1 Our Number System

Exercise 1.1

1. Correct numbers are:
   (a) 7,582; seven thousand five hundred eighty-two
   (b) 2,08,690; two lakh eight thousand six hundred ninety
   (c) 81,479: eighty-one thousand four hundred seventy-nine
   (d) 6,81,295: six lakh eighty-one thousand two hundred ninety-five
2. The place value of the underlined digit in:
   (a) 58$\underline{3}$92 is 300. (b) 6,01,$\underline{7}$53 is 700.
   (c) 2,$\underline{9}$7,286 is 90,000. (d) 81,42$\underline{7}$ is 7.
3. (a) Comparing the digits of 758 and 578, we find that the hundreds place digits $7 > 5$.
   $\therefore$ $758 > 578$
   (b) Comparing the digits in the numbers 2896 and 2899, we find that the ones place digits $6 < 9$.
   $\therefore$ $2896 < 2899$
   (c) Comparing the digits in the numbers 10254 and 10154, we find that the hundreds place digits $6 < 9$.
   $\therefore$ $10254 > 10154$
   (d) Comparing the digits in the numbers 58130 and 58131, we find that the ones place digits $0 < 1$.
   $\therefore$ $58130 < 58131$
   (e) Comparing the digits in the numbers 901760 and 896015, we find that the lakhs place digits $9 > 8$.
   $\therefore$ $901760 > 896015$
   (f) Comparing the digits in the numbers 5692 and 18983, we find that 5692 is a 4-digit number and 18983 is a 5-digit number. A 4-digit number is always smaller than a 5-digit number.
   $\therefore$ $5692 < 18983$
4. (a) We write the numbers in the place-value chart.

L	T Th	Th	H	T	O
		2	9	8	5
	5	6	2	8	0
4	3	6	9	0	5
	9	5	0	7	6

From the place-value chart, observe that 2985 < 56280 < 95076 < 436905. This is the ascending order of the given numbers.

(b) We write the numbers in the place-value chart.

L	T Th	Th	H	T	O
	1	2	7	5	2
		9	0	1	5
	3	7	8	2	5
	3	7	2	8	5

From the place-value chart, observe that 9015 < 12752 < 37285 < 37825. This is the ascending order of the given numbers.

5. (a) We write the numbers in the place-value chart.

L	T Th	Th	H	T	O
	9	0	1	7	6
	2	5	8	9	5
	2	8	9	5	2
	2	5	8	9	6

From the place-value chart, observe that 90176 > 28952 > 25896 > 25895. This is the descending order of the given numbers.

(b) We write the numbers in the place-value chart.

L	T Th	Th	H	T	O
	8	3	7	6	9
	9	3	7	8	6
	9	3	8	7	6
	8	7	3	6	9

From the place-value chart, observe that 93876 > 93786 > 87369 > 83769. This is the descending order of the given numbers.

6. (a) To form the greatest number, we write the given digits in descending order. Thus, the greatest number is 78210.

To form the smallest number, we write the given digits in ascending order. Thus, the smallest number is 10278.

(b) To form the greatest number, we write the given digits in descending order. Thus, the greatest number is 75210.

To form the smallest number, we write the given digits in ascending order. Thus, the smallest number is 10275.

7. The greatest 5-digit number = 99999

The smallest 6-digit number = 100000

Their difference = 100000 – 99999 = 1.

8. The given number is 873962.
   Place value of 7 = 70000 and its face value = 7.
   Required difference = 70000 – 7 = 69993.
9. The given number is 487306.
   Place value of 8 = 80000 and place value of 3 = 300.
   Required sum = 80000 + 300 = 80300.
10. The required 6-digit number is 999996.

Exercise 1.2

1. The successor of a number is the number just after it.
   (a) Successor of 1,78,645 = 1,78,645 + 1 = 1,78,646.
   (b) Successor of 7,90,000 = 7,90,000 + 1 = 7,90,001.
   (c) Successor of 15,99,999 = 15,99,999 + 1 = 16,00,000.
   (b) Successor of 4,44,100 = 4,44,100 + 1 = 4,44,101.
2. The predecessor of a number is the number just after it.
   (a) Predecessor of 10,00,000 = 10,00,000 – 1 = 9,99,999.
   (b) Predecessor of 6,45,999 = 6,45,999 – 1 = 6,45,998.
   (c) Predecessor of 70,300 = 70,300 – 1 = 70,299.
   (b) Predecessor of 45,000 = 45,000 – 1 = 44,999.
3. The numbers in the Indian place-value chart are written as:

	Crores		**Lakhs**		**Thousands**		**Ones**		
	T C	**C**	**T L**	**L**	**T Th**	**Th**	**H**	**T**	**O**
(a)			4	8	1	7	6	9	2
(b)		2	0	7	1	9	5	8	8
(c)	7	9	8	1	6	5	4	2	3

4. The numbers in the Indian place-value chart are written as:

	Millions		**Thousands**			**Ones**		
	T M	**M**	**H Th**	**T Th**	**Th**	**H**	**T**	**O**
(a)		3	8	9	0	6	1	7
(b)		8	9	0	0	7	9	3
(c)	2	5	1	6	7	8	2	6

5. The number name for:
   (a) 7,45,381 is seven lakh forty-five thousand three hundred eighty-one.
   (b) 80,09,407 is eighty lakh nine thousand four hundred seven.
   (c) 8,60,00,970 is eight crore sixty lakh nine hundred seventy.

6. The numbers in words are:
   (a) 68,580,276: sixty-eight million five hundred eighty thousand two hundred seventy-six
   (b) 987,850: nine hundred eighty-seven thousand eight hundred fifty
   (c) 6,287,700,738: six billion two hundred eighty-seven million seven hundred thousand seven hundred thirty-eight
7. The expanded form of:
   (a) 784296 = 7,84,296 = 7 × 1,00,000 + 8 × 10,000 + 4 × 1,000 + 2 × 100 + 9 × 10 + 6 × 1
   (b) 2786903 = 27,86,903 = 2 × 10,00,000 + 7 × 1,00,000 + 8 × 10,000 + 6 × 1,000 + 9 × 100 + 6 × 1
   (c) 80276953 = 8,02,76,953 = 8 × 1,00,00,000 + 2 × 1,00,000 + 7 × 10,000 + 6 × 1,000 + 9 × 100 + 5 × 10 + 3 × 1
   (d) 479452000 = 47,94,52,000 = 4 × 10,00,00,000 + 7 × 1,00,00,000 + 9 × 10,00,000 + 5 × 10,000 + 2 × 1,000
8. The required numeral is:
   (a) 5,05,950 (b) 7,00,02,890 (c) 68,19,14,785
   (d) 9,050,086 (e) 640,217,865
9. The standard form:
   (a) is 70,60,830 (b) 50,30,271 (c) 2,84,52,058
   (d) 70,00,057 (e) 20,00,030
10. (a) Comparing the ones place digits of the given numbers, we find that $0 < 1$.
    $\therefore$ 7,85,290 < 7,85,291
    (b) Comparing the hundreds place digits of the given numbers, we find that $8 < 9$.
    $\therefore$ 897,572 < 987,756
    (c) Comparing the given numbers, we find that both of them are equal.
    $\therefore$ 2,37,45,487 = 23,745,487
    (d) Comparing the given numbers, we find that both of them are equal.
    $\therefore$ 96,45,37,820 = 964,537,820

Exercise 1.3

1. To round off a number to the nearest ten, we consider the ones place digit. If it is 5 or more, then the tens place digit is increased by 1 and ones place digit becomes 0. The other digits remains the same. Following it, the number:
   (a) 294 to the nearest ten is rounded off to 290.
   (b) 48 to the nearest ten is rounded off to 50.
   (c) 7962 to the nearest ten is rounded off to 7960.
   (d) 57335 to the nearest ten is rounded off to 57340.

