



Vista
Books

Based on the Syllabus prescribed by National Council
of Educational Research and Training (NCERT)



Maths



**Teacher's Manual
(Class 6)**

By:
Sulabh Sharma
B.Sc, M.Sc (Math)

Chapter

1

Knowing Our Numbers

Exercise 1.1

1. Make an Indian place-value table with nine columns and four periods; and write in it the following numbers :

Questions part	Crores		Lakhs		Thousands		Ones		
	Ten Crores	Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
(a)					7	1	5	0	7
(b)				2	3	1	7	5	6
(c)			1	0	4	5	7	2	3
(d)		9	6	0	7	8	7	8	2

2. Make an International place-value table with nine columns and three periods; and write in it the following numbers :

Questions part	Millions			Thousands			Ones		
(a)					2	3	1	7	5
(b)				4	9	2	0	0	1
(c)			7	8	2	3	1	2	0
(d)		9	4	3	1	0	2	7	8

3. Write the place-value of each of the digits of 25643193; and also express the number in the expanded form.

Place-value of 2 in 25643193 is 20000000

Place-value of 5 in 25643193 is 5000000

Place-value of 6 in 25643193 is 600000

Place-value of 4 in 25643193 is 40000

Place-value of 3 in 25643193 is 3000

Place-value of 1 in 25643193 is 100

Place-value of 9 in 25643193 is 90

Place-value of 3 in 25643193 is 3

In the expanded form, 25643193 is written as :

$20000000 + 5000000 + 600000 + 40000 + 3000 + 100 + 90 + 3$

4. Rewrite each of the following numbers, using commas, in relation to both the systems of numeration :

In Indian system :

(a) 71,932 (b) 19,79,302 (c) 87,61,20,345

In International system :

(a) 71,932 (b) 1,979,302 (c) 876,120,345

5. Write in the short form :

(a) 3720 (b) 90603055 (c) 1100759

6. Write the following numbers in expanded form :

(a) $5 \times 100000000 + 4 \times 10000000 + 0 \times 1000000 + 8 \times 100000$
 $+ 0 \times 10000 + 3 \times 1000 + 0 \times 100 + 1 \times 10 + 5 \times 1$

(b) $3 \times 10000000 + 1 \times 1000000 + 2 \times 100000 + 3 \times 10000$
 $+ 4 \times 1000 + 5 \times 100 + 6 \times 10 + 0 \times 1$

(c) $7 \times 100000 + 8 \times 10000 + 9 \times 1000 + 5 \times 100 + 0 \times 10 + 7 \times 1$

(d) $5 \times 1000000 + 7 \times 100000 + 0 \times 10000 + 0 \times 1000 + 0 \times 100$
 $+ 0 \times 10 + 5 \times 1$

7. Fill in the blanks :

(a) Thirty six; forty four; six; two hundred

(b) 200110005

(c) Two hundred seventy-eight; one

8. Place value of the digit 2 in the number

$84235 = 2 \times 100 = 200$

Face value of the digit 2 in the number

$84235 = 2$

Required difference = $200 - 2 = 198$

So, the required difference is 198.

9. The place values of two 8's in 98378234 are 8000000 and 8000.

$$\begin{array}{r} \therefore \text{ Required difference} = 8000000 \\ - 8000 \\ \hline 79,92,000 \end{array}$$

So, the required difference is 7992000.

10. The place value of 3 in 16234507 = 30000

The place value of 5 in 16234507 = 500

\therefore The required product = $30000 \times 500 = 1,50,00,000$

11. The required numbers are 504, 540, 450 and 405.

12. The thousands place digit = 7

The thousands place digit = 8

The ten's place digit = 0

The one's place digit = 5

\therefore The required number = 7805

13. The given number = 543

\therefore The number obtained by reversing the digit's = 345

\therefore The required difference = $543 - 345 = 198$

So, the required number is 198.

14. The given number = 4485

\therefore The number interchanging by hundreds and ten's places
= 4845

Yes, number is increased.

\therefore The number increased by 360.

15. Consider the number 78654325. Name the values of the digits at :

(a) 300

(b) 50000

(c) 600000

(d) 70000000

(e) 8000000

(f) 70000000

16. Find the greatest and the smallest numbers in each of the following cases :

(a) Greatest : 27,09,835; Smallest : 7,63,048

(b) Greatest : 3,68,92,173; Smallest : 12,37,689

Exercise 1.2

1. Round off each of the following numbers to nearest ten :

(a) 36

In 36, digit at ones place is 6. ($6 > 5$)

\therefore The required round of 36 is 40.

(b) 173

In 173, digit at ones place is 3 and ($3 < 5$)

\therefore The required round of 173 is = 170.

(c) 3869

In 3869, digit at ones place is 9, which is greater than 5.

\therefore The required round of 3869 is 3870.

(d) 16378

In 16378, digit at ones place is 8, which is greater than 5.

\therefore The required round of 16378 is 16380

(e) 4678

In 4678, digit at ones place is 8, which is greater than 5.

\therefore The required round of 4678 is 4680.

2. Round off each of the following numbers to nearest hundreds :

(a) 814

In 814, digit at tens place is 1, which is less than 5.

\therefore The required round of 814 = 800.

(b) 1254

In 1254, digit at tens place is 5, which is equal to 5.

\therefore The required round of 1254 = 1300.

(c) 43126

In 43126, digit at tens place is 2, which is less than 5.

\therefore The required round of 43126 = 43100.

(d) 98165

In 98165, digit at tens place is 6, which is greater than 5.

\therefore The required round of 98165 = 98200.

(e) 10392

In 10392, digit at tens place is 9, which is greater than 5.

\therefore The required round of 10392 = 10400.

3. Round off each of the following numbers to nearest thousands :

(a) 793

In 793, digit at hundreds place is 7, which is 45 greater than 5.

\therefore The required round of 793 = 1000

(b) 4826

In 4826, digit at hundreds place is 8, which is greater than 5.

\therefore The required round of 4826 = 5000

(c) 16719

In 16719, digit at hundreds place is 7, which is greater than 5.

\therefore The required round of 16719 = 17000

(d) 28394

In 28394, digit at hundreds place is 3, which is less than 5.

\therefore The required round of 28394 = 28000

(e) 32222

In 32222, digit at hundreds place is 2, which is less than 5.

\therefore The required round of 32222 = 32000

4. Round off each of the following numbers to nearest ten thousands :

(a) 17514

In 17514, digit at thousands place is 7, which is greater than 5.

\therefore The required round of 17514 = 20000

(b) 26340

In 26340, digit at thousands place is 6, which is greater than 5.

\therefore The required round of 26340 = 30000

(c) 34890

In 34890, digit at thousands place is 4, which is less than 5.

\therefore The required round of 34890 = 30000

(d) 272685

In 272685, digit at thousands place is 2, which is less than 5.

\therefore The required round of 272685 = 270000

(e) 10952

In 10952, digit at thousands place is 0, which is less than 5.

\therefore The required round of 10952 = 10000

5. Estimate the sum by rounding off to nearest ten :

(a) $16472 + 21434 + 65556$

Estimating all numbers to the nearest tens. We have,

$$16470 + 21430 + 65560$$

So, estimated sum = 103460

(b) $21470 + 12437 + 230$

Estimating all numbers to the nearest tens. We have,

$$21470 + 12440 + 230$$

So, estimated sum = 34140

(c) $74635 + 82960 + 1245$

Estimating all numbers to the nearest tens. We have,

$$74640 + 82960 + 1250$$

So, estimated sum = 158850

6. Estimate the difference by rounding off to nearest hundreds :

(a) $7531 - 1916$

Estimating these numbers to nearest hundreds

$$7500 - 1900$$

So, estimated difference = 5600

(b) $53045 - 1456$

Estimating these numbers to nearest hundreds

$$53000 - 1500$$

So, estimated difference = 51500

(c) $9525 - 3542$

Estimating these numbers to nearest hundreds

$$9500 - 3500$$

So, estimated difference = 6000

(d) $8260 - 4919$

Estimating these numbers to nearest hundreds

$$8300 - 4900$$

So, estimated difference = 3400

7.

Nearest 10

Mathematics book has page = 492

490

Science book has page = 368

- 370

So, estimated difference =

120

8. Estimate the product to nearest tens.

(a)	39	$\xrightarrow{\text{estimating nearest 10}}$	40
	$\times 42$	$\xrightarrow{\text{estimating nearest 10}}$	$\times 40$
Actual product	<u>1638</u>	So, estimated product	<u>1600</u>
(b)	86	$\xrightarrow{\text{estimating nearest 10}}$	90
	$\times 21$	$\xrightarrow{\text{estimating nearest 10}}$	$\times 20$
Actual product	<u>1806</u>	So, estimated product	<u>1800</u>
(c)	115	$\xrightarrow{\text{estimating nearest 10}}$	120
	$\times 232$	$\xrightarrow{\text{estimating nearest 10}}$	$\times 230$
Actual product	<u>26680</u>	So, estimated product	<u>27600</u>
(d)	1456	$\xrightarrow{\text{estimating nearest 10}}$	1460
	$\times 230$	$\xrightarrow{\text{estimating nearest 10}}$	$\times 230$
Actual product	<u>334880</u>	So, estimated product	<u>335800</u>

9. Tony walks everyday = 365 m
 Distance covered in 130 days = 365
 $\times 130$
47450

In 47450, digit at hundreds place is 4, so estimated to nearest thousands will give 47000.

10. Find the estimated quotient of the following :

(a)	$638 \div 23$		$20 \overline{) 640} (32$
	638	$\xrightarrow{\text{estimating nearest 10}}$	640
	23	$\xrightarrow{\text{estimating nearest 10}}$	20
	So, $640 \div 20$		<u>60</u>
	= 32		<u>40</u>
			<u>40</u>
			<u>×</u>
(b)	$751 \div 32$		$30 \overline{) 750} (25$
	751	$\xrightarrow{\text{estimating nearest 10}}$	750
	32	$\xrightarrow{\text{estimating nearest 10}}$	30
	So, $750 \div 30$		<u>60</u>
	= 25		<u>150</u>
			<u>150</u>
			<u>×</u>

(c) $7098 \div 52$

7098	$\xrightarrow{\text{estimating nearest 10}}$	7100	
52	$\xrightarrow{\text{estimating nearest 10}}$	50	
So, $7100 \div 50$			$ \begin{array}{r} 50 \overline{) 7100} \quad (142 \\ \underline{50} \\ 210 \\ \underline{200} \\ 100 \\ \underline{100} \\ 0 \end{array} $
$= 142$			

(d) $2432 \div 55$

2432	$\xrightarrow{\text{estimating nearest 10}}$	2400	
55	$\xrightarrow{\text{estimating nearest 10}}$	60	
So, $2400 \div 60$			$ \begin{array}{r} 60 \overline{) 2400} \quad (40 \\ \underline{240} \\ 0 \\ \underline{0} \\ 0 \end{array} $
$= 40$			

(e) $2660 \div 19$

2660	$\xrightarrow{\text{estimating nearest 10}}$	2660	
19	$\xrightarrow{\text{estimating nearest 10}}$	20	
So, $2660 \div 20$			$ \begin{array}{r} 20 \overline{) 2660} \quad (133 \\ \underline{20} \\ 66 \\ \underline{60} \\ 60 \\ \underline{60} \\ 0 \end{array} $
$= 133$			

Exercise 1.3

1. Write each of the following as a Hindu-Arabic numeral :

- | | |
|---------------------------------------|----------------------------------|
| (a) V = 5 | (b) X = 10 |
| (c) XV = 10 + 5 = 15 | (d) XX = 10 + 10 = 20 |
| (e) XXV = 10 + 10 + 5 = 25 | (f) XXIX = 10 + 10 + 10 - 1 = 29 |
| (g) XXX = 10 + 10 + 10 = 30 | (h) XXXV = 10 + 10 + 10 + 5 = 35 |
| (i) XL = 50 - 10 = 40 | (j) L = 50 |
| (k) LX = 50 + 10 = 60 | (l) XC = 100 - 10 = 90 |
| (m) C = 100 | (n) CI = 100 + 1 = 101 |
| (o) CIX = 100 + 10 - 1 = 109 | (p) CL = 100 + 50 = 150 |
| (q) CC = 100 + 100 = 200 | |
| (r) CCXLIX = 100 + 100 + 40 + 9 = 249 | |
| (s) CCCL = 100 + 100 + 100 + 50 = 350 | |

- (t) $CD = 500 - 100 = 400$
 (u) $DCL = 500 + 100 + 50 = 650$
 (v) $DCCLXVIII = 500 + 100 + 100 + 50 + 10 + 8 = 768$
 (w) $CM = 1000 - 100 = 900$
 (x) $M = 1000$
 (y) $MCCL = 1000 + 100 + 100 + 50 = 1250$
2. Express each of the following as a Roman numeral :
- (a) $9 = 10 - 1 = IX$
 (b) $19 = 10 + 9 = XIX$
 (c) $35 = 10 + 10 + 10 + 5 = XXXV$
 (d) $39 = 10 + 10 + 10 + 9 = XXXIX$
 (e) $40 = 50 - 10 = XL$
 (f) $59 = 50 + 9 = LIX$
 (g) $84 = 50 + 10 + 10 + 10 + 4 = LXXXIV$
 (h) $79 = 50 + 10 + 10 + 9 = LXXIX$
 (i) $66 = 50 + 10 + 6 = LXVI$
 (j) $69 = 50 + 10 + 9 = LXIX$
 (k) $75 = 50 + 10 + 10 + 5 = LXXV$
 (l) $85 = 50 + 10 + 10 + 10 + 5 = LXXXV$
 (m) $44 = 40 + 4 = XLIV$
 (n) $23 = 10 + 10 + 3 = XXIII$
 (o) $62 = 50 + 10 + 2 = LXII$
3. Express each of the following as a Roman numeral :
- (a) $341 = 100 + 100 + 100 + 40 + 1 = CCCXLI$
 (b) $226 = 100 + 100 + 20 + 6 = CCXXVI$
 (c) $195 = 100 + 90 + 5 = CXC V$
 (d) $164 = 100 + 50 + 10 + 4 = CLXIV$
 (e) $759 = 500 + 100 + 100 + 50 + 9 = DCCLIX$
 (f) $611 = 500 + 100 + 10 + 1 = DCXI$
 (g) $596 = 500 + 90 + 6 = DXCVI$
 (h) $475 = 500 - 100 + 70 + 5 = CDLXXV$

Multiple Choice Questions

Tick (✓) the correct option :

1. (b) 2. (b) 3. (a) 4. (c) 5. (c) 6. (a) 7. (c) 8. (d)

BRAIN BOOSTER

1. Greatest four digit no. using 2 different digits = 9998
2. Zero (o) :
3. Greatest no. which on rounding off gives 5400 = 5449
Smallest no which no rounding off gives 5400 = 5350
So difference = $5449 - 5350 = 99$
4. 1,329,854,134
 - (a) one billion three hundred twenty-nine million eight hundred fifty-four thousand one hundred thirty-four.
 - (b) One arab thirty-two crore ninety-eight lakh fifty-four thousand one hundred thirty-four.
5. Largest no formed by digits 0, 2, 5 and 7 = 7520
smallest no. formed by digits 0, 2, 5 and 7 = -2057
Difference = $\underline{\underline{5463}}$

Chapter

2

Playing With Numbers

Exercise 2.1

1. Tell whether each of the following statements is True or False :
 - (a) False
 - (b) True
 - (c) True
 - (d) False
 - (e) True
 - (f) False
 - (g) False
 - (h) True
 - (i) True
2. Write 'odd' or 'even' for each of the following :
 - (a) odd
 - (b) even
 - (c) odd
 - (d) even
 - (e) odd
 - (f) odd
3. Write all factors of the following numbers :
 - (a) We know that,

$60 = 1 \times 60$	$60 = 4 \times 15$
$60 = 2 \times 30$	$60 = 5 \times 12$
$60 = 3 \times 20$	$60 = 6 \times 10$

\therefore All the factors of 60 are : 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60.

(b) We know that,

$$16 = 1 \times 16$$

$$16 = 2 \times 8$$

$$16 = 4 \times 4$$

\therefore All the factors of 16 are : 1, 2, 4, 8 and 16.

(c) We know that,

$$144 = 1 \times 144$$

$$144 = 2 \times 72$$

$$144 = 3 \times 48$$

$$144 = 4 \times 36$$

$$144 = 6 \times 24$$

$$144 = 8 \times 18$$

$$144 = 9 \times 16$$

$$144 = 12 \times 12$$

\therefore All the factors of 144 are : 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72 and 144.

4. Give the first four multiples of each :

(a) First multiples of 5 are :

$$5 \times 1 = 5; 5 \times 2 = 10; 5 \times 3 = 15; \text{ and } 5 \times 4 = 20$$

Thus, 5, 10, 15 and 20 are first four multiples of 5.

(b) First four multiples of 13 are :

$$13 \times 1 = 13; 13 \times 2 = 26; 13 \times 3 = 39 \text{ and } 13 \times 4 = 52$$

Thus, 13, 26, 39 and 52 are first four multiples of 13.

(c) First four multiples of 17 are :

$$17 \times 1 = 17; 17 \times 2 = 34; 17 \times 3 = 51 \text{ and}$$

Thus, 17, 34, 51 and 68 are first four multiples of 17.

5. A number is divisible by 15. By what other numbers will that number be divisible?

A number is divisible by 15.

Factors of 15 = 1, 3, 5, 15

So, we say that a number is divisible by 15, then it will be divisible by 1, 3 and 5 too.

6. A number is divisible by 5 and 8 both. By which other number will that number be always divisible?

Multiplying 5 by 8 = $8 \times 5 = 40$

We can say that a number is divisible by 5 and 8 both, it must always be divisible by 40.

7. Write all the even numbers between 40 and 60.

(Note : which number is divisible by 2 is called an even number).

Then, the even number between 40 and 60 = 42, 44, 46, 48, 50, 52, 54, 56 and 58

8. Write all the odd numbers less than 20.

(Note : Which number is not divisible by 2 is called an odd number)

Then, the odd numbers less than 20 :

1, 3, 5, 7, 9, 11, 13, 15, 17, 19

9. Find the common factors of :

(a) Factors of 45 = $\textcircled{1}$, $\textcircled{3}$, $\textcircled{5}$, 9, $\textcircled{15}$, 45

Factors of 60 = $\textcircled{1}$, 2, $\textcircled{3}$, 4, $\textcircled{5}$, 6, 10, 12, $\textcircled{15}$, 20, 30

Factors of 105 = $\textcircled{1}$, $\textcircled{3}$, $\textcircled{5}$, 7, $\textcircled{15}$, 21, 105

Common factors = 1, 3, 5, 15

(b) Factors of 21 = $\textcircled{1}$, 3, $\textcircled{7}$, 21

Factors of 35 = $\textcircled{1}$, 5, $\textcircled{7}$, 35

Common factors = 1, 7

(c) Factors of 16 = $\textcircled{1}$, $\textcircled{2}$, $\textcircled{4}$, 8, 16

Factors of 20 = $\textcircled{1}$, $\textcircled{2}$, $\textcircled{4}$, 5, 10, 20

Common factors = 1, 2, 4

(d) Factors of 8 = $\textcircled{1}$, $\textcircled{2}$, $\textcircled{4}$, 8

Factors of 12 = $\textcircled{1}$, $\textcircled{2}$, 3, $\textcircled{4}$, 6, 12

Factors of 20 = $\textcircled{1}$, $\textcircled{2}$, $\textcircled{4}$, 5, 10, 20

Common factors = 1, 2, 4

(e) Factors of 3 = $\textcircled{1}$, $\textcircled{3}$

Factors of 6 = $\textcircled{1}$, 2, $\textcircled{3}$, 6

Factors of 9 = $\textcircled{1}$, $\textcircled{3}$, 9

Common factors = 1, 3

(f) Factors of 10 = $\textcircled{1}$, 2, $\textcircled{5}$, 10

Factors of 15 = $\textcircled{1}$, 3, $\textcircled{5}$, 15

Common factors = 1, 5

10. Find the first three common multiples of :

(a) Multiples of 8 = 8, 16, (24), (32), 40, (48), 56, 64, (72), 80

Multiples of 12 = 12, (24), 36, (48), 60, (72), 84

common multiples of 8 and 12 = 24, 48, 72

(b) Multiples of 6 = 6, 12, (18), 24, 30, (36), 42, 48,

Multiples of 9 = 9, (18), 27, (36), 45, (54), 63

common multiples of 6 and 9 = 18, 36, 54

(c) Multiples of 10 = 10, 20, 30, 40, (50), 60, 70, 80, 90, (100), 110, 120, (130), 140, 150

Multiples of 25 = 25, (50), 75, (100), 125, (150), 175

common multiples of 10 and 25 = 50, 100

11. Write down the prime numbers between :

(a) Prime number between 1 and 20 = 2, 3, 5, 7, 11, 13, 17, 19

(b) Prime number between 28 and 44 = 29, 31, 37, 41, 43

(c) Prime number between 90 and 120 = 97, 101, 103, 107, 109, 113

12. Write all the numbers less than 90 which are common multiples of 5 and 6.

Multiples of 5 = 5, 10, 15, 20, 25, (30), 35, 40, 45, 50, 55, (60), 65, 70, 75, 80, 85, (90), 95

Multiples of 6 = 6, 12, 18, 24, (30), 36, 42, 48, 54, (60), 66, 72, 78, 84, (90)

Common multiples of 5 and 6 is 30, 60 and 90.

13. Express each of the following as a sum of two odd primes :

(a) Sum of 13 and 17 prime number, we get 30.

$$13 + 17 = 30$$

(b) Sum of 23 and 41 prime number, we get 64.

$$23 + 41 = 64$$

(c) Sum of 31 and 67 prime number, we get 98.

$$31 + 67 = 98$$

Exercise 2.2

1. Check divisibility of the following numbers by 2, 4, 8, 5 and 10. Put a tick (✓) for divisible and cross (✗) for not divisible :

Number	2	4	8	5	10
(a) 1586	✓	✗	✗	✗	✗
(b) 4995	✗	✗	✗	✓	✗
(c) 572	✓	✓	✗	✗	✗
(d) 464	✓	✓	✓	✗	✗
(e) 990	✓	✗	✗	✓	✓

2. Check divisibility of the following numbers by 3, 6, 9 and 11. Put a (✓) for divisible and a (✗) for not divisible.

Number	3	6	9	11
(a) 71232	✓	✓	✗	✗
(b) 21084	✓	✓	✗	✗
(c) 5335	✗	✗	✗	✓
(d) 1258	✗	✗	✗	✗

3. A number is divisible by both 5 and 12. By which other number will that number be always divisible?

Multiplying 5 by 12 = $5 \times 12 = 60$

Factors of 60 = 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

A number is divisible by both 5 and 12. It is also divisible by 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

4. A number is divisible by 12. By what other numbers will that number be divisible?

Factor of 12 = 1, 2, 3, 4, 6, 12

A number is divisible by 12. It is also divisible by 1, 2, 3, 4, 6 and 12.

5. Is 2430780 divisible by 7?

Number = 2430780

Rule of divisible by 7 = A number is divisible by 7 if the difference of twice the digit at ones place and the number is formed by. The digits at remaining places is divisible by 7.

Digit at ones place = 0

Twice the one place = $0 \times 2 = 0$

Remaining places = $243078 - 0 = 243078$

243078 is not divisible by 7.

So, we say that 2430780 is not divisible by 7 too.

6. If a number is divisible by 4 and 6, is it necessary that it will be divisible by 24? If not, write one such number.

No, it is not necessary that a number divisible by 4 and 6, will be divisible by 24 also. For example, 12 is divisible by both 4 and 6 but it cannot be divided by 24 as it is smaller than it.

7. If a number is divisible by 2 and 7, will it be divisible by 14?

Give an example.

Yes, If number is divisible by 2 and 7, it will be divisible by 14.

Because 2 and 7 are factors of 14.

For example :

938 = As units place is even digit so, 938 is divisible by 2.

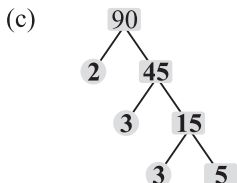
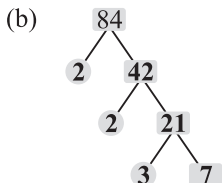
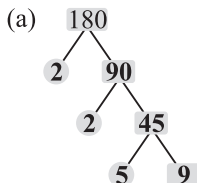
$$[938 - (8 \times 2)] = 93 - 16 = 77$$

77 is divisible 7.

Thus, 938 is also divisible by 14.

Exercise 2.3

1. Complete the following factor trees and write down the prime factors of each number :



2. Write the prime factorization of each of the following number :

(a) 256

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

$$256 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

(b) 120

2	120
2	60
2	30
3	15
5	5
	1

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

(c) 180

2	180
2	90
3	45
3	15
5	5
	1

$$\therefore 180 = 2 \times 2 \times 3 \times 3 \times 5$$

(d) 96

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

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

(e) 54

2	54
3	27
3	9
3	3
	1

$$\therefore 54 = 2 \times 3 \times 3 \times 3$$

(f) 28

2	28
2	14
7	7
	1

$$\therefore 28 = 2 \times 2 \times 7$$

(g) 24

2	24
2	12
2	6
3	3
	1

$$\therefore 24 = 2 \times 2 \times 2 \times 3$$

(h) 36

2	36
2	18
3	9
3	3
	1

$$\therefore 36 = 2 \times 2 \times 3 \times 3$$

3. Find the HCF of :

(a) 18 and 48

The prime factorization of 18 and 48 are :

$$18 = \textcircled{2} \times \textcircled{3} \times 3$$

$$48 = \textcircled{2} \times 2 \times 2 \times 2 \times \textcircled{3}$$

Common factors are 2 and 3.

The product of these factors = $2 \times 3 = 6$

Thus, 6 is HCF of 18 and 48.

2	18	2	48
3	9	2	24
3	3	2	12
	1	2	6
		3	3
			1

(b) 35 and 45

The prime factorization 35 and 45 are :

$$35 = \textcircled{5} \times 7$$

$$45 = \textcircled{5} \times 3 \times 3$$

Common factors are 5.

Thus, 5 is HCF of 35 and 45.

5	35	3	45
7	7	3	15
	1	5	5
			1

(c) 30 and 42

The prime factorization 30 and 42 are :

$$30 = \textcircled{2} \times \textcircled{3} \times 5$$

$$42 = \textcircled{2} \times \textcircled{3} \times 7$$

Common factors are 2 and 3.

The product of these factors = $2 \times 3 = 6$

Thus, 6 is HCF of 30 and 42.

2	30	2	42
3	15	3	21
5	5	7	7
	1		1

- (d) 60 and 72

The prime factorization of 60 and 72 are :

$$60 = \textcircled{2} \times \textcircled{2} \times \textcircled{3} \times 5$$

$$72 = \textcircled{2} \times \textcircled{2} \times 2 \times \textcircled{3} \times 3$$

Common factors of 60 and 72 = $2 \times 2 \times 3$

$$\begin{aligned} \text{The product of these factors} &= 2 \times 2 \times 3 \\ &= 12 \end{aligned}$$

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

Thus, 12 is HCF of 60 and 72.

- (e) 18 and 60

Prime factorization of 18 and 60 are :

$$18 = \textcircled{2} \times \textcircled{3} \times 3$$

$$60 = \textcircled{2} \times \textcircled{3} \times 3 \times 5$$

Common factors of 18 and 60 = 23

Product of these factors = $2 \times 3 = 6$

HCF of 18 and 60 = 6

2	18	2	60
3	9	2	30
3	3	3	15
	1	5	5
			1

- (f) 38 and 25

Prime factorization of 38 and 25.

$$38 = 2 \times 19 \times \textcircled{1}$$

$$25 = 5 \times 5 \times \textcircled{1}$$

Common factors of 38 and 25 = 1

HCF of 38 and 25 = 1

2	38	5	25
19	19	5	5
	1		1

4. Write the smallest and the largest 4-digit numbers and determine the prime factorization of each.

The smallest 4-digit number = 1000

2	1000
2	500
2	250
5	125
5	25
5	5
	1

Prime factors of $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$

The largest 4-digit number = 9999

Prime factors of 9999

$$= 3 \times 3 \times 11 \times 101$$

3	9999
3	3333
11	1111
101	101
	1

5. Find the HCF of :

(a) 36, 126 and 180

Prime factorization of 36, 126 and 180

$36 = \textcircled{2} \times 2 \times \textcircled{3} \times \textcircled{3}$	<table><tr><td>2</td><td>36</td></tr><tr><td>2</td><td>18</td></tr><tr><td>3</td><td>9</td></tr><tr><td>3</td><td>3</td></tr><tr><td></td><td>1</td></tr></table>	2	36	2	18	3	9	3	3		1	<table><tr><td>2</td><td>126</td></tr><tr><td>3</td><td>63</td></tr><tr><td>3</td><td>21</td></tr><tr><td>7</td><td>7</td></tr><tr><td></td><td>1</td></tr></table>	2	126	3	63	3	21	7	7		1	<table><tr><td>2</td><td>180</td></tr><tr><td>2</td><td>90</td></tr><tr><td>3</td><td>45</td></tr><tr><td>3</td><td>15</td></tr><tr><td>5</td><td>5</td></tr><tr><td></td><td>1</td></tr></table>	2	180	2	90	3	45	3	15	5	5		1
2	36																																		
2	18																																		
3	9																																		
3	3																																		
	1																																		
2	126																																		
3	63																																		
3	21																																		
7	7																																		
	1																																		
2	180																																		
2	90																																		
3	45																																		
3	15																																		
5	5																																		
	1																																		
$126 = \textcircled{2} \times \textcircled{3} \times \textcircled{3} \times 7$																																			
$180 = \textcircled{2} \times 2 \times \textcircled{3} \times \textcircled{3} \times 5$																																			
Common factors of 36, 126 and 180 = 2, 3, 3																																			

Common factors of 36, 126 and 180 = 2, 3, 3

Product of common factors = $2 \times 3 \times 3$

Thus, HCF of 36, 126 and 180 = 18

(b) 49, 91 and 112

Prime factorization of 49, 91 and 112

$49 = 7 \times \textcircled{7}$	<table><tr><td>7</td><td>49</td></tr><tr><td>7</td><td>7</td></tr><tr><td></td><td>1</td></tr></table>	7	49	7	7		1	<table><tr><td>7</td><td>91</td></tr><tr><td>13</td><td>13</td></tr><tr><td></td><td>1</td></tr></table>	7	91	13	13		1	<table><tr><td>2</td><td>112</td></tr><tr><td>2</td><td>56</td></tr><tr><td>2</td><td>28</td></tr><tr><td>2</td><td>14</td></tr><tr><td>7</td><td>7</td></tr><tr><td></td><td>1</td></tr></table>	2	112	2	56	2	28	2	14	7	7		1
7	49																										
7	7																										
	1																										
7	91																										
13	13																										
	1																										
2	112																										
2	56																										
2	28																										
2	14																										
7	7																										
	1																										
Common factors of 49, 91 and 112 = 7																											
Thus, 7 is HCF of 49, 91, 112.																											
18, 54 and 81																											

$$91 = \textcircled{7} \times 13$$

$$112 = 2 \times 2 \times 2 \times 2 \times \textcircled{7}$$

Common factors of 49, 91 and 112 = 7

Thus, 7 is HCF of 49, 91, 112.

