per metre

Total cost of fencing = ` $(22.50\times 104)$ = ` 2340

(b) is correct.

3. Length of the rectangle $= \dfrac{\text{Area}}{\text{Breadth}} = \dfrac{650}{13}\text{ m} = 50\text{ m}$

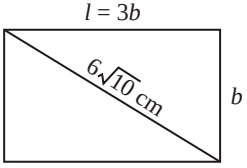
Now, perimeter of rectangle $= 2(l+b)$
$$= 2(50+13)\text{ m}$$
$$= 2\times 63\text{ m}$$
$$= 126\text{ m}$$

(d) is correct.

4. Let the breadth be b and length be $3b$.

By the Pythagoras theorem,

$$(\text{Diagonal})^2 = (\text{length})^2 + (\text{breadth})^2$$
$$(6\sqrt{10})^2 = (3b)^2 + b^2$$
$$360 = 9b^2 + b^2$$
$$360 = 10b^2$$
$$b^2 = \frac{360}{10}$$
$$b^2 = 36$$



$$b = 6$$

So, Length $= 3 \times 6\,\text{cm} = 18\,\text{cm}$ and breadth $= 6\,\text{cm}$

Now, perimeter of rectangle $= 2(l + b)$

$$= 2(18 + 6)\,\text{cm}$$
$$= 2 \times 24\,\text{cm}$$
$$= 48\,\text{cm}$$

(a) is correct.

5. Perimeter of square field $= \dfrac{\text{Total cost of fencing}}{\text{Cost per metre}}$

$$4 \times \text{side} = \frac{2000}{25}\,\text{m}$$
$$\text{side} = \frac{80}{4}\,\text{m}$$
$$\text{side} = 20\,\text{m}$$

(c) is correct.

6. Length of room $= 5\text{ m }40\text{ cm} = 5.40\text{ m}$

Breadth of room $= 4\text{ m }50\text{ cm} = 4.50\text{ m}$

Area of room $= l \times b$

$$= 5.40 \times 4.50\,\text{m}^2$$
$$= 24.30\,\text{m}^2$$

(b) is correct.

7. Length of lane $= 150\,\text{m} = 150 \times 100\,\text{cm}$

Breadth of lane $= 9\,\text{m} = 9 \times 100\,\text{cm}$

Area of lane $= l \times b$

$$= 150 \times 100 \times 9 \times 100\,\text{cm}^2$$
$$= 13500000\,\text{cm}^2$$

Now, area of 1 brick $= l \times b$

$$= 22.5 \times 7.5\,\text{cm}^2$$
$$= 168.75\,\text{cm}^2$$

Number of bricks $= \dfrac{\text{Area of lane}}{\text{Area of 1 brick}}$

$$= \frac{13500000}{168.75}\,\text{bricks}$$
$$= 80000\text{ bricks}$$

(d) is correct.

8. Diameter of the circle = 7 cm

Circumference = πd

$$= \frac{22}{7} \times 7 \text{ cm}$$

$$= 22 \text{ cm}$$

(b) is correct.

9. Circumference of circle = 88 cm

$$\pi d = 88 \text{ cm}$$

$$\frac{22}{7} \times d = 88 \text{ cm}$$

$$d = \frac{88 \times 7}{22} \text{ cm}$$

$$d = 28 \text{ cm}$$

(a) is correct.

10. Diameter of wheel = 70 cm

Circumference of wheel = πd

$$= \frac{22}{7} \times 70 \text{ cm} = 220 \text{ cm}$$

$\because$ Distance covered in 1 revolution = 220 cm

Distance covered in 50 revolution = 50×220 cm

$= 11000$ cm or 110 m

(b) is correct.

HOTS

- Pattern of perimeter $\rightarrow$ 4, 8, 12, 16, 20, 24, 28, 32, 36, 40.
  Perimeter of the tenth figure is 40 cm.

VALUE BASED

- Area of rectangular ground = 5270 m^2

Breadth = 62 m

$$\text{Length} = \frac{\text{area}}{\text{breadth}} = \frac{5270}{62} = 85 \text{ m}$$

Perimeter = $2 \times$ (Length + Breadth)

$= 2 \times (85 + 62)$

$= 2 \times 147 = 294$ m

Hence, the perimeter of rectangular ground is 294 m.

EXERCISE 22

1. (a) Data : In our day-to-day life, we collect various numerical facts. The numerical facts are called data.

(b) Raw data : Data obtained in the original form is called raw data.

(c) Array : When the data is arranged in an ascending or a descending order, so that it can be arranged in a systematic order, then the data is called an array.

(d) Tabulation of data : Arranging the data in a systematic form of a table is called tabulation or presentation of the data.

(e) Observations : Each numerical figure in a data is called an observation.

(f) Frequency of an observation : The number of times a particular observation occurs is called its frequency.

2. Arranging the data in ascending order, we get the given data as :

1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 5, 5, 5

Now, we may prepare the frequency table, as shown below.