2. To round off a number to the nearest hundred, we consider the tens place digit. If it is 5 or more, then the hundreds place digit is increased by 1. The ones and tens place digits become 0. The other digits remains the same. Following it, the number:
   (a) 453 to the nearest hundred is rounded off to 500.
   (b) 4724 to the nearest hundred is rounded off to 4700.
   (c) 18215 to the nearest hundred is rounded off to 18200.
   (d) 91262 to the nearest hundred is rounded off to 91300.
3. To round off a number to the nearest thousand, we consider the hundreds place digit. If it is 5 or more, then the thousands place digit is increased by 1. The ones, tens and hundreds place digits become 0. The other digits remains the same. Following it, the number:
   (a) 6828 to the nearest thousand is rounded off to 7000.
   (b) 895 to the nearest thousand is rounded off to 1000.
   (c) 38495 to the nearest thousand is rounded off to 38000.
   (d) 27521 to the nearest thousand is rounded off to 28000.
4. To round off a number to the nearest ten thousand, we consider the thousands place digit. If it is 5 or more, then the ten thousands place digit is increased by 1. The ones, tens, hundreds and thousands place digits become 0. The other digits remains the same. Following it, the number:
   (a) 21523 to the nearest ten thousand is rounded off to 22000.
   (b) 45421 to the nearest ten thousand is rounded off to 45000.
   (c) 46830 to the nearest ten thousand is rounded off to 47000.
   (d) 165754 to the nearest ten thousand is rounded off to 170000.
5. Rounding off the given numbers to the nearest thousand, we get
   42632 = 43000, 52350 = 52000 and 14585 = 15000.
   $\therefore$ Estimated sum = 43000 + 52000 + 15000 = 110000.
6. Rounding off the given numbers to the nearest thousand, we get
   45234 = 45000 and 54645 = 55000.
   $\therefore$ Estimated difference = 55000 – 45000 = 10000.
   Actual difference = 54645 – 45234 = 9411.
7. Rounding off the given numbers to the nearest thousand:
   (a) 2542 + 572 = 3000 + 1000 = 4000.
   (b) 1546 + 2342 + 1232 = 2000 + 2000 + 1000 = 5000.
   (c) 9570 – 4524 = 10000 – 5000 = 5000.
   (d) 952 – 423 = 1000 – 0 = 1000.
8. Rounding off the given numbers to their greatest value and multiplying, we get:
   (a) 949 × 326 = 900 × 300 = 270000.
   (b) 52 × 432 = 50 × 400 = 2000.

(c) $592 \times 334 = 600 \times 300 = 240000$.

(d) $942 \times 99 = 900 \times 100 = 90000$.

9. Rounding off the given numbers to their greatest value and dividing, we get:

(a) $77 \div 25 = 80 \div 30 = 2$.

(b) $85 \div 23 = 90 \times 20 = 4$.

(c) $91 \div 25 = 90 \div 30 = 3$.

(d) $5204 \div 54 = 5000 \div 50 = 100$.

10. Total quantity of rice = 942 kg

Quantity of rice sold in one day = 52 kg

Quantity of rice sold in 6 days = $52 \times 6 = 312$ kg

Quantity of rice left unsold = 942 kg – 312 kg = 630 kg.

$\therefore$ Quantity of rice left unsold to the nearest hundred = 600 kg.

Exercise 1.4

1. Number of students present = 2976

Number of students absent = 289

Number of students on leave = 48

$\therefore$ Total number of students = 2976 + 289 + 48 = 3313.

Value shown by students on leave is discipline as they informed about it earlier.

2. Number of mango trees planted = 1732

Number of Ashoka trees planted = 895

Number of tulsi trees planted = 680

Number of neem trees planted = 705

$\therefore$ Total number of trees planted = 1732 + 895 +680 + 705 = 4012.

Value shown by planting trees is to clean environment.

3. Amount of money in Vivek's account = ₹ 25,87,309

Amount of money withdrawn by him = ₹ 23,70,104

Amount of money each child got = ₹ 23,70,104 ÷ 2 = ₹ 11,85,052.

Hence, the share of each child is ₹ 11,85,052.

Value shown by Vivek is equality between boy and girl.

4. Total number of books sold in the exhibition = 786 + 1007 + 987 + 1210 + 906 = 4896.

Hence, 4896 books were sold in the book exhibition.

Reading books is important because they are improve our concentration and memory.

5. The seating capacity of the bus = 52

Number of buses needed to take 560 students = 560 ÷ 52

Estimated number of buses needed = 600 ÷ 50 = 12.

Hence, estimated number of buses required to take 560 students is 12.

6. The number of girls enrolled in year 2014 = 1156
The number of girls enrolled in year 2012 = 778
The difference of number of girls enrolled in two years = 1156 – 778
Estimated difference of number of girls enrolled in two years = 1200 – 800 = 400.
The thinking of people in the society about education of girls is increasing.

Exercise 1.5

1. The Roman numeral for:
   (a) 56 = 50 + 6 = L + VI = LVI.
   (b) 329 = 300 + 20 + 9 = CCC + XX + IX = CCCXXIX.
   (c) 434 = 50 + 6 = 400 + 30 + 4 = CD + L + VI = CDLVI.
   (d) 280 = 200 + 50 + 30 = CC + L + XXX = CCLXXX.
   (e) 478 = 400 + 50 + 20 + 8 = CD + L + XX + VIII = CDLXXVIII.
   (f) 306 = 300 + 6 = CCC + VI = CCCVI.
   (g) 76 = 50 + 20 + 6 = L + XX + VI = LXXVI.
   (h) 115 = 100 + 10 + 5 = C + X + V = CXV.
   (i) 97 = 50 + 40 + 7 = L + XL + VII = LXLVII.
   (j) 1001 = 1000 + 1 = M + I = MI.
   (k) 297 = 200 + 50 + 40 + 7 = CC + L + XL + VII = CCLXLVII.
   (l) 119 = 100 + 10 + 9 = C + X + IX = CXIX.
2. The Hindu-Arabic numeral for:
   (a) LVI = L + VI = 50 + 6 = 56.
   (b) CCLXXIII = CC + L + XX + III = 200 + 50 + 20 + 3 = 273.
   (c) MDCLV = M + D + C + L + V = 1000 + 500 + 100 + 50 + 5 = 1655.
   (d) CCLXI = CC + L + X + I = 200 + 50 + 10 + 1 = 261.
   (e) DXXI = D + XX + I = 500 + 20 + 1 = 521.
   (f) CLXI = C + L + X + I = 100 + 50 + 10 + 1 = 161.
   (g) CCCLX = CCC + L + X = 300 + 50 + 10 = 360.
   (h) XCV = XC + V = 90 + 5 = 995.
3. (a) LXII = 62 and LXI = 61.
   As 62 > 61, so LXII > LXI.
   (b) XCI = 91 and XCII = 92.
   As 91 < 92, so XCI < XCII.
   (c) XCVI = 96 and XCIV = 94
   As 96 > 94, so XCVI > XCIV.