(c) 18, 54 and 81

Prime factorization of 18,

54 and 81

54 and 81	<table><tr><td>2</td><td>18</td></tr><tr><td>3</td><td>9</td></tr><tr><td>3</td><td>3</td></tr><tr><td></td><td>1</td></tr></table>	2	18	3	9	3	3		1	<table><tr><td>2</td><td>54</td></tr><tr><td>3</td><td>27</td></tr><tr><td>3</td><td>9</td></tr><tr><td>3</td><td>3</td></tr><tr><td></td><td>1</td></tr></table>	2	54	3	27	3	9	3	3		1	<table><tr><td>3</td><td>81</td></tr><tr><td>3</td><td>27</td></tr><tr><td>3</td><td>9</td></tr><tr><td>3</td><td>3</td></tr><tr><td></td><td>1</td></tr></table>	3	81	3	27	3	9	3	3		1
2	18																														
3	9																														
3	3																														
	1																														
2	54																														
3	27																														
3	9																														
3	3																														
	1																														
3	81																														
3	27																														
3	9																														
3	3																														
	1																														
$18 = 2 \times \textcircled{3} \times \textcircled{3}$																															
$54 = 2 \times \textcircled{3} \times \textcircled{3} \times 3$																															
$81 = 3 \times \textcircled{3} \times \textcircled{3} \times 3$																															
Common factors of 18, 54 and 81		1	1																												

Common factors of 18, 54 and 81

$$= 3 \times 3 = 9$$

Thus, 9 is HCF of 18, 54 and 81.

(d) 16, 48 and 60

The prime factorization of
16, 48 and 60 are :

$$16 = \textcircled{2} \times \textcircled{2} \times 2 \times 2$$

$$48 = \textcircled{2} \times \textcircled{2} \times 2 \times 2 \times 3$$

$$60 = \textcircled{2} \times \textcircled{2} \times 3 \times 5$$

2	16	2	48	2	60
2	8	2	24	2	30
2	4	2	12	3	15
2	2	2	6	5	5
	1	3	3		1
			1		

Common factors of 16, 48 and 60 = $2 \times 2 = 4$.

Thus 4 is the HCF of 16, 48 and 60.

(e) 12, 45 and 75

The prime factorization of

12, 45 and 75 are :

$$12 = \textcircled{3} \times 4$$

$$45 = \textcircled{3} \times 3 \times 5$$

$$75 = \textcircled{3} \times 5 \times 5$$

3	12	3	45	3	75
4	4	3	15	5	25
	1	5	5	5	5
			1		1

Common factors is 3.

Thus 3 is the HCF of 12, 45 and 75.

(f) 15, 30 and 75

The prime factorization of

15, 30 and 75 are :

$$15 = \textcircled{3} \times \textcircled{5}$$

$$30 = 2 \times \textcircled{3} \times \textcircled{5}$$

$$75 = \textcircled{3} \times \textcircled{5} \times 5$$

3	15	2	30	3	75
5	5	3	15	5	25
	1	5	5	5	5
			1		1

Common factors are 3, 5

The product of these factor is $= 3 \times 5 = 15$

6. Find the prime factors of 1729.

The prime factors of 1729

7	1729
13	247
19	19
	1

Prime factors of 1729 = $7 \times 13 \times 19$

Exercise 2.4

1. Find the LCM of :

(a) 20, 25 and 30

The prime factorization
of 20, 25 and 30

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

$$25 = 5 \times 5$$

$$30 = 2 \times 3 \times 5$$

LCM of 20, 25 and 30

$$= 2 \times 2 \times 3 \times 5 \times 5 = 300$$

(c) 24 and 100

The prime factorization of
24 and 100 are :

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

$$100 = 2 \times 2 \times 5 \times 5$$

LCM of 24 and 100

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

$$= 600$$

(e) 24 and 80

The prime factorizations
of 24 and 80 are :

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

$$80 = 2 \times 2 \times 2 \times 2 \times 5$$

LCM of 24 and 80

$$= 2 \times 2 \times 2 \times 2 \times 5 \times 3 = 240$$

(b) 40, 48 and 45

The prime factorization
of 48 and 45

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$45 = 3 \times 3 \times 5$$

LCM of 40, 48 and 45

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

$$= 720$$

(d) 45 and 75

The prime factorization of
45 and 75 are :

$$45 = 3 \times 3 \times 5$$

$$75 = 3 \times 5 \times 5$$

LCM of 45 and 75

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

$$= 225$$

(f) 12 and 18

The prime factorization
of 12 and 18 are :

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

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

LCM of 12 and 18

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

2. Find the LCM of :

(a) 28, 36, 45, 60

2	28
2	14
7	7
	1

2	36
2	18
3	9
3	3
	1

3	45
3	15
5	5
	1

2	60
2	30
3	15
5	5
	1

Prime factorization of 28, 36, 45 and 60

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

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

$$45 = 3 \times 3 \times 5$$

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

$$\text{LCM of 38, 36, 45 and 60} = 2 \times 2 \times 3 \times 3 \times 7 \times 5 = 1260$$

(b) 144, 180, 384

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	180
2	90
3	45
3	15
5	5
	1

2	384
2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

Prime factorizations of 144, 180 and 384

$$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$180 = 2 \times 2 \times 3 \times 3 \times 5$$

$$384 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$$

LCM of 144, 180 and 384

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 5760$$

3. Find the HCF and LCM of :

(a) 186, 403

2	186
3	93
31	31
	1

13	403
31	31
	1

Prime factorization of 186 and 403

$$186 = 2 \times 3 \times (31)$$

$$403 = 13 \times (31)$$

HCF of 186 and 403 = 31

One number = 186, other number = 403

Product of two number = Product of HCF and LCM

$$186 \times 403 = 31 \times \text{LCM} \quad \text{LCM} = \frac{186 \times 403}{31} = 2418$$

(b) 490, 1155

2	490
5	245
7	49
7	7
	1

3	1155
5	385
7	77
11	11
	1

Prime factorization of 490 and 1155.

$$490 = 2 \times (5) \times (7) \times 7 \quad 1155 = 3 \times (5) \times (7) \times 11$$

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

HCF of 490 and 1155 = 35

one number = 490, other number = 1155

Product of two numbers = Product of HCF and LCM

$$490 \times 1155 = 35 \times \text{LCM}$$

$$\text{LCM} = \frac{490 \times 1155}{35} = 16170$$

4. Is the product of three numbers always equal to the product of their HCF and LCM? Give reasons in support of your answer.

No; for the three numbers 5, 10 and 15, the HCF is 5 and LCM is 30.

Here, $\text{HCF} \times \text{LCM} = 5 \times 30 = 150$

Product of numbers = $5 \times 10 \times 15 = 750$

5. Can two numbers have 16 as their HCF and 204 as their LCM? Give reasons in support of your answer.

No, two numbers cannot have 16 as their HCF and 204 as their LCM this is so, because 16 is not a factor of 204 and in such a case HCF should be a factor of LCM.

6. The HCF of two numbers is 145 and their LCM is 2175. If one of the numbers is 725, find the other.

HCF of two numbers = 145

LCM of two numbers = 2175

One number = 725

One number \times the other number = HCF \times LCM

$$\text{Required other number} = \frac{145 \times 2175}{725} = 435$$

Exercise 2.5

- Two tankers contain 700 and 750 litres of milk respectively. Find the maximum capacity of a container which can measure the milk of each tanker in exact number of times.

Quantity of one tankers = 700 l

Quantity of second tankers = 750 l

HCF of 700 and 750

2	700
2	350
5	175
5	35
7	7
	1

2	750
3	375
5	125
5	25
5	5
	1

Prime factorization of 700 and 750

$$700 = 2 \times 2 \times 5 \times 5 \times 7$$

$$750 = 2 \times 3 \times 5 \times 5 \times 5$$

Common factors of 700 and 750 = 2, 5, 5

Product of common factors = $2 \times 5 \times 5 = 50$

Thus, the maximum capacity of a container is 50 l.

- The length, breadth and height of a room are 6 m 30 cm, 5 m 85 cm and 3 m 60 cm respectively. What will be the greatest length of a tape which can measure the dimensions of the room in exact number of times.

Length of a room = 6 m 30 cm = 630 cm

Breadth of a room = 5 m 85 cm = 585 cm

Height of a room = 3 m 60 cm = 360 cm

HCF of 630; 585 and 360 :

2	630
3	315
3	105
5	35
7	7
	1

3	585
3	195
5	65
13	13
	1

2	360
2	180
2	90
3	45
3	15
5	5
	1

$$630 = \textcircled{2} \times \textcircled{3} \times \textcircled{3} \times \textcircled{5} \times 7$$

$$585 = \textcircled{3} \times \textcircled{3} \times \textcircled{5} \times 13$$

$$360 = 2 \times 2 \times 2 \times \textcircled{3} \times \textcircled{3} \times \textcircled{5}$$

Common factors of 630, 585 and 360 = 3, 3, 5

Product of common factors = $3 \times 3 \times 5 = 45$

Thus the greatest length of a tape is 45 cm.

3. There are 312, 260 and 156 students in class VI, VII and VIII respectively. Buses are to be hired to take the students to a picnic. Find the maximum number of students who can sit in a bus if each bus takes equal number of students. Also, find the number of buses required.

Number of students in each class VII = 312

Number of students in class VII = 260

Number of students in class VIII = 156

Number of students sit in each bus = HCF of 312, 260 and 156

2	312
2	156
2	78
3	39
13	13
	1

2	260
2	130
5	65
13	13
	1

2	156
2	78
3	39
13	13
	1

Prime factorization of 312, 260 and 156 are :

$$312 = \textcircled{2} \times \textcircled{2} \times 2 \times 3 \times \textcircled{13}$$

$$260 = \textcircled{2} \times \textcircled{2} \times 5 \times \textcircled{13}$$

$$156 = \textcircled{2} \times \textcircled{2} \times 3 \times \textcircled{13}$$

Common factors of 312, 260 and 156 = $2 \times 2 \times 13$

Product of common factor = $2 \times 2 \times 13 = 52$

Number of students in each bus = 52

Total number of students = $312 + 260 + 156 = 728$

Required buses = $728 \div 52 = 14$

Thus, the number of buses required = 14.

4. Find the greatest number which exactly divides 40 and 87 leaving remainders 4 and 3 respectively.

When 40 is divided by the required number a remainder is left
 $= 40 - 4 = 36$

Similarly $87 - 3 = 84$ must be completely divisible by the required number

HCF of 36 and 84

2	36
2	18
3	9
3	3
	1

2	84
2	42
3	21
7	7
	1

$$36 = \textcircled{2} \times \textcircled{2} \times \textcircled{3} \times 3$$

$$84 = \textcircled{2} \times \textcircled{2} \times \textcircled{3} \times 7$$

HCF of 36 and 84 = $2 \times 2 \times 3 = 12$

Hence, the required number = 12.

5. A rectangular court yard is 20 m 16 cm long and 15 m 60 cm broad. It is to be paved with square-shaped tiles of the same size. Find the number of tiles required to pave the court yard.

Length of a rectangular court yard = 20 m 16 cm = 2016 cm

Breadth of a rectangular court yard = 15 m 60 cm = 1560 cm

HCF of 2016 and 1560

2	2016
2	1008
2	504
2	252

2	1560
2	780
2	390
3	195

2	126
3	63
3	21
7	7
	1

5	65
13	13
	1

Prime factors of 2016 and 1560 :

$$2016 = \textcircled{2} \times \textcircled{2} \times \textcircled{2} \times 2 \times 2 \times \textcircled{3} \times 3 \times 7$$

$$1560 = \textcircled{2} \times \textcircled{2} \times \textcircled{2} \times \textcircled{3} \times 5 \times 13$$

Common factors of 2016 and 1560 = 2, 2, 2, 3

HCF of 2016 and 1560 = $8 \times 3 = 24$

$$\begin{aligned} \text{Required tiles} &= \frac{\text{Area of floor}}{\text{Area of tile}} = \frac{2016 \times 1560}{24 \times 24} \\ &= \frac{3144960}{576} = 5460 \end{aligned}$$

Required tiles 5460 to covered the floor.

6. The circumference of the wheels of a carrier are 3 m 25 cm and 5 m. What is the least distance in which both wheels make an exact number of revolutions?

Circumference of wheel = 3 m 25 cm = 325 cm and 500 cm

Prime factorization of 325 and 500 :

$$325 = 5 \times 5 \times 13$$

$$500 = 2 \times 2 \times 5 \times 5 \times 5$$

LCM of 325 and 500 = $5 \times 5 \times 5 \times 2 \times 2 \times 13 = 6500$ cm

The least distance revolutions of wheels is 6500 cm.

Or $(6500 \div 1000)$ km = 6.5 km.

7. In a morning walk, three boys step off together from the same spot. Their steps measure 63 cm, 70 cm and 77 cm respectively. What is the minimum distance each should cover so that all can cover the distance in complete steps?

Distance covered by first boy = 630 cm

Distance covered by second boy = 70 cm

Distance covered by third boy = 77 cm

LCM of 63, 70, 77

Prime factors of 63, 70, 77 :

$$63 = 7 \times 9$$

$$70 = 7 \times 10$$

$$77 = 7 \times 11$$

$$\text{LCM of 63, 70, 77} = 7 \times 9 \times 10 \times 11$$

$$= 6930 \text{ cm or } 69.30 \text{ m}$$

$$= 69 \text{ m } 30 \text{ cm}$$

8. Three boxes of books contain 24, 40 and 56 books. These books are to be packed in small packets which will contain equal number of books. What is the largest number of books that can be packed in each of the small packets?

Number of books in first box = 24

Number of books in second box = 40

Number of books in third box = 56

Number of books pack in small packet = HCF of 24, 40 and 50

$$24 = \textcircled{2} \times \textcircled{2} \times \textcircled{2} \times 3$$

$$40 = \textcircled{2} \times \textcircled{2} \times \textcircled{2} \times 5$$

$$56 = \textcircled{2} \times \textcircled{2} \times \textcircled{2} \times 7$$

Common factors of 24, 40 and 56 = $2 \times 2 \times 2 = 8$

8 books that can be packed in each of the small packets.

9. Find the smallest number which when divided by 25, 40, 60 leaves a remainder of 7 in each case.

The required number is 7 added to the LCM of 25, 40 and 60

Now, $25 = 5 \times 5$

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

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

$$\text{LCM} = 2 \times 2 \times 2 \times 3 \times 5 \times 5 = 600$$

Hence, the required number is $600 + 7 = 607$.

10. Determine the greatest 5-digit number which is exactly divisible by each of 8, 15 and 21.

By common diision method :

LCM of 8, 15 and 21 = $2 \times 2 \times 2 \times 3 \times 5 \times 7 = 840$

The greatest 5-digit number = 99999

We find that when 99999 is divided

by 840 the remainder = 39.

So, the number exactly divisible

by 8, 15 and 21

$$= 99999 - 39$$

$$= 99960$$

$$\begin{array}{r} 119 \\ 840 \overline{) 99999} \\ \underline{-840} \\ 1599 \\ \underline{-840} \\ 7599 \\ \underline{-7560} \\ 39 \end{array}$$

2	8, 15, 21
2	4, 15, 21
2	2, 15, 21
3	1, 15, 21
5	1, 5, 7
7	1, 1, 7
	1, 1, 1

11. Determine the two numbers nearest to 10000 which are exactly divisible by each of 2, 3, 4, 5, 6 and 7.

First we will find the LCM of 2, 3, 4, 5 and 7

2	2, 3, 4, 5, 6, 7
2	1, 3, 2, 5, 3, 7
3	1, 3, 1, 5, 3, 7
5	1, 1, 1, 5, 1, 7
7	1, 1, 1, 1, 1, 7
	1, 1, 1, 1, 1, 1

$$\begin{array}{r} 23 \\ 420 \overline{) 10000} \\ \underline{-840} \\ 1600 \\ \underline{-1260} \\ 340 \end{array}$$

$$\text{LCM} = 2 \times 2 \times 3 \times 5 \times 7 = 420$$

We find that when 10000 is divided by 420, the remainder is 340.

So, the number exactly divisible by 2, 3, 4, 5, 6 and 7

$$= 10000 - 340 = 9660$$

Next number which is divisible by 2, 3, 4, 5, and 7

$$= 9660 \times 420 = 10080.$$

12. A boy saves ₹ 4.65 daily. Find the least number of days in which he will be able to save an exact number of rupees.

(Saving in 1 day = ₹ 4.65)

Saving in 100 days = ₹ $4.65 \times 100 = ₹ 465$

Now, to find least number of days for exact rupees, we will find LCM of 465 and 100.

Prime factorization of 465 and 100

$$465 = 3 \times 5 \times 31$$

$$100 = 2 \times 2 \times 5 \times 5$$

$$\text{LCM of 465 and 100} = 2 \times 2 \times 3 \times 5 \times 5 \times 31 = 9300$$

3	465
5	155
31	31
	1

2	100
2	50
25	25
5	5
	1

$$\begin{aligned} \text{Exact number of days} &= \text{LCM} \div 465 \\ &= 9300 \div 465 = 20 \text{ days} \end{aligned}$$

Multiple Choice Questions

Tick (✓) the correct options :

1. (b) 2. (c) 3. (c) 4. (d) 5. (c) 6. (a) 7. (b)

Chapter

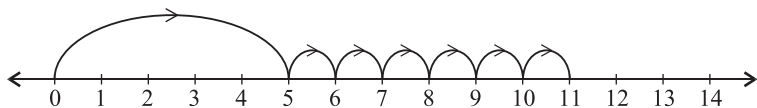
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Whole Numbers

Exercise 3.1

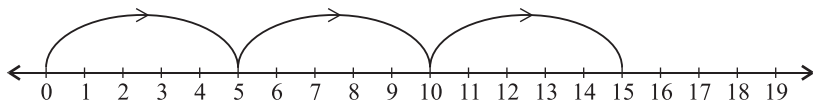
- Say True (T) or False (F) :
 (a) F (b) F (c) T (d) F (e) F
- In each of the following pairs of the numbers, state which whole number is on the left of the other number on the number line :
 (a) Clearly, $2221 < 2251$
 \therefore 2221 lies to the left of 2251
 (b) Clearly, $9521 > 5921$
 \therefore 5921 lies to the left of 9521
 (c) The largest 2-digit number = 99
 The smallest 3-digit number = 100
 Clearly, $99 < 100$
 \therefore 99 lies to the left of 100

3. Add 5 and 6 using the number line. ($5 + 6 = 11$)



$$5 + 6 = 11$$

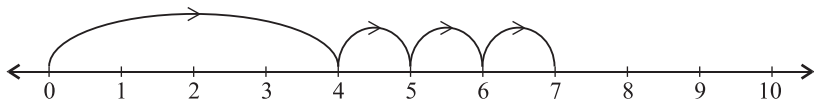
4. Multiply 5 by 3 using the number line.



$$5 \times 3 = 15$$

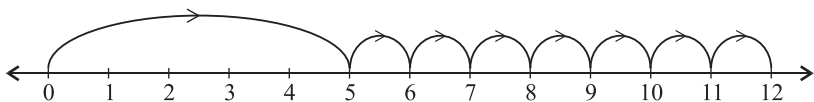
5. Using number line find the following :

(a) $4 + 3 = 7$



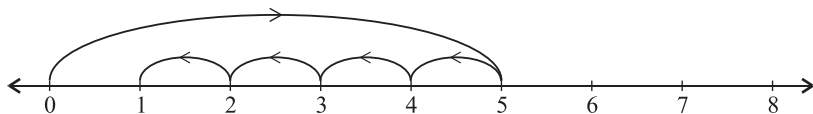
$$4 + 3 = 7$$

(b) $5 + 6 + 1$



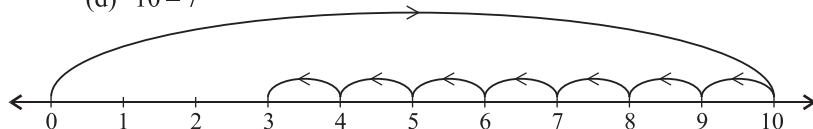
$$5 + 6 + 1 = 12$$

(c) $5 - 4 = 1$



$$5 - 4 = 1$$

(d) $10 - 7$



$$10 - 7 = 3$$

Exercise 3.2

1. Find the sum using suitable rearrangement of numbers :

$$\begin{aligned} \text{(a)} \quad & 753 + 807 + 947 \\ & = (753 + 947) + 807 \\ & = 1700 + 807 \\ & = 2507 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 1983 + 647 + 217 + 353 \\ & = (1983 + 217) + (647 + 353) \\ & = 2200 + 1000 \\ & = 3200 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & 186 + 278 + 314 + 422 + 2053 \\ & = (186 + 314) + (278 + 422) + 2053 \\ & = 500 + 700 + 2053 \\ & = 1200 + 2053 = 3253 \end{aligned}$$

2. Verify the associative property of addition for the following numbers :

$$\begin{aligned} \text{(a)} \quad & 3, 5, 7 \quad (3 + 5) + 7 = 8 + 7 = 15 \\ & \quad \quad \quad 3 + (5 + 7) = 3 + 12 = 15 \\ & \quad \quad \quad (3 + 5) + 7 = 3 + (5 + 7) \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 2, 4, 6 \quad = (2 + 4) + 6 = 6 + 6 = 12 \\ & \quad \quad \quad = 2 + (4 + 6) = 2 + 10 = 12 \\ & \quad \quad \quad = (2 + 4) + 6 = 2 + (4 + 6) \end{aligned}$$

3. Find the product using associative property of numbers :

$$\text{(a)} \quad 4 \times 572 \times 50 = (4 \times 50) \times 572 = 200 \times 572 = 11400$$

$$\begin{aligned} \text{(b)} \quad & 625 \times 777 \times 16 = (625 \times 16) \times 777 \\ & \quad \quad \quad = 10000 \times 777 = 7770000 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & 125 \times 799 \times 4 = (125 \times 4) \times 799 \\ & \quad \quad \quad = 500 \times 799 = 399500 \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & 50 \times 29 \times 80 = (50 \times 80) \times 29 \\ & \quad \quad \quad = 4000 \times 29 = 116000 \end{aligned}$$

4. If $a = 256$ and $b = 175$, show that $a - b \neq b - a$.

$$a = 256, b = 175$$

$$\begin{aligned} & (a - b) \neq (b - a) \\ & (a - b) = 256 - 175 = 81 \\ & (b - a) = 175 - 256 = -81 \end{aligned}$$

$$\therefore \quad 81 \neq -81$$

$$\therefore \quad (a - b) \neq (b - a)$$

5. Simplify the following :

- (a) $661 \times 93 + 7 \times 661$
 $= 661(93 + 7) = 661 \times 100 = 66100$
- (b) $562 \times 4 \times 80 + 281 \times 20 \times 8 \times 4$
 $= 2248 \times 80 + 2248 \times 80 = 2248 \times (80 + 80)$
 $= 2248 \times 160 = 359680$
- (c) $265 \times 7265 - 7265 \times 265$
 $= 7265 \times (265 - 265)$
 $= 7265 \times (0) = 0$
- (d) $697 \times 25 \times 282 + 3485 \times 5 \times 718$
 $= 17425 \times 282 + 17425 \times 718$
 $= 17425 \times (282 + 718)$
 $= 17425 \times 1000 = 17425000$

6. If $a = 12$, $b = 8$ and $c = 5$, show that $a - (b - c) \neq (a - b) - c$.

$$a = 12, b = 8, c = 5$$

$$a - (b - c) \neq (a - b) - c$$

$$a - (b - c) = 12 - (8 - 5) = 12 - 3 = 9$$

$$(a - b) - c = (12 - 8) - 5 = 4 - 5 = -1$$

$$\therefore 9 \neq -1$$

$$\therefore a - (b - c) \neq (a - b) - c$$

7. If $a = 10$ and $b = 6$, show that $a - b \neq b - a$

$$a = 10, b = 6$$

$$(a - b) \neq (b - a)$$

$$(a - b) = (10 - 6) = 4$$

$$(b - a) = (6 - 10) = -4$$

$$\therefore 4 \neq -4$$

$$\therefore (a - b) \neq (b - a)$$

8. If $a = 256$, $b = 362$ and $c = 182$, show that $a - (b - c) \neq (a - b) - c$.

$$a = 256, b = 362, c = 182$$

$$a - (b - c) \neq (a - b) - c$$

$$256 - (362 - 182) = 256 - 180 = 76$$

$$(256 - 362) - 182 = -106 - 182 = -288$$

$$\therefore 76 \neq -288$$

$$\therefore a - (b - c) \neq (a - b) - c$$

9. If $a = 4$, $b = 3$ and $c = 6$, find the following :

(a) $a \times (b + c) = 4 \times (3 + 6) = 4 \times 9 = 36$

(b) $ab + ac = 4 \times 3 + 4 \times 6 = 12 + 24 = 36$

10. Verify that $b + c = a$ if $a - b = c$ for

(a) $a = 5$, $b = 3$

$$c = a - b$$

$$c = 5 - 3 = 2$$

$$\therefore 3 + 2 = 5$$

(b) $a = 23$, $b = 9$

$$c = a - b$$

$$c = 23 - 9 = 14$$

$$\therefore 9 + 14 = 23$$

11. If $a = 8$, $b = 5$ and $c = 2$, find the following :

(a) $a \times (b - c) = 8 \times (5 - 2)$

$$= 8 \times 3 = 24$$

(b) $ab - ac = 8 \times 5 - 8 \times 2$

$$= 40 - 16 = 24$$

12. If $a = 84$ and $b = 4$, verify whether $a \div b \neq b \div a$.

$$a = 84, b = 4$$

$$a \div b \neq b \div a$$

$$a \div b = 84 \div 4 = 21$$

$$b \div a = 4 \div 84 = 0.048$$

$$\therefore 21 \neq 0.048$$

$$\therefore a \div b \neq b \div a$$

13. Find the difference between the largest 5 digit number and smallest 3 digit number.

$$\text{The largest 5-digit number} = 99999$$

$$\text{The smallest 3 digit number} = 1000$$

$$\text{Difference} = 99999 - 1000 = 99899$$

14. A shopkeeper sold 7 bedsheets for ₹ 350 each and 13 pillow covers for ₹ 50 each. Find the amount he earned by selling the bedsheets and pillow covers.

$$\text{Cost of 1 bed sheets} = ₹ 350$$

$$\text{Cost of 7 bed sheets} = ₹ 350 \times 7 = ₹ 2450$$

$$\text{Cost of 1 pillow cover} = ₹ 30$$

$$\text{Cost of 13 pillow cover} = ₹ 30 \times 13 = ₹ 390$$

$$\text{Total selling price of bed sheets and pillow covers}$$

$$= ₹ (2450 + 390)$$

$$= ₹ 2840$$

15. Fill in the blanks :

(a) $4129 \times 0 = 0$

(b) $78 \times 87 \times 15 = 87 \times 78 \times 15$

(c) $195 \times 405 = 405 \times 195$

(d) $7 \times 0 = 0 = 0 \times 7$

(e) $1275 \div 1 = 1275$

(f) $5 \times 92 \times 20 = 100 \times 92$

(g) $4 \times (25 \times 679) = (4 \times 25) \times 679$

(h) $0 + 515 = 515$

Exercise 3.3

1. Study each of the following patterns. Write the next two steps for each :

a. $37 \times 3 = 111$

$37 \times 6 = 222$

$37 \times 9 = 333$

$37 \times 12 = 444$

$37 \times 15 = 555$

$37 \times 18 = 666$

28

b. $1 + 2 = 3$

$1 + 2 + 3 = 6$

$1 + 2 + 3 + 4 = 10$

$1 + 2 + 3 + 4 + 5 = 15$

$1 + 2 + 3 + 4 + 5 + 6 = 21$

$1 + 2 + 3 + 4 + 5 + 6 + 7 =$

c. $9 \times 9 + 7 = 88$

$9 \times 98 + 6 = 888$

$9 \times 987 + 5 = 8888$

$9 \times 9876 + 4 = 88888$

$9 \times 98765 + 3 = 888888$

$9 \times 987654 + 2 = 8888888$

d. $99 \times 1 + 1 = 100$

$99 \times 2 + 2 = 200$

$99 \times 3 + 3 = 300$

$99 \times 4 + 4 = 400$

$99 \times 5 + 5 = 500$

$99 \times 6 + 6 = 600$

Multiple Choice Questions

Tick (✓) the correct answer :

1. (a) 2. (b) 3. (a) 4. (b) 5. (b) 6. (a) 7. (b) 8. (a) 9. (c) 10. (a) 11. (a) 12. (d)

BRAIN BOOSTER

Fill in the boxes with +, −, × or ÷ sign.

71,234 $\boxed{+}$

$0 = 71,234$

45,638 $\boxed{\times}$

$0 = 0$

6815 $\boxed{\div}$

$6815 = 1$

3636 $\boxed{-}$

$3636 = 0$

0 $\boxed{\times}$

$65,329 = 0$

53,817 $\boxed{\div}$

$1 = 53,817$

2963 $\boxed{-}$

$1 = 2962$

79,643 $\boxed{+}$

$1 = 79,644$

Exercise 4.1

- Give opposite of :
 - Loosing a weight of 5 kg
 - Decrease in population
 - Going west
 - A profit of ₹ 7.
 - A with drawn of ₹ 100
 - + 34
- Find :
 - $|5| - |0| = 5 - 0 = 5$
 - $|7| - |-3| = 7 - 3 = 4$
 - $|5| + |-3| = 5 + 3 = 8$
 - $|5| + |-12| = 5 + 12 = 17$
 - $|-10| - |5| = 10 - 5 = 5$
 - $|-3 - 2| = |-5| = 5$
- Indicate the following by '+' or '-' sign :
 - A loss of ₹ 800 = - ₹ 800
 - 3 km below sea level = -3 km
 - A gain of ₹ 500 = + ₹ 500
 - 3°C above zero = + 3°C
 - Decrease of 9 = -9
 - A deposit of ₹ 200 = + ₹ 200
- Replace * in each by < or > so that the statement is true :
 - $0 < 5$
 - $-17 > -18$
 - $-5 < -2$
 - $-100 < -98$
- Which number in each of the following pairs is to the right of the other on the number line?
 - $(1, 7) = 1 < 7$ 7 lies to right to 1
 - $(-2, -5) = -2 > -5$ lies to right to -5
 - $(0, -3) = 0 > -3$ 0 lies to right to -3
 - $(-5, 8) = -5 < 8$ \therefore 8 lies to the right of -5.
- Which number in each of the following is smaller?
 - $(0, -2)$ Since, $0 > -2$
-2 is smaller than 0.
 - $(-3, -5)$ Since, $-3 > -5$
-5 is smaller than -3.
 - $(-5, 2)$ Since, $-5 < 2$
-5 is smaller than 2.

- (d) $(-12, 9)$ Since, $-12 < 9$
 -12 is smaller than 9 .
 (e) $(0, 3)$ Since, $0 < 3$
 0 is smaller than 3 .

7. Write all integers between :

- (a) -5 and 0
 Integers between -5 and $0 = -4, -3, -2, -1$
 (b) -3 and 3
 Integers between -3 and $3 = -2, -1, 0, 1, 2$
 (c) 0 and 8
 Integers between 0 and $8 = 1, 2, 3, 4, 5, 6, 7$
 (d) (-7) and 0
 Integers between -7 and $0 = -6, -5, -4, -3, -2, -1$

Exercise 4.2

1. In a Math quiz, 1 mark is gained for each correct answer. 1 mark is lost for each wrong answer. There are 20 questions. If all questions are answered correctly, a student's score will be 20; If all questions are answered incorrectly, a student's score will be -20 .