Number	Tally marks	Frequency
1	𝍸	5
2	𝍸 ||	7
3	𝍸 |	6
4	||	2
5	|||	3
	Total	**23**

3. Arranging the data in ascending order, we get the given data as :

5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 7, 7, 7, 8, 8, 8, 8, 8, 8, 9, 9, 10, 10

Now, we may prepare the frequency table, as shown below.

Number	Tally marks	Frequency
5	||	2
6	||||	4
7	𝍸 ||	7
8	𝍸	5
9	||	2
10	||	2
	Total	**22**

4. On arranging the given data in table, we get

Number of children	Tally marks	Number of families
0	||	2
1	𝍸 |	6
2	𝍸 ||||	9
3	𝍸	5
4	|||	3

5. On arranging the given data in table, we get

Size	Tally marks	Frequency
4	||	2
5	𝍸	5
6	||||	4
7	||||	4
8	𝍸 |	6
9	𝍸 ||	7
	Total	**28**

6. On arranging the given data in table, we get

Obtain marks	Tally marks	Frequency
2	|	1
4	||	2
5	𝍸 |	6
6	|||	3
8	|	1
10	𝍸 ||||	9
12	|	1
15	||||	4
16	||	2
17	||	2
18	𝍸	5
19	|||	3
20	𝍸 |	6
	Total	**45**

7. On arranging the given data in table, we get

Height (in cm)	Tally marks	Frequency
115	||	2
117	|	1
118	||	2
120	||	2
150	|	1
155	||||	4
158	|	1
160	𝍸	5
162	|	1
165	|||	3
166	|	1
167	|	1
168	|	1
170	|	1
175	||	2
180	||	2
	Total	**30**

8. (a) numerical figures (b) original (c) array (d) frequency (e) tabulation

HOTS

-

Temperature in °C	Tally marks	Number of days
32	||||	4
34	𝍸||	7
36	𝍸 𝍸	10
38	𝍸 |	6
40	|||	3

VALUE BASED

-

Grade	Tally marks	Number of students
A	𝍸 𝍸	10
B	𝍸 𝍸 |	11
C	𝍸 ||||	9
D	𝍸 𝍸	10

EXERCISE 23

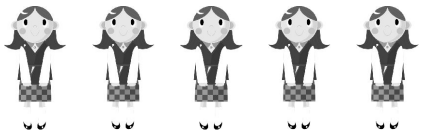
1. Scale :  ≡ 10 fans sold

Now, we may draw the pictograph, as shown below :

Month	Number of fans sold
March	
April	
May	
June	
July	
August	

2. Scale :  ≡ 5 successful students

We may draw the pictograph, as shown below :

Subject	Number of students passed
English	
Mathematics	

Hindi	
Drawing	

3. Scale :  = 10 stools

We may draw the pictograph, as shown below :

Room number	Number of stools
I	
II	
III	
IV	
V	

4. Scale :  = 2 absentees

We may draw the pictograph, as shown below :

Day	No. of absentees
Monday	

Tuesday	
Wednesday	
Thursday	
Friday	

5. (a) Number of chapatis were made on Monday = $4 \times 50 = 200$

(b) Number of chapatis were made on Thursday = $4 \times 50 = 200$

Number of chapatis were made on Tuesday = $7 \times 50 = 350$

Difference of numbers of chapatis were made on these days

$= 350 - 200$

$= 150$

(c) Number of chapatis were made on Thursday = $4 \times 50 = 200$

Number of chapatis were made on Friday = $8 \times 50 = 400$

Total number of chapatis were made on these days

$= 200 + 400$

$= 600$

(d) The maximum number of chapatis were made on Friday.

Number of chapatis were made on Friday = $8 \times 50 = 400$

6. (a) Number of mango trees = $3 \times 8 = 24$

(b) Number of banyan trees = $4 \times 8 = 32$

(c) Number of neem trees = $5 \times 8 = 40$

(d) Total number of trees = $24 + 32 + 40 = 96$

7. (a) Number of scooters were sold on Monday = $5 \times 6 = 30$

(b) Number of scooters were sold on Tuesday = $4 \times 6 = 24$

(c) Sale of the scooters was maximum on Friday.

Number of scooters were sold on Friday = $7 \times 6 = 42$

(d) Sale of the scooters was minimum on Saturday.
Number of scooters were sold on Saturday $= 2 \times 6 = 12$

HOTS

- Do yourself

Chapter 24 Bar Graphs

EXERCISE 24

1. (a) The given bar graph shows the different modes of transport to school used by 51 students of a locality.

(b) Maximum number of students use bicycle for going to school.

(c) 14 students use bus for going to school.

(d) $6 + 10 + 16 + 5 = 37$ students do not use bus for going to school.

2. (a) The production was maximum in the 2nd week.

(b) The production was minimum in the 4th week.