(d) XXXIX = 39 and XL = 40

As 39 < 40, so XXXIX < XL.

4. (a) XXV + VIII = 25 + 8 = 33 = XXXIII.

(b) XL + IV = 40 + 4 = 44 = XLIV.

(c) XL + XX = 40 + 20 = 60 = LX.

(d) XCII – X = 92 – 10 = 82.

(e) XC – X = 90 – 10 = 80.

(f) LXXX – L = 80 – 50 = 30 = XXX.

(g) CVIII – XCVIII = 108 – 98 = 10 = X.

(h) XVIII – III = 18 – 3 = 15.

5. 139 = CXXXIX, 270 = CCLXX, 49 = XLIX and 32 = XXXII

Hence, (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv)

Multiple Choice Questions

1. At the ones place both face value and place value of a digit are always same.

Thus, the correct option is (a).

2. The 3-digit number formed using 5, 6 and 0 are: 506 and 605. So, two numbers can be formed.

Thus, the correct option is ~~(a)~~.

3. The millions period consists of ones, thousands and millions.

Thus, the correct option is (c).

4. The required greatest 5-digit number is 75480.

Thus, the correct option is (c).

5. The place value of a digit increases 10 times when we move from right to left.

Thus, the correct option is (b).

6. The required 4-digit number is 8732.

Thus, the correct option is (a).

7. The sum of the place values of all digits of 7010 is 7000 + 0 + 10 + 0 = 7010.

Thus, the correct option is (a).

8. The place of the underlined digit in 74<u>3</u>296 is thousands.

Thus, the correct option is (c).

9. The required greatest 4-digit number formed is 6332.

Thus, the correct option is (c).

10. Place value and face value of 5 in 35729 are respectively 5000 and 5.

Their difference = 5000 – 5 = 4995.

Thus, the correct option is (b).

Mental Maths

1. The required smallest 3-digit number is 101.
2. We write 1 million as 1,000,000. Thus 1,000 thousands make a million.
3. The natural numbers start with 1 while the whole numbers start with 0. Thus, whole number zero (0) is not a natural number.
4. We write one lakh as 1,00,000. Thus, there are 10 ten thousands in 1 lakh.
5. The face value and place value of the underlined digit in 497682 are same, i.e., 2. Thus, the required difference is 2 – 2 = 0.
6. The required smallest 3-digit number having 9 at its ones place is 109.
7. The numbers expressed in words are called number names.
8. The smallest natural number is 1.
9. The number 44 cannot be rounded off to 50.
10. There are nine 1-digit numbers in all.

HOTS (Higher Order Thinking Skills)

1. In the number 148__7, the missing digit at the tens place must be 6 because 60 – 7 = 53.
2. The 2-digit numbers having 1 as a digit are 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 31, 41, 51, 61, 71, 81, and 91. These are eighteen numbers. Thus, the 1 occurs eighteen times in 2-digit numbers.
3. (a) The numbers 3494 and 3695 are rounded off to 3500 and 3700 respectively.
   (b) The numbers 49 and 63 are rounded off to 50 and 60 respectively.
   (c) The numbers 7854 and 7845 are rounded off to 7850 and 7850 respectively.
   The pair of numbers in part (c) rounded off to the same number.

Chapter Test

1. The number 2748560 in the Indian system of numeration is written as 27,48,560. The place value of the underlined digit is 7,00,000, i.e., 7 lakh.
   The number 2748560 in the International system of numeration is written as 2,748,560. The place value of the underlined digit is 700,000 , i.e., 7 hundred thousands.
2. In the Indian system of numeration, every period has two digits except the ones period which has three digits. Thus, 75028169 in this system is written as 7,50,28,169.
   In the International system of numeration, every period has three digits. Thus, 75028169 in this system is written as 75,028,169.
3. We write the numbers in the place-value chart.

T Th	Th	H	T	O
7	8	1	0	6
7	8	0	1	6
7	9	4	5	2
	9	9	9	9

From the table we observe that 9999 < 78016 < 78106 < 79452 which is the ascending order of the numbers.

4. The given digits are 6, 0, 1, 9, 8 and 5.
   The largest number formed with these digits = 986510.
   The smallest number formed with these digits = 105689.
   Difference between the number formed = 9,86,510 – 1,05,689 = 8,80,821.
5. The place value of 9 in 19,68,072 = 9,00,000
   The face value of 9 in 19,68,072 = 9
   Difference between the place value and face value = 9,00,000 – 9 = 8,99,991.
6. (a) The successor of 7,01,800 is 7,01,800 + 1 = 7,01,801.
   (b) The predecessor of 40,000 is 40,000 – 1 = 39,999.
7. The consecutive odd number succeeding 70037 = 70037 + 2 = 70039.
   The consecutive odd number succeeding 70039 = 70039 + 2 = 70041.
   The consecutive odd number succeeding 70041 = 70041 + 2 = 70043.
   Thus, the three consecutive odd numbers succeeding 70037 are: 70039, 70041 and 70043.
8. The largest 3-digit number = 999
   The largest 2-digit number = 99
   Number of 3-digit numbers = 999 – 99 = 900.
9. Rounding off:
   (a) 48176 to the nearest ten, we get 48180.
   (b) 97164 to the nearest hundred, we get 97200.
   (c) 817956 to the nearest thousand, we get 818000.
10. Estimating to the nearest hundred:
   (a) 45176 – 28172 = 45200 – 28800 = 16400.
   (b) 942683 + 432 = 942700 + 400 = 943100.
11. The Roman numeral for:
   (a) 382 = CCCLXXXII.
   (b) 99 = XCIX.
   (c) 513 = DXIII.
12. The Hindu-Arabic numeral for:
   (a) CLVI = 156
   (b) LXXI = 71
   (c) DVII = 507.

2 Playing with Numbers

Exercise 2.1

1. Applying the DMAS rule and simplifying, we get:

(a) $7 + 9 - 6 = 16 - 6 = 10$. [First add and then subtract.]

(b) $128 + 315 - 208 = 443 - 208 = 235$. [First add and then subtract.]

(c) $76 + 82 - 72 + 13 = 76 + 82 + 13 - 72$ [Arranging the numbers]

$= 171 - 72$. [Adding]

$= 99$. [Subtracting]

(d) $2381 - 746 + 4151 - 2073$

$= 2381 + 4151 - 746 - 2073$ [Arranging the numbers]

$= 6532 - 746 - 2073$ [Adding positive numbers]

$= 6532 - 2819 = 3713$. [Adding negative numbers and subtracting]

(e) $256 - 180 - 54 + 70 = 326 - 234$ [Adding positive and negative numbers separately]

$= 92$. [Subtracting]

(f) $40 + 60 - 60 - 40 = 100 - 100$ [Adding positive and negative numbers separately]

$= 0$. [Subtracting]

Exercise 2.2

Applying the BODMAS rule and simplifying, we get:

1. $15 + [7 + \{(3 + 7) - 4\}]$

$= 15 + [7 + \{10 - 4\}]$

$= 15 + [7 + 6]$

$= 15 + 13 = 28$.