Number of question = 20

If 20 questions correct; score will be = 20

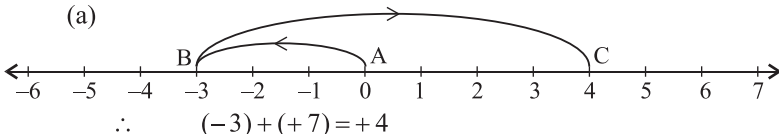
If 20 questions incorrect; score will be = -20

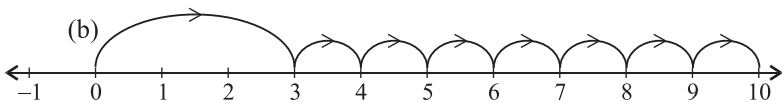
Present score of Suraj = 4

- (a) Score after answering all the five question correctly
 $= 4 + 5 \times 1 = 9$
 (b) Score after answering all the five question along
 $= 4 - 5 \times 1 = 4 - 5 = -1$
 (c) Score after answering 2 questions correctly and 3 question incorrectly
 $= 4 + 2 \times 1 - 1 \times 3 = 4 + 2 - 3 = 4 - 1 = 3$

2. Represent the following on a number line :

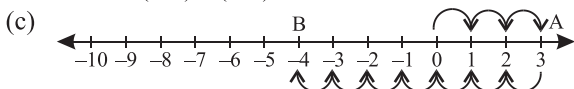
(a)



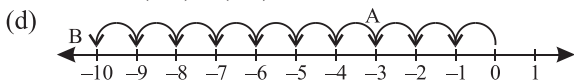


$$(+3) + (+7) = 10$$

$$\therefore (+3) + (+7) = +10$$



$$\therefore (+3) + (-7) = -4$$



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

3. Find :

(a) $200 + (-174) + (-26)$

$$= 200 - 174 - 26$$

$$= 200 - 200 = 0$$

(b) $4 + (-99) + (-101) + 96$

$$= 4 + 96 - 99 - 101$$

$$= 100 - 200 = -100$$

(c) $(-18) + (+25) + (-37) = -18 + 25 - 37$

$$= 25 - 55 = -30$$

(d) $(-100) + (-99) + (-98) + \dots + 98 + 99 + 100$

$(-)$ and $(+)$ added

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

$$\therefore (-100) + (-99) + (-98) + \dots + 98 + 99 + 100 = 0$$

4. Find :

(a) The successor of $-100 = -100 + 1 = -99$

(b) The predecessor of $0 = 0 - 1 = -1$

(c) The negative of $-50 = -(-50) = (50)$

(d) The additive inverse of $254 = -254$

5. Fill in the blanks :

(a) $-6 + 6 = 0$

(b) $-40 + 40 = 0$

(c) $15 + (-15) = 0$

(d) $0 + 0 = 0$

6. Add the successor of -99 and the predecessor of 9 , and find the sum.

$$\text{Successor of } -99 = -99 + 1 = -98$$

Predecessor of 9 = $9 - 1 = 8$

Sum of -98 and $8 = -98 + 8 = -90$

7. At 5 a.m., the temperature at a place was -5°C . It rose by 7° after three hours and stayed constant for two hours. What were the temperatures at 8 a.m. and at 9 a.m.?

Temperature at 5 a.m. = -5°C

Increase in temperature = 7°C

Temperature at 8 am = $(-5 + 7) = 2^{\circ}\text{C}$

Time period for which the temperature is remaining constant = 3 hrs after 8 am.

\therefore temperature at 9 am = temperature at 8 am = 2°C

8. Find the sum of $-21, -9, 63, -22$ and -28 .

$$\begin{aligned}(-21) + (-9) + 63 + (-22) + (-28) &= -21 - 9 - 22 - 28 + 63 \\ &= -80 + 63 = -17\end{aligned}$$

9. A diver is 10 m below sea level. His position is given as -10m . Give his new position as integer, if he :

(a) He goes further by 10 m

$$\text{New position} = -10 - 10 = -20\text{m}$$

(b) He comes up by 5 m

$$\text{New position} = -10 + 5 = -5\text{m}$$

10. Classify the following statements as true (T) or false (F) :

(a) T (b) T (c) F (d) T (e) T

Exercise 4.3

1. Subtract the sum of -8 and -28 from the sum of -13 and 31 .

Sum of -8 and -28

$$-8 + (-28) = -8 - 28 = -36$$

Sum of -13 and 31

$$= -13 + 31 = 18$$

Subtract the sum of -8 and -28 from the sum of -13 and 31 .

$$18 - (-36) = 18 + 36 = 54$$

2. Simplify :

$$(a) \quad -12 + 18 - 15 + 3$$

$$= -12 - 15 + 18 + 3$$

$$= -27 + 21 = -6$$

$$(b) \quad -8 + (-6) + (-11)$$

$$= -8 - 6 - 11$$

$$= -25$$

$$\begin{aligned} \text{(c)} \quad & 7 - (-9) + (-3) \\ & = 7 + 9 - 3 \\ & = 7 + 6 = 13 \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & -6 - 8(-5) \\ & = -6 - 8 + 15 \\ & = -14 + 15 = 1 \end{aligned}$$

3. A place is 37 m above sea level and another is 35 m below sea level. What is the difference of levels between the two places?

A place is Sea level above 37 m = + 37 m

A place is sea level below 35 m = - 35 m

$$\text{Difference} = 37 - (-35) = 37 + 35 = 72 \text{ cm}$$

4. p and q are two integers such that p is the predecessor of q .

Find the value of $p - q$.

If p is the predecessor of q

Then,

$$p < q$$

$$p + 1 = q$$

\therefore

$$p - q = -1$$

Value of $p - q = -1$

5. Fill in the blanks :

$$\text{(a)} \quad 13 + (-13) = \mathbf{(0)}$$

$$\text{(b)} \quad -3 + \mathbf{(-9)} = -12$$

$$\text{(c)} \quad 11 - \mathbf{(-11)} = 22$$

$$\text{(d)} \quad -6 + \mathbf{(6)} = 0$$

6. Subtract -5 from 7. Subtract 7 from -5. Are the two results the same?

Subtract -5 from 7

$$7 - (-5) = 7 + 5 = 12$$

Subtract 7 from -5

$$= -5 - 7 = -12$$

No, $7 - (-5) \neq -5 - 7$

7. Subtract :

$$\text{(a)} \quad \text{Subtract : } -340 \text{ from } -370 \quad \text{(b)} \quad \text{Subtract : } 2 \text{ from } -7$$

$$= -370 - (-340)$$

$$= -7 - 2 = -9$$

$$= -370 + 340 = -30$$

$$\text{(c)} \quad \text{Subtract : } -62 \text{ from } 0$$

$$\text{(d)} \quad \text{Subtract : } 0 \text{ from } -52$$

$$= 0 - (-62) = 62$$

$$= -52 - 0 = -52$$

8. Calculate the sum :

$$3 + (-3) + 3 + (-3) + 3 + (-3) + \dots$$

(a) If the number of terms is 40.

$$[3 + (-3)] \times 20 = 0 \times 20 = 0$$

(b) If the number of terms is 71,

$$[3 + (-3)] \times 35 + 3$$

$$0 \times 35 + 3 = 3$$

9. Which of the following statements are true?

(b) $-4 + (-2) < 2$, the statements are true.

10. From the sum of -38 and -12 subtract -18 .

$$\text{Sum of } -38 \text{ and } -12 = -38 + (-12) = -38 - 12 = -50$$

$$\text{Subtract } -18 = -50 - (-18) = -50 + 18 = -32$$

11. The sum of two integers is -50 . If one of them is 78 , what is the other integer?

$$\text{Sum of two integers} = -50$$

$$\text{One of them} = 78$$

$$\text{Other number} = x$$

$$78 + x = -50$$

$$x = -50 - 78$$

$$x = -128$$

The other number is -128 .

12. Two cars started from the same point. First car went towards the east and covered 64 km in one hour. The second car went towards the west and covered 58 km in one hour. Find the distance between the two cars after one hour.

$$\text{Speed of first car} = 64 \text{ km/hours}$$

$$\text{Distance covered in 1 hr} = 64 \text{ km}$$

$$\text{Speed of second car} = 58 \text{ km/hrs}$$

$$\text{Distance covered in 1 hrs} = 58 \text{ km}$$

$$\text{Difference} = 64 + 58 = 122$$

$$\text{Distance between two cars after 1 hr} = 122 \text{ km.}$$

Multiple Choice Questions

Tick (✓) the correct answer :

1. (c) 2. (b) 3. (c) 4. (a) 5. (c) 6. (a) 7. (b) 8. (c)

BRAIN BOOSTER

- To get a successor of an integer we add 1 in it. To get predecessor an integer we subtract 1 in it.
No, the sum of a successor and a predecessor of an integer cannot be odd.
- The required x and y are 32 and 3125 as $32 \times 3125 = 100000$ and both of these do not contain 0 as a digit.

Chapter

5

Fractions

Exercise 5.1

1. Write the fraction representing the shaded portion :

(a) Fraction = $\frac{5}{12}$

(b) Fraction = $\frac{28}{100} = \frac{7}{25}$

(c) Fraction = $\frac{4}{6}$ or $\frac{2}{3}$

(d) Fraction = $\frac{9}{16}$

(e) Fraction = $\frac{4}{6}$ or $\frac{2}{3}$

(f) Fraction = $\frac{5}{7}$

(g) Fraction = $\frac{3}{4}$

(h) Fraction = $\frac{4}{5}$

2. Shade the portion according to the fraction given :

(a) $\frac{2}{3}$



(b) $\frac{1}{4}$



(c) $\frac{5}{6}$



(d) $\frac{3}{8}$



3. The number of students playing in the ground were 25. There were 15 boys. What fraction of the students in the playground are girls?

Number of students playing in the ground = 25

Number of boys = 15

∴ Number of girls = $25 - 15 = 10$

Fraction of the students in playground are girls = $\frac{10}{25}$ or $\frac{2}{5}$

4. Kajal invited 30 friends on her birthday. Only 20 friends turned up. What fraction of friends did not attend her party?

Number of friends invited on birthday = 30

Number of friends turned the party = 20

Number of friends did not attended the party = $30 - 20 = 10$

Fraction of friends did not attend her party = $\frac{10}{30} = \frac{1}{3}$

5. Write the natural numbers from 12 to 21. What fraction of them are prime numbers?

The natural number from 12 to 21 = 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

Total numbers are 10.

Prime number between 12 to 21 = 13, 17, 19

Total numbers of prime number is 3

Fraction of prime number = $\frac{3}{10}$.

Exercise 5.2

1. Fill in the blanks to make the following fractions equivalent :

(a) $\frac{35}{28} = \frac{5}{4} = \frac{45}{36}$ (b) $\frac{20}{58} = \frac{60}{174} = \frac{10}{29}$ (c) $\frac{100}{500} = \frac{200}{1000} = \frac{50}{250}$

2. Which of the following figures represent equivalent fractions?

(a) $\frac{4}{18}$ (b) $\frac{3}{12} = \frac{1}{4}$ (c) $\frac{1}{4}$ (d) $\frac{2}{8} = \frac{1}{4}$

(b), (c), (d) are equivalent fractions.

3. Give a proper fraction :

Proper fraction : In, proper fraction, numerator is less than denominator.

- (a) Sum of numerator and denominator = 12

$$N + D = 12$$

$$\text{Proper fractions} = \frac{1}{11}, \frac{3}{9}, \frac{4}{8}, \frac{5}{7}$$

(b) Numerator = 9 and denominator = $9 \times 2 - 1 = 17$

$$\text{Proper fraction} = \frac{9}{17}$$

(c) Numerator = 15 and denominator 17

$$\text{Proper fraction} = \frac{15}{17}$$

4. Check whether the given fractions are equivalent :

(a) $\frac{45}{65}, \frac{18}{26}$

$$\frac{45}{65} \begin{array}{c} \nearrow \frac{18}{26} \\ \searrow \end{array}$$

$$45 \times 26, 18 \times 25$$

$$\text{Since, } 1170 = 1170$$

$$\text{So, } \frac{45}{65} \text{ and } \frac{18}{26} \text{ are equivalent}$$

fractions.

(c) $\frac{12}{25}, \frac{6}{5}$

$$\frac{12}{25} \begin{array}{c} \nearrow \frac{6}{5} \\ \searrow \end{array}$$

$$12 \times 5, 6 \times 25$$

$$\text{Since, } 60 \neq 150$$

$$\text{So, } \frac{12}{25} \text{ and } \frac{6}{5} \text{ are equivalent}$$

fractions.

(b) $\frac{6}{5}, 1\frac{2}{10} \text{ or } \frac{12}{10}$

$$\frac{6}{5} \begin{array}{c} \nearrow \frac{12}{10} \\ \searrow \end{array}$$

$$6 \times 10, 12 \times 5$$

$$\text{Since, } 60 = 60$$

$$\text{So, } \frac{6}{5} \text{ and } 1\frac{12}{10} \text{ are equivalent}$$

fractions.

(d) $\frac{5}{4}, \frac{125}{100}$

$$\frac{5}{4} \begin{array}{c} \nearrow \frac{125}{100} \\ \searrow \end{array}$$

$$5 \times 100, 125 \times 4$$

$$\text{Since, } 500 = 500$$

$$\text{So, } \frac{5}{4} \text{ and } \frac{125}{100} \text{ are equivalent}$$

fractions.

5. Reduce the following fractions to the simplest form :

(a) $\frac{2}{28} = \frac{2 \div 2}{28 \div 2} = \frac{1}{14}$

(b) $\frac{56}{24} = \frac{56 \div 8}{24 \div 8} = \frac{7}{3}$

(c) $\frac{42}{66} = \frac{42 \div 6}{66 \div 6} = \frac{7}{11}$

(d) $\frac{120}{180} = \frac{120 \div 60}{180 \div 60} = \frac{2}{3}$

6. Write two improper fractions with :

(a) numerator 11

In improper fraction numerator is greater than the denominator.

So, denominator is < 11

Denominator $11 - 1 = 10$ and $11 - 2 = 9$

$$\text{Fraction} = \frac{11}{10}, \frac{11}{9}$$

(b) denominator 11

In improper fraction numerator is greater than the denominator.

So, Numerator is > 11

\therefore numerator $11 + 1 = 12$ and $12 + 1 = 13$

$$\text{Fraction } \frac{12}{11} \text{ and } \frac{13}{11}$$

(c) numerator 5

In improper fraction numerator is greater than the denominator.

So, denominator is < 5

\therefore Denominator $5 - 2 = 3$ and $5 - 3 = 2$

$$\therefore \text{Fraction} = \frac{5}{3} \text{ and } \frac{5}{2}$$

(d) denominator 9

In improper fraction numerator is greater than the denominator.

So, numerator is > 9

So, Numerator $= 9 + 1 = 10$ and $10 + 1 = 11$

$$\therefore \text{Fractions} = \frac{10}{9} \text{ and } \frac{11}{9}$$

7. (a) $2\frac{1}{2} = \frac{5}{2}$

$$\frac{5}{2} \div \frac{1}{2} = \frac{5}{2} \times 2 = 5$$

5 halves can be made in $2\frac{1}{2}$.

(b) $4\frac{1}{2} = \frac{9}{2}; \frac{9}{2} \div \frac{1}{2}$

$$\frac{9}{2} \times 2 = 9$$

9 halves can be made in
fraction $4\frac{1}{2}$.

$$(c) \quad 7\frac{1}{2} = \frac{15}{2}; \quad \frac{15}{2} \div \frac{1}{2} = \frac{15}{2} \times 2 = 15$$

15 halves can be made in fraction $7\frac{1}{2}$.

8. Number of students in class VI A = 36

Number of boys = 18

Number of girls = $36 - 18 = 18$

fraction of girls in section VI A = $\frac{18}{36}$ or $\frac{1}{2}$

Number of students in class VI B = 30

Number of boys = 15

Number of girls = $30 - 15 = 15$

Fraction of girls in section VI B = $\frac{15}{30}$ or $\frac{1}{2}$

Number of students in class VI C = 32

Number of boys = 16

Number of girls = $32 - 16 = 16$

Fraction of girls in section VI C = $\frac{16}{32}$ or $\frac{1}{2}$

Thus, yes, each section have equal fraction of girls students?

9. Find the equivalent fraction of $\frac{5}{8}$ having :

(a) numerator = 55

$$\frac{5}{8} = \frac{5 \times 11}{8 \times 11} = \frac{55}{88}$$

(b) denominator = 80

$$\frac{5}{8} = \frac{5 \times 10}{8 \times 10} = \frac{50}{80}$$

(c) numerator = 45

$$\frac{5}{8} = \frac{5 \times 9}{8 \times 9} = \frac{45}{72}$$

(d) denominator = 24

$$\frac{5}{8} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24}$$

10. Express the following as improper fractions :

$$(a) \quad 1\frac{1}{9} = \frac{9 \times 1 + 1}{9} = \frac{9 + 1}{9} = \frac{10}{9} \quad (b) \quad 4\frac{1}{3} = \frac{4 \times 3 + 1}{3} = \frac{12 + 1}{3} = \frac{13}{3}$$

$$(c) \quad 3\frac{2}{5} = \frac{3 \times 5 + 2}{5} = \frac{15 + 2}{5} = \frac{17}{5} \quad (d) \quad 1\frac{2}{7} = \frac{1 \times 7 + 2}{7} = \frac{7 + 2}{7} = \frac{9}{7}$$

11. Express the following as mixed fractions :

$$(a) \frac{64}{5} = 64 \div 5 \quad \begin{array}{r} 12 \\ 5 \overline{)64} \\ \underline{-5} \\ 14 \\ \underline{-10} \\ 4 \end{array}$$

$$= 12\frac{4}{5}$$

$$(b) \frac{43}{8} = 43 \div 8 \quad \begin{array}{r} 5 \\ 8 \overline{)43} \\ \underline{-40} \\ 3 \end{array}$$

$$= 5\frac{3}{8}$$

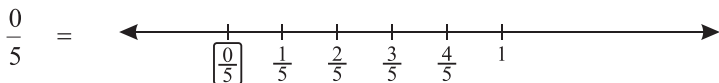
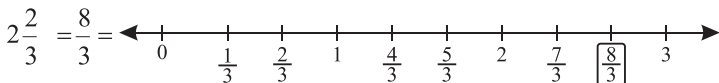
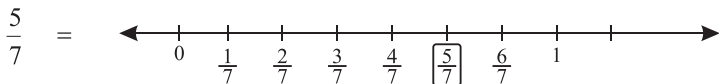
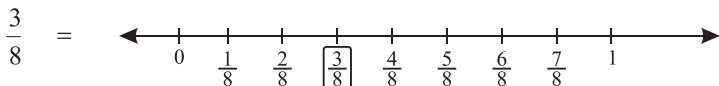
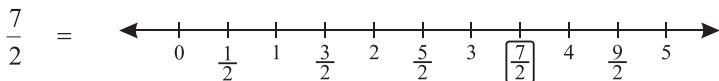
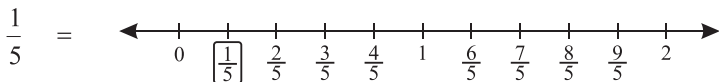
$$(c) \frac{19}{3} = 19 \div 3 \quad \begin{array}{r} 6 \\ 3 \overline{)19} \\ \underline{-18} \\ 1 \end{array}$$

$$= 6\frac{1}{3}$$

$$(d) \frac{23}{4} = 23 \div 4 \quad \begin{array}{r} 5 \\ 4 \overline{)23} \\ \underline{-20} \\ 3 \end{array}$$

$$= 5\frac{3}{4}$$

12. Draw number lines and locate following fractions on them :



Exercise 5.3

1. Simplify :

$$\begin{aligned} \text{(a)} \quad 6\frac{3}{5} + 2\frac{1}{5} \\ = \frac{33}{5} + \frac{11}{5} = \frac{33+11}{5} \\ = \frac{44}{5} \text{ or } 8\frac{4}{5} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad 4\frac{1}{3} - 3\frac{1}{3} \\ = \frac{13}{3} - \frac{10}{3} = \frac{13-10}{3} \\ = \frac{3}{3} = 1 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 3\frac{2}{7} - 2\frac{1}{7} \\ = \frac{23}{7} - \frac{15}{7} = \frac{23-15}{7} \\ = \frac{8}{7} \text{ or } 1\frac{1}{7} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad 1\frac{1}{3} + 2\frac{3}{8} \\ = \frac{4}{3} + \frac{19}{8} = \frac{4 \times 8 + 19 \times 3}{24} \\ = \frac{24 + 57}{24} = \frac{81}{24} \text{ or } 3\frac{3}{8} \end{aligned}$$

2. Arrange the following fractions in ascending order :

(Note : When we compare two fractions with the same denominator the fraction with the greater numerator is greater.)

$$\text{(a)} \quad \frac{1}{2}, \frac{3}{2}, \frac{13}{2}, \frac{7}{2}, \frac{9}{2}, \frac{10}{2}$$

Compare the numerator $1 < 3 < 7 < 9 < 10 < 13$

$$\text{or, Ascending order} = \frac{1}{2} < \frac{3}{2} < \frac{7}{2} < \frac{9}{2} < \frac{10}{2} < \frac{13}{2}$$

$$\text{(b)} \quad \frac{11}{7}, \frac{17}{7}, \frac{3}{7}, \frac{4}{7}, \frac{9}{7}, \frac{10}{7}$$

Compare the numerations $3 < 4 < 9 < 10 < 11 < 17$

$$\text{or, Ascending order} = \frac{3}{7} < \frac{4}{7} < \frac{9}{7} < \frac{10}{7} < \frac{11}{7} < \frac{17}{7}$$

3. Subtract the first fraction from the second :

$$\begin{aligned} \text{(a)} \quad \text{Subtract } \frac{1}{6} \text{ from } \frac{1}{2} \\ = \frac{1}{2} - \frac{1}{6} = \frac{3-1}{6} = \frac{2}{6} \text{ or } \frac{1}{3} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad \text{Subtract } \frac{2}{9} \text{ from } \frac{4}{7} \\ = \frac{4}{7} - \frac{2}{9} = \frac{4 \times 9 - 2 \times 7}{63} \\ = \frac{36-14}{63} = \frac{22}{63} \end{aligned}$$

$$(c) \text{ Subtract } \frac{2}{7} \text{ from } \frac{7}{2}$$

$$= \frac{7}{2} - \frac{2}{7} = \frac{7 \times 7 - 2 \times 2}{14} = \frac{49 - 4}{14} = \frac{45}{14}$$

$$(d) \text{ Subtract } 2\frac{1}{5} \text{ from } 12\frac{1}{2}$$

$$\therefore 2\frac{1}{5} = \frac{11}{5} \text{ or } 12\frac{1}{2} = \frac{25}{2}$$

$$= \frac{25}{2} - \frac{11}{5} = \frac{25 \times 5 - 11 \times 2}{10} = \frac{125 - 22}{10} = \frac{103}{10}$$

$$(e) \text{ Subtract } \frac{4}{11} \text{ from } \frac{9}{11}$$

$$= \frac{9}{11} - \frac{4}{11} = \frac{9-4}{11} = \frac{5}{11}$$

$$(f) \text{ Subtract } \frac{1}{7} \text{ from } \frac{11}{7}$$

$$= \frac{11}{7} - \frac{1}{7} = \frac{11-1}{7} = \frac{10}{7}$$

4. Add the following fractions :

$$(a) \text{ Add } \frac{1}{3} \text{ and } \frac{1}{4}$$

$$= \frac{1}{3} + \frac{1}{4} = \frac{1 \times 4 + 3 \times 1}{12} = \frac{4+3}{12} = \frac{7}{12}$$

$$(b) \text{ Add } \frac{2}{5}, \frac{3}{2} \text{ and } \frac{1}{7}$$

$$= \frac{2}{5} + \frac{3}{2} + \frac{1}{7} = \frac{2 \times 14 + 3 \times 35 + 1 \times 10}{70}$$

$$= \frac{28 + 105 + 10}{70} = \frac{143}{70} \text{ or } 2\frac{3}{70}$$

$$(c) \text{ Add } \frac{1}{3} \text{ and } \frac{3}{8}$$

$$= \frac{1}{3} + \frac{3}{8} = \frac{1 \times 8 + 3 \times 3}{24} = \frac{8+9}{24} = \frac{17}{24}$$

$$(d) \text{ Add } 2\frac{1}{2} \text{ and } 3\frac{7}{4} \text{ or } 2\frac{1}{2} = \frac{5}{2} \text{ and } 3\frac{7}{4} = \frac{19}{4}$$

$$= \frac{5}{2} + \frac{19}{4} = \frac{5 \times 2 + 19}{4} = \frac{10+19}{4} = \frac{29}{4} \text{ or } 7\frac{1}{4}$$

$$(e) \text{ Add : } \frac{5}{11}, \frac{12}{11} \text{ and } \frac{1}{22} \text{ or } \frac{5}{11} + \frac{12}{11} + \frac{1}{22}$$

$$= \frac{5 \times 2 + 12 \times 2 + 1}{22} = \frac{10 + 24 + 1}{22} = \frac{35}{22} \text{ or } 1 \frac{13}{22}$$

$$(f) \text{ Add : } 5\frac{1}{6} \text{ and } 6\frac{1}{5} \text{ or } 5\frac{1}{6} = \frac{31}{6} \text{ and } 6\frac{1}{5} = \frac{31}{5}$$

$$= \frac{31}{6} + \frac{31}{5} = \frac{31 \times 5 + 31 \times 6}{30} = \frac{155 + 186}{30} = \frac{341}{30} \text{ or } 11 \frac{11}{30}$$

5. Compare the following fractions and write the greater fraction :

$$(a) \frac{5}{7}, \frac{9}{11}$$

The given fractions are unlike, so, let us take the LCM of 7 and 11 = 77

$$\frac{5}{7} = \frac{5 \times 11}{7 \times 11} = \frac{55}{77} \text{ and } \frac{9}{11} = \frac{9 \times 7}{11 \times 7} = \frac{63}{77}$$

$$\text{Clearly } \frac{55}{77} < \frac{63}{77} \text{ therefore, } \frac{5}{7} < \frac{9}{11}$$

$$\text{So, } \frac{9}{11} \text{ is greater than } \frac{5}{7}.$$

$$(b) \frac{26}{32}, \frac{1}{16}$$

The given fractions are unlike, so let us take the LCM of 32 and 16 = 16

$$\frac{26 \div 2}{32 \div 2} = \frac{13}{16}; \frac{1 \div 1}{16 \div 1} = \frac{1}{16}$$

$$\text{Clearly, } \frac{13}{16} > \frac{1}{16} \text{ therefore, } \frac{26}{32} > \frac{1}{16}$$

$$(c) 2\frac{1}{5}, 1\frac{7}{9} \text{ or } \frac{11}{5}, \frac{16}{9}$$

LCM of 5 and 9 = 45

$$\frac{11 \times 9}{5 \times 9} = \frac{99}{45}; \frac{16 \times 5}{9 \times 5} = \frac{80}{45}$$

Clearly, $\frac{99}{45} > \frac{80}{45}$

So, $2\frac{1}{5}$ is greater than $1\frac{7}{9}$.

(d) $\frac{4}{17}, \frac{3}{22}$

LCM of 17 and 22 = 374

$$\frac{4 \times 22}{17 \times 22} = \frac{88}{374}; \quad \frac{3 \times 17}{22 \times 17} = \frac{51}{374}$$

Clearly, $\frac{88}{374} > \frac{51}{374}$

So, $\frac{4}{17}$ is greater than $\frac{3}{22}$.

(e) $\frac{1}{8}, \frac{1}{10}$

LCM of 8 and 10 = 40

$$\frac{1 \times 5}{8 \times 5} = \frac{5}{40}; \quad \frac{1 \times 4}{10 \times 4} = \frac{4}{40}$$

Clearly, $\frac{5}{40} > \frac{4}{40}$

So, $\frac{1}{8}$ is greater than $\frac{1}{10}$.

(f) Compare : $\frac{2}{15}, \frac{2}{25}$

LCM of 15 and 25 = 75

$$\frac{2 \times 5}{15 \times 5} = \frac{10}{75}; \quad \frac{2 \times 3}{25 \times 3} = \frac{6}{75}$$

Clearly, $\frac{10}{75} > \frac{6}{75}$

So, $\frac{2}{15}$ is greater than $\frac{2}{25}$.

6. Write three like fractions with denominator :

Like fractions : The fractions that have same denominator are called like fractions.

(a) Denominator = 13

Like fractions = $\frac{1}{13}, \frac{2}{13}, \frac{3}{13}$

(b) Denominator = 11

Like fractions = $\frac{1}{11}, \frac{2}{11}, \frac{3}{11}$

(c) Denominator = 7

Like fractions = $\frac{1}{7}, \frac{2}{7}, \frac{3}{7}$

(d) Denominator = 5

Like fractions = $\frac{1}{5}, \frac{2}{5}, \frac{3}{5}$

7. Sum of two numbers = $\frac{7}{8}$

One numbers = $\frac{3}{4}$

Other number = $\frac{7}{8} - \frac{3}{4} = \frac{7-3 \times 2}{8} = \frac{7-6}{8} = \frac{1}{8}$

8. Total oil contained in a tin = $15\frac{3}{4} l$ or $\frac{63}{4} l$

Leaked oil = $2\frac{1}{2} l$ or $\frac{5}{2} l$

Oil is left in tin = $\frac{63}{4} - \frac{5}{2} l = \frac{63-5 \times 2}{4} l$
 $= \frac{63-10}{4} l = \frac{53}{4} l$ or $13\frac{1}{4} l$

9. Money earned in a day = ₹ $87\frac{1}{2}$ or ₹ $\frac{175}{2}$

Money spent on food = ₹ $37\frac{3}{4}$ or ₹ $\frac{151}{4}$

Money left with Krishan = ₹ $\left(\frac{175}{2} - \frac{151}{4}\right) = ₹ \frac{175 \times 2 - 151}{4}$
 $= ₹ \frac{350 - 151}{4} = ₹ \frac{199}{4}$ or $49\frac{3}{4}$

Thus, ₹ $49\frac{3}{4}$ money is left with him.

10. Quantity of milk bought = $5\frac{3}{4} l$ or $\frac{23}{4} l$

Quantity of milk consumed = $2\frac{1}{4} l$ or $\frac{9}{4} l$

$$\text{Milk is left with Seema} = \left(\frac{23}{4} - \frac{9}{4} \right) l = \frac{23-9}{4} l = \frac{14}{4} l \text{ or } \frac{7}{2} l$$

Thus, $3\frac{1}{2} l$ milk is left with Seema.

11. Weight of potatoes = $3\frac{1}{2}$ or $\frac{7}{2}$ kg

Weight of tomatoes = $1\frac{3}{4}$ or $\frac{7}{4}$ kg

Weight of carrots = $1\frac{1}{4}$ or $\frac{5}{4}$ kg

$$\begin{aligned} \text{Total weight of vegetable purchased by Mrs Sharma} &= \frac{7}{2} + \frac{7}{4} + \frac{5}{4} \\ &= \frac{7 \times 2 + 7 + 5}{4} = \frac{14 + 7 + 5}{4} \\ &= \frac{26}{4} \text{ or } \frac{13}{2} = 6\frac{1}{2} \text{ kg} \end{aligned}$$

Mrs Sharma purchased $6\frac{1}{2}$ kg vegetable.

12. Rahul gives oranges = $\frac{5}{7}$

$$\text{Oranges left in basket} = 1 - \frac{5}{7} = \frac{7-5}{7} = \frac{2}{7}$$

$\frac{2}{7}$ oranges were left in the basket.