(c) The average production is $\frac{600 + 1000 + 800 + 500 + 700}{5} = \frac{3600}{5}$

$= 720$ per week

(d) $600 + 1000 + 800 = 2400$ cycles were produced in the first three weeks.

3. (a) The given bar graph shows the number of members in each of the 60 families of a colony.

(b) 10 families have 3 members each.

(c) 5 couples have no child.

(d) A family of 4 members is most common.

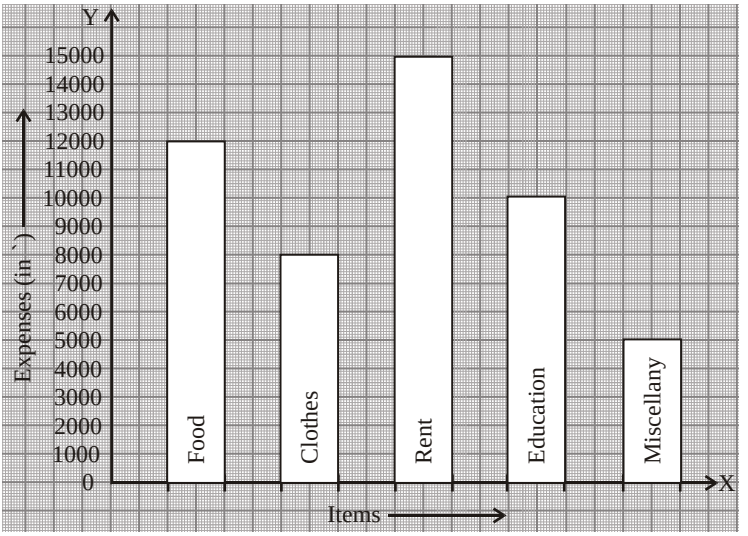
4. (a) The given bar graph shows the marks obtained by a student in each of the four subjects in an examination.

(b) The student is poorest in Science.

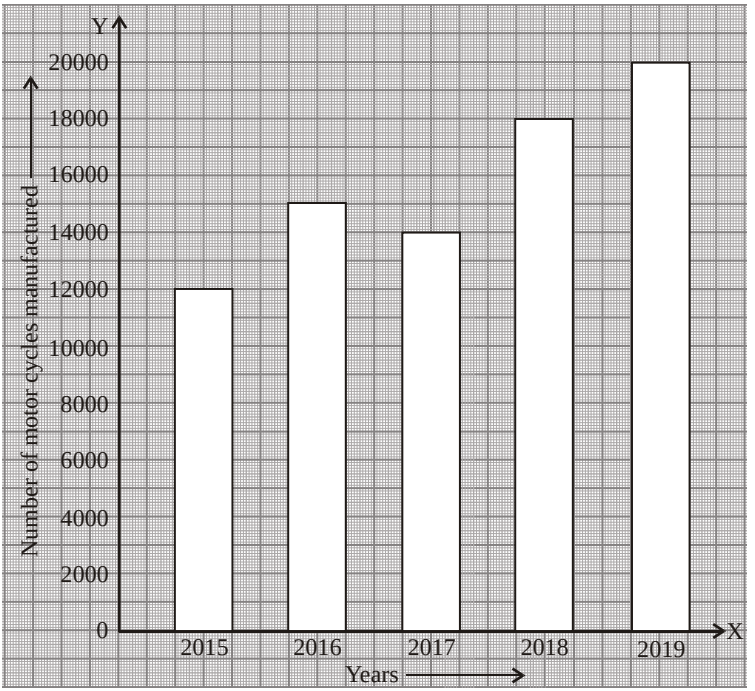
(c) The student is best in Mathematics.

(d) He got more than 40 marks in Hindi and Mathematics.

5. Scale : 1 unit length = 1000 items

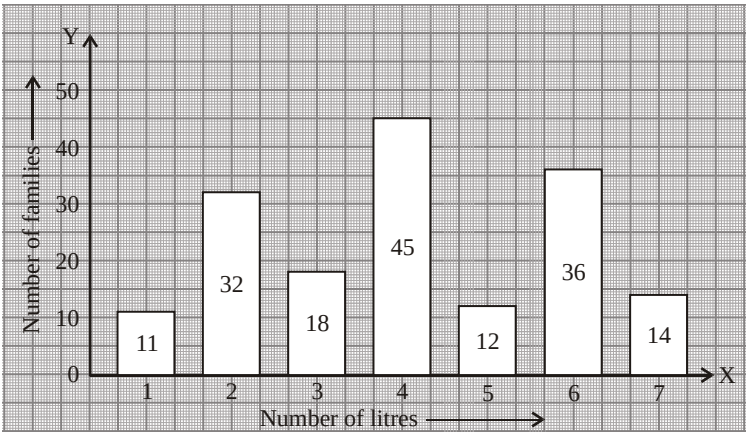


6. Scale : 1 unit length = 2000 motor cycles



HOTS

- Milk consumption per day by each family in a colony.



j j j j j j