2. $82 - [7 + \{15 - 7 \div 7\}]$

$= 82 - [7 + \{15 - 1\}]$

$= 82 - [7 + 14]$

$= 82 - 21 = 61$.

3. $20 \div (8 \text{ of } 2 + 6 - 3)$

$= 20 \div (8 \times 2 + 6 - 3)$

$= 20 \div (16 + 6 - 3)$

$= 20 \div (22 - 3)$

$= 20 \div 19 = 1\frac{1}{19}$.

4. $75 \div [30 - \{40 \div 8 - (15 - 3 \text{ of } 5)\}]$

$= 75 \div [30 - \{40 \div 8 - (15 - 15)\}]$

$= 75 \div [30 - \{40 \div 8 - 0\}]$

$= 75 \div [30 - \{5 - 0\}]$

$= 75 \div [30 - 5] = 75 \div 25 = 3$.

5. $250 - [170 - \{18 - (10 - 4 - 2)\}]$

$= 250 - [170 - \{18 - (10 - 6)\}]$

$= 250 - [170 - \{18 - 4\}]$

$= 250 - [170 - 14] = 250 - 156 = 94$.

6. $(15 + 25) \text{ of } 4 + 10 \times 5 - 12$

$= 40 \text{ of } 4 + 10 \times 5 - 12$

$= 40 \times 4 + 10 \times 5 - 12$

$= 160 + 50 - 12 = 210 - 12 = 198$.

7. $28 \times 12 \div 6 - 18 \times 4 \div \frac{9}{3}$ of 12
$= 28 \times 12 \div 6 - 18 \times 4 \div 3 \times 12$
$= 28 \times 2 - 18 \times 4 \div 3 \times 12$
$= 28 \times 2 - 72 \div 36$
$= 56 - 2 = 54.$

8. $(4 \text{ of } 4 + 8) \div 6 - 28 \div 7$
$= (4 \times 4 + 8) \div 6 - 28 \div 7$
$= (16 + 8) \div 6 - 28 \div 7$
$= 24 \div 6 - 28 \div 7$
$= 4 - 4 = 0.$

9. $15 + [8 - (6 + 2) - \overline{7 - 3}]$
$= 15 + [8 - (6 + 2) - 4]$
$= 15 + [8 - 8 - 4]$
$= 15 + [-4] = 15 - 4 = 11.$

10. $15 + [45 - \{18 + (15 \div 5)\}]$
$= 15 + [45 - \{18 + 3\}]$
$= 15 + [45 - 21]$
$= 15 + 24 = 39.$

11. $(6 + 12) \div 6 + 20 \div 5 \text{ of } 4$
$= 18 \div 6 + 20 \div 5 \text{ of } 4$
$= 18 \div 6 + 20 \div 5 \times 4$
$= 3 + 1 = 4.$

12. $[8 \times (17 - 2) + 20 \times 3] \div \{10 \times (7 - 4) - 10\}$
$= [8 \times 15 + 20 \times 3] \div \{10 \times 3 - 10\}$
$= [120 + 60] \div \{30 - 10\}$
$= 180 \div 20 = 9.$

Exercise 2.3

1. (a) $4 = 1 \times 4 = 2 \times 2$
Thus, the factors of 4 are 1, 2 and 4.
(b) $9 = 1 \times 9 = 3 \times 3$
Thus, the factors of 9 are 1, 3 and 9.
(c) $18 = 1 \times 18 = 2 \times 9 = 3 \times 6$
Thus, the factors of 18 are 1, 2, 3, 6, 9 and 18.
(d) $24 = 1 \times 24 = 2 \times 12 = 3 \times 8 = 4 \times 6$
Thus, the factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24.
(e) $72 = 1 \times 72 = 2 \times 36 = 3 \times 24 = 4 \times 18 = 6 \times 12 = 8 \times 9$
Thus, the factors of 72 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36 and 72.

2. (a) The first five multiples of 8 are: 8×1, 8×2, 8×3, 8×4, and 8×5
Thus, the five multiples of 8 are: 8, 16, 24, 32 and 40.
(b) The first five multiples of 3 are: 3×1, 3×2, 3×3, 3×4, and 3×5
Thus, the five multiples of 8 are: 3, 6, 9, 12 and 15.
(c) The first five multiples of 11 are: 11×1, 11×2, 11×3, 11×4, and 11×5
Thus, the five multiples of 11 are: 11, 22, 33, 44 and 55.
(d) The first five multiples of 25 are: 25×1, 25×2, 25×3, 25×4, and 25×5
Thus, the five multiples of 25 are: 25, 50, 75, 100 and 125.
(e) The first five multiples of 50 are: 50×1, 50×2, 50×3, 50×4, and 50×5
Thus, the five multiples of 50 are: 50, 100, 150, 200 and 250.

3. The multiples of 8 are: 8 × 1, 8 × 2, 8 × 3, 8 × 4, 8 × 5, 8 × 6 , 8 × 7, 8 × 8, 8 × 9 , 8 × 10, 8 × 11, 8 × 12, 8 × 13, ...

   = 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, ...

   Thus, the multiples of 8 lying between 70 and 100 are: 72, 80, 88, and 96.

4. Factors of 7 = 1 and 7, i.e., 2 factors.

   Factors of 10 = 1, 2, 5 and 10, i.e., 4 factors.

   Factors of 12 = 1, 2, 3, 4, 6 and 12, i.e., 6 factors.

   Factors of 36 = 1, 2, 3, 4, 6, 9, 12, 18 and 36, i.e., 9 factors.

   Thus, the number 36 has the greatest number of factors.

5. (a) True

   (b) The smallest multiple of a number is the number itself, so the given statement is false.

   (c) 54 = 6 × 9, so 54 is a multiple of 6. Thus, the given statement is true.

   (d) 72 ÷ 4 = 18. As 72 is completely divisible by 4, so the given statement is true.

   (e) 9 is not completely divisible by 6. Thus, the given statement is false.

   (f) 24 ÷ 24 = 1. As 24 is completely divisible by 24, so the given statement is true.

   (g) 17 ÷ 17 = 1. As 17 is completely divisible by 17, so the given statement is true.

6. (a) — (iii), (b) — (i), (c) — (ii), (d) — (v), (e) — (iv)

Exercise 2.4

1. We know that ones place digit of an even number is either 0, 2, 4, 6, or 8. An odd number ends in 1, 3, 5, 7 or 9.

   (a) As ones place digit of 15 is 5, so it is an odd number.

   (b) As ones place digit of 171 is 1, so it is an odd number.

   (c) As ones place digit of 482 is 2, so it is an even number.

   (d) As ones place digit of 1007 is 7, so it is an odd number.

   (e) As ones place digit of 9786 is 6, so it is an even number.

2. Expressing the given numbers as the product of prime numbers, we get:

   (a) 50 = 2 × 5 × 5 (b) 24 = 2 × 2 × 2 × 3

   (c) 36 = 2 × 2 × 3 × 3 (d) 6 = 2 × 3

   (e) 8 = 2 × 2 × 2

3. Prime numbers:

   (a) less than 30 are: 2, 3, 5, 7, 11, 13, 17, 19, 23 and 29.