13. Fraction of pots sold on Monday = $\frac{1}{3}$

Fraction of pots sold on Tuesday = $\frac{1}{4}$

Fraction of pots sold on Wednesday = $\frac{1}{5}$

Fraction of pots sold on Thursday = $\frac{1}{6}$

$$\text{Total pots sold} = \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} = \frac{20 + 15 + 12 + 10}{60} = \frac{57}{60}$$

$$\text{Remaining pots sold in weekened} = 1 - \frac{57}{60} = \frac{60-57}{60} = \frac{3}{60} \text{ or } \frac{1}{20}$$

14. Mahi takes time to cross the bridge by car $= 4\frac{1}{2}$ min $= \frac{9}{2}$ min

Tarun, takes time to cross the bridge by car $= 3\frac{1}{3}$ min $= \frac{10}{3}$ min

$$\text{Comparison} = \frac{9}{2} \text{ and } \frac{10}{3}$$

$$\text{Now, } \frac{9 \times 3}{2 \times 3} = \frac{27}{6} \quad \text{and} \quad \frac{10 \times 2}{3 \times 2} = \frac{20}{6}$$

$$\text{Clearly, } \frac{27}{6} > \frac{20}{6}$$

$$\text{Difference} = \frac{27}{6} - \frac{20}{6} = \frac{27-20}{6} = \frac{7}{6}$$

$$\text{Thus, Mahi takes } 1\frac{1}{6} \text{ min more than Tarun.}$$

15. Fraction of collection by students $= \frac{2}{3}$

$$\text{Fraction of collection by school staff} = \frac{1}{6}$$

$$\text{Total collection} = \frac{2}{3} + \frac{1}{6} = \frac{2 \times 2 + 1}{6} = \frac{4+1}{6} = \frac{5}{6}$$

$$\text{Fraction of collection from donations} = 1 - \frac{5}{6} = \frac{6-5}{6} = \frac{1}{6}$$

$$\text{Thus, } \frac{1}{6} \text{ of funds collected from donations.}$$

16. For Dev :

$$\text{Number of pages} = 40$$

$$\text{Number of coloured pages} = 4$$

$$\text{Fraction of coloured pages} = \frac{4}{40} = \frac{1}{10}$$

For Raman :

Fraction of coloured pages = $\frac{1}{3}$

Compare $\frac{1}{10}$ and $\frac{1}{3}$

$$\frac{1 \times 3}{10 \times 3}, \frac{10 \times 1}{10 \times 3} = \frac{3}{30} \quad \text{Clearly, } \frac{10}{30}$$

Thus, Dev coloured less pages.

17. Time spend on Friday = $\frac{1}{2}$ hours

Time spend on Saturday = $\frac{7}{4}$ hours

Time spend on Sunday = $\frac{1}{3}$ hours

Total time spend for study over the weekend

$$\begin{aligned} &= \frac{1}{2} + \frac{7}{4} + \frac{1}{3} = \frac{1 \times 6 + 7 \times 3 + 1 \times 4}{12} \\ &= \frac{6 + 21 + 4}{12} = \frac{31}{12} \text{ or } 2\frac{7}{12} \end{aligned}$$

Thus, she studied $2\frac{7}{12}$ hours over the weekend.

18. Pallavi bought of cloth = $3\frac{2}{3}$ m = $\frac{11}{3}$ m

Deepa bought of cloth = $2\frac{1}{3}$ m or $\frac{7}{3}$ m

Since, $\frac{11}{3} > \frac{7}{3}$

$$\text{Difference} = \frac{11}{3} - \frac{7}{3} = \frac{11-7}{3} = \frac{4}{3} \text{ m or } 1\frac{1}{3} \text{ m}$$

Thus, Pallavi bought more cloth. She bought $1\frac{1}{3}$ m cloth extra.

19. Length of a wire = $2\frac{1}{3}$ m or $\frac{7}{3}$ m

Length of one piece = $\frac{1}{4}$ m

$$\begin{aligned}\text{Length of other piece} &= \left(\frac{7}{3} - \frac{1}{4}\right) \text{m} = \frac{7 \times 4 - 1 \times 3}{12} \text{m} \\ &= \frac{28 - 3}{12} = \frac{25}{12} \text{m} \quad \text{or } 2\frac{1}{12} \text{m}\end{aligned}$$

20. Write the shaded portion as fraction and arrange them in ascending order :

(a) Descending order = $\frac{4}{5} > \frac{3}{5} > \frac{2}{5} > \frac{1}{5}$

(b) Descending order = $\frac{6}{8} > \frac{5}{8} > \frac{3}{8} > \frac{1}{8}$

Multiple Choice Questions

Tick (✓) the correct answer :

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

BRAIN BOOSTER

1. Total parts of bread = 16

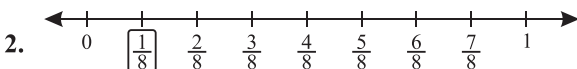
I ate = $\frac{4}{16}$ part of bread

My brother ate = $\frac{7}{16}$ part of bread

Since, $\frac{4}{16} < \frac{7}{16}$ Difference = $\frac{7}{16} - \frac{4}{16} = \frac{3}{16}$

So, my brother ate $\frac{3}{16}$ parts more than me

Fraction of bread left = $1 - \frac{4}{16} - \frac{7}{16} = \frac{16 - 4 - 7}{16} = \frac{16 - 11}{16} = \frac{5}{16}$



3. $\frac{55}{100}$ is the different fraction of given fraction.

4. $\frac{3}{7} + \frac{5}{9} = \frac{9 \times 3 + 5 \times 7}{63} = \frac{27 + 35}{63} = \frac{62}{63}$

5. (a) $\frac{1}{2} > \frac{1}{3}$ (b) $\frac{3}{7} > \frac{2}{7}$

6. Proper fraction = $\frac{5}{9}$. Infinite fractions can be written in this way.

Chapter

6

Decimals

Exercise 6.1

1. Write the following decimals into place value table :

	Thous -ands	Hundreds	Tens	Ones	Tenths	Hundre dths	Thousan dths
(a)		3	3	6	4	5	
(b)			4	6	5	6	
(c)		7	8	0	2		
(d)	1	2	6	4	5	0	9

2. Write the following as decimals :

(a) $200 + 40 + 0.7 + 0.009 = 240.709$

(b) $30 + 4 + 0.5 + 0.06 = 34.56$

(c) $600 + 7 + 9 + 0.4 = 679.4$

(d) $100 + 5 + 0.3 + 0.04 + 0.005 = 105.345$

(e) $700 + 4 + 0.2 = 704.2$

(f) $700 + 50 + 6 = 756.0$

3. Write each as decimal :

(a) six tenths = **0.6**

(b) two tens three ones and five tenths = **23.5**

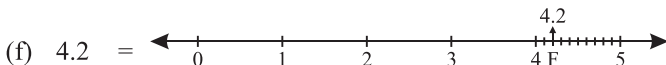
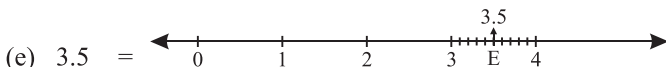
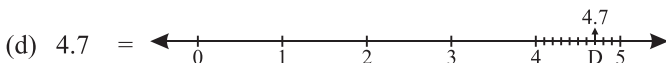
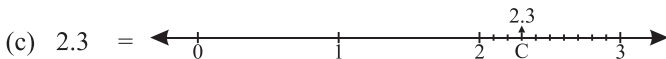
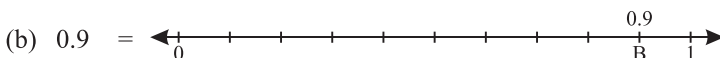
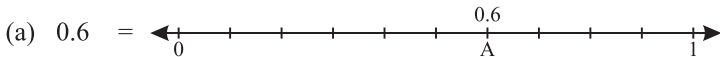
(c) two hundred and six tenths = **200.6**

(d) four and seven tenths = **4.7**

(e) fourteen and eight tenths = **14.8**

(f) ninety two and six tenths = **92.6**

4. Represent the following on number line :



5. Write the following as decimal :

(a) $\frac{27}{10} = 2.7$

(b) $\frac{131}{10} = 13.1$

(c) $\frac{36}{10} = 3.6$

(d) $\frac{125}{10} = 12.5$

(e) $\frac{246}{10} = 24.6$

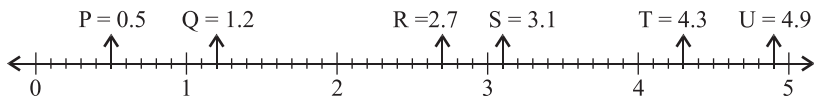
(f) $70\frac{4}{10} = \frac{704}{10} = 70.4$

(g) $20 + 6 + \frac{5}{10} = 20 + 6 + 0.5 = 26.5$

(h) $40\frac{3}{10} = \frac{403}{10} = 40.3$

(i) $100 + 5 + \frac{6}{10} = 100 + 5 + 0.6 = 105.6$

6. Write the decimals that are represented by the points P, Q, R, S, T and U on given number line.



7. Between which two whole numbers on the number line does the given number lie. Which of these whole number is nearer to the number given?

- (a) 0.7



0.7 is present in between 0 and 1

0.7 is nearer to 1.

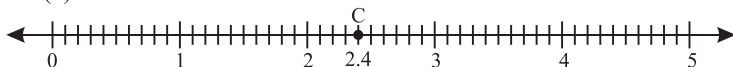
- (b) 1.7



1.7 is present in between 1 and 2.

1.7 is nearer to 2.

- (c) 2.4



2.4 is present in between 2 and 3.

2.4 is nearer to 2.

- (d) 3.9



3.9 is present in between 3 and 4.

3.9 is nearer to 4.

- (e) 4.8



4.8 is present in between 4 and 5.

4.8 is nearer to 5.

(f) 9.2



9.2 is present in between 9 and 10.

9.2 is nearer to 9.

8. Express the following as cm using decimal :

(a) $2 \text{ mm} = \frac{2}{10} = 0.2 \text{ cm}$

(b) $175 \text{ mm} = \frac{175}{10} = 17.5 \text{ cm}$

(c) $14 \text{ cm } 2 \text{ mm} = 14 \text{ cm} + \frac{2}{10} \text{ cm} = 14 + 0.2 \text{ cm} = 14.2 \text{ cm}$

(d) $20 \text{ cm } 6 \text{ mm} = 20 \text{ cm} + \frac{6}{10} \text{ cm} = 20 \text{ cm} + 0.6 \text{ cm} = 20.6 \text{ cm}$

9. Express the following decimals as fractions in lowest form :

(a) $\frac{7}{10}$

(b) $\frac{47}{2}$

(c) $\frac{73}{5}$

(d) $\frac{237}{10}$

(e) $\frac{128}{5}$

(f) $\frac{19}{5}$

Exercise 6.2

1. Express as kg using decimals : $\left(\frac{1}{1000} \text{ kg} = 1\text{g} \right)$

(a) 2 gm

$= \frac{2}{1000} \text{ kg} = 0.002 \text{ kg}$

(b) 100 gm

$= \frac{100}{1000} \text{ kg} = 0.1 \text{ kg}$

(c) 4250 gm

$= \frac{4250}{1000} \text{ kg} = 4.250 \text{ kg}$

(d) $5 \text{ kg } 8 \text{ gm} = 5 \text{ kg} + \frac{8}{1000} \text{ kg}$

$= 5 \text{ kg} + 0.008 \text{ kg} = 5.008 \text{ kg}$

(e) 26 kg 50 gm

$= 26 \text{ kg} + \frac{50}{1000} \text{ kg}$

$= 26 \text{ kg} + 0.05 \text{ kg} = 26.05 \text{ kg}$

2. Express as km using decimals :

$$\begin{aligned} \text{(a) } 8 \text{ m} &= \frac{8}{1000} \text{ km} \\ &= 0.008 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{(b) } 80 \text{ m} &= \frac{80}{1000} \text{ km} \\ &= 0.08 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{(c) } 808 \text{ m} &= \frac{808}{1000} \text{ km} \\ &= 0.808 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{(d) } 17 \text{ km } 70 \text{ m} \\ &= 17 \text{ km} + \frac{70}{1000} \text{ km} \\ &= 17 \text{ km} + 0.070 \text{ km} \\ &= 17.07 \text{ km} \end{aligned}$$

3. Convert :

$$\begin{aligned} \text{(a) } 14.2 \text{ cm into mm} \quad & (1 \text{ cm} = 10 \text{ mm}) \\ 14.2 \text{ cm} &= 14.2 \times 10 \text{ mm} = 142 \text{ mm} \end{aligned}$$

$$\begin{aligned} \text{(b) } 3.4 \text{ m into cm} \quad & (1 \text{ m} = 100 \text{ cm}) \\ 3.4 \text{ m} &= 3.4 \times 100 \text{ cm} = 340 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{(c) } 164 \text{ cm into m} \quad & (1 \text{ m} = \frac{1}{100} \text{ cm}) \\ 164 \text{ cm} &= \frac{164}{100} = 1.64 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{(d) } 2500 \text{ m into km} \quad & \left(1 \text{ m} = \frac{1}{1000} \text{ km} \right) \\ 2500 \text{ m} &= \frac{2500}{1000} = 2.5 \text{ km} \end{aligned}$$

4. Convert as cm using decimals : $\left(\frac{1}{10} \text{ mm} = 1 \text{ cm} \right)$

$$\text{(a) } 5 \text{ mm} = \frac{5}{10} \text{ cm} = 0.5 \text{ cm}$$

$$\text{(b) } 124 \text{ mm} = \frac{124}{10} \text{ cm} = 12.4 \text{ cm}$$

$$\text{(c) } 9 \text{ cm } 5 \text{ mm} = 9 \text{ cm} + \frac{5}{10} \text{ cm} = 9 \text{ cm} + 0.5 \text{ cm} = 9.5 \text{ cm.}$$

$$\text{(d) } 3 \text{ cm } 3 \text{ mm} = 3 \text{ cm} + \frac{3}{10} \text{ cm} = 3 + 0.3 \text{ cm} = 3.3 \text{ cm}$$

5. Add the following amount :

(a) Add : ₹ 435.00
and ₹ 43.20

$$\begin{array}{r} \text{₹ } 435.00 \\ + \text{ ₹ } 43.20 \\ \hline \text{₹ } 478.20 \end{array}$$

(b) Add : ₹ 49.45 and ₹ 100.42

$$\begin{array}{r} \text{₹ } 49.45 \\ + \text{ ₹ } 100.42 \\ \hline \text{₹ } 149.87 \end{array}$$

(c) Add : ₹ 150.40
and ₹ 234.50

$$\begin{array}{r} \text{₹ } 150.40 \\ + \text{ ₹ } 234.50 \\ \hline \text{₹ } 384.90 \end{array}$$

(d) Add : ₹ 270.50 and ₹ 130.46

$$\begin{array}{r} \text{₹ } 270.50 \\ + \text{ ₹ } 130.46 \\ \hline \text{₹ } 400.96 \end{array}$$

6. Convert as rupees using decimals : $\left(\text{₹ } \frac{1}{100} = 1 \text{paise} \right)$

(a) 125 paise

$$= \text{₹ } \frac{125}{100} = \text{₹ } 1.25$$

(b) 80 paise

$$= \text{₹ } \frac{80}{100} = \text{₹ } 0.8$$

(c) 50 rupees 90 paise

$$\begin{aligned} &= \text{₹ } 50 + \text{₹ } \frac{90}{100} \\ &= \text{₹ } 50 + \text{₹ } 0.9 = \text{₹ } 50.90 \end{aligned}$$

(d) 725 paise

$$= \text{₹ } \frac{725}{100} = \text{₹ } 7.25$$

7. Convert the following into paise :

(a) ₹ 18.75 = $18 \times 100\text{p} + 0.75 \times 100\text{p} = 1800\text{p} + 75\text{p} = 1875\text{p}$

(b) ₹ 20.50 = $20 \times 100\text{p} + 0.50 \times 100\text{p} = 2000\text{p} + 50\text{p} = 2050\text{p}$

(c) ₹ 3.01 = $3 \times 100\text{p} + 0.01 \times 100\text{p} = 300\text{p} + 1\text{p} = 301\text{p}$

(d) ₹ 100.00 = $100 \times 100\text{p} = 10000\text{p}$

8. Express as metres using decimals :

(a) 15 cm

$$= \frac{15}{100} \text{ m} = 0.15 \text{ m}$$

(b) 60 cm

$$= \frac{60}{100} = 0.60 \text{ m}$$

(c) 2m 45 cm = $2\text{m} + \frac{45}{100} \text{ m}$

$$= 2\text{m} + 0.45 \text{ m} = 2.45 \text{ m}$$

(d) 4 m 15 cm

$$\begin{aligned} &= 4\text{m} + \frac{15}{100} \text{ m} \\ &= 4\text{m} + 0.15 \text{ m} = 4.15 \text{ m} \end{aligned}$$

9. Subtract :

$$\begin{array}{r} \text{(a) Subtract ₹ 27.85} \\ \text{from ₹ 30.81} \\ \text{₹ 30.81} - \text{₹ 27.85} \\ \text{₹ 30.81} \\ - \text{₹ 27.85} \\ \hline \text{₹ 2.96} \end{array}$$

$$\begin{array}{r} \text{(b) Subtract ₹ 50.45} \\ \text{from ₹ 80.30} \\ \text{₹ 80.30} - \text{₹ 50.45} \\ \text{₹ 80.30} \\ - \text{₹ 50.45} \\ \hline \text{₹ 29.85} \end{array}$$

$$\begin{array}{r} \text{(c) Subtract ₹ 59.05} \\ \text{from ₹ 70.00} \\ \text{₹ 70.00} \\ - \text{₹ 59.05} \\ \hline \text{₹ 10.95} \end{array}$$

$$\begin{array}{r} \text{(d) Subtract ₹ 355.62} \\ \text{from ₹ 395.00} \\ \text{₹ 395.00} \\ - \text{₹ 355.62} \\ \hline \text{₹ 39.38} \end{array}$$

10. Subtract :

(a) Subtract : 10 km 200 m from 20 km 435 m

$$10 \text{ km } 200 \text{ m} = 10.200 \text{ km}$$

$$20 \text{ km } 435 \text{ m} = 20.435 \text{ km}$$

$$\Rightarrow 20.435 \text{ km} - 10.200 \text{ km} = 10.235 \text{ km}$$

$$\begin{array}{r} 20.435 \text{ km} \\ - 10.200 \text{ km} \\ \hline 10.235 \text{ km} \end{array} \quad \text{or } 10 \text{ km } 235 \text{ m}$$

(b) Subtract : 15 kg 280 gm from 20 kg 400 gm

$$15 \text{ kg } 280 \text{ gm} = 15.280 \text{ kg}$$

$$20 \text{ kg } 400 \text{ gm} = 20.400 \text{ kg}$$

$$20.400 \text{ kg} - 15.280 \text{ kg}$$

$$\begin{array}{r} 20.400 \text{ kg} \\ - 15.280 \text{ kg} \\ \hline 5.120 \text{ kg} \end{array} \quad \text{or } 5.120 \text{ kg} = 5 \text{ kg } 120 \text{ g}$$

(c) Subtract : 15 km 300 m from 30 km

$$15 \text{ km } 300 \text{ m} = 15.300 \text{ km}$$

$$30 \text{ km} = 30 \text{ km}$$

$$\begin{array}{r} 30.000 \text{ km} \\ - 15.300 \text{ km} \\ \hline 14.700 \text{ km} \end{array} \quad \text{or } 14 \text{ km } 700 \text{ m}$$

- (d) Subtract : 6 cm 5 mm from 8 cm 2 mm

$$6 \text{ cm } 5 \text{ mm} = 6.5 \text{ cm}$$

$$8 \text{ cm } 2 \text{ mm} = 8.2 \text{ cm}$$

$$8.2 \text{ cm} - 6.5 \text{ cm} = 1.7$$

$$\begin{array}{r} 8.2 \text{ cm} \\ - 6.5 \text{ cm} \\ \hline 1.7 \text{ cm} \end{array} \quad \text{or} \quad 1 \text{ cm } 7 \text{ mm}$$

Exercise 6.3

1. Find the sum in each of the following :

(a) $0.009 + 3.142 + 30.08$

$$\begin{array}{r} 0.009 \\ 3.142 \\ + 30.080 \\ \hline 33.231 \end{array}$$

(b) $15.06 + 1.45 + 6.723$

$$\begin{array}{r} 15.060 \\ 1.450 \\ + 6.723 \\ \hline 23.233 \end{array}$$

(c) $27.067 + 2.45 + 1.38$

$$\begin{array}{r} 27.067 \\ 2.450 \\ + 1.380 \\ \hline 30.897 \end{array}$$

(d) $0.75 + 10.425 + 3.4$

$$\begin{array}{r} 0.750 \\ 10.425 \\ + 3.400 \\ \hline 14.575 \end{array}$$

2. Subtract :

(a) Subtract : 81.45 from 112

$$\begin{array}{r} 112.00 \\ - 81.45 \\ \hline 30.55 \end{array}$$

(b) Subtract : 6.12 from 81.42

$$\begin{array}{r} 81.42 \\ - 6.12 \\ \hline 75.30 \end{array}$$

(c) Subtract : 6.79 from 20.32

$$\begin{array}{r} 20.32 - 6.79 \\ 20.32 \\ - 6.79 \\ \hline 13.53 \end{array}$$

(d) Subtract : 9.847 from 11.6

$$\begin{array}{r} 11.6 - 9.847 \\ 11.600 \\ - 9.847 \\ \hline 1.753 \end{array}$$

- (e) Subtract : 48.06 from 70 (f) Subtract : 19.01 from 45.67

$$\begin{array}{r} 70 - 48.06 \\ 70.00 \\ - 48.06 \\ \hline 21.94 \end{array}$$

$$\begin{array}{r} 45.67 \\ - 19.01 \\ \hline 26.66 \end{array}$$

3. Subtract the following :

(a) $9.892 - 6.56$

$$\begin{array}{r} 9.892 \\ - 6.560 \\ \hline 3.332 \end{array}$$

(b) $21.751 - 12.45$

$$\begin{array}{r} 21.751 \\ - 12.450 \\ \hline 9.301 \end{array}$$

(c) $18.52 - 6.79$

$$\begin{array}{r} 18.52 \\ - 6.79 \\ \hline 11.73 \end{array}$$

(d) $11.6 - 9.847$

$$\begin{array}{r} 11.600 \\ - 9.847 \\ \hline 1.753 \end{array}$$

4. This is so because decimals combine with whole numbers to give another number greater than a particular number. For example, if we add 0.4 to 1.0 we get 1.4 which is greater than 1.

$$0.4 + 1 = 1.4$$

$$1.4 > 1$$

5. In the sum, decimal point comes directly below the decimal point of the number which are added.

Sum of 10001.0001 and 0.00001

$$\begin{array}{r} 10001.001 \\ + 0.00001 \\ \hline 10001.00101 \end{array}$$

6. Money spent by Aman = ₹ 900.50

Money spent by Pracheta = ₹ 675.25

Clearly, $900.50 > 675.25$

Difference = ₹ 900.50 - ₹ 675.25 = ₹ 225.25

Aman spent ₹ 225.25 more than Pracheta.

$$\begin{array}{r} ₹ 900.50 \\ - ₹ 675.25 \\ \hline ₹ 225.25 \end{array}$$

7. Let x should be added to 20.75 to get 25.5

$$x + 20.75 = 25.50$$

$$x = 25.50 - 20.75 = 4.75$$

Thus, required number 4.75 to added to get 25.5.

$$\begin{array}{r} 25.00 \\ - 20.75 \\ \hline 4.75 \end{array}$$

8. Cost of a school bag = ₹ 275

Cost of a lunh box = ₹ 95

Total cost = ₹ 275 + ₹ 95 = ₹ 370

Total money had = ₹ 1000

Money spent = ₹ 370

Money left = ₹ (1000 - 370) = ₹ 630

Thus, ₹ 630 is left with her.

$$\begin{array}{r} ₹ 275 \\ ₹ 95 \\ \hline ₹ 370 \\ ₹ 1000 \\ - ₹ 370 \\ \hline ₹ 630 \end{array}$$

9. Sum of 182.38 and 132.91

$$\begin{array}{r} 182.38 \\ + 132.91 \\ \hline 315.29 \end{array}$$

Subtract 315.29 from 998.45

$$\begin{array}{r} 998.45 \\ + 315.29 \\ \hline 683.16 \end{array}$$

10. Length of cloth for shirt = 3 m 20 cm = 3.20 m

Length of cloth for trouser = 2 m 15 cm = 2.15 m

Total length = 3.20 m + 2.15 m = 5.35 m

Thus, Ankita bought 5 m 35 cm cloth.

$$\begin{array}{r} 3.20 \text{ m} \\ + 2.15 \text{ m} \\ \hline 5.35 \text{ m} \end{array}$$

11. Rakhi's mother gave her money = ₹ 110.50

Rakhi's father gave her money = ₹ 115.80

Total money = ₹ 110.50 + ₹ 115.80 = ₹ 226.30

$$\begin{array}{r} ₹ 110.50 \\ + ₹ 115.80 \\ \hline ₹ 226.30 \end{array}$$

Thus, ₹ 226.30 is given to Rakhi by her parents.

Multiple Choice Questions

Tick (✓) the correct answer :

1. (b) 2. (a) 3. (a) 4. (b) 5. (c) 6. (c) 7. (b) 8. (a) 9. (c)

Exercise 7.1

1. Which ratio is greater?

- (a) 3 : 4 or 5 : 6

Compare the ratio 3 : 4 and 5 : 6

$$3 : 4 = \frac{3}{4} \text{ and } 5 : 6 = \frac{5}{6}$$

Now, LCM of 4 and 6 = 12

Making the denominator of each fraction equal to 12.

$$\text{We have, } \frac{3 \times 3}{4 \times 3} = \frac{9}{12} \text{ and } \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$$

$$\text{Since, } \frac{9}{12} < \frac{10}{12}$$

$$\text{So, } 3 : 4 < 5 : 6$$

Thus, 5 : 6 is greater than 3 : 4.

- (b) 9 : 11 or 7 : 3

Compare the ratio 9 : 11 and 7 : 3

$$9 : 11 = \frac{9}{11} \text{ and } 7 : 3 = \frac{7}{3}$$

LCM of 11 and 3 = 33

Making denominator of each fraction equal to 33.

$$\frac{9 \times 3}{11 \times 3} = \frac{27}{33}; \frac{7 \times 11}{3 \times 11} = \frac{77}{33}$$

$$\text{Since, } \frac{27}{33} < \frac{77}{33}$$

$$\text{Hence } 9 : 11 < 7 : 3$$

Thus, 7 : 3 is greater than 9 : 11.

- (c) 1 : 2 or 3 : 7

Compare the ratio 1 : 2 and 3 : 7

$$1:2 = \frac{1}{2} \text{ and } 3:7 = \frac{3}{7}$$

LCM of 2 and 7 = 14

Making denominator of each fraction equal to 14.

$$\frac{1 \times 7}{2 \times 7} = \frac{7}{14} \text{ and } \frac{3 \times 2}{7 \times 2} = \frac{6}{14}$$

Since, $\frac{7}{14} > \frac{6}{14}$

So, $1:2 > 3:7$

Thus 1 : 2 is greater than 3 : 7.

(d) 5 : 13 or 2 : 5

Compare the ratio = 5 : 13 and 2 : 5

$$5:13 = \frac{5}{13} \text{ or } 2:5 = \frac{2}{5}$$

LCM of 13 and 5 = 65

Making denominator of each fraction equal to 65

$$\frac{5 \times 5}{13 \times 5} = \frac{25}{65} \text{ and } \frac{2 \times 13}{5 \times 13} = \frac{26}{65}$$

Since, $\frac{25}{65} < \frac{26}{65}$ So, $5:13 < 2:5$

Thus, 2:5 is greater than 5 : 13.

2. Express each one of the following ratios in its simplest form :

(a) 500 : 1000

$$= \frac{500 \div 500}{1000 \div 500} = \frac{1}{2} \text{ or } 1:2$$

(b) 450 : 270

$$= \frac{450 \div 90}{270 \div 90} = \frac{5}{3} \text{ or } 5:3$$

(c) 17 : 34

$$= \frac{17 \div 17}{34 \div 17} = \frac{1}{2} \text{ or } 1:2$$

(d) 65 : 91

$$= \frac{65 \div 13}{91 \div 13} = \frac{5}{7} \text{ or } 5:7$$

(e) 50 : 225

$$= \frac{50 \div 25}{225 \div 25} = \frac{2}{9} \text{ or } 2:9$$

(f) 70 : 42

$$= \frac{70 \div 14}{42 \div 14} = \frac{5}{3} \text{ or } 5:3$$

$$(g) \quad 100:150 \\ = \frac{100 \div 50}{150 \div 50} = \frac{2}{3} \text{ or } 2:3$$

$$(h) \quad 33:99 \\ = \frac{33 \div 33}{99 \div 33} = \frac{1}{3} \text{ or } 1:3$$

$$(i) \quad 25:45 \\ = \frac{25 \div 5}{45 \div 5} = \frac{5}{9} \text{ or } 5:9$$

$$(j) \quad 16:18 \\ = \frac{16 \div 2}{18 \div 2} = \frac{8}{9} \text{ or } 8:9$$

3. Find the ratio of the following :

(a) Ratio of 400 mL to 1.6 L
 Ratio of 400 mL to 1.6×1000 mL (1 L = 1000 mL)
 Ratio of 400 mL to 1600 mL
 $400:1600$

$$\text{Ratio} = 1:4$$

(b) Ratio of 60 paise to ₹ 1
 Ratio of 60 paise to 100 paise (₹ 1 = 100 p)
 $60:100$

$$\text{Ratio} = 3:5$$

(c) Ratio of 25 cm to 2.5 m
 Ratio of 25 cm to 2.5×100 cm (1 m = 100 cm)
 Ratio of 25 cm to 250 cm
 $\text{Ratio} = 25:250 = 1:10$

(d) Ratio of 15 min to 1.5 hrs
 Ratio of 15 min to 1.5×60 min (1 hrs = 60 min)
 Ratio 15 min to 90 min
 $15:90 = 1:6$

4. In class VI of a school having 50 students, 20 play cricket, 10 play table tennis and 15 play badminton. The remaining students do not play any game. No student is allowed to play more than one game. Find the ratio of the number of students :

The total number of students = 50

Number of students play cricket = 20

Number of students play table tennis = 10

Number of students play badminton = 15

$$\begin{aligned} \text{Number of students do not play} &= 50 - (20 + 10 + 15) \\ &= 50 - 45 = 5 \end{aligned}$$

- (a) Ratio of who play some game to total number of students
 $= 45 : 50$ or $9 : 10$
- (b) Ratio of who, play some game to who do not play any game
 $= 45 : 5$ or $9 : 1$
- (c) Ratio of who play table tennis to play badminton $= 10 : 15$ or
 $2 : 3$
- (d) Ratio of who play cricket to play table tennis $= 20 : 10 = 2 : 1$
5. Mr Sonu earns ₹ 18,000 per month. He spends ₹ 12,000 and saves the rest. Find the ratio of the following in the simplest form :
 Mr Sonu earns = ₹ 18000
 He spend money = ₹ 12000
 His saving = ₹ 18000 – ₹ 12000 = ₹ 6000
- (a) Ratio of his income to expenditure $= 18000 : 12000 = 3 : 2$
 (b) Ratio of his expenditure to saving $= 12000 : 6000 = 2 : 1$
 (c) Ratio of his saving to total income $= 6000 : 18000 = 1 : 3$
 (d) Ratio of his earnings to saving $= 18000 : 6000 = 3 : 1$
6. In a Rawat academy there are 30 cricket players and 20 football player setting training. Find the ratio of the following in the simplest form :
 Number of cricket player = 30
 Number of football player = 20
 Total player $= 30 + 20 = 50$
- (a) Ratio of football player to cricket player $= 20 : 30 = 2 : 3$
 (b) Ratio of cricket player to football $= 30 : 20 = 3 : 2$
 (c) Ratio of football player to all player $= 20 : 50 = 2 : 5$
 (d) Ratio of cricket player to all player $= 30 : 50$ or $3 : 5$
7. Number of girls = 16
 Number of boys = 24
 Ratio of boys to number of girls $= 24 : 16$ or $3 : 2$
8. Number of pairs of white earrings = 4
 Number of pairs of red earrings = 5
 Total number of pairs $= 4 + 5 = 9$
 Ratio of while earrings to total number of earrings $= \frac{4}{9} = 4 : 9$

9. Speed of Krishna's car = 60 km per hours
Speed of Ravi's car = 45 km per hours
Ratio of the speed of Ravi's car to Krishna's car = 45 : 60 or 3 : 4
10. A tempo, covered distance in 2 hrs = 60 km
Distance covered in 1 hrs = $60 \div 2$ km = 30 km
So, tempo's speed = 30 km/hr
Car, covered distance in 1 hr = 80 km
Car's speed = 80 km/hr
Ratio of speed = $\frac{30}{80} = \frac{3}{8}$ or 3 : 8
11. Somya has 24 cups and 18 saucers. Find the ratio of the following in the simplest form :
Number of cups = 24
Number of saucers = 18
Total crockery = 24 + 18 = 42
(a) Ratio of cups to saucers = 24 : 18 = 4 : 3
(b) Ratio of saucers to cups = 18 : 24 = 3 : 4
(c) Ratio of cups to whole crockery = 24 : 42 = 4 : 7
(d) Ratio of saucers to whole crockery = 18 : 42 = 3 : 7
12. The present age of a father is 36 years and that of his son is 8 years. Find the ratio of :
Present age of the father = 36 years
Present age of his son = 8 years
(a) Ratio present age of father to the present age of son = 36 : 8
 $= 9 : 2$
(b) His son's age = 6 years
Then, father's age = $36 - 2 = 34$ years
Ratio = 34 : 6 = 17 : 3
(c) After 10 year his son age = $8 + 10 = 18$ years
After 10 year his father age = $36 + 10 = 46$ years
Ratio = 46 : 18 or 23 : 9
(d) If father's age = 30 years
Son's age = $8 - 6 = 2$ years
Ratio = 30 : 2 = 15 : 1

Exercise 7.2

1. Which of the following are true by the rule of proportion :

(Rule : If $a : b :: c : d$ are in proportion. Then, product of extremes is equal to product of means $a \times d = b \times c$)

(a) $10 : 15 :: 20 : 25$

$$10 \times 25 \neq 15 \times 20$$

$$250 \neq 300$$

It is not in true proportion.

(b) $24 : 96 :: 16 : 54$

$$24 \times 54 \neq 96 \times 16$$

$$1296 \neq 1536$$

It is not in true proportion.

(c) $1 : 2 :: 3 : 6$

$$1 \times 6 = 2 \times 3$$

$$6 = 6$$

It is in true proportion.

(d) $75 : 150 :: 3 : 18$

$$75 \times 18 \neq 150 \times 3$$

$$1350 \neq 450$$

It is not in true proportion.

(e) $63 : 105 :: 18 : 30$

$$63 \times 30 = 105 \times 18$$

$$1890 = 1890$$

It is in true proportion.

(f) $5 : 25 :: 30 : 150$

$$5 \times 150 = 25 \times 30$$

$$750 = 750$$

It is in true proportion.

(g) $66 : 22 :: 22 : 66$

$$66 \times 66 \neq 22 \times 22$$

$$4356 \neq 484$$

It is not true proportion.

(h) $18 : 24 :: 15 : 20$

$$24 \times 15 = 18 \times 20$$

$$360 = 360$$

It is in true proportion.

2. Write the extremes in the following :

(a) $(4) : 5 : 20 : (25)$

$$\text{Extremes} = 4, 25$$

(b) $(22) : 11 : 88 : (44)$

$$\text{Extremes} = 22, 44$$

(c) $(1) : 2 : 3 : (6)$

$$\text{Extremes} = 1, 6$$

(d) $(3) : 4 : 6 : (8)$

$$\text{Extremes} = 3, 8$$

(e) $(16) : 24 : 24 : (36)$

$$\text{Extremes} = 16, 36$$

(f) $(5) : 7 : 25 : (35)$

$$\text{Extremes} = 5, 35$$

(g) $(1) : 6 : 4 : (24)$

$$\text{Extremes} = 1, 24$$

(h) $(50) : 150 : 100 : (300)$

$$\text{Extremes} = 50, 300$$

3. Find x in the following proportions :

(To find x ; product of extremes = product of means)

(a) $169 : x :: x : 1$

$$169 \times 1 = x \times x$$

(b) $80 : 32 :: x : 16$

$$80 \times 16 = 32 \times x$$

$$169 = x^2$$

$$13 = x$$

or, $x = 13$

$$\begin{aligned} \text{(c)} \quad x:3::57:19 \\ 19 \times x = 3 \times 57 \\ x = \frac{3 \times 57}{19} = 9 \end{aligned}$$

$$x = 9$$

$$\begin{aligned} \text{(e)} \quad 125:x::x:5 \\ 125 \times 5 = x \times x \end{aligned}$$

$$625 = x^2$$

$$25 = x$$

or, $x = 25$

$$\begin{aligned} \text{(g)} \quad 60:x::52:39 \\ 60 \times 39 = 52 \times x \\ x = \frac{60 \times 39}{52} = 45 \end{aligned}$$

$$x = 45$$

$$x = \frac{80 \times 16}{32}$$

$$x = 40$$

$$\begin{aligned} \text{(d)} \quad 18:x::27:3 \\ 18 \times 3 = 27 \times x \\ x = \frac{18 \times 3}{27} = 2 \end{aligned}$$

$$x = 2$$

$$\begin{aligned} \text{(f)} \quad 10:15::12:x \\ 10 \times x = 15 \times 12 \\ x = \frac{15 \times 12}{10} = \frac{180}{10} = 18 \end{aligned}$$

$$x = 18$$

$$\begin{aligned} \text{(h)} \quad 11:121::x:231 \\ 11 \times 231 = 121 \times x \\ x = \frac{11 \times 231}{121} = 21 \end{aligned}$$

$$x = 21$$

4. Write the mean in the following :

$$\text{(a)} \quad 25 : (5) :: (20) : 4$$

$$\text{Mean} = 5, 20$$

$$\text{(c)} \quad 4 : (12) :: (12) : 36$$

$$\text{Mean} = 12, 12$$

$$\text{(e)} \quad 2 : (3) :: (24) : 36$$

$$\text{Mean} = 3, 24$$

$$\text{(g)} \quad 25 : (30) :: (16) : 36$$

$$\text{Mean} = 30, 16$$

$$\text{(b)} \quad 1 : (4) :: (8) : 32$$

$$\text{Mean} = 4, 8$$

$$\text{(d)} \quad 2 : (5) :: (16) : 40$$

$$\text{Mean} = 5, 16$$

$$\text{(f)} \quad 4 : (5) :: (16) : 20$$

$$\text{Mean} = 5, 16$$

$$\text{(h)} \quad 15 : (32) :: (135) : 288$$

$$\text{Mean} = 32, 135$$

5. Prove that the four numbers in each of the following are in proportion :

$$\text{(a)} \quad 4, 1, 8 \text{ and } 2$$

$$\text{Ratio of 4 to 1} = 4 : 1$$

Ratio of 8 to 2 = $8:2=4:1$

Since, $4:1=8:4$

\therefore 4, 1, 8 and 2 are in proportion.

(b) 4, 8, 16 and 32

Ratio of 4 to 8 = $4:8=\frac{4}{8}=\frac{1}{2}$

Ratio of 16 to 32 = $16:32=\frac{16}{32}=\frac{1}{2}$

Since, $4:8=16:32$

\therefore 4, 8, 16 and 32 are in proportion.

(c) 7, 42, 5 and 30

Ratio of 7 to 42 = $7:42=\frac{7}{42}=\frac{1}{6}=1:6$

Ratio of 5 to 30 = $5:30=\frac{5}{30}=\frac{1}{6}=1:6$

Since, $7:42=5:30$

\therefore 7, 42, 5 and 30 are in proportion.

(d) 9, 6, 15 and 10

Ratio of 9 to 6 = $9:6=\frac{9}{6}=\frac{3}{2}$

Ratio of 15 to 10 = $15:10=\frac{15}{10}=\frac{3}{2}$

Since, $9:6=15:10$

\therefore 9, 6, 15 and 10 are in proportion.

(e) 5, 7, 25 and 35

Ratio of 5 to 7 = $5:7=\frac{5}{7}$

Ratio of 25 to 35 = $25:35=\frac{5}{7}$

Since, $5:7=25:35$

\therefore 5, 7, 25 and 35 are in proportion.

- (f) 24, 30, 12 and 15

$$\text{Ratio of 24 to 30} = 24 : 30 \quad \frac{24}{30} = \frac{4}{5} = 4 : 5$$

$$\text{Ratio of 12 to 15} = 12 : 15 \quad \frac{12}{15} = \frac{4}{5} = 4 : 5$$

Since, $24 : 30 = 12 : 15$

\therefore 24, 30, 12 and 15 are in proportion.

- (g) 35, 21, 10 and 6

$$\text{Ratio 35 to 21} = 35 : 21 = \frac{35}{21} = \frac{5}{3}$$

$$\text{Ratio of 10 to 6} = 10 : 6 = \frac{5}{3}$$

Since, $35 : 21 = 10 : 6$

\therefore 35, 21, 10 and 6 are in proportion.

- (h) 60, 45, 40 and 30

$$\text{Ratio of 60 to 45} = 60 : 45 = \frac{60}{45} = \frac{4}{3} \text{ or } 4 : 3$$

$$\text{Ratio of 40 to 30} = 40 : 30 = \frac{40}{30} = \frac{4}{3} \text{ or } 4 : 3$$

Since, $60 : 45 :: 40 : 30$

\therefore 60, 45, 40 and 30 are in proportion.

6. Find the fourth term of the following proportions :

- (a) Let fourth term be x .

Since, 21, 27, 14, x are in proportion

So, $21 : 27 :: 14 : x$

$$21x = 27 \times 14$$

$$x = \frac{27 \times 14}{21} = 18$$

$$x = 18$$

Thus, fourth term is 18.

- (b) Let fourth term be x

Since, 57, 76, 108, x are in proportion

So, $57 : 76 :: 108 : x$

$$57 \times x = 76 \times 108$$

$$x = \frac{76 \times 108}{57} = 144$$

$$x = 144$$

Thus, fourth term is 144.

- (c) Let fourth term be x .

Since, 3, 9, 27, x are in proportion

So, $3:9::27:x$

$$3x = 9 \times 27$$

$$x = \frac{9 \times 27}{3} = 81$$

$$x = 81$$

Thus, fourth term is 81.

- (d) Let fourth term be x .

Since, 1, 10, 100, x are in proportion

So, $1:10::100:x$

$$1 \times x = 100 \times 10$$

$$x = 1000$$

Thus, fourth term = 1000.

7. Find the mean proportion between the numbers :

- (a) 36, 16

$$36:x::x:16$$

$$x^2 = 36 \times 16$$

$$x = \sqrt{36 \times 16} = 6 \times 4 = 24$$

$$x = 24$$

Mean proportion = 24

- (b) 4, 9

$$4:x::x:9$$

$$x^2 = 4 \times 9$$

$$x = \sqrt{4 \times 9} = 2 \times 3 = 6$$

$$x = 6$$

Mean proportion = 6

- (c) 4, 16

$$4:x::x:16$$

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

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

$$x = \sqrt{4 \times 16} = 2 \times 4 = 8$$

$$x = 8$$

Mean proportion = 6

- (d) 125, 5

$$125:x::x:5$$

$$x^2 = 125 \times 5$$

$$x^2 = 625$$

$$x = \sqrt{625} = 25$$

$$x = 25$$

Mean proportion = 25

(e) 121, 100

$$121:x::x:100$$

$$x^2 = 121 \times 100$$

$$x = \sqrt{121 \times 100}$$

$$x = 11 \times 10$$

$$x = 110$$

$$\text{Mean proportion} = 110$$

(g) 4, 36

$$4:x::x:36$$

$$x^2 = 4 \times 36$$

$$x = \sqrt{4 \times 36}$$

$$x = 2 \times 6$$

$$x = 12$$

$$\text{Mean proportion} = 12$$

(f) 32, 50

$$32:x::x:50$$

$$x^2 = 32 \times 50$$

$$x^2 = 1600$$

$$x = \sqrt{1600}$$

$$x = 40$$

$$\text{Mean proportion} = 40$$

(h) 25, 36

$$25:x::x:36$$

$$x^2 = 25 \times 36$$

$$x = \sqrt{25 \times 36}$$

$$x = 5 \times 6$$

$$x = 30$$

$$\text{Mean proportion} = 30$$

8. Let the number be x .

$$\therefore x:32::18:24$$

$$\frac{x}{32} = \frac{18}{24}$$

$$x = \frac{18 \times 32}{24}$$

$$x = 3 \times 8$$

$$x = 24$$

Hence the number is 24.

9. Let the fourth term be x

15, 20, 30 and x are in proportion.

$$15:20::30:x$$

$$15 \times x = 20 \times 30$$

$$x = \frac{20 \times 30}{15} = 40$$

Thus, the fourth term = 40.

10. Height of tin = 8 cm

Quantity of oil = 352 l

New height = 12.5 cm

Quantity of oil = x

$$8:12.5::352:x \quad x = \frac{12.5 \times 352}{8} \text{ l} = 550 \text{ l}$$

Thus, after increase the height the tin 550 l oil.

11. Mean proportion 9 and 4

$$9:x::x:4$$
$$x^2 = 9 \times 4 \quad x = \sqrt{9 \times 4} = 3 \times 2 = 6$$

Thus, mean proportion = 6

12. Scale = 1 : 90

Actual length of the field = 270 m

$$1:90::x:270$$
$$90x = 270 \times 1 \quad x = \frac{270}{90} = 3 \text{ cm}$$

We take 3 cm as a scale on the map.

13. Let breadth of rectangle be x cm

Length of rectangle = 80 cm

Ratio of length to breadth = 80 : x

given Ratio = 6 : 3

$$80:x = 6:3$$
$$6x = 80 \times 3 \quad x = \frac{80 \times 3}{6} = 40 \text{ cm}$$

Thus, breadth of rectangle = 40 cm.

14. Let second term be x

1st term : 2nd term :: 3rd term : 4th term

$$42:x::70:35$$
$$42 \times 35 = 70 \times x$$
$$x = \frac{42 \times 35}{70}$$
$$x = 21$$

Value of second term = 21.

15. x, y, z are in continued proportion

$$x : y :: y : z$$

$$x : 6 :: 6 : 12 \quad (\text{given; } y = 6, z = 12)$$

$$12x = 6 \times 6$$

$$x = \frac{6 \times 6}{12} = 3$$

$$x = 3$$

Value of x is 3.

Exercise 7.3

1. Cost of 10 kg rice = ₹ 245

$$\text{Cost of 1 kg rice} = ₹ 245 \div 10 = ₹ 24.50$$

$$\text{Cost of 3 kg rice} = ₹ 24.50 \times 3 = ₹ 73.50$$

∴ Cost of 3 kg rice is ₹ 73.50.

2. Cost of 35 inland letters = ₹ 105

$$\text{Cost of 1 inland letter} = ₹ 105 \div 35 = ₹ 3$$

$$\text{Cost of 60 inland letters} = ₹ 3 \times 60 = ₹ 180$$

Thus, the cost of 60 inland letter is ₹ 180.

3. Weight of 12 tables = 132 kg

$$\text{Weight of 1 table} = 132 \div 12 = 11 \text{ kg}$$

$$\text{Weight of } t \text{ tables} = 11 \text{ kg} \times 5 = 55 \text{ kg}$$

Thus, weight of 5 tables is 55 kg.

4. Length of cloths produces in 4 hrs = 240 m

$$\text{Length of cloth produces in 1 hr} = \frac{240}{4} \text{ m}$$

$$\text{Length of cloth produces in 18 hrs} = \frac{240}{4} \times 18 \text{ m} = 1080 \text{ m}$$

$$\text{Length of cloth produces in 1 day} = 1080 \text{ m}$$

$$\text{Length of cloth produces in 6 days} = 1080 \times 6 \text{ m} = 6480 \text{ m}$$

5. Average of rainfall in last 4 days = 366 mm

$$\text{Average of rainfall in last 1 day} = 366 \div 4 = 91.5 \text{ mm}$$

$$\text{Average of rainfall in last 7 days} = 91.5 \times 7 = 640.5 \text{ mm}$$

6. Cost of a dozen eggs = ₹ 30

Cost of 12 eggs = ₹ 30

Cost of 1 egg = ₹ $30 \div 12 = ₹ 2.5$

Cost of 15 eggs = ₹ $2.5 \times 15 = ₹ 37.5$

∴ Cost of 15 eggs is ₹ 37.5.

7. Cost of 7 pens = ₹ 91

Cost of 1 pen = ₹ $91 \div 7 = ₹ 13$

Cost of 9 pens = ₹ 108

Cost of 1 pen = ₹ $108 \div 9 = ₹ 12$

Thus, Shubham bought 9 pens of the cost ₹ 108.

Shubham bought the pens at a cheaper rate.

8. Quantity of petrol required to cover 256 km = 16 l

Quantity of petrol required to cover 1 km = $\frac{16}{256}$ l

Quantity of petrol required to cover 400 km = $\frac{16}{256} \times 400$ l = 25 l

Thus, we need 25 l petrol to cover 400 km distance.

9. Distance covered in 3 hrs = 2550 km

Distance covered in 1 hr = $\frac{2550}{3}$ km

Distance covered in 7 hrs = $\frac{2550}{3} \times 7$ km = 5950 km

An aeroplane covered 5950 km in 7 hrs.

10. Charges to carry 24 boxes = ₹ 1800

Charges to carry 1 box = ₹ $\frac{1800}{24}$

Charges to carry 18 boxes = ₹ $\frac{1800}{24} \times 18 = ₹ 1350$

Thus, charges to carry 18 boxes is ₹ 1350.

11. Required diesel for covered 594 km = 108 l

Required diesel for covered 1650 km = $\frac{108}{594} \times 1650$ l = 300 l

MCQs

Tick (✓) the correct answer :

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

BRAIN BOOSTER

1. Amount = ₹ 1800

The given ratio = 2 : 3 : 5

Sum of ratios = 2 + 3 + 5 = 10

$$\text{Rohit's part} = ₹ 1800 \times \frac{2}{10} = ₹ 360$$

$$\text{Bholanath's part} = ₹ 1800 \times \frac{3}{10} = ₹ 540$$

$$\begin{aligned}\text{Chameli's part} &= ₹ 1800 \times \frac{5}{10} \\ &= ₹ 900\end{aligned}$$

2. No, it is not necessary that Sam's expenditure is more than Tony's.
Because salaries may be different.
3. Vani's earn = x

Nikhil earn = $5x$

Ratio of Vani's earn to Nikhil's earn = $x : 5x = 1 : 5$

4. $\frac{p}{q} = \frac{p}{r}$

$$q = r$$

It must be true.

5. Cost of 15 pens = ₹ 60

Cost of 1 pen = ₹ $60 \div 15 = ₹ 4$

Number of pen purchased = ₹ $156 \div 4 = 39$.

6. Time taken by 3 men to complete the work = 8 days

Time taken by 1 man to complete the work = 8×3 days

Time taken by 4 men to complete the work = $\frac{8 \times 3}{4} = 6$ days

7. **Section A;** Ratio of boys to girls = 2 : 3

Section B; Ratio of boys to girls = 2 : 3

If number of boys = 18

Let number of girls be x

Ratio of boys to girls = 18 : x

So, $2 : 3 :: 18 : x$

$$2x = 18 \times 3$$

$$x = \frac{18 \times 3}{2} = 27$$

So, Number of girls is 27.

8. Ratio of weight on earth and weight on moon = 84 : 14 or 6 : 1

If weight on earth = 9 kg

$$6 : 1 :: 9 : x$$

$$6x = 14 \times 9$$

$$x = \frac{1 \times 9}{6} = 1.5 \text{ kg}$$

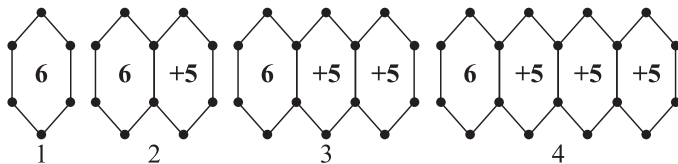
Chapter

8

Introduction to Algebra

Exercise 8.1

1. Look at the pattern of shapes made with matchsticks.



Number of Figure	1	2	3	4
Use matchsticks	6	11 ($6 \times 2 - 1$)	16 ($6 \times 3 - 2$)	21 ($6 \times 4 - 3$)

(a) Required matchsticks for 6th shapes :

$$= 6 \times 6 - 5 = 36 - 5 = 31$$

(b) Required matchsticks for 21st shapes :

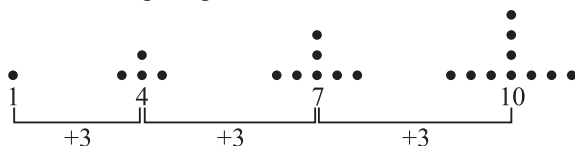
$$= 6 \times 21 - 20 = 126 - 20 = 106$$

(c) Required matchsticks for n th shapes :

$$= 6 \times n - (n - 1)$$

$$= 6n - n + 1 = 5n + 1$$

2. Observe the following dot pattern and :

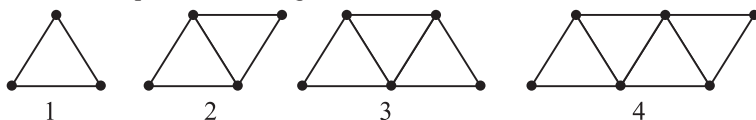


(a) The generalize statement for the dots of the n^{th} shape $= 3n - 2$

(b) Rule = Adding 3

(c) The pattern numbers $= 1, 4, 7, 10, 13, \dots$

3. Look at the pattern of triangles made with matchsticks :



Number of triangles	1	2	3	5	6	11	n
Number of matchsticks	3	5	7	11	13	23	$(n \times 2 + 1)$

4. Find the formula which gives the number of matchsticks required to make the n th pattern of each of the following :

(a) Required matchsticks $= 2$

Required matchsticks for n th shapers $= 2n$

(b) Required matchsticks $= 4$

Required matchsticks for n th shapes $= 4n$

(c) Required matchsticks $= 2$

Required matchsticks for n th shapes $= 2n$

(d) Required matchstick $= 3$

Required matchsticks for n th shape $= 3n$

5. Look at the pattern and complete the table :

Four matchsticks $= 1 \times 4 = 4, 2 \times 4 = 8, 3 \times 4 = 12, 4 \times 4 = 16$
 For dots $= 1 \times 4 - 0 = 4, 2 \times 4 - 1 = 7,$
 $3 \times 4 - 2 = 10, 4 \times 4 - 3 = 13$

Number of squares	1	2	3	4	7	15	n
Number of matchsticks	4	8	12	16	28	$15 \times 4 = 60$	$n \times 4 = 4n$
Number of dots	4	7	10	13	$4 \times 7 - 6 = 22$	$15 \times 4 - 14 = 46$	$(3n + 1)$ $3n + 1$

6. Using the given formula, complete the table :

	Series	Formula	Term to be bind
(a)	16, 19, 22, 25...	$3n + 13$	25th term $= 3 \times 25 + 13 = 88$
(b)	5, 12, 19, 26,...	$7n - 2$	100th term $= 7 \times 100 - 2 = 698$
(c)	-1, 2, 5, 8, ...	$3n - 4$	31th term $= 3 \times 31 - 4 = 89$

Exercise 8.2

1. Which out the following are expressions with numbers only?

(b), (e) and (f) are expressions with number only.

2. Write the following in the form of algebraic expressions :

(a) $x - 10$ (b) $2y + 11$ (c) $\frac{x}{4} + y + z$

(d) $x - y$ (e) $xy + x + y$

3. For the value of x given in the boxes, find the value of the expression in each table :

(a)

x	expression
3	$3x - 1 = 3 \times 3 - 1 = 9 - 1 = 8$
2	$3x + 1 = 3 \times 2 + 1 = 6 + 1 = 7$

0	$4x + 5 = 4 \times 0 + 5 = 0 + 5 = 5$
-1	$x + 5 = -1 + 5 = 4$
-4	$7x + 29 = -7 \times 4 + 29 = -28 + 29 = 1$

(b)

x	expression
8	$6x - 46 = 6 \times 8 - 46 = 48 - 46 = 2$
10	$x - 10 = 10 - 10 = 0$
-1	$4 - 7x = 4 - 7(-1) = 4 + 7 = 11$
9	$x - 8 = 9 - 8 = 1$
2	$3x + 2 = 3 \times 2 + 2 = 6 + 2 = 8$

4. Translate into algebraic expression :

(a) $5x + 3$

(b) $6n - 5$

5. State in words the meaning of the following algebraic expressions :

(a) 7 more than a number x

(b) y subtracted from 2 times x

(c) 3 times the product of a and b

(d) x divided by y

6. $(k - m)$ years

7. $x + x + x, 3x$

8. $(k + 5)$ years

9. $10m + n$

Exercise 8.3

1. Find the value of the following expressions for the given values of variables :

(a) Substituting the value of $x = 1$ and $y = 2$ in the given expression, we get

$$\begin{aligned}
 x^2 y + x^2 y^2 - xy^2 &= (1)^2 \times 2 + (1)^2 (2)^2 - 1 \times (2)^2 \\
 &= 1 \times 2 + 1 \times 4 - 1 \times 4 \\
 &= 2 + 4 - 4 \\
 &= 6 - 4 \\
 &= 2
 \end{aligned}$$

- (b) Substituting the value of $a=2$, $b=3$ and $c=5$ in the given expression, we get

$$\begin{aligned}4a - 3b + c &= 4 \times 2 - 3 \times 3 + 5 \\&= 8 - 9 + 5 \\&= 13 - 9 = 4\end{aligned}$$

- (c) Substituting the value of $a=0$, $b=1$ and $c=1$ in the given expression, we get

$$\begin{aligned}a^2 - 2b^2 + 3c^2 &= (0)^2 - 2(1)^2 + 3(1)^2 \\&= 0 - 2 \times 1 + 3 \times 1 = 3 - 2 = 1\end{aligned}$$

- (d) Substituting the value of $x=1$, $y=-2$ and $z=3$ given expression, we get

$$\begin{aligned}x^2 - y^2 - z^2 \\(1)^2 - (-2)^2 - (3)^2 &= 1 - 4 - 9 \\&= 1 - 13 = -12\end{aligned}$$

- (e) Substituting the values of $x=-1$, $y=2$ and $z=1$ in the given expression, we get

$$\begin{aligned}4xyz - 2xy + 3xyz \\&= 4 \times (-1) \times 2 \times 1 - 2 \times (-1) \times 2 + 3 \times (-1) \times 2 \times 1 \\&= -8 + 4 - 6 \\&= -14 + 4 = -10\end{aligned}$$

- (f) Substituting the values of $x=3$ and $a=5$ in the given expression, we get

$$\begin{aligned}5 + 4x^3 - 4x + 2a &= 5 + 4(3)^3 - 4(3) + 2 \times 5 \\&= 5 + 4 \times 27 - 4 \times 3 + 10 \\&= 5 + 108 - 12 + 10 \\&= 123 - 12 \\&= 111\end{aligned}$$

2. Value of $3x + (2y \times z)$

Putting $x=7$, $y=6$ and $z=4$

$$\begin{aligned}&= 3 \times 7 + (2 \times 6 \times 4) \\&= 21 + (12 \times 4) \\&= 21 + 48 \\&= 69\end{aligned}$$

3. $\frac{xy}{w} - (x + w)$

Putting $x = 25$, $y = 36$ and $w = 20$

$$\begin{aligned} &= \frac{25 \times 36}{20} - (25 + 20) \\ &= \frac{900}{20} - 45 = \frac{900 - 45 \times 20}{20} \\ &= \frac{900 - 900}{20} = \frac{0}{20} = 0 \end{aligned}$$

4. $\frac{m^2}{3n}$; put $m = 6$ and $n = 3$

$$\frac{(6)^2}{3 \times 3} = \frac{36}{9} = 4$$

Value of $\frac{m^2}{3n} = 4$

Multiple Choice Questions

Tick (✓) the correct answers :

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

BRAIN BOOSTER

Complete the table given below, based on the pattern of dots and line segments. Also generalize and find the expression for the number of dots and segments used in case of n squares.

Number of squares	1	2	3	4	5	10	n
Number of dots	4	8	$3 \times 4 = 12$	$4 \times 4 = 16$	20	$10 \times 4 = 40$	$n \times 4 = 4n$
Number of line segments	$5 \times 1 - 1 = 4$	$5 \times 2 - 1 = 9$	$5 \times 3 - 1 = 14$	$5 \times 4 - 1 = 19$	$5 \times 5 - 1 = 24$	$5 \times 10 - 1 = 49$	$(4n + n - 1) = 5n - 1$

Exercise 9.1

1. Verify by substitution that :

(a) The root of $\frac{z}{7} = 8$ is $z = 56$

Value of $z = 56$, putting in $\frac{z}{7} = 8$

$$\frac{56}{7} = 8$$

$$8 = 8$$

$$\text{LHS} = \text{RHS}$$

(b) The root of $8 - 7y = 1$ is $y = 1$

Value of $y = 1$, putting in $8 - 7y = 1$

$$8 - 7 \times 1 = 8 - 7 = 1$$

$$\text{LHS} = \text{RHS}$$

(c) The root of $5x - 8 = 2x - 2$ is $x = 2$

Value of $x = 2$ putting in $5x - 8 = 2x - 2$

$$\text{LHS} = 5 \times 2 - 8 = 10 - 8 = 2$$

$$\text{RHS} = 2 \times 2 - 2 = 4 - 2 = 2$$

$$2 = 2$$

$$\text{LHS} = \text{RHS}$$

(d) The root of $3 + 2x = 9$ is $x = 3$

Value of $x = 3$ putting in $3 + 2x = 9$

$$3 + 2 \times 3 = 9$$

$$3 + 6 = 9$$

$$9 = 9$$

$$\text{LHS} = \text{RHS}$$

(e) The root of $3x - 5 = 7$ is $x = 4$

Value of $x = 4$ putting in $3x - 5 = 7$

$$3 \times 4 - 5 = 7$$

$$12 - 5 = 7$$

$$7 = 7$$

$$\text{LHS} = \text{RHS}$$

2. Solve each of the following equations by the trial-and-error method :

We make a guess and try several values of x and find the values of the LHS and RHS.

(a) $3x = 9$

x	LHS	RHS
1	$3 \times 1 = 3$	9
2	$3 \times 2 = 6$	9
3	$3 \times 3 = 9$	9

Hence, $x = 3$ is the solution of the equation.

(b) $2x + 4 = 3x$

x	LHS	RHS
1	$2 \times 1 + 4 = 6$	$3 \times 1 = 3$
2	$2 \times 2 + 4 = 8$	$3 \times 2 = 6$
3	$2 \times 3 + 4 = 10$	$3 \times 3 = 9$
4	$2 \times 4 + 4 = 12$	$3 \times 4 = 12$

Hence, $x = 4$ is the solution of the equation.

(c) $\frac{x}{2} = 3$

x	LHS	RHS
1	$\frac{1}{2}$	3
2	$\frac{2}{2} = 1$	3
3	$\frac{3}{2}$	3

4	$\frac{4}{2}=2$	3
5	$\frac{5}{2}$	3
6	$\frac{6}{2}=3$	3

Hence, $x = 6$ is the solution of the equation.