   (b) between 100 and 115 are: 101, 103, 107, 109 and 113.

   (c) from 150 to 200 are: 151, 157, 163, 167, 173, 179, 181, 191, 193, 197 and 199.

4. Multiples of 15 are: 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, ...

   Thus, the multiples of 15 between 100 and 200 are: 105, 120, 135, 150, 165, 180 and 195.

5. There is only one prime number, i.e., 2.
6. (a) Factors of 17 are: 1 and 17.
   Factors of 71 are: 1 and 71.
   As 1 is the common factor, so 17 and 71 are co-primes.
   (b) Factors of 15 are: 1, 3 and 5.
   Factors of 51 are: 1, 3 and 17.
   As 15 and 51 have more than one common factors, so they are co-primes.
7. The four pairs of co-primes are: (2, 3), (3, 8), (4, 7) and (4, 13).
8. There are six twin prime numbers pairs between 1 and 50. They are: (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), and (41, 43).
9. (a) The number 35 can be written as the sum of three odd prime numbers as:
   $35 = 17 + 13 + 5$.
   (b) The number 83 can be written as the sum of three odd prime numbers as:
   $83 = 23 + 29 + 31$.
   (c) The number 131 can be written as the sum of three odd prime numbers as:
   $131 = 5 + 53 + 73$.
   (d) The number 173 can be written as the sum of three odd prime numbers as:
   $173 = 53 + 59 + 61$.
10. Composite number between 70 and 100 are: 72, 74, 75, 76, 77, 78, 80, 81, 82, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96, 98 and 99.
    Thus, six required consecutive composite numbers between 70 and 100 are: 90, 91, 92, 93, 94, 95 and 96.
11. (a) 46 as the sum of two odd primes is: $43 + 3$ or $41 + 5$.
    (b) 70 as the sum of two odd primes is: $67 + 3$.
    (c) 100 as the sum of two odd primes is: $97 + 3$.
    (d) 18 as the sum of two odd primes is: $11 + 7$ or $13 + 5$.
12. (a) The smallest prime number is 2, so the given statement is false.
    (b) 2 is the only even prime number, so the given statement is true.
    (c) As every number is a multiple of 1, so the given statement is true.
    (d) A prime number has only two factors 1 and the number itself, so the given statement is true.
    (e) The sum of two prime numbers is always even, except 2. So the given statement is false.
    (f) The smallest composite number is 4, so the given statement is false.
    (g) The sum of two even number is always even, so the given statement is false.
    (h) Every natural number is either prime or composite, so the given statement is true.

Exercise 2.5

1. We know that a number is divisible by 4 if its last two digits are either zeros or the number formed by its last two digits is divisible by 4. Also a number is divisible by 8 if its last three digits are either zeros or the number formed by its last three digits divisible by 8.

   Using the above, we find that:

   (a) 7816 is divisible by 4 because the number formed by its last two digits, i.e., 16 is divisible by 4.

   Also, 7816 is divisible by 8 because the number formed by its last three digits, i.e., 816 is divisible by 8.

   (b) 109720 is divisible by 4 because the number formed by its last two digits, i.e., 20 is divisible by 4.

   Also, 109720 is divisible by 8 because the number formed by its last three digits, i.e., 720 is divisible by 8.

   (c) 14631 is not divisible by 4 because the number formed by its last two digits, i.e., 31 is not divisible by 4.

   Also, 14631 is not divisible by 8 because the number formed by its last three digits, i.e., 631 is divisible by 8.

   (d) 954000 is divisible by both 4 and 8.

   (e) 1500 is divisible by 4 because its last two digits are zeros. But it is not divisible by 8.

   (f) 391072 is divisible by both 4 and 8.

2. A number is divisible by 2 if it is an even number. Following this rule, we find that:

   (a) 450 is divisible by 2. (b) 86139 is not divisible by 2.

   (c) 81278 is divisible by 2. (d) 300212 is divisible by 2.

3. A number is divisible by 3 and 9 if the sum of its is divisible by 3 and 9 respectively. Following this rule, we find that:

   (a) sum of digits of 14762 = 1 + 4 + 7 + 6 + 2 = 20, which is neither divisible by 3 nor by 9. Thus, 14762 is not divisible by 3 and 9.

   (b) sum of digits of 371892 = 3 + 7 + 1 + 8 + 9 + 2 = 30, which is divisible by 3 but not by 9. Thus, 371892 is divisible by 3 but not by 9.

   (c) sum of digits of 64233 = 6 + 4 + 2 + 3 + 3 = 18, which is divisible by both 3 and 9. Thus, 64233 is divisible by 3 and 9.

   (d) sum of digits of 801726 = 8 + 0 + 1 + 7 + 2 + 6 = 24, which is divisible by 3 but not by 9. Thus, 14762 is not divisible by 3 and 9.

4. We have 7814695.

   Divisibility by 7: Twice its last digit 5 = 10.

   Difference between the remaining number 7814695 and 10 = 7814695 – 10 = 7814685, which is not a multiple of 7. Thus, the number 781469 is not divisible by 7.

Divisibility by 11:

Sum of digits at odd places = 5 + 6 + 1 + 7 = 19.

Sum of digits at even places = 9 + 4 + 8 = 21.

Difference between the two sums = 21 – 19 = 2, which is not a multiple of 11.

Thus, the number 781469 is not divisible by 11.

5. A number is divisible by 5 if its ones place digit is either 0 or 5. A number is divisible by 10 if its ones place digit is 0. Following these rules, we get:
   (a) 71265 is divisible by 5 but not by 10. (b) 8720 is divisible by both 5 and 10.
   (c) 111350 is divisible by both 5 and 10. (d) 600000 is divisible by both 5 and 10.
6. We have 267*5.
   (a) Sum of its digits = 2 + 6 + 7 + 5 = 20, which is not a multiple of 3.
   The multiple of 3 nearest to 20 is 21.
   Thus, the required smallest digit to be replaced by * is 1.
   (b) Sum of its digits = 2 + 6 + 7 + 5 = 20, which is not a multiple of 9.
   The multiple of 9 next to 20 is 27.
   Thus, the required largest digit to be replaced by * is 7.
7. (a) We have 7*489.
   Sum of its digits = 7 + 4 + 8 + 9 = 28, which is not a multiple of 9.
   The multiple of 9 next to 28 is 36.
   Thus, the required smallest digit to be replaced by * is 8.
   (b) We have 4069*2.
   Sum of its digits = 4 + 0 + 6 + 9 + 2 = 21, which is not a multiple of 9.
   The multiple of 9 next to 21 is 27.
   Thus, the required largest digit to be replaced by * is 6.
8. (a) We have 69_245.
   Sum of its digits at odd places = 5 + 2 + 9 = 16.
   Sum of its digits at even places = 4 + 6 = 10.
   Difference between the two sums = 16 – 10 = 6.
   To make the difference as 0, we subtract 6.
   Thus, the required digit is 6.
   (b) We have 8726_4.
   Sum of its digits at odd places = 4 + 6 + 7 = 17.
   Sum of its digits at even places = 2 + 8 = 10.
   Difference between the two sums = 17 – 10 = 7.
   To make the difference as 0, we subtract 7.
   Thus, the required digit is 7.

Exercise 2.6

1. (a) $144 = 2 \times 72 = 2 \times 2 \times 36$
$= 2 \times 2 \times 2 \times 2 \times 3 \times 3$
Thus, we write 144 as $2 \times 2 \times 2 \times 2 \times 3 \times 3$.

(b) $375 = 5 \times 75$
$= 5 \times 5 \times 15 = 5 \times 5 \times 5 \times 3$
Thus, we write 375 as $5 \times 5 \times 5 \times 3$.

(c) $672 = 2 \times 336$
$= 2 \times 2 \times 168$
$= 2 \times 2 \times 2 \times 84$
$= 2 \times 2 \times 2 \times 2 \times 42$
$= 2 \times 2 \times 2 \times 2 \times 2 \times 21$
$= 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7$
Thus, we write 672 as $2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7$.

(d) $900 = 9 \times 100$
$= 3 \times 3 \times 100$
$= 3 \times 3 \times 2 \times 50$
$= 3 \times 3 \times 2 \times 2 \times 25$
$= 2 \times 2 \times 3 \times 3 \times 5 \times 5$
Thus, we write 375 as $2 \times 2 \times 3 \times 3 \times 5 \times 5$.

(e) $1850 = 2 \times 925$
$= 2 \times 5 \times 145$
$= 2 \times 5 \times 5 \times 29$
Thus, we write 375 as $2 \times 5 \times 5 \times 29$.

2. (a) $2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$
$= 8 \times 9 \times 25$
$= 8 \times 25 \times 9 = 200 \times 9 = 1800$.
Thus, the number is 1800.

(b) $2 \times 2 \times 11 \times 7$
$= 4 \times 11 \times 7$
$= 44 \times 7 = 308$.
Thus, the number is 308.

(c) $3 \times 13 \times 11 = 39 \times 11 = 429$.
Thus, the number is 429.

3. (a) We have $9 \times 2 \times 2 \times 2$.
Here, the number 9 is not properly prime factorised as $9 = 3 \times 3$.
Thus, it is not the correct factorisation of prime factors.

(b) We have $7 \times 6 \times 5 \times 2 \times 2$.
Here, the number 6 is not properly prime factorised as $6 = 2 \times 3$.
Thus, it is not the correct factorisation of prime factors.

(c) We have $2 \times 2 \times 3 \times 3 \times 13$.

Here, all the factors are prime numbers.

Thus, it is the correct factorisation of prime factors.

4. (a) We have to find HCF of 570 and 1425.

By prime factorisation, we get:

2	570
3	285
5	95
19	19
	1

3	1425
5	475
5	95
19	19
	1

$570 = 2 \times 3 \times 5 \times 19$

$1425 = 3 \times 5 \times 5 \times 19$

Common factors are 3, 5 and 19.

$\therefore$ HCF of 570 and 1425 $= 3 \times 5 \times 19 = 285$.

Thus, the HCF of 570 and 1425 is 285.

(b) We have to find HCF of 26, 52, and 260.

By prime factorisation, we get:

2	26
13	13
	1

2	52
2	26
13	13
	1

2	260
2	130
5	65
13	13
	1

$26 = 2 \times 13$

$52 = 2 \times 2 \times 13$

$260 = 2 \times 2 \times 5 \times 13$

Common factors are 2 and 13.

$\therefore$ HCF of 26, 52 and 260 $= 2 \times 13 = 26$.

Thus, the HCF of 26, 52 and 260 is 26.

(c) We have to find HCF of 147, 126, and 105.

By prime factorisation, we get:

3	147
7	49
7	7
	1

2	126
3	63
3	21
7	7
	1

3	105
5	35
7	7
	1

147 = 3 × 7 × 7

126 = 2 × 3 × 3 × 7

105 = 3 × 5 × 7

Common factors are 3 and 7.

∴ HCF of 105, 126 and 105 = 3 × 7 = 21.

Thus, the HCF of 105, 126 and 105 is 21.

(d) We have to find HCF of 84 and 216.

By prime factorisation, we get:

2	84
2	42
3	21
7	7
	1

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

84 = 2 × 2 × 3 × 7

216 = 2 × 2 × 2 × 3 × 3 × 3

Common factors are 2, 2 and 3.

∴ HCF of 84 and 216 = 2 × 2 × 3 = 12.

Thus, the HCF of 84 and 216 is 12..

(e) We have to find HCF of 219, 2628 and 2190.

By prime factorisation, we get:

3	219
73	73
	1

2	2628
2	1314
3	657
3	219
73	73
	1

2	2190
3	1095
5	365
73	73
	1

219 = 3 × 73

2628 = 2 × 2 × 3 × 3 × 73

2190 = 2 × 3 × 5 × 73

Common factors are 2 and 73.

∴ HCF of 219, 2628 and 2190 = 2 × 73 = 219.

Thus, the HCF of 219, 2628 and 2190 is 219.

(f) We have to find HCF of 440, 220 and 110.

By prime factorisation, we get:

2	110
5	55
11	11
	1

2	220
2	110
5	55
11	11
	1

2	440
2	220
2	110
5	55
11	11
	1

$110 = 2 \times 5 \times 11$

$220 = 2 \times 2 \times 5 \times 11$

$440 = 2 \times 2 \times 2 \times 5 \times 11$

Common factors are 2, 5 and 11.

$\therefore$ HCF of 110, 220 and 440 $= 2 \times 5 \times 11 = 110$.

Thus, the HCF of 110, 220 and 440 is 110.

5. Smallest 3-digit number = 100

By prime factorisation, we get

$100 = 2 \times 2 \times 5 \times 5$, which is the required prime factorisation.

2	100
2	50
5	25
5	5
	1

6. Greatest 4-digit number = 9999

By prime factorisation, we get

3	9999
3	3333
11	1111
101	101
	1

$9999 = 3 \times 3 \times 11 \times 101$.

Thus, the prime factors of the greatest 4-digit number are: $3 \times 3 \times 11$ and 101.

7. The largest number which divides 276 and 1242 is their HCF.

By prime factorisation, we get

2	276
2	138
3	69
23	23
	1

2	1242
3	621
3	207
3	69
23	23
	1

Common factors are 2, 3 and 23.

HCF $= 2 \times 3 \times 23 = 138$.

Thus, the required largest number is 138.

8. (a) We have to find HCF of 72 and 372.

Dividing 372 by 72, we get:

```
 72 | 372 | 5
   –370
    2 | 72 | 18
      –72
       0
```

(b) We have to find HCF of 81 and 117.

Dividing 372 by 72, we get:

```
 81 | 117 | 1
   –081
    36 | 81 | 2
      –72
       9 | 36 | 4
          –36
           0
```

(c) We have to find HCF of 36, 96, 108 and 216.

First dividing 96 by 36, we get:

```
 36 | 96 | 1
   –72
    24 | 36 | 2
      –24
       12 | 24 | 2
          –24
           0
```

HCF of 36 and 96 is 12.

Now we divide 216 by 108, we get:

```
108 | 216 | 2
   –216
      0
```

HCF of 108 and 216 is 108.

Now we divide HCF 108 by HCF 12.

```
 12 | 108 | 9
   –108
      0
```

HCF of 108 and 216 is 108.