(d) $x - 3 = 7$

x	LHS	RHS
1	$1 - 3 = -2$	7
2	$2 - 3 = -1$	7
3	$3 - 0 = 0$	7
4	$4 - 3 = 1$	7
5	$5 - 3 = 2$	7
6	$6 - 3 = 3$	7
7	$7 - 3 = 4$	7
8	$8 - 3 = 5$	7
9	$9 - 3 = 6$	7
10	$10 - 3 = 7$	7

Hence, $x = 10$ is the solution of the equation.

(e) $x + 5 = 8$

x	LHS	RHS
1	$1 + 5 = 6$	8
2	$2 + 5 = 7$	8
3	$3 + 5 = 8$	8

Hence, $x = 3$ is the solution of the equation.

(f) $x + 7 = 7$

x	LHS	RHS
0	$0 + 7 = 7$	7

Hence, $x = 0$ is the solution of the equation.

(g) $10 - x = 6$

x	LHS	RHS
1	$10 - 1 = 9$	6
2	$10 - 2 = 8$	6
3	$10 - 3 = 7$	6
4	$10 - 4 = 6$	6

Hence, $x = 4$ is the solution of the equation.

(h) $x - 4 = 2x - 6$

x	LHS	RHS
1	$1 - 4 = -3$	$2 \times 1 - 6 = -4$
2	$2 - 4 = -2$	$2 \times 2 - 6 = -2$

Hence, $x = 2$ is the solution of the equation.

(i) $2x + 3 = 3x$

x	LHS	RHS
1	$2 \times 1 + 3 = 5$	$3 \times 1 = 3$
2	$2 \times 2 + 3 = 7$	$3 \times 2 = 6$
3	$2 \times 3 + 3 = 9$	$3 \times 3 = 9$

Hence, $x = 3$ is solution of the equation.

3. Write each of the following statements as an equation :

(a) $4x - 3 = 17$

(b) $5x = 40$

(c) $x + 8 = 15$

(d) $25 - x = 1$

(e) $x - 5 = 3$

(f) $3x - 5 = 16$

(g) $x - 12 = 24$

(h) $19 - 2x = 11$

(i) $6x = x + 5$

(j) $\frac{x}{8} = 7$

4. Write a statement for each of the equations, given below :
- (a) 11 more than x is 17 (b) 4 more than twice x is 10
 (c) x divided by 5 is 7 (d) 7 more than x is 10
 (e) x less than 3 is 7 (f) 7 less than x is 5

Exercise 9.2

1. Solve each of following equation and verify answer :

$$\begin{aligned} \text{(a) } 3(2-5x) - 2(1-6x) &= 1 \\ (6-15x) - (2-12x) &= 1 \\ 6-15x-2+12x &= 1 \\ 6-2-15x+12x &= 1 \\ 4-3x &= 1 \\ -3x &= 1-4 \\ x &= -3 \div -3 = 1 \\ x &= 1 \end{aligned}$$

Verification : ($x=1$) putting in $3(2-5x) - 2(1-6x) = 1$

$$\begin{aligned} &= 3(2-5 \times 1) - 2(1-6 \times 1) = 1 \\ &= (3 \times 2 - 5 \times 3) - 2 \times 1 + 12 = 1 \\ &= -9 + 10 = 1 \\ 1 &= 1 \end{aligned}$$

$$\text{RHS} = \text{LHS}$$

$$\begin{aligned} \text{(b) } \frac{n}{4} - 5 &= \frac{n}{6} + \frac{1}{2} \\ \frac{n-5 \times 4}{4} &= \frac{n+3}{6} & \Rightarrow & \frac{n-20}{4} \quad \swarrow \searrow \quad \frac{n+3}{6} \\ 6(n-20) &= 4(n+3) & \Rightarrow & 6n-120=4n+12 \\ 6n-4n &= 120+12 & \Rightarrow & 2n=132 \\ n &= \frac{132}{2} = 66 & \Rightarrow & n=66 \end{aligned}$$

Verification : ($n=66$) putting in $\frac{n}{4} - 5 = \frac{n}{6} + \frac{1}{2}$

$$\begin{aligned} \frac{66}{4} - 5 &= \frac{66}{6} + \frac{1}{2} \\ \frac{66-5 \times 4}{4} &= \frac{66+3}{6} \end{aligned}$$

$$\frac{66-20}{4} = \frac{69}{6} \Rightarrow \frac{46}{4} = \frac{69}{6}$$

$$\frac{23}{2} = \frac{23}{2}$$

$$\text{LHS} = \text{RHS}$$

$$(c) \quad \frac{2m}{3} + 8 = \frac{m}{2} - 1$$

$$\frac{2m + 8 \times 3}{3} = \frac{m - 1 \times 2}{2}$$

$$\frac{2m + 24}{3} = \frac{m - 2}{2}$$

$$2(2m + 24) = 3(m - 2) \text{ (Cross multiplication)}$$

$$4m + 48 = 3m - 6$$

$$4m - 3m = -6 - 48$$

$$m = -54$$

$$m = -54$$

Verification : ($m = -54$) putting in $\frac{2m}{3} + 8 = \frac{m}{2} - 1$

$$\frac{2 \times (-54)}{3} + 8 = \frac{-54}{2} - 1$$

$$\frac{-108}{3} + 8 = -27 - 1$$

$$-36 + 8 = -28$$

$$-28 = -28$$

$$\text{LHS} = \text{RHS}$$

$$(d) \quad \frac{2x}{5} - \frac{3}{2} = \frac{x}{2} + 1$$

$$\frac{2x \times 2 - 3 \times 5}{10} = \frac{x + 2}{2}$$

$$\frac{4x - 15}{10} = \frac{x + 2}{2} \quad \text{(Cross multiplication)}$$

$$2(4x - 15) = 10(x + 2)$$

$$8x - 30 = 10x + 20$$

$$8x - 10x = 20 + 30$$

$$-2x = 50$$

$$x = \frac{50}{-2} = -25$$

$$x = -25$$

Verification : ($x = -25$) putting in $\frac{2x}{5} - \frac{3}{2} = \frac{x}{2} + 1$

$$\frac{2 \times (-25)}{5} - \frac{3}{2} = \frac{-25}{2} + 1$$

$$\frac{-50}{5} - \frac{3}{2} = \frac{-25 + 2}{2}$$

$$\frac{-50 \times 2 - 3 \times 5}{10} = \frac{-23}{2}$$

$$\frac{-100 - 15}{10} = \frac{-23}{2}$$

$$\frac{-115}{10} \text{ or } \frac{-23}{2} = \frac{-23}{2}$$

$$\text{LHS} = \text{RHS}$$

$$(e) \quad \frac{x-3}{5} - 2 = \frac{2x}{5}$$

$$\frac{x-3-2 \times 5}{5} = \frac{2x}{5}$$

$$\frac{x-3-10}{5} = \frac{2x}{5}$$

$$\frac{x-13}{5} = \frac{2x}{5}$$

$$5(x-13) = 2x \times 5 \quad (\text{cross multiplication})$$

$$5x - 13 \times 5 = 10x$$

$$5x - 65 = 10x$$

$$-65 = 10x - 5x$$

$$-65 = 5x$$

$$x = \frac{-65}{5} = -13$$

$$x = -13$$

Verification : $x = -13$ putting in $\frac{x-3}{5} - 2 = \frac{2x}{5}$

$$\frac{-13-3}{5} - 2 = \frac{2 \times (-13)}{5}$$

$$\frac{-16}{5} - 2 = \frac{-26}{5}$$

$$\frac{-16 - 2 \times 5}{5} = \frac{-26}{5}$$

$$\frac{-16 - 10}{5} = \frac{-26}{5}$$

$$\frac{-26}{5} = \frac{-26}{5}$$

RHS = LHS

(f) $\frac{3x}{10} - 4 = 14$

$$\frac{3x - 4 \times 10}{10} = 14$$

$$3x - 40 = 14 \times 10$$

$$3x - 40 = 140$$

$$3x = 140 + 40$$

$$3x = 180$$

$$x = \frac{180}{3} = 60$$

$$x = 60$$

Verification : $x = 60$ putting in $\frac{3x}{10} - 4 = 14$

$$\frac{3 \times 60}{10} - 4 = 14$$

$$\frac{180}{10} - 4 = 14$$

$$18 - 4 = 14$$

$$14 = 14$$

RHS = LHS

2. Solve the following equation and check the result in each case :

(a) $6x - 5 = 2x + 11$ (Adding 5 in both sides)

$$6x + 5 - 5 = 2x + 11 + 5$$

$$6x = 2x + 16$$

$$6x - 2x = 16 \quad (\text{By transposing } 2x \text{ to LHS})$$

$$4x = 16$$

$$x = \frac{16}{4} = 4$$

$$x = 4$$

Check : x 's value ($x=4$) putting in $6x - 5 = 2x + 11$

$$\text{LHS} = 6 \times 4 - 5 = 24 - 5 = 19$$

$$\text{RHS} = 2 \times 4 + 11 = 8 + 11 = 19$$

$$19 = 19$$

$$\text{LHS} = \text{RHS}$$

(b) $\frac{x}{2} = \frac{x}{3} + 5$

$$\frac{x}{2} + 5 = \frac{x}{3} + 5 + 5 \quad (\text{Adding 5 in both sides})$$

$$\frac{x+10}{2} = \frac{x+10 \times 3}{3}$$

$$3(x+10) = 2(x+30) \quad (\text{Cross multiplication})$$

$$3x + 30 = 2x + 60$$

$$3x - 2x = 60 - 30$$

$$x = 30$$

$$x = 30$$

Value of $x = 30$ putting in $\frac{x}{2} = \frac{x}{3} + 5$

$$\frac{30}{2} = \frac{30}{3} + 5$$

$$15 = 10 + 5$$

$$15 = 15$$

$$\text{LHS} = \text{RHS}$$

(c) $4x - 4 = 16$ (Adding 4 in both sides)

$$4x - 4 + 4 = 16 + 4$$

$$4x = 20$$

$$x = \frac{20}{4} = 5$$

$$x = 5$$

Check : Value of $x = 5$ putting in $(4x - 4)$

$$4 \times 5 - 4 = 20 - 4 = 16$$

$$16 = 16$$

$$\text{LHS} = \text{RHS}$$

(d) $x - 2 = -5$ (Adding 2 in both sides)

$$x - 2 + 2 = -5 + 2$$

$$x = -3$$

Check : Value of $x = -3$ putting in $(x - 2)$

$$-3 - 2 = -5$$

$$-5 = -5$$

$$\text{LHS} = \text{RHS}$$

(e) $\frac{3x}{5} = 18$ (Dividing $\frac{3}{5}$ in both sides)

$$\frac{3x}{5} \div \frac{3}{5} = 18 \div \frac{3}{5}$$

$$x \left(\frac{3}{5} \times \frac{5}{3} \right) = 18 \times \frac{5}{3}$$

$$x = 30$$

Check : Value of $x = 30$ putting in $\frac{3x}{5}$

$$\frac{3 \times 30}{5} = 18$$

$$18 = 18$$

$$\text{LHS} = \text{RHS}$$

(f) $x + 5 = -7$ (Subtracting 5 in both sides)

$$x + 5 - 5 = -7 - 5$$

$$x = -12$$

Check : x 's value putting in $(x + 5)$

$$-12 + 5 = -7$$

$$\text{RHS} = \text{LHS}$$

(g) $x + 2 = 7$ (Subtracting 2 in both sides)

$$x + 2 - 2 = 7 - 2$$

$$x = 5$$

Check : x 's value putting in $(x + 2)$

$$5 + 2 = 7$$

$$7 = 7$$

$$\text{RHS} = \text{LHS}$$

(h) $3 - x = 1$ (Subtracting 3 in both sides)

$$3 - 3 - x = 1 - 3$$

$$-x = -2$$

$$x = 2$$

Check : x 's value putting in $(3 - x)$

$$3 - 2 = 1$$

$$1 = 1$$

$$\text{RHS} = \text{LHS}$$

(i) $3x - 3 = 12$ (Adding 3 in both sides)

$$3x - 3 + 3 = 12 + 3$$

$$3x = 15$$

$$x = \frac{15}{3} = 5$$

$$x = 5$$

Check : Value of x put in $3x - 3$

$$3 \times 5 - 3 = 15 - 3 = 12$$

$$12 = 12$$

$$\text{LHS} = \text{RHS}$$

3. Solve the following :

(a) $6x + 5 = 3x + 20$

$$6x - 3x = 20 - 5 \quad \Rightarrow \quad 3x = 15$$

$$x = \frac{15}{3} = 5 \quad \Rightarrow \quad x = 5$$

(b) $\frac{m}{4} + 8 = 12$

$$\frac{m}{4} = 12 - 8 \quad \Rightarrow \quad \frac{m}{4} = 4$$

$$m = 4 \times 4 = 16 \quad \Rightarrow \quad m = 16$$

$$(c) \quad (12m - 3) = 5(2m + 1)$$

$$12m - 3 = 10m + 5 \quad \Rightarrow \quad 12m - 10m = 5 + 3$$

$$2m = 8 \quad \Rightarrow \quad m = \frac{8}{2} = 4$$

$$m = 4$$

$$(d) \quad \frac{2x}{3} + 8 = \frac{x}{2} - 1$$

$$\frac{2x}{3} + 8 + 1 = \frac{x}{2} \quad \Rightarrow \quad \frac{2x}{3} + 9 = \frac{x}{2}$$

$$\frac{2x + 27}{3} = \frac{x}{2} \quad \text{(Cross-multiplication)}$$

$$2(2x + 27) = 3x \quad \Rightarrow \quad 4x + 54 = 3x$$

$$\Rightarrow \quad x = -54$$

$$(e) \quad 3(x + 6) + 2(x + 3) = 54$$

$$3x + 18 + 2x + 6 = 54$$

$$3x + 2x + 18 + 6 = 54$$

$$5x + 24 = 54$$

$$5x = 54 - 24$$

$$5x = 30$$

$$x = \frac{30}{5}$$

$$x = 6$$

$$(f) \quad \frac{m}{4} - \frac{1}{2} = \frac{m}{3} + 1$$

$$\frac{m}{4} - \frac{m}{3} = 1 + \frac{1}{2} \quad \Rightarrow \quad \frac{3m - 4m}{12} = \frac{2 + 1}{2}$$

$$\frac{-m}{12} = \frac{3}{2} \quad \Rightarrow \quad -2m = 12 \times 3$$

$$m = \frac{36}{-2} = -18 \quad \Rightarrow \quad m = -18$$

$$(g) \quad \frac{3y}{10} - 4 = 11$$

$$\frac{3y - 4 \times 10}{10} = 11 \quad \Rightarrow \quad \frac{3y - 40}{10} = 11$$

$$3y - 40 = 11 \times 10 \quad \Rightarrow \quad 3y = 150$$

$$y = \frac{150}{3} = 50 \quad \Rightarrow \quad y = 50$$

$$(h) \quad 3(x + 2) - 2(x - 3) = 5$$

$$3x + 6 - 2x + 6 = 5$$

$$3x - 2x + 6 + 6 = 5$$

$$x + 12 = 5$$

$$x = -7$$

$$(i) \quad 2(x - 2) - 3(x - 3) = 5(x - 5)$$

$$2x - 4 - 3x + 9 = 5x - 25$$

$$2x - 3x + 9 - 4 = 5x - 25$$

$$-x + 5 = 5x - 25$$

$$-x - 5x = -25 - 5$$

$$-6x = -30$$

$$x = 5$$

Exercise 9.3

1. Let the number be x

x multiply by 17 and add 4 $= x \times 17 + 4 = 17x + 4$

According to the question,

$$17x + 4 = 225$$

$$17x = 225 - 4$$

$$x = \frac{221}{17} = 13$$

$$x = 13$$

Thus, the number is 13.

2. Let a number be x .

According to question,

$$x + 80 = 2x$$

$$80 = 2x - x$$

$$80 = x$$

So, required number is 80.

3. Let one natural number $= x$

Second number $= x + 1$

Third number $= x + 2$

Sum of these numbers $= x + x + 1 + x + 2 = 3x + 3$
According to question,

$$\text{Sum of these numbers} = 114$$

$$3x + 3 = 114$$

$$3x = 114 - 3$$

$$3x = 111$$

$$x = \frac{111}{3} = 37$$

$$x = 37$$

The numbers are : $x, x + 1, x + 2$

$$37, (37 + 1), (37 + 2)$$

$$37, 38, 39$$

4. Let Rekha's present age be x years

Then, her mother's present age $= (x + 27)$ years

Rekha's age after 8 years $= (x + 8)$ years

Her mother's age after 8 year $= (x + 27 + 8) = (x + 35)$ years

According to question,

$$x + 35 = 2(x + 8)$$

$$x + 35 = 2x + 16$$

$$2x - x = 35 - 16$$

$$x = 19$$

Rekha's present age $= 19$ years

And, her mother's present age $= (19 + 27)$ years $= 46$ years.

5. Let breadth of a wire x cm.

Length of a wire $= (x + 7)$ cm

Perimeter of rectangle $= 2(l + b) = 2(x + x + 7)$

$$= 2(2x + 7) = (4x + 14) \text{ cm}$$

According to question,

$$4x + 14 = 86$$

$$4x = (86 - 14) \text{ cm}$$

$$4x = 72 \text{ cm}$$

$$x = \frac{72}{4} \text{ cm} = 18 \text{ cm}$$

So, breadth of a wire $= 18$ cm, length of a wire $(18 + 7)$ cm $= 25$ cm.

6. Let breadth of a park be x m.

So, length of a park $= (x + 5)$ m

$$\begin{aligned}\text{Perimeter of a park} &= 2(l + b) = 2(x + x + 5) \text{ m} \\ &= 2(2x + 5) = (4x + 10) \text{ m}\end{aligned}$$

According to question,

$$4x + 10 = 74$$

$$4x = 74 - 10$$

$$x = \frac{64}{4} = 16 \text{ m}$$

$$x = 16 \text{ m}$$

So, length $= (16 + 5) \text{ m} = 21 \text{ m}$; breadth $= 16 \text{ m}$.

7. Let breadth of a rectangular field be x m.

Length of a rectangular field $= 3x$ m

$$\begin{aligned}\text{Perimeter of a field} &= 2(l + b) = 2(x + 3x) \text{ m} \\ &= 2 \times 4x = 8x \text{ m}\end{aligned}$$

According to question :

$$8x = 168$$

$$x = \frac{168}{8} \text{ m} = 21 \text{ m}$$

$$x = 21 \text{ m}$$

So, breadth $= 21 \text{ m}$, length $= 3 \times 21 = 63 \text{ m}$.

8. Let one number be x .

And, second number be $(x + 18)$.

Sum of their number

$$x + x + 18 = 2x + 18$$

According to question,

$$2x + 18 = 92$$

$$2x = 92 - 18$$

$$x = \frac{74}{2} = 37$$

So, the one number is 37 and the second number is $37 + 18 = 55$.

9. Let the present age of Mr. Sharma's son be x years.

Then, Mr Sharma's age $= 3 \times x \text{ years} = 3x \text{ years}$

Mr Sharma son's age before 3 years $= (x - 3) \text{ years}$

Then, his age before 3 years = $(3x - 3)$ years

According to question,

$$4(x - 3) = (3x - 3)$$

$$4x - 12 = 3x - 3$$

$$4x - 3x = -3 + 12$$

$$x = 9$$

The present age of son = 9 years.

Mr Sharma's age = 9×3 years = 27 years.

10. Number of girls = x

Number of boys = $x + 334$

Total strength = 572

$$x + x + 334 = 572$$

$$2x = 572 - 334$$

$$x = \frac{238}{2} = 119$$

Thus, 119 girls in the school.

11. Let number of coins of 50 paise be x

Number of coins of 25 paise = $4x$

Value of 50 paise coin = $x \times 0.50 = ₹ 0.50 x$

Value of 25 paise coins = $4x \times 0.25 = ₹ 1.0 x$

According to question,

Total money = ₹ 30

$$₹ 1.00 x + ₹ 0.50 x = ₹ 30$$

$$₹ 1.50 x = ₹ 30$$

$$x = ₹ \frac{₹ 30}{₹ 1.50} = 20$$

Number of coins of 50 paise is 20

And number of coin of 25 paise = $20 \times 4 = 80$.

12. Let, the present age of Mr. Bhaskar's son be x years.

Mr Bhaskar's present age = $4x$ years

After 16 year,

His son's age = $(x + 16)$ years

His age = $(4x + 16)$ years

According to question $(x + 16) 2 = 4x + 16$

$$2x + 32 = 4x + 16$$

$$32 - 16 = 4x - 2x$$

$$16 = 2x$$

$$x = \frac{16}{2} = 8 \text{ years}$$

His son's age = 8 years and his age = 32 years.

- 13.** Let Vikram's age be x years

Then, Manav's age = $2x$ years

Difference of their ages = 11 years

$$2x - x = 11$$

$$x = 11 \text{ years}$$

Vikram's age = 11 years, Manav's age

$$= 22 \text{ years}$$

- 14.** Let Akash's age be x years

Kamal's age = $(x + 6)$ years

Sum of their age = 28 years

$$x + (x + 6) = 28$$

$$2x + 6 = 28$$

$$2x = 28 - 6$$

$$x = \frac{22}{2} = 11 \text{ years}$$

Akash's age = 11 years and Kamal's age = 17 years.

- 15.** In square $ABCD$,

$$DC = (3x - 8) \text{ cm}; BC = (x + 4) \text{ cm}$$

We know that, sides of a square is equal in length.

$$DC = BC$$

$$3x - 8 = x + 14$$

$$3x - x = (14 + 8) \text{ cm}$$

$$2x = 22 \text{ cm}$$

$$x = \frac{22}{2} \text{ cm} = 11 \text{ cm}$$

$$DC = (3 \times 11 - 8) \text{ cm} = 33 - 8 \text{ cm} = 25 \text{ cm}$$

Perimeter of square = $4 \times \text{side}$

Perimeter of square = $4 \times 25 = 100 \text{ cm}$

16. In $\triangle ABC$,

$$\angle A + \angle B + \angle C = 180^\circ$$

$$2x^\circ + x^\circ + 3x^\circ = 180^\circ$$

$$6x^\circ = 180^\circ$$

$$x^\circ = \frac{180^\circ}{6} = 30^\circ$$

Thus, The magnitude of $\angle A = 2 \times 30^\circ = 60^\circ$

The magnitude of $\angle B = 30^\circ = 30^\circ$

The magnitude of $\angle C = 3 \times 30^\circ = 90^\circ$

17. Since, $ABCD$ is a rectangle

$$DC = (4a + 3) \text{ cm}; BC = (2a + 1) \text{ cm}$$

$$\text{Perimeter} = 2(BC + DC) = 2\{(4a + 3) + (2a + 1)\} \text{ cm}$$

$$= 2\{4a + 3 + 2a + 1\}$$

$$= 2\{6a + 4\} = 12a + 8$$

According to question, $(10a + 12) \text{ m}$ is the perimeter.

$$10a + 12 = 12a + 8$$

$$10a - 12a = 8 - 12$$

$$-2a = -4$$

$$a = 2$$

Value of $a = 2 \text{ cm}$.

MCQs

Tick (✓) the correct answer :

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

BRAIN BOOSTER

1. In triangle $\triangle ABC$,

$$AB = x + 1; \quad AC = 2x + 1, \quad BC = 5x + 7$$

$$\text{Perimeter of triangle} = AB + AC + BC$$

$$= x + 1 + 2x + 1 + 5x + 7$$

$$= 8x + 9$$

According to question,

$$\begin{aligned}
 \text{Perimeter of triangle} &= 4x + 25 \\
 8x + 9 &= 4x + 25 \\
 8x - 4x &= 25 - 9 \\
 4x &= 16 \\
 x &= \frac{16}{4} = 4
 \end{aligned}$$

Value of $x = 4$.

2. (a) In square $ABCD$,

$$\begin{aligned}
 AB &= 2K + 7 \\
 BC &= 3K - 7 \\
 AB &= BC \\
 2K + 7 &= 3K - 7 \\
 7 + 7 &= 3K - 2K \\
 14 &= K
 \end{aligned}$$

- (b) In Triangle $\triangle ABC$,

$$\begin{aligned}
 AB &= BC = AC \\
 AB &= 3K - 4, BC = 2K + 1; AC = K + 6 \\
 AB &= BC \\
 3K - 4 &= 2K + 1 \\
 3K - 2K &= 1 + 4 \\
 K &= 5
 \end{aligned}$$

Value of $K = 5$ cm

Chapter

10

Basic Geometrical Ideas (2-D)

Exercise 10.1

1. Name the line(s), shown in each of the following figures :

- | | |
|--------------|------------------------|
| (a) Line l | (b) Line AB |
| (c) Line P | (d) Line AB and CD |

2. How many line segments are there in each of the following figures :

- | | | | |
|-----------|----------|-----------|------------|
| (a) Seven | (b) Four | (c) Seven | (d) Twelve |
|-----------|----------|-----------|------------|

3. In each of the figures given below, name all the points and the line segments.

(a) A, B, C, D, E and F are points and $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DE}, \overline{EF}$ and \overline{FA} are line segments.

(b) P, Q, R, S and T are points and $\overline{PQ}, \overline{QR}, \overline{RS}, \overline{SP}, \overline{ST}, \overline{TQ}, \overline{PT}, \overline{TR}, \overline{PR}, \overline{SQ}$ are line segments.

(c) A, B, C, D, E, F, G and H are points and $\overline{AB}, \overline{BF}, \overline{AE}, \overline{EF}, \overline{DC}, \overline{CG}, \overline{DH}, \overline{HG}, \overline{AD}, \overline{BC}, \overline{EH}$ and \overline{FG} are line segments.

4. Identify each of the following figure given below as a ray, a line segment or a line :


(a) A line segment

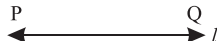
(b) A ray

(c) Line

(d) A ray

(e) A line segment

5. (a) 

(b) 

6. Yes; countless number of lines passing through O can be drawn.

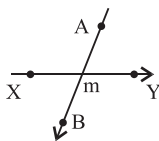
7. No, we cannot draw more than one line passing through P and Q .


8. $(\overline{AB}, \overline{DC}), (\overline{AD}, \overline{BC}), (\overline{JK}, \overline{DB}), (\overline{DB}, \overline{EF}), (\overline{JK}, \overline{EF})$, are pairs of parallel lines; and $(\overline{AC}, \overline{JK}), (\overline{AC}, \overline{DB}), (\overline{AC}, \overline{EF}), (\overline{AD}, \overline{JK}), (\overline{AB}, \overline{JK}), (\overline{AD}, \overline{DB})$

$(\overline{AB}, \overline{DB}), (\overline{DC}, \overline{EF}), (\overline{BC}, \overline{EF})$ are pair of intersecting lines.

9. Eight points, twelve line segments and six planes

10. (a)  (b)



(c) 

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

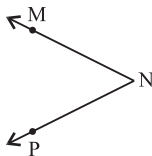
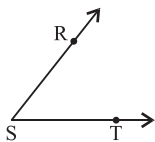
12. (a) Lines l and q (b) Lines l and p (c) Lines m, q and r

Exercise 10.2

1. Name the angles given in the following figure :

(a) $\angle AOB$ (b) $\angle XZY$ (c) $\angle PQR$ (d) $\angle DEF$

2.



3. $\angle AOB$, $\angle AOC$, $\angle AOD$, $\angle BOC$, $\angle BOD$, $\angle COD$

4. (a) Interior of $\angle AOC = P, T, Z$

(b) Exterior of $\angle AOC = X, Y, R, B$

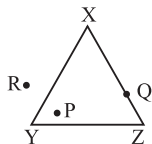
5. Triangles = $\triangle AEB$, $\triangle BEC$, $\triangle CED$, $\triangle DEA$, $\triangle ABC$, $\triangle ADB$, $\triangle BCD$, $\triangle CDA$

6. (a) Point on $\triangle ABC = A, B, C, M, N$

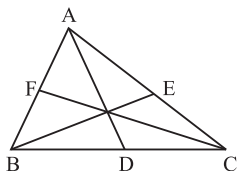
(b) Interior of $\triangle ABC = P, R$ and Z .

(c) Exterior of $\triangle ABC = S, Q, T$

7.



8.



Exercise 10.3

1. Which of the following figures are quadrilaterals?

(a), (b) and (f) are quadrilateral.

2. In quadrilateral $ABCD = \overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}$ are the four sides; $\angle A$, $\angle B$, $\angle C$, $\angle D$ are the four angles; \overline{AC} , \overline{BD} are the two diagonals.

3. (a) Adjacent sides = $\overline{AB}, \overline{BC}$

(b) Adjacent angle = $\angle A, \angle B$

(c) Opposite angle = $\angle A, \angle C$

(d) Opposite side = $\overline{AB}, \overline{DC}$

4. (a) Exterior point of quadrilateral = F, H

(b) Point on quadrilateral = A, B, C, D, I, M, Y

(c) Interior point of quadrilateral = E, U, G

5. \therefore The circumference = 132 cm

$$2\pi r = 132 \Rightarrow 2 \times \frac{22}{7} \times r = 132$$

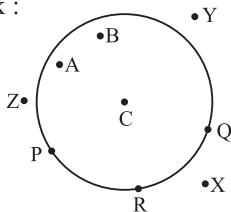
$$\Rightarrow 2r = \frac{132 \times 7}{22} = 42 \text{ cm}$$

Length of diameter = 42 cm.

6. The given, $r = 7$

$$\text{Circumference} = 2\pi r = 2 \times \frac{22}{7} \times 7 = 44 \text{ cm}$$

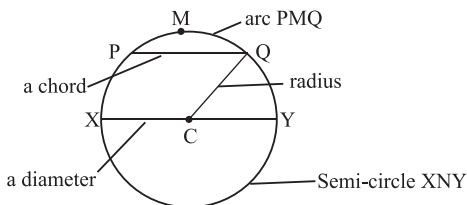
7. (a) a minor arc = AXB
 (b) A major arc = AYB
 (c) a semi circle = PYQ
 (d) a minor segment = Region AXB
 (e) a minor sector = Region OBQ
8. Draw a circle. Mark :



9. In the adjoining figure, name the following :

- (a) Point O = The centre
 (b) \overline{AB} is largest chord and \overline{PQ} is chord.
 (c) \overline{OC} = Radius
 (d) \overline{AB} Diameter

10. Draw circle mark in it :



11. Fill in the blanks, using the words (always, sometimes or never) :

- (a) A radius is **Never** a chord.
- (b) A chord is **sometime** a diameter.
- (c) A diameter divides a circle **always** into two equal parts.
- (d) A diameter is **always** the longest chord in a circle.

Multiple Choice Questions

Tick (✓) the correct answer :

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

BRAIN BOOSTER

Look at the figure and answer the following :

- (a) 8 triangles.
- (b) Name of diagonals are AC and DB .
- (c) Yes; point G in the interior of $ABCD$.
- (d) The point interior is E in $\triangle AOB$.

Chapter

11

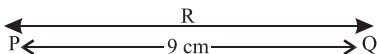
Understanding Geometrical Shapes

Exercise 11.1

1. $PQ = 9$ cm

$$PR = PQ \times \frac{1}{2} = \frac{9}{2} = 4.5 \text{ cm}$$

$$PR = RQ = 4.5 \text{ cm.}$$



2. Identify the longest side in the following triangles using the method of observation.

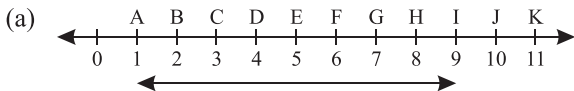
- (a) By observation we say that \overline{PR} is longest side.
- (b) By observation we say that \overline{AC} is longest side.
- (c) By observation we say that \overline{PS} is longest side.