Thus, the HCF of 36, 96, 108 and 216 is 12.

(d) We have to find HCF of 105 and 135.

Dividing 135 by 105, we get:

```
105 | 135 | 5
    –105
     15 | 105 | 7
        –105
          0
```

Thus, the HCF of 105 and 135 is 15.

(e) We have to find HCF of 105 and 196.

Dividing 196 by 105, we get:

```
105 | 196 | 1
    –105
     91 | 105 | 2
        –91
         14 | 91 | 2
            –84
             7 | 14 | 2
                –14
                 0
```

Thus, the HCF of 105 and 196 is 7.

(f) We have to find HCF of 408, 510 and 1054.

First we divide 510 by 408.

```
408 | 510 | 1
    –408
    102 | 408 | 4
        –408
           0
```

HCF of 408 and 510 is 102.

Now we divide 1054 by 102.

```
102 | 1054 | 10
    –1020
      34 | 102 | 3
         –102
           0
```

HCF of 1054 and 102 is 34.

Thus, the HCF of 408, 510 and 1054 is 34.

9. The given numbers are 18 and 54.

As the remainder is 2, so we subtract 2 from the given numbers and get 16 and 52.

Now we find HCF of 16 and 52.

```
16 | 52 | 3
   -48
    4 | 16 | 4
      -16
       0
```

Thus, the required given greatest number is 4.

10. The given numbers are 1444 and 2020.

As the remainder is 4, so we subtract from the given numbers and get 1440 and 2016.

Now we find HCF of 1440 and 2016.

```
1440 | 2016 | 1
    -1440
     576 | 1440 | 2
        -1152
         288 | 576 | 2
            -576
             0
```

Thus, the required given greatest number is 288.

11. The maximum of fruits in a carton will be the HCF of the number of apples, oranges and mangoes, i.e., 156, 260 and 312.

First we divide 260 by 156.

```
156 | 260 | 1
   -156
    104 | 156 | 1
       -104
         52 | 104 | 2
           -104
            0
```

HCF of 156 and 260 is 52.

Now we find the HCF of 52 and 312.

```
 52 | 312 | 6
   -312
    0
```

HCF of 52 and 312 is 52.

Thus, the maximum number of fruits in a carton would be 52.

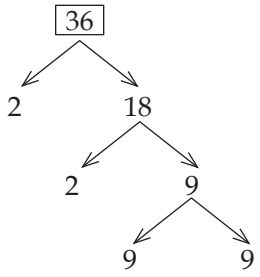
12. (a) The HCF of two consecutive numbers is 1.

(b) As any even number is divisible by 2, so the HCF of 2 and an even number is 2.

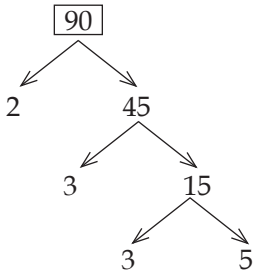
(c) Next multiple of 6 is 12. So, the HCF of 6 and 12 is 6.

(d) Co-primes are numbers having the common factor as 1. So the HCF of two co-primes is 1.

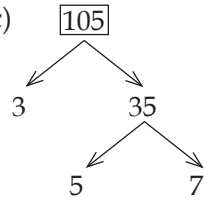
13. (a)



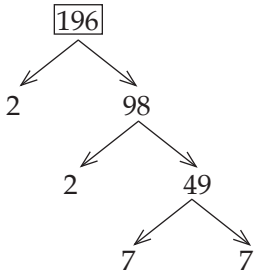
(b)



(c)



(d)



Exercise 2.7

1. (a) We have 24 and 34.

By prime factorisation, we get

2	24
2	12
2	6
3	3
	1

2	30
3	15
5	5
	1

Prime factors of 24 = 2, 2, 2 and 3.

Prime factors of 30 = 2, 3 and 5.

Here, 2 appears the maximum three times.

3 appears the maximum one time.

5 appears the maximum one time.

LCM = 2 × 2 × 2 × 3 × 5 = 120.

(b) We have 84, 126 and 288.

By prime factorisation, we get

2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

2	126
3	63
3	21
7	7
	1

2	84
2	42
3	21
7	7
	1

Prime factors of 84 = 2, 2, 3 and 7.

Prime factors of 126 = 2, 3, 3 and 7.

Prime factors of 288 = 2, 2, 2, 2, 2, 3 and 3.

Here, 2 appears the maximum five times.

3 appears the maximum two times.

7 appears the maximum one time.

LCM = 2 × 2 × 2 × 2 × 2 × 3 × 3 × 7 = 2016.

(c) We have 144 and 384.

By prime factorisation, we get

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

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

Prime factors of 144 = 2, 2, 2, 2, 3 and 3

Prime factors of 384 = 2, 2, 2, 2, 2, 2, 2, 3 and 3.

Here, 2 appears the maximum seven times.

3 appears the maximum two times.

LCM = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3 × 3 = 1152.

(d) We have 96, 128 and 240.

By prime factorisation, we get

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

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

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

Prime factors of 96 = 2, 2, 2, 2, 2 and 3.
Prime factors of 128 = 2, 2, 2, 2, 2, 2 and 2.
Prime factors of 240 = 2, 2, 2, 2, 3 and 5.
Here, 2 appears the maximum seven times.
3 appears the maximum one time.
5 appears the maximum one time.
LCM = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3 × 5 = 1920.

2. (a) We have 128 and 256.
By prime factorisation, we get

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

LCM = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2
= 256.
Thus, the LCM 128 and 256 is 256.

(b) We have 15, 24 and 38.
By prime factorisation, we get

2	15, 24, 38
2	15, 12, 19
2	15, 6, 19
3	15, 3, 19
5	5, 1, 19
19	1, 1, 19
	1, 1, 1

LCM = 2 × 2 × 2 × 3 × 5 × 19 = 2,280.
Thus, the LCM 15, 24 and 38 is 2,280.

(c) We have 576, 720 and 360.

2	576, 720, 360
2	288, 360, 180
2	144, 180, 90
2	72, 90, 45
2	36, 45, 45
2	18, 45, 45
3	9, 45, 45
3	3, 15, 15
5	1, 5, 5
	1, 1, 1

LCM = 2 × 2 × 2 × 2 × 2 × 2 × 3 × 3 × 5 = 2,880.

Thus, the LCM 576, 720 and 360 is 2,880.

(d) We have 35, 84 and 120.

2	35, 84, 120
2	35, 42, 60
2	35, 21, 30
3	35, 21, 15
5	35, 7, 5
7	7, 7, 1
	1, 1, 1

LCM = 2 × 2 × 2 × 3 × 5 × 7 = 840.

Thus, the LCM 35, 84 and 120 is 840.

3. First we find the LCM of 35, 56 and 91.

2	35, 56, 91
2	35, 28, 91
2	35, 14, 91
5	35, 7, 91
7	7, 7, 91
13	1, 1, 13
	1, 1, 1

LCM = 2 × 2 × 2 × 5 × 7 × 13 = 3640.

As the remainder is 4 in each case, so the required smallest number is 3640 + 4 = 3644.

Thus, the required smallest number is 3644.