- 3.

$$PT = 6 \text{ cm, } ST = 4 \text{ cm}$$

$$\overline{PS} = 6 - 4 = 2 \text{ cm}$$

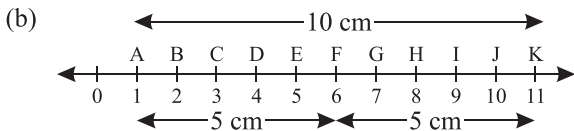
4. Using the number line (drawn above). Verify :



$$AI = 8 \text{ cm}$$

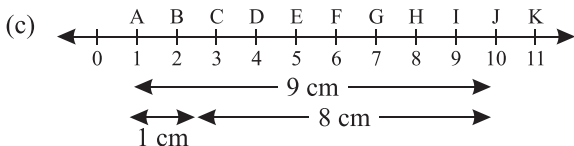
$$\text{Mid point} = 4 \text{ cm}$$

$\therefore E$ is the mid point as it lies at a distance of AI .



$$AF = 5 \text{ cm}; FK = 5 \text{ cm}$$

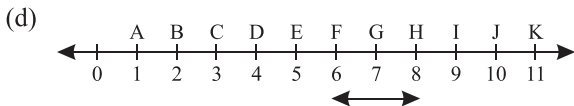
$$AK = 5 \text{ cm} + 5 \text{ cm} = 10 \text{ cm}$$



$$\overline{AJ} = 9 \text{ cm} \quad \overline{BJ} = 2 \text{ cm}$$

\leftrightarrow

$$\overline{AB} = (9 - 2) \text{ cm} = 7 \text{ cm}$$



$$FH = 2 \text{ cm}$$

$$FG = 1 \text{ cm}; GH = 1 \text{ cm}$$

$\therefore G$ is the mid point as it lies at a distance of FH .

Exercise 11.2

1. How many right angles are made if you start facing :

- We will start from south and will end at south itself. Hence right angles can be made = Four
- We will start from west and will end at east itself. Hence right angle can be made = Two

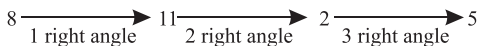
- (c) We will start from north and will end at west itself.
Hence right angle can be made = Three

2. Match the following :

- (a) $1\frac{1}{2}$ right angles (iii) 135°
 (b) more than $\frac{3}{4}$ th revolution (i) 285°
 (c) half of the revolution (ii) 180°
 (d) less than $\frac{1}{4}$ th of revolution (v) 52°
 (e) between $\frac{1}{4}$ th and $\frac{1}{2}$ of revolution (iv) 115°

3. Where will the hour hand of a clock stop if it starts from :

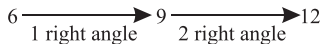
- (a) Start at 8 and turns 3 right angles thus we will reach at 5.



- (b) Start at 9 and turns 1 right angle
Thus, we will reach at 12



- (c) Start at 6 and turns 2 right angle thus we will reach at 12



4. Classify the following angles :

(a) Acute (b) Reflex (c) Obtuse (d) Reflex (e) Right

5. Measure the following angles in the given figure using the protractor and classify them :

$$\angle COE = 25^\circ \text{ (Acute)}$$

$$\angle BOE = \angle BOC + \angle COE = 50^\circ + 25^\circ = 75^\circ \text{ (acute)}$$

$$\angle AOB = \angle AOF + \angle FOB = 45^\circ + 40^\circ = 85^\circ \text{ (acute)}$$

$$\begin{aligned} \angle AOC &= \angle AOF + \angle FOB + \angle BOC \\ &= 45^\circ + 40^\circ + 50^\circ = 135^\circ \text{ (obtuse)} \end{aligned}$$

$$\begin{aligned} \angle AOE &= \angle AOF + \angle FOB + \angle BOC + \angle COE \\ &= 45^\circ + 40^\circ + 50^\circ + 25^\circ = 160^\circ \text{ (obtuse)} \end{aligned}$$

$$\angle FOC = \angle FOB + \angle BOC = 40^\circ + 50^\circ = 90^\circ \text{ (Right)}$$

$$\begin{aligned} \angle DOC &= \angle DOA + \angle AOF + \angle FOB + \angle LOC \\ &= 45^\circ + 45^\circ + 40^\circ + 50^\circ = 180^\circ \text{ (Straight)} \end{aligned}$$

6. Find the angles formed by the two hands of clock at :

(a) 5.05 p.m. (b) 6 : 40 a.m. (c) 8 : 15 p.m. (d) 10 : 00 a.m.



7. Find the degree measure of :

$$(a) \ 2\frac{1}{2} \text{ right angles} = 90^\circ + 90^\circ + 90^\circ \times \frac{1}{2} = 90^\circ + 90^\circ + 45^\circ = 225^\circ$$

$$(b) \ \frac{2}{5} \text{ of complete angle} = \frac{2}{5} \times 360^\circ = 144^\circ$$

$$(c) \ \frac{1}{2} \text{ of straight angle} = 180^\circ \times \frac{1}{2} = 90^\circ$$

$$(d) \ \frac{4}{5} \text{ of straight angle} = 180^\circ \times \frac{4}{5} = 144^\circ$$

8. Find x in the following figures :

(a) $\angle ACB + \angle ACD = 180^\circ$ (Linear pair angles)

$$60^\circ + x = 180^\circ$$

$$x = 180^\circ - 60^\circ = 120^\circ$$

(b) In $\triangle ABC$ $x^\circ + 20^\circ = 90^\circ$ (Right angles]

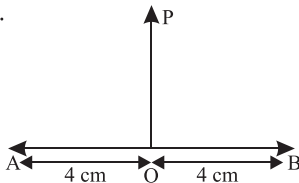
$$\therefore x^\circ = 90^\circ - 20^\circ$$

$$x^\circ = 70^\circ$$

Exercise 11.3

1. Mark a line AB and intersect OP of AB .

$$PO \perp AB$$



2. From the given figure, answer the following :

(a) Yes, $BC = DC = 1$ cm

(b) Yes, $\angle LCD = \angle LCF = 90^\circ$

(c) \overline{LM} is perpendicular bisector of three line segments $= \overline{BD}, \overline{AE}, \overline{PF}$

(d) $\angle BCM = 90^\circ$

(e) $DQ = 4$ cm mid point = 2 cm

Mid point = OF

Exercise 11.4

1. Classify the following triangles on the basis of their angles :

(a) Obtuse angled triangle

(b) Acute angled triangle

(c) Right angled triangle

(d) Obtuse angled triangle

2. Name the following triangles in two different ways :

(a) Acute angled triangle, isosceles triangle

(b) Obtuse angled triangle, scalene triangle

(c) Acute angled triangle, equilateral triangle

(d) Right angled triangle, isosceles triangle

3. Find the measure of the angles marked by x in the following :

(a) In $\triangle ABD$,

$$\angle ABD = \angle DBC + \angle CBA = 90^\circ$$

$$x^\circ + 75^\circ = 90^\circ$$

$$x = 90^\circ - 75^\circ = 15^\circ$$

(b) In $\triangle ABD$, [Linear pair angles]

$$\angle BCD = \angle ACB + \angle ACD$$

$$180^\circ = 60^\circ + x^\circ$$

$$x = 180^\circ - 60^\circ = 120^\circ$$

4. Since, the sum of three angles of a triangle can not exceed 180° , but here a triangle have two right angles, which is equal to 180° , therefore such a triangle is not possible.
5. **Equilateral triangle** Three sides of an equilateral triangle are equal and three angles are also equal.

So, each angle of triangle is 60° .

Let one angle of triangle be x°

Then, sum of angle of a triangle = 180°

$$x + x + x = 180^\circ$$

$$3x = 180^\circ$$

$$x = \frac{180^\circ}{3} = 60^\circ$$

6. In $\triangle PRQ$

$$\angle PRQ + \angle PQR + \angle RPQ = 180^\circ$$

$$\angle PRQ + 45^\circ + 45^\circ = 180^\circ$$

$$\angle PRQ = 180^\circ - 90^\circ$$

$$\angle PRQ = 90^\circ$$

7. $\triangle ABC$ isosceles triangle

$$\angle B = 130^\circ$$

Let $\angle A = \angle C = x^\circ$

Sum of angle of a triangle = 180°

$$x + x + 130^\circ = 180^\circ$$

$$2x = 180^\circ - 130^\circ$$

$$x = 50^\circ \div 2 = 25^\circ$$

Other angles are 25° and 25° .

Exercise 11.5

1. Classify the following figures as parallelogram, square, rectangles, rhombus, trapezium, isosceles trapezium or a kite.
- | | |
|------------|----------------|
| (a) Kite | (b) Rectangles |
| (c) Square | (d) Trapezium |

2. State whether the following statements are true or false. Correct and rewrite the false statements.

- (a) True (b) False, every rectangle is a parallelogram.
 (c) True (d) True
 (e) False, A square is a special form of rectangle.

3. Match the columns :

Column A

Column B

- | | |
|---|---------------------|
| (a) Opposite sides are parallel and equal | (iii) Parallelogram |
| (b) All angles are equal | (ii) Rectangle |
| (c) Diagonals bisect each other at right angles | (i) Rhombus |

4. Equilateral triangle = $\triangle ABC$

Right triangle = $\triangle ACD, \triangle GEF$

Rectangle = $ACEG$

Trapezium = $ADEG$

Parallelogram = $AGFD$

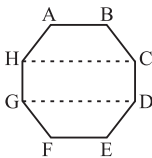
5. Do it yourself.

6. Write the similarities between :

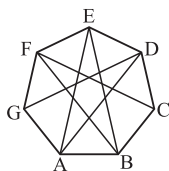
- (a) **Squares and rhombus** : Both have two pairs of parallel sides and both have four equal sides.
- (b) **Rectangle and Square** : Both are quadrilaterals with all four angles are right angle.
- (c) **Parallelogram, rectangle and rhombus** : All of these are quadrilaterals and opposite side are parallel to each other and the opposite angles are also equal.

7. Draw, regular octagon $ABCDEFGH$.

The $CDGH$ as rectangle.



8. Irregular hexagon has unequal sides whereas in a regular hexagon, all sides and angles are equal.
9. Draw heptagon make diagonals.
 Than, we see that four diagonals in one heptagon.



Exercise 11.6

1. Match the following :

Shapes

- (a) Sphere
- (b) Cylinder
- (c) Cuboid
- (d) Cube

Objects

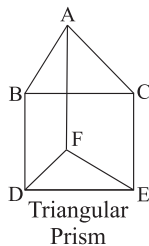
- (ii) A cricket ball
- (i) A coke can
- (iv) A chalk duster
- (iii) A dice

2. Complete the following table :

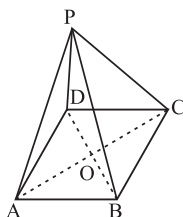
	Shape	Edges	Vertices	Faces
(a)	Cuboid	12	8	6
(b)	Cube	12	8	6
(c)	Cylinder	2	0	3
(d)	Cone	1	1	2
(e)	Sphere	0	0	1
(f)	Triangular prism	9	6	5
(g)	Triangular pyramid	6	4	4
(h)	Square pyramid	8	5	5

3. Write the number of triangles in the nets of :

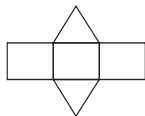
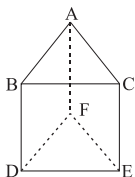
(a) Triangles in triangles prism
 $= 2(\Delta ABC, \Delta DEF)$



(b) Triangle in square pyramid
 $= 3(\Delta ABP, \Delta ADP, \Delta PBC)$



4. Trinagular prism. Net of triangular prism



MCQs

Tick (✓) the correct answer :

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

Chapter

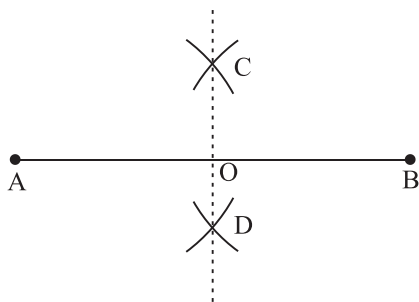
12

Constructions

Exercise 12.1

1. Steps of Construction :

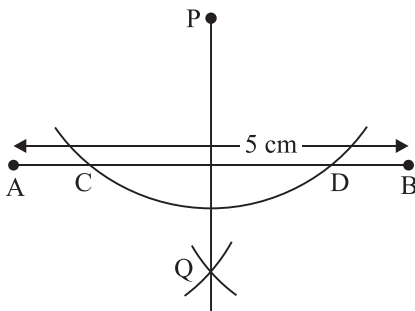
- Draw a line segment AB of lengths 6.2 cm.
- Taking A as the centre and with any radius more than half of AB , draw an arc on either side of AB .



- (iii) Similarly, taking B as the centre and radius as in step (ii), draw another arc on either side of AB intersecting the previous arcs at C and D .
- (iv) Join C and D crossing AB at O .
Hence, CD is the required perpendicular bisector of line segment AB .

2. Steps of Construction :

- (i) Draw a line segment AB of length 5 cm and mark point P outside the line segment AB .
- (ii) Taking P as the centre and with any suitable radius, draw an arc cutting AB at C and D .



- (iii) Taking C and D as centres and with radius more than half of CD , draw arcs below AB intersecting each other at Q .
- (iv) Join P and Q .
Hence, PQ is the required perpendicular to the line segment \overline{AB} from point P lying outside the line segment AB .

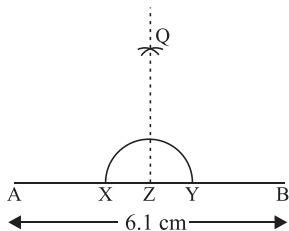
3. Steps of Construction :

- (i) Draw a line segment \overline{AB} of length 6.1 cm and take a point Z on it.
- (ii) Taking Z as the centre and with any convenient radius, draw an arc cutting \overline{AB} at X and Y .

- (iii) Taking X and Y as centres and with any suitable radius draw arcs cutting each other at Q .

- (iv) Join Z and Q .

Then, ZQ is perpendicular to AB passing through the point Z .

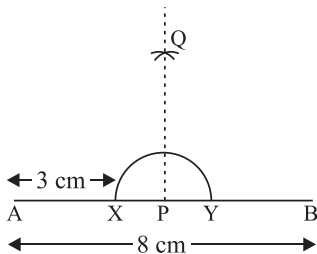


4. Steps of Construction :

- (i) Draw a line segment \overline{AB} of length 8 cm.

- (ii) With A as centre and radius 3 cm cut the line of AB take point P on it.

- (iii) Taking P as the centre and with any convenient radius draw an arc cutting \overline{AB} at X and Y .



- (iv) Taking X and Y as centres and with any suitable radius draw arcs cutting each at Q .

- (v) Join P and Q .

Then, PQ is perpendicular to AB passing through the point P .

5. Draw the circle of the following radii :

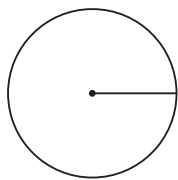
- (a) **Steps of construction :**

- (i) Mark a point O on a sheet of paper, where a circle is to be drawn.

- (ii) Take a pair of compasses and measure 3.5 cm using a ruler.

- (iii) Without disturbing the opening of the compasses, keep the needle at mark O and draw complete arc holding the compasses from its knob.

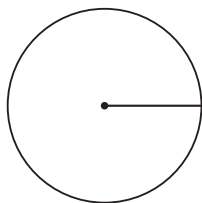
After completing one complete round, we get the desired circle.



- (b) **Steps of Construction :**

- (i) Mark a point O on a sheet of paper, where a circle is to be drawn.

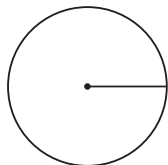
- (ii) Take a pair of compasses and measure 4.5 cm using a ruler.
- (iii) Without disturbing the opening of the compasses. Keep the needle at mark O and draw complete arc holding the compasses from its knob.



After completing one complete round, we get the desired circle.

(c) Steps of Construction :

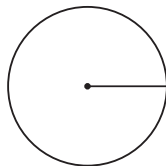
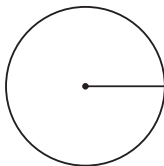
- (i) Mark a point O on a sheet of paper, where a circle is to be drawn.
- (ii) Take a pair of compasses and measure 2.7 cm using a ruler.
- (iii) Without disturbing the opening of the compasses, keep the needle at mark O and draw complete arc holding the compasses from its knob.



After completing one complete round, we get the desired circle.

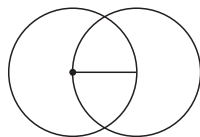
6. Steps of Construction :

- (i) Open the compasses for the required radius of 2 cm.
- (ii) Mark a point A .
- (iii) Place the pointer of the compasses on A .
- (iv) Turn the compasses slowly to draw the circle.
- (v) Repeat steps (i) to (iv) and again draw a circle with centre at B .
 $AD = 2$ cm; $BC = 2$ cm
 radii of two circles = equal.



7. Steps of Construction :

- (i) Open the compass for radius of 2 cm.
- (ii) Make point O .
- (iii) Place the pointer of the compasses on O .
 Draw a circle.
- (iv) Draw OA .
- (v) With A as centre take OA as radius.



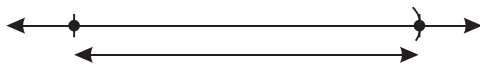
- (vi) Place the pointer of the compasses on A .
- (vii) Turn the compasses slowly to draw the circle.

8. Using a ruler and a pair of compasses, draw the line segments of the following lengths :

- (a) Length = 5.2 cm

Steps of Construction :

- (i) Draw a line l and mark a point A on it.
- (ii) Open the arms of the compass so that the end points of the open arms equal to 5.2 cm.



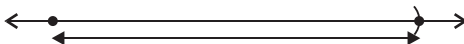
- (iii) Without disturbing the opening of the compasses, place its needle at the point A and draw an arc to cut the line l at the point B .

- (iv) AB is the required line segment of length 5.2 cm.

- (b) Length 7.7 cm

Steps of Construction :

- (i) Draw a line l and mark a point A on it.
- (ii) Open the arms of the compass so that the end points of the open arms equal to 7.7 cm.



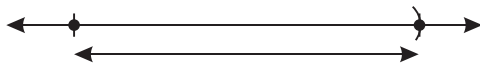
- (iii) Without disturbing the opening of the compasses, place its needle at the point A and draw an arc to cut the line l at the point B .

- (iv) AB is the required line segment of length 7.7 cm.

- (c) Length = 4.5 cm

Steps of Construction :

- (i) Draw a line l and mark a point A on it.
- (ii) Open the arms of the compass so that the end points of the open arms equal to 4.5 cm.



(iii) Without disturbing the opening of the compasses, place its needle at the point A and draw an arc to cut the line l at the point B .

(iv) AB is the required line segment of length 4.5 cm.

9. Draw two line segments AB and CD of lengths 3.7 cm and 5.5 cm respectively. Construct the line segment of the following lengths :

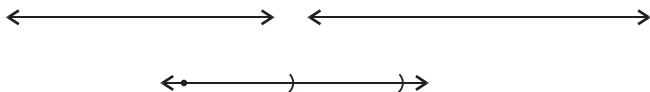
(a) **Steps of Construction :**

(i) Draw any line l and mark a point A on it.

(ii) Construct a segment PQ on l equal in length to $AB = 3.7$ cm starting from P .

(iii) Now construct another segment QR on l of length (5.5 cm) starting from Q .

(iv) Then, PR is required segment equal to $AB + CD$.



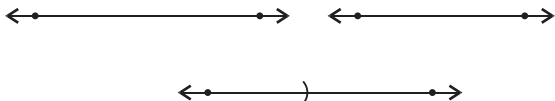
$$PR = AB + CD = 3.7 \text{ cm} + 5.5 \text{ cm} = 9.2 \text{ cm}$$

(b) **Steps of Construction :**

(i) Draw any line l and mark a point D on it.

(ii) Starting from P construct a segment PR on l equal in length to $CD = 5.5$ cm.

(iii) Now, construct an other segment QR on l equal in length to $AB = 3.7$ cm starting from Q .

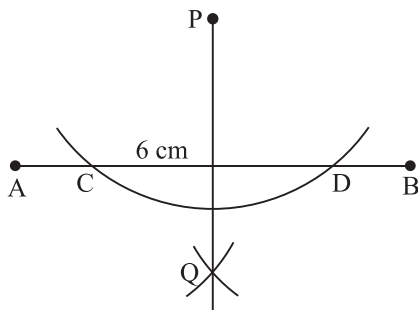


$$\text{The } PQ \text{ is required segment equal to } CD - AD = (5.5 - 3.7) \text{ cm} = 1.8 \text{ cm}$$

10. Steps of Construction :

(i) Draw a line segment \overline{AB} of length 6 cm and mark point P outside the line segment AB .

(ii) Taking P as the centre and with any suitable radius, draw an arc cutting AB at C and D .



(iii) Taking C and D as centres and with radius more than half of CD , draw arcs below AB intersecting each other at Q .

(iv) Join P and Q .

Hence, PQ is the required perpendicular to the line segment \overline{AB} from point P lying outside the line segment AB .

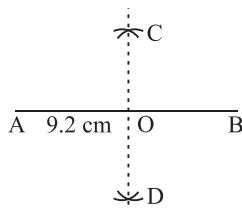
11. Steps of Construction :

(i) Draw a line segment AB of length 9.2 cm.

(ii) Taking A as the centre and with any radius more than half of AB , draw an arc on either side of AB .

(iii) Similarly, taking B as the centre and radius as in step (ii) draw another arc on either side of AB intersecting the previous arcs at C and D .

(iv) Join C and D crossing AB at O .



Hence, CD is the required perpendicular bisector of the line segment AB .

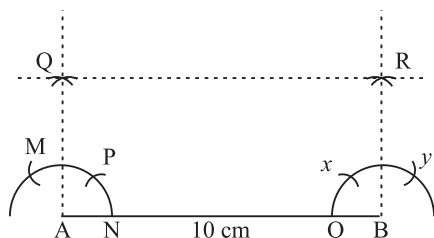
Verification : Measure AO and OB . We find the measurement of $AO = OB$.

12. Steps of Construction :

(i) Draw $AB = 10$ cm.

(ii) Taking A as centre and any convenient radius draw an arc M and N .

(iii) Taking M and P as centres and with any suitable radius draw arcs cutting each other at Q .



- (iv) Again, taking B as centre and taking some radius draw an arc O and y .
- (v) Taking x and y as centres and with any suitable radius draw arcs cutting each other at P .
- (vi) Join Q and P . Then, $PQ \parallel AB$.

Exercise 12.2

1. Using ruler and a pair of compasses, construct angles of the following measures :

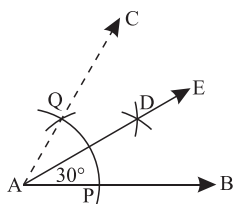
- (a) 30°

Steps of Construction :

- (i) Draw an angle of 60° as explained before.

- (ii) Taking A as the centre and with any suitable radius, draw an arc PQ that cuts AB at P and AC at Q .

- (iii) Taking P as the centre and radius greater than half of PQ , draw an arc. Taking Q as the centre and with the same radius draw another arc, cutting the previous arc at D .



- (iv) Join A and D to get the line segment \overline{AD} and produce it to get \overrightarrow{AE} .

- (v) \overrightarrow{AE} is the angular bisector of $\angle CAB$.

Therefore, $\angle CAD = \angle DAB = 30^\circ$, is the required angle.

- (b) 45°

Steps of Construction :

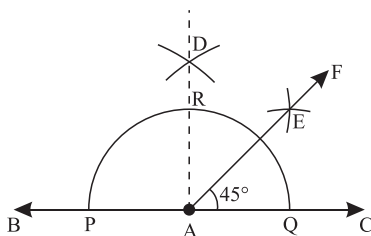
- (i) Draw an angle of 90° as explained before.

(ii) Taking Q as a centre and a radius more than half of QR , draw an arc.

(iii) Taking R as the centre and the same radius, draw an arc cutting the previous arc at E .

(iv) Join A and E to get the line segment \overline{AE} .

(v) AF is the angular bisector of $\angle DAC$. Therefore, $\angle DAE = \angle EAC = 45^\circ$ is the required angle.



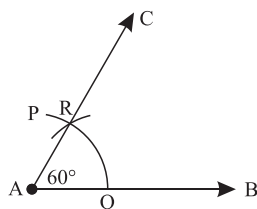
(c) 60°

Steps of Construction :

(i) Draw any ray \overrightarrow{AB} .

(ii) Taking A as the centre and with any suitable radius, draw an arc \overrightarrow{PQ} that cuts \overrightarrow{AB} at Q .

(iii) Taking Q as the centre and radius equal to \overline{AQ} , draw an arc cutting the previous arc PQ at R .



(iv) Join \overline{AR} and produce it to get \overrightarrow{AC} .

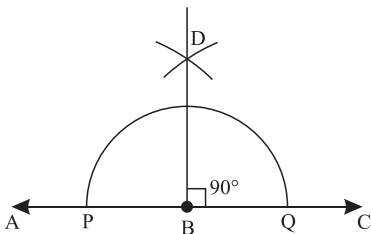
(v) $\angle BAC$ is the required angle equal to 60° .

(d) 90°

Steps of Construction :

(i) Draw a line AC and mark a point B on it.

(ii) Taking B as the centre and with any suitable radius, draw an arc \overleftrightarrow{PQ} cutting \overleftrightarrow{AC} at P and Q .



(iii) Taking P and Q as the centres and with any convenient radius, draw arcs intersecting each other at D .

(iv) Join B and D to get the \overline{BD} .

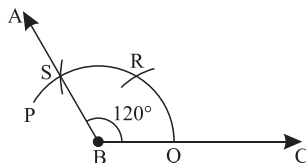
Then, $\angle ABD = \angle DBC = 90^\circ$ is the required angle.

(e) 120°

Steps of Construction :

(i) Draw a ray BC .

(ii) Taking B as the centre and with any suitable radius, draw an arc PQ cutting \overrightarrow{BC} at Q .



(iii) Taking Q as the centre and \overline{BQ} as a radius draw an arc cutting arc PQ at R . Taking R as the centre and with the same radius, cut an arc PQ at another point S .

(iv) Join \overline{BS} and produce it to get \overrightarrow{BA} .

(v) $\angle ABC$ is the required angle of measuring 120° .

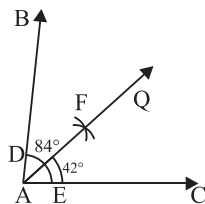
2. Steps of Construction :

(i) Draw an angle $\angle BAC = 84^\circ$.

(ii) Taking A as centre and with any suitable radius, draw an arc cutting \overrightarrow{AB} and \overrightarrow{AC} of $\angle CAB$ at D and E respectively.

(iii) Taking D as the centre and any radius more than half \overline{DE} draw an arc.

(iv) Similarly, taking E as the centre and with the same radius draw an arc intersecting previous arc at P . Join \overline{AF} and produce it to get \overrightarrow{AQ} .



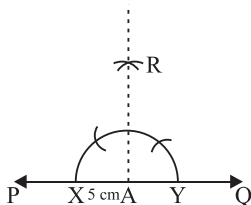
Thus, ray \overrightarrow{AQ} is the required bisector of $\angle CAB$ or $\angle BAC$.

3. Steps of Construction :

(i) Draw a line $PQ = 5$ cm and mark a point A on it such that $PA = 3$ cm.

(ii) Taking A as the centre and with any suitable radius draw an arc XY cutting

\overleftrightarrow{PQ} at X and Y .



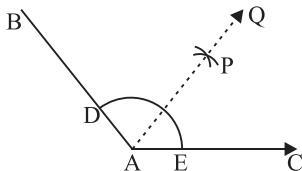
- (iii) Taking X and Y as the centres and with any convenient radius draw arcs intersecting each other R .

Join A and R to get the \overline{AR} .

$\angle PAR = \angle RAQ = 90^\circ$ is the required angle.

4. Steps of Construction :

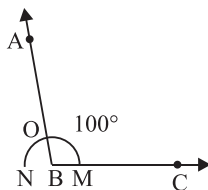
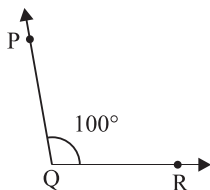
- (i) Draw $\angle BAC = 140^\circ$.
- (ii) Taking A as the centre and with any suitable radius, draw an arc cutting the arms \overrightarrow{AB} and \overrightarrow{AC} of $\angle CAB$ at D and E respectively.
- (iii) Taking D as the centre and radius more than half of DE , draw an arc.
- (iv) Similarly, taking E as the centre and with the same radius (as in step (iii)) draw an arc intersecting the previous arc at P . Join \overline{AP} and produce it to get \overrightarrow{AQ} .



Thus, ray \overrightarrow{AQ} is the required bisector of $\angle CAB = 70^\circ$ or $\angle BAC = 70^\circ$.

5. Draw an angle $\angle PQR = 100^\circ$ by protractor.

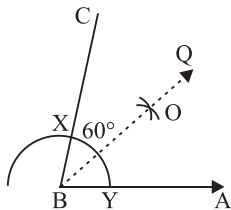
Draw an angle $\angle ABC = 100^\circ$



- (i) We will open the compass of the required length.
- (ii) By taking B as centre we will draw a semicircle.
- (iii) The point where this semi-circle cuts BN , we will make this point as M .
- (iv) Now taking M as centre, we will draw an arc. Thus, we will be marked as O .
- (v) Now, we will extend a line from B through O . This is the required angle of 100° .

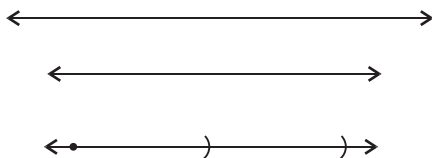
6. Steps of Construction :

- (i) Draw an angle of 60° using a protractor.
 - (ii) Take B as the centre and draw an arc of convenient length cutting \overrightarrow{BC} and \overrightarrow{BA} at X and Y respectively with the compass.
 - (iii) With Y as the centre for the compass and more than half of XY as the length, draw an arc from Y to the exterior of XY . With the same radius and X as the centre cut the previous arc at O .
 - (iv) Join OB .
- Now, line BO is the bisector of Angle ABC
 $\angle CBO = \angle ABO = 30^\circ$.



7. $AB = 7.5$ cm; $CD = 5.4$ cm

$$PQ = AB - CD = (7.5 - 5.4) \text{ cm} = 2.1 \text{ cm}$$

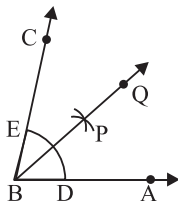


Steps of Construction :

- (i) Draw any line l and mark a point P on it.
 - (ii) Starting from P construct a segment PR on l equal in length to AB .
 - (iii) Now, construct on other segment QR on l equal in length to CD starting from Q as shown.
- Then, PQ is required segment equal to difference of AB and CD .

8. Steps of Construction :

- (i) Draw $\angle ABC = \angle B = 75^\circ$.
- (ii) Taking B as the centre and with any suitable radius, draw an arc cutting the arms \overrightarrow{BA} and \overrightarrow{CB} of $\angle CBA$ at D and E respectively.



- (iii) Taking D as the centre and any radius more than half of DE , draw an arc.
- (iv) Similarly, taking E as the centre and with the same radius (as in step (iii)). draw an arc intersecting the previous arc at P . Join \overline{BP} and produce it to get \overrightarrow{BQ} .

Thus, ray \overrightarrow{BQ} is the required bisector of $\angle CBA = 37.5^\circ$ or $\angle QBA = 37.5^\circ$.

9. First diagonal = 5.5 cm, second diagonal = (5.5 + 2.5) cm = 8.0 cm

Area of the kite = $\frac{1}{2}$ the product of diagonal

$$= \frac{1}{2} \times 5.5 \times 8$$

$$= 5.5 \times 4 = 22 \text{ cm}^2$$

Area of the kite = 22 cm^2

10. Do Q. 10 same as Q. 6

11. Do yourself same as Q. 10

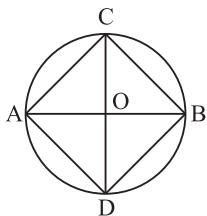
Multiple Choice Questions

Tick (✓) the correct answer :

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

BRAIN BOOSTER

1.

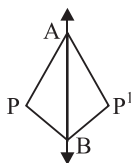


Quadrilateral, Square

2. $\overline{AP} = \overline{AP'}$

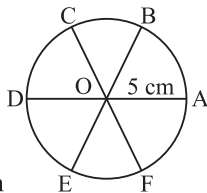
$\overline{BP} = \overline{BP'}$

Yes, $\overline{AP} = \overline{AP'}$ & $\overline{BP} = \overline{BP'}$



3. A circle of radius = 5 cm.

We make a circle with the radius of 5 m cm and draw an arc cutting the circle with the opening of a compass equal to its radius = 5 cm



Exercise 13.1

1. Following are the number of children in 20 families of a colony :

No. of students	Tally marks	Frequency
1		6
2		8
3		4
4		2

- (a) The minimum number of children in a family is 1.
 (b) The maximum number of children in a family is 4.
 (c) The most common number of children in a family of the colony is 2.
 (d) 8 families have 2 children.

2. The final marks in English test of 30 students are as follows :

(a)

Group	Tally marks	Number of students
30 – 39		2
40 – 49		3
50 – 59		8
60 – 69		8
70 – 79		4
80 – 89		2
90 – 99		2
100 – 109		1
		30

- (b) The highest score = 100 (c) The lowest score = 37

- (d) 2 student failed.
 (e) 5 students marks in less than 50.

3. The monthly electricity bill (in ₹) of 30 houses in a locality of Delhi are given below :

Electricity bill	Tally marks	Number of houses
1055		8
1056		5
1476		1
1578		1
2001		1
2033		1
2044		5
2046		3
2048		3
2218		1
2255		1
		30

- (a) $15(1 + 1 + 5 + 3 + 3 + 1 + 1)$ houses had electricity bill more than ₹ 2000.
 (b) $15(8 + 5 + 1 + 1)$ houses had bill more than ₹ 1000 but less than ₹ 2000.
 (c) The maximum bill amount is ₹ 2255.
 (d) The range of above data = $2255 - 1055 = 1200$.

4. The height of 20 students (in cm) is recorded as under :

Height of students (in cm)	Tally marks	Frequency
114		1
115		2
116		1

117		7
118	/	2
119	/	1
120		2
125		4

5. In a ready made garments store, on a particular day the following size of shirts were sold.






























Size of shirts	Tally marks	Frequency
32		3
34		3
36		2
38		4
40		12
42		3
44		3


- (a) Size 36 had min. sale
- (b) Size 40 had max. sale

6. The number ceiling fan made in a factory in 7 days of a week is given below :





































- (a) The factory made **200** ceiling fan on Tuesday.
- (b) The factory made maximum number of ceiling fan on **Wednesday**.
- (c) The factory made minimum number of ceiling fan on **Friday**.
- (d) **300** ceiling fan were made on Saturday.
- (e) 200 ceiling fan are made on **Tuesday** and **Thursday**.

7. The following table shows the number of cars sold by five dealers in a particular month.

Dealer	Bike sold
Saya	           
Bagga Links	       
Ajay automobiles	   
Bhasin automobiles	  
Competent automobile	 

 = 5 Cars sold.

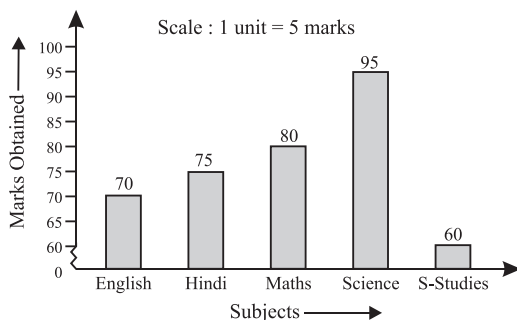
8. The following table shows the daily production mobile sets in an industry for 7 days of a week :

Days	Number of Mobile Sets
Mon	     
Tue	       
Wed	  
Thu	    
Fri	 
Sat	       
Sun	   

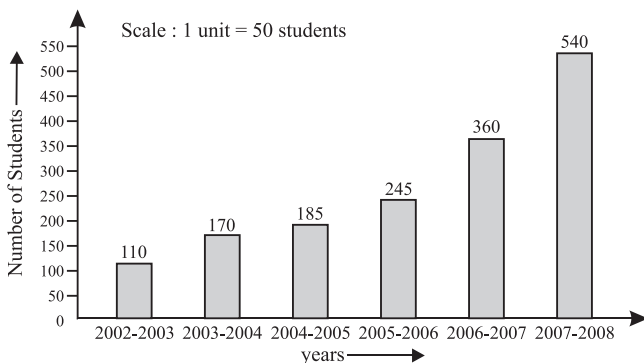
Mobile set  = 50 mobiles

Exercise 15.2

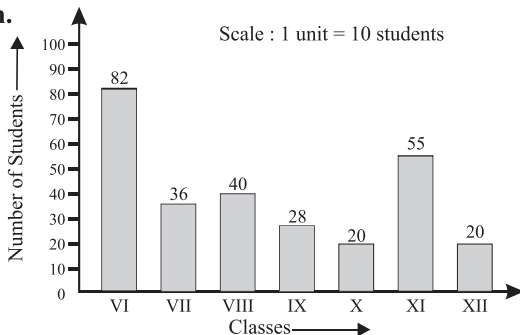
1. The marks obtained by a student in various subjects are given below :



2. The year-wise growth of a little stars school is shown below :



3. The number of students admitted in a year in a school in different classes is given below. Represent the data by a bar graph.



4. The graph given below indicates the number of books issued by a library during a week.
- The bar graph shows the number of books issued by a library during a week.
 - 40 books were issued on Monday.
 - 50 books were issued on Thursday.
 - 220 total number of books were issued.
(40 + 60 + 30 + 50 + 25 + 15)
 - 45 more books were issued on Tuesday than Saturday.
(60 – 15)
5. Read the bar graph given below shows the productions of wheat in 8 states and answer the following questions :
- Bar graph shows the total production of wheat (in tonnes) in 8 different states.
 - MP is the largest produces of wheat.
 - WB state has the minimum production of wheat.
 - The total production of UP and MP = 13000.
6. The bar-graph shows the number of goals scored by a football team per match. Read the graph and answer the questions given :
- 68 matches were played in all (12 + 20 + 16 + 6 + 12 + 2).
 - 4 goals were scored in 12 matches.
 - No goal was scored in 12 matches.
7. The given bar graph represents the circulation of newspapers in different languages. Study the graph and answer the following questions :
- The total circulation of newspapers in Hindi, Marathi and Tamil is 220000.
(160000 + 40000 + 20000)
 - The circulation is least language in Tamil.
 - The circulation is highest language in Hindi.

MCQs

- | | | | |
|--------|--------|--------|--------|
| 1. (b) | 2. (c) | 3. (a) | 4. (c) |
| 5. (b) | 6. (c) | 7. (b) | 8. (a) |

Exercise 14.1

1. Find the perimeter of the following figures :

- (a) Perimeter = $(2 + 3 + 5 + 3 + 2 + 8 + 2 + 3 + 5 + 3 + 2 + 8)$ cm = 46 cm
- (b) Perimeter = $(6 + 3 + 2 + 8 + 2 + 8 + 2 + 3)$ cm = 34 cm
- (c) Perimeter = $(10 + 4 + 20 + 4 + 15 + 12)$ cm = 65 cm
- (d) Perimeter = $(2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2)$ cm
= 24 cm
- (e) Perimeter = $(4 + 4 + 6 + 6 + 6)$ cm = 26 cm
- (f) Perimeter = $(2 + 9 + 8 + 9 + 2 + 6 + 4 + 6)$ cm = 46 cm
- (g) Perimeter = $(10 + 10 + 10 + 10 + 10 + 10 + 10 + 10)$ cm = 80 cm
- (h) Perimeter = $(15 + 10 + 12 + 24)$ m = 61 cm
- (i) Perimeter of rectangle = $2(\text{length} + \text{breadth})$
length = 10 cm; breadth = 15 cm
Perimeter = $2(10 + 15)$ cm = 2×25 cm = 50 cm
- (j) Perimeter of square = $4 \text{ side} = 4 \times 40$ cm = 160 cm
- (k) Perimeter = $(5 + 6 + 7)$ cm = 18 cm
- (l) Perimeter = sum of all sides
Perimeter = $(12 + 12 + 15)$ cm = 39 cm

2. Find the perimeter of the rectangle whose dimensions are given as :

Since, perimeter of rectangle = $2(l + b)$

- (a) length = 65 cm, breadth = 40 cm
Perimeter = $2(65 + 40) = 2(105) = 210$ cm
- (b) length = 40 cm, breadth = 12 cm
Perimeter = $2(40 + 12) = 2 \times 52 = 104$ cm
- (c) length = 185 m, breadth = 80 m
Perimeter = $2(185 + 80) = 2 \times 265 = 530$ m
- (d) length = 10 m 25 cm or 10.25 m breadth = 5 m 75 cm or 5.75 m
Perimeter = $2(10.25 + 5.75)$ m = 2×16 m = 32 m

3. Find the perimeter of a square with one side as :

Since, perimeter of square = $4 \times \text{side}$

- | | |
|--------------------------------|--|
| (a) Side = 15 cm | Perimeter = $4 \times 15 \text{ cm} = 60 \text{ cm}$ |
| (b) Side = 24 cm | Perimeter = $4 \times 24 \text{ cm} = 96 \text{ cm}$ |
| (c) Side = 195 cm | Perimeter = $4 \times 195 \text{ cm} = 780 \text{ cm}$ |
| (d) Side = 1 m 25 cm or 1.25 m | Perimeter = $4 \times 1.25 \text{ m} = 5.0 \text{ m}$ |

4. Determine the perimeter of a triangle whose sides are :

- (a) Sides = 15 cm, 12 cm, 7 cm
Perimeter = $(15 + 12 + 7)$ cm = 34 cm
- (b) Sides = 4 cm, 3 cm, 6 cm
Perimeter = $(4 + 3 + 6)$ cm = 13 cm
- (c) Sides = 15 cm, 20 cm, 25 cm
Perimeter = $(15 + 20 + 25)$ cm = 60 cm
- (d) Sides = 25 cm, 26 cm, 27 cm
Perimeter = $(25 + 26 + 27)$ cm = 78 cm

5. Length of a plot = 0.6 km = 600 m

Breadth of a plot = 0.5 km = 500 m

$$\text{Perimeter} = 2(l + b)$$
$$\text{Perimeter} = 2(600 + 500) = 2 \times 1100 = 2200 \text{ m}$$
$$\text{Required wires} = 2200 \times 5 = 11000 \text{ m} = 11 \text{ km}$$
$$\text{Cost of wire required for fencing} = ₹ 11000 \times 9 = ₹ 99000$$

6. Length of rectangular park = 150 m

Breadth of rectangular park = 100 m

$$\text{Perimeter} = 2(150 + 100) = 2 \times 250 \text{ m} = 500 \text{ m}$$

Total distance covered by an athlete in 12 rounds = $12 \times 500 \text{ m}$
 $= 6000 \text{ m}$

7. Length of rectangular park = 60 m

Breadth of rectangular park = 40 cm

$$\text{Perimeter} = 2 \times (60 + 40) \text{ m} = 200 \text{ m}$$

Total distance covered by Mayank = $200\text{ m} \times 3 = 600\text{ m}$

Side of square = 55 m

$$\text{Perimeter} = 4 \times 55 = 220 \text{ m}$$

Total distance covered by Roma = $220 \text{ m} \times 3 = 660$

Roma walk more distance by 60 m.

8. Perimeter = 2 (length + breadth)

$$600 = 2 (\text{length} + 90)$$

$$600 = 2 \text{ length} + 90 \times 2$$

$$\text{length} = \frac{600 - 180}{2} = 210 \text{ m,}$$

$$\text{So, length} = 210 \text{ m}$$

9. Ratio of length and breadth = 2 : 1

$$\text{Length of rectangular field} = 2x$$

$$\text{Breadth of rectangular field} = x$$

$$\text{Perimeter of rectangular field} = 2(2x + x) = 2 \times 3x = 6x$$

$$\text{Total distance} = 2 \text{ km} = 2000 \text{ m}$$

$$\text{Number of times around this field} = 5 \text{ times}$$

$$\text{Distance covered in 1 time} = \frac{2000}{5} = 400 \text{ m}$$

$$\text{Perimeter of field is } 400 \text{ m}$$

According to question;

$$400 = 6x$$
$$x = \frac{400}{6} = \frac{200}{3}$$

$$\text{length of field} = \left(2 \times \frac{200}{3} \right) \text{ m} = \frac{400}{3} \text{ m,}$$

$$\text{Breadth of this field} = \frac{200}{3} \text{ m}$$

$$\text{Perimeter} = 600 \text{ m; breadth} = 90 \text{ m}$$

10. Side of square garden = 25 m

$$\text{Perimeter of garden} = 4 \times 25 \text{ m} = 100 \text{ m}$$

$$\text{Cost of fencing} = 100 \times 10 = ₹ 1000$$

11. Length of rectangular of park = 50 m

$$\text{Breadth of rectangular of park} = 30 \text{ m}$$

$$\text{Perimeter} = 2(l + b) = 2(50 + 30) = 2 \times 80 = 160 \text{ m}$$

$$\text{Cost of fence around a rectangular play ground} = ₹ 160 \times 50$$
$$= ₹ 8000$$

12. Side of square park = 80 m

$$\text{Perimeter of square} = 4 \times \text{side} = 4 \times 80 = 320 \text{ m}$$

$$\text{Distance covered by Lalit} = 2 \times 320 \text{ m} = 640 \text{ m}$$

$$\text{length of rectangular park} = 100 \text{ m}$$

$$\text{Breadth of rectangular park} = 75 \text{ m}$$

$$\text{Perimeter of rectangle} = 2(l + b) = 2(100 + 75) \text{ cm} = 2 \times 175 \text{ cm}$$

Distance covered by Rohan = $350 \times 3 = 1050$ cm

Lalit covers less distance.

13. Ratio of length and breadth = 4 : 1

Let length of a rectangular playground = $4x$

breadth of a rectangular playground = x

Perimeter = $2(4x + x) = 2 \times 5x = 10x$

Total cost fencing the playground = ₹ 5000

Cost of fencing per metre = ₹ 50

Perimeter of playground = $\frac{5000}{50} = 100$ cm

According to question

$$10x = 100$$

$$x = 10 \text{ cm}$$

length of rectangular park = $4 \times 10 = 40$ cm

breadth of rectangular park = 10 cm

14. Length of rectangular box = 75 cm

Breadth of rectangular box = 25 cm

Perimeter of rectangular = $2(l + b)$

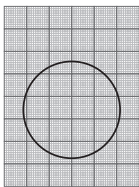
Perimeter of box = $2(75 + 25)$ cm = 2×100 cm = 200 cm

length of the tape required is 200 cm.

Exercise 14.2

1. Find the area of the following figures by counting the number of squares :

(a)



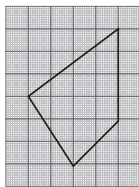
Number of full squares = 10

Number of half squares = 6

$$\text{Area} = 10 + 6 \times \frac{1}{2} \text{ cm}^2$$

$$= 13 \text{ cm}^2$$

(b)



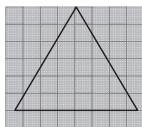
Number of full squares = 10

Number of half squares = 4

$$\text{Area} = 10 + 4 \times \frac{1}{2} \text{ cm}^2$$

$$= 12 \text{ cm}^2$$

(c)

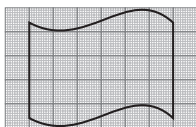


Number of full squares = 14

Number of half squares = 4

$$\begin{aligned}\text{Area} &= \left(14 + 4 \times \frac{1}{2} \right) \text{cm}^2 \\ &= 16 \text{cm}^2\end{aligned}$$

(d)

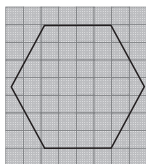


Number of full square = 20

Number of half squares = 4

$$\begin{aligned}\text{Area} &= \left(20 + 4 \times \frac{1}{2} \right) \text{cm}^2 \\ &= 22 \text{cm}^2\end{aligned}$$

(e)



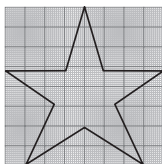
Number of full squares = 28

Number of half squares

$$= 6$$

$$\begin{aligned}\text{Area} &= \left(28 + 6 \times \frac{1}{2} \right) \text{cm}^2 \\ &= 31 \text{cm}^2\end{aligned}$$

(f)



Number of full squares = 8

Number of half squares

$$= 12 \times \frac{1}{2} = 6$$

$$\begin{aligned}\text{Area} &= (8 + 6) \text{cm}^2 \\ &= 14 \text{cm}^2\end{aligned}$$

Exercise 14.3

1. Find the area of rectangle whose length and breadth are :

(a) length = 12 cm, breadth = 8 cm

$$\text{Area of rectangle} = (12 \times 8) \text{cm}^2 = 96 \text{cm}^2$$

(b) length = 14 cm, breadth = 8 cm

$$\text{Area of rectangle} = (14 \times 8) \text{cm}^2 = 112 \text{cm}^2$$

(c) length = 25 cm, breadth = 16 cm

$$\text{Area of rectangle} = (25 \times 16) \text{cm}^2 = 400 \text{cm}^2$$

(d) length = 12.6 m, breadth = 9 m

$$\text{Area of rectangle} = (12.6 \times 9) \text{m}^2 = 113.4 \text{m}^2$$

2. Find the area of a square whose side is :

- (a) Side = 13 cm

$$\text{Area of square} = (13 \times 13) \text{ cm}^2 = 169 \text{ cm}^2$$

- (b) Side = 25 cm

$$\text{Area of square} = (25 \times 25) \text{ cm}^2 = 625 \text{ cm}^2$$

- (c) Side = $10\frac{1}{2} \text{ m} = \frac{21}{2} \text{ m} = 10.5 \text{ m}$

$$\text{Area of square} = (10.5)^2 \text{ m}^2 = 110.25 \text{ m}^2$$

- (d) Side = 4 m 50 cm or 4.50 m

$$\text{Area of square} = (4.5 \times 4.5) \text{ m}^2 = 20.25 \text{ m}^2$$

3. Find the area of rectangles with following dimensions and see which one has the greater area.

- (a) $l = 10 \text{ m } 10 \text{ cm or } 10.10 \text{ m}$ $b = 3 \text{ m } 30 \text{ cm or } 3.3 \text{ m}$

$$\text{Area} = (10.10 \times 3.3) \text{ m}^2 = 33.33 \text{ m}^2$$

- (b) $l = 14 \text{ m } 25 \text{ cm or } 14.25 \text{ m}$ $b = 2 \text{ m } 30 \text{ cm or } 2.30 \text{ m}$

$$\text{Area} = (14.25 \times 2.30) \text{ m}^2 = 32.775 \text{ m}^2$$

- (c) $l = 8 \text{ m } 45 \text{ cm or } 8.45 \text{ m}$ $b = 6 \text{ m } 25 \text{ cm or } 6.25 \text{ m}$

$$\text{Area} = (8.45 \times 6.25) \text{ m}^2 = 52.8125 \text{ m}^2$$

So, area of rectangle C is greater.

4. Area of rectangle = 900 m^2

$$\text{Length} = 50 \text{ m}$$

$$\text{Area} = \text{length} \times \text{breadth}$$

$$900 \text{ m}^2 = 50 \text{ m} \times \text{breadth}$$

$$\text{breadth} = \frac{900 \text{ m}^2}{50 \text{ m}} = 18 \text{ m}$$

$$\text{Perimeter} = 2(50 + 18) = 2 \times 68 = 136 \text{ cm}$$

5. Length of room = 10 m

$$\text{Breadth of room} = 8 \text{ m}$$

$$\text{Area} = 10 \times 8 \text{ m}^2 = 80 \text{ m}^2$$

$$\text{Cost of carpeting the room} = ₹ 80 \times 135 = ₹ 10800$$

6. Length of a paper sheet = 300 cm

$$\text{Breadth of a paper sheet} = 150 \text{ cm}$$

$$\text{Area} = 300 \times 150 = 45000 \text{ cm}^2$$

Length of envelopes from small sheets = 10 cm

Breadth of envelopes from small sheets = 3 cm

$$\text{Area} = 10 \times 3 \text{ cm}^2 = 30 \text{ cm}^2$$

$$\text{Number of envelopes made from big sheet} = \frac{45000}{30} = 1500$$

7. Length of a stick = 1 m = 100 cm

$$\text{Area of square} = 625 \text{ m}^2$$

New length of stick = 90 cm

Let length of stick 100 cm Original area = 625

$$\text{Let length of stick 1 cm original area} = \frac{625}{100}$$

$$\text{Length of stick 90 cm of original area} = \frac{625}{100} \times 90 = 562.5 \text{ m}^2$$

8. Length of a room = 17 m

Breadth of a room = 10 m

$$\text{Area of a room} = 17 \times 10 = 170 \text{ m}^2$$

Side of square carpet = 12 m

$$\text{Area of carpet} = 12 \times 12 \text{ m}^2 = 144 \text{ m}^2$$

$$\begin{aligned} \text{Area of the floor which will remain bare} &= (170 - 144) \text{ m}^2 \\ &= 26 \text{ m}^2 \end{aligned}$$

9. Length of a field = 60 m

Breadth of a field = 40 m

$$\text{Area} = (60 \times 40) \text{ m}^2 = 2400 \text{ m}^2$$

$$\text{Cost of ploughing} = ₹ 2400 \times 25 = ₹ 60000$$

10. Length of drawing room = 5 m 40 cm = 5.40 m

breadth of drawing room = 4 m 10 cm or 4.10 m

$$\text{Area of room} = (5.40 \times 4.10) \text{ m}^2 = 22.14 \text{ m}^2$$

$$\text{Cost of carpet} = ₹ 22.14 \times 325 = ₹ 7195.5$$

11. Side of the square = 24 m

$$\text{Area of square} = (24 \times 24) \text{ m}^2 = 576 \text{ m}^2$$

A rectangle and a square are equal in area.

$$\text{Area of rectangle} = 576 \text{ m}^2 \quad \text{length} \times \text{breadth} = 576$$

$$36 \times \text{breadth} = 576 \quad \text{breadth} = \frac{576}{36} = 16$$

$$\text{breadth of rectangle} = 16 \text{ m}$$

$$\text{given, length of rectangle} = 36 \text{ m}$$

$$\text{Perimeter of rectangle} = 2(16 + 36) = 104 \text{ m.}$$

$$\text{Perimeter of square} = 4 \times 24 \text{ m} = 96 \text{ m}$$

12. Length of rectangular field = 34 m 20 cm = 34.20 m

$$\text{Breadth of rectangular field} = 16 \text{ m } 30 \text{ cm} = 16.30 \text{ m}$$

$$\text{Perimeter} = 2(34.20 + 16.30) = 2 \times 50.50 \text{ m} = 101 \text{ m}$$

$$\text{Area} = (34.20 \times 16.30) \text{ m}^2 = 557.46 \text{ m}^2$$

$$\text{Cost of fencing} = ₹ 101 \times 40 = ₹ 4040$$

$$\text{Cost of turfing} = ₹ 557.46 \times 21 = ₹ 11706.66$$

13. Let side of square be x cm

$$\text{Area of square} = x \times x = x^2 \text{ cm}^2$$

$$\text{Now, new side of square will be} = 2x \text{ cm}$$

$$\text{and new area} = (2x)^2 \text{ cm}^2 = 4x^2 \text{ cm}^2 = 4 \times x^2 \text{ cm}^2$$

We can say that area becomes 4 times.

14. Length of a ground = 45 m

$$\text{Breadth of a ground} = 30 \text{ m}$$

$$\text{Area} = l \times b = 45 \times 30 = 1350 \text{ m}^2$$

$$\text{Cost of leveling a ground} = ₹ 1350 \times 12 = ₹ 16200$$

15. Calculate the area of each one of the shaded regions split into rectangles :

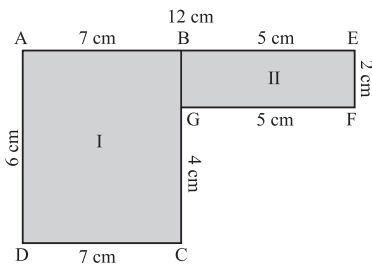
- (a) Two rectangle in the figure

$ABCD$ and $BGFE$

$$\begin{aligned} \text{Area of } ABCD &= 7 \times 6 \text{ cm}^2 \\ &= 42 \text{ cm}^2 \end{aligned}$$

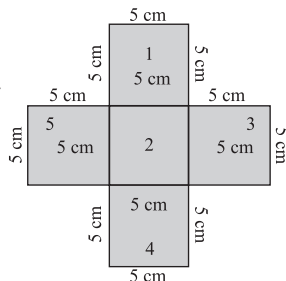
$$\begin{aligned} \text{Area } BGFE &= 5 \times 2 \text{ cm}^2 \\ &= 10 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total Area} &= (42 + 10) \text{ cm}^2 \\ &= 52 \text{ cm}^2 \end{aligned}$$



- (b) 5 square in the figure
all sides are equal in 5 squares
The area of first square $= 5 \times 5 \text{ cm}^2$
 $= 25 \text{ cm}^2$

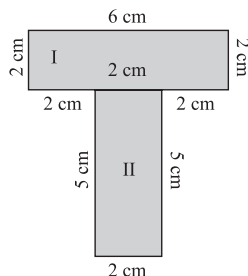
$$\begin{aligned}\text{Area of figure} &= 25 \times 5 \\ &= 625 \text{ cm}^2\end{aligned}$$



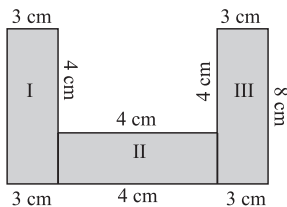
- (c) 2 rectangle in the figure
Area of I rectangle $= 6 \times 2 \text{ cm}^2$
 $= 12 \text{ cm}^2$

$$\begin{aligned}\text{Area of II rectangle} &= 5 \times 2 \text{ cm}^2 \\ &= 10 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of figure} &= 12 + 10 \text{ cm}^2 \\ &= 22 \text{ cm}^2\end{aligned}$$



- (d) 2 rectangle and 1 square in the figure



$$\text{Area of I rectangle} = 3 \times 8 \text{ cm}^2 = 24 \text{ cm}^2$$

$$\text{Area of II square} = 4 \times 4 \text{ cm}^2 = 16 \text{ cm}^2$$

$$\text{Area of III rectangle} = 3 \times 8 \text{ cm}^2 = 24 \text{ cm}^2$$

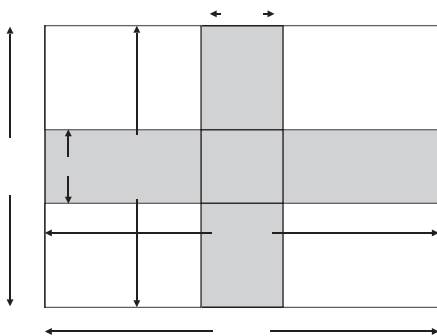
$$\text{Area of figure} = 24 + 16 + 24 = 64 \text{ cm}^2$$

MCQs

- | | | | |
|--------|--------|--------|--------|
| 1. (d) | 2. (d) | 3. (c) | 4. (a) |
| 5. (c) | 6. (b) | 7. (b) | 8. (c) |

BRAIN BOOSTER

1.



$$\begin{aligned} \text{Area of } ABCD &= AB \times AC & (AB = CD; AC = BD) \\ &= 40 \times 2 = 80 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of } PQRS &= PQ \times PR & (PR = QS; PQ = RS) \\ &= 60 \times 2 = 120 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of } LMNO \text{ square} &= 2 \text{ m} \times 2 \text{ m} & (LM = MO = ON = NL) \\ &= 4 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of path} &= (80 + 120 - 4) \text{ m}^2 \\ &= 200 - 4 \text{ m}^2 = 196 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of remaining part} &= (2400 - 196) \text{ m}^2 \\ &= 2204 \text{ m}^2 \end{aligned}$$

2. A farmer ploughed field in 1 day = 1 acres or 100 m^2
 or he ploughed 100 m^2 field = in 1 day
 or he ploughed 300 m^2 field = in $1 \times \frac{1}{100} \times 300 = 3$ days

3. Number of side of pentagon = 5

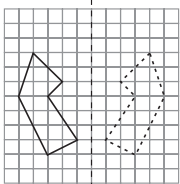
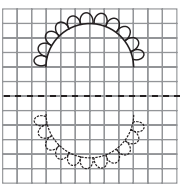
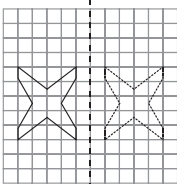
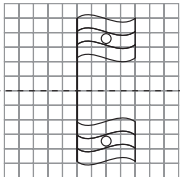
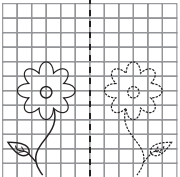
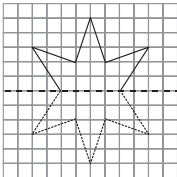
$$\text{Perimeter of pentagon} = 9 \times 5 = 45 \text{ m}$$

$$\text{Speed} = 7 \text{ m per min}$$

$$\begin{aligned} \text{Time taken to complete one round of pentagon} &= 45 \div 7 \\ &= 6.428 \text{ min.} \end{aligned}$$

4. As B square is covering more space than that covered by A . So, area of square A is less than the area of square B .

Exercise 15.1

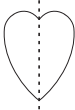
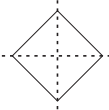

1. (a)  (b)  (c) 
- (d)  (e)  (f) 

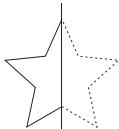
2. **B, M, S, W**

No Symmetry.

3. Fill in the blanks :

- (a) A square has **4** lines of symmetry.
 (b) A **circle** has unlimited number of lines of symmetry.
 (c) A **scalene** triangle has no line of symmetry.
 (d) The letter 'X' has **2** lines of symmetry.

4. (a)  (b)  (c) 

5. (a)  (b) 

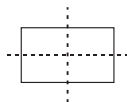
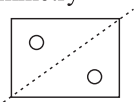
6. (a) 1 Symmetry (b) 4 Symmetry

7. Door, leaf, books, table and scale are symmetrical objects from our surroundings.

8. Take a piece of paper and fold it in half. Open it and spill a few drops of ink or water colour on one-half side. Now press the two halves together and open it again. What do you observe?

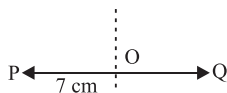
- (a) Yes, there is any symmetry (b) in the pattern formed.

symmetry

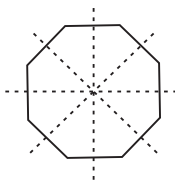
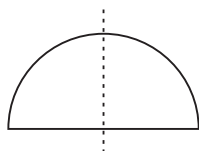
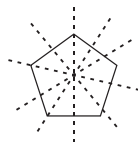
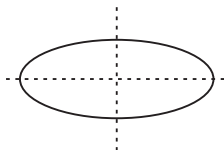
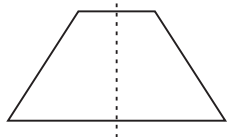


(c) No, there is not any other line of symmetry in the figure.

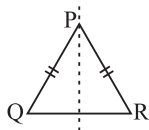
9.



10.



11.



12. Lady birds, butterfly, square, circle and human face.

Multiple Choice Questions

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