4. The smallest number divisible by 18, 36, 48 and 72 is their LCM.

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

LCM = 2 × 2 × 2 × 2 × 3 × 3 = 144

Thus, the required smallest number is 144.

5. First we find the LCM of the given numbers 12, 16 and 28.

2	12, 16, 28
2	6, 8, 14
2	3, 4, 7
2	3, 2, 7
3	3, 1, 7
7	1, 1, 7
	1, 1, 1

LCM = 2 × 2 × 2 × 2 × 3 × 7 = 336.

The largest 4-digit number = 9999

Dividing 9999 by the LCM 336, we get

9999 ÷ 336 = 29.76

Now, 29 × 336 = 9744 and 30 × 336 = 10080, which is a 5-digit number.

Thus, the required largest 4-digit number is 9744.

6. The smallest number exactly divisible by 24, 30 and 36 is their LCM.

2	24, 30, 36
2	12, 15, 18
2	6, 15, 9
3	3, 15, 9
3	1, 5, 3
5	1, 5, 3
	1, 1, 1

LCM = 2 × 2 × 2 × 3 × 3 × 5 = 360.

Thus, the required smallest number is 360.

7. The 5-digit smallest number exactly divisible by 15, 20 and 25 is their LCM.

2	15, 20, 25
2	15, 10, 25
3	15, 5, 25
5	5, 5, 25
5	1, 1, 5
	1, 1, 1

LCM = 2 × 2 × 3 × 5 × 5 = 300.

The smallest 5-digit number = 10,000

Dividing 10,000 by the LCM, we get 10,000 ÷ 300 = 33.33.

Now 300 × 33 = 9,900, which is a 4-digit number.

Also, 300 × 34 = 10,200, which is a 5-digit number.

Thus, the required smallest 5-digit number is 10,200.

8. The duration of time of ringing bells together is the LCM of 6, 8 and 12.

2	6, 8, 12
2	3, 4, 6
2	3, 2, 3
3	3, 1, 3
	1, 1, 1

LCM = 2 × 2 × 2 × 3 = 24.

As per question, bells ting together at 6 a.m. They will again ring after 24 minutes, i.e., at 6 : 24 a.m.

9. First we find the LCM of 15, 20, 25 and 30.

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

LCM = 2 × 2 × 3 × 5 × 5 = 300.

The least 6-digit number = 1,00,000

Dividing 1,00,000 by the LCM, we get 1,00,000 ÷ 300 = 333.33.

Now 300 × 333 = 99,900, which is a 5-digit number.

Also, 300 × 334 = 1,00,000, which is a 6-digit number.

As per question, a remainder of 10 is left in each case.

Thus, the required least 6-digit number is 1,00,200 + 10 = 1,00,210.

10. We know that the product of two numbers is equal to the product of their LCM and HCF.

One number × Other number = LCM × HCF

$$\text{Other number} = \frac{\text{LCM} \times \text{HCF}}{\text{One number}} = \frac{1335 \times 89}{267} = 445.$$

Thus, the other number is 445.

11. LCM = Product of numbers ÷ HCF

= 4107 ÷ 37 = 111.

Thus, the LCM of numbers is 111.

12. $$\text{Other number} = \frac{\text{LCM} \times \text{HCF}}{\text{One number}} = \frac{1449 \times 23}{161} = 207.$$

Thus, the other number is 207.

13. The maximum length of each piece is the HCF of lengths of pipes, i.e., 16 m and 24 m.

Factors of 16 = 2, 4, 8 and 16

Factors of 24 = 2, 3, 4, 6, 8, 12 and 24

Common factors are: 2, 4 and 8 in which 8 is the greatest.

HCF of 16 and 24 = 8

Thus, the length of each piece is 8 m.

14. The complete table is given below:

	First Number	Second Number	HCF	LCM
(a)	16	20	4	80
(b)	60	240	60	240
(c)	84		28	168
(d)	27	108	27	108

Multiple Choice Questions

See the **Answers** given in the textbook.

Mental Maths

1. The largest 2-digit prime number is 97.
2. Two consecutive numbers differ by 1. So, their HCF is 1.
3. Two consecutive even numbers differ by 2. So, their HCF is 2.
4. Smallest 3-digit number 100.

Dividing 100 by 3, we get 33.33

Now 33 × 3 = 99, which is a 2-digit number.

Also, 34 × 3 = 102, which is the required smallest 3-digit number.

5. 40 = 2 × 2 × 2 × 5 and 45 = 3 × 3 × 5
   Common factor is 5, which is the required HCF.
6. 145 × 2 = 290, so required LCM is 290.
7. The smallest 3-digit prime number is 101.
8. The largest 5-digit number = 99,999
   A number is divisible by 5 if its ones place digit is either 0 or 5.
   Thus, the largest 5-digit number divisible by 5 is 99,995.
9. The smallest 4-digit number = 1,000
   Dividing 1000 by 8, we get 125.
   Thus, the required smallest 4-digit number is 1,000.
10. HCF of 999 and 1000 = 1
    $\text{LCM} = \frac{999 \times 1000}{1} = 999 \times 1000 = 9,99,000.$

HOTS (Higher Order Thinking Skills)

1. The only even number having exactly three factors is 4 as: factors of 4 = 1, 2 and 4.
2. The only odd composite number having exactly four prime factors is 210 as: 210 = 2 × 3 × 5 × 7.
3. 4 ÷ 4 + 4 × 4 = 20.

Chapter Test

1. The complete table is given below.

	Number	All factors of	Common factors	HCF
(a)	8, 12	8 = 2, 4, 8 12 = 2, 3, 4, 12	2 and 4	4
(b)	15, 20, 45	15 = 3, 5, 15 20 = 2, 4, 5, 10, 20 45 = 3, 5, 9, 15, 45	5	5

2. (a) HCF of the prime numbers 13 and 17 is 1.
   (b) HCF of the prime numbers 3, 5 and 17 is 1.
3. (a) LCM of the co-primes 8 and 9 is 72.
   (b) LCM of the co-primes 15 and 16 is 240.
4. (a) We know that a number is completely divided by 5 if its ones place digit is either 0 or 5. To make ones place digit of 31762 as 5, we should add 3. Thus, the required smallest number is 3
   (b) We have 4936__.
   Sum of digits = 4 + 9 + 3 + 6 = 22. The common multiple of 3 and 9 next to 22 is 27.

Thus, the required digit is 27 – 22 = 5.

5. The smallest 4-digit number = 1000.

Dividing it by 6, we get

$$\begin{array}{r|l} 6 & 1000 \\ \hline & -996 \\ \hline & 4 \end{array} \quad 166$$

The remainder is 4.

To make 1,000 divisible by 6, we add 2 to it.

Thus, the smallest 4-digit number divisible by 6 is 1,002.

6. First we find LCM of 12, 15 and 20.

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

LCM = 2 × 2 × 3 × 5 = 60.

As 2 is left in each case, so the required number is 60 + 2 = 62.

7. The greatest 2-digit number is 99.

3	9, 99
3	3, 33
11	1, 11
	1, 1

LCM = 3 × 3 × 11 = 99.

Thus, the LCM of 9 and the greatest 2-digit number is 99.

8. The lengths of tapes are 6.3 m = 630 cm, 5 m 85 cm = 585 cm and 3 m 60 cm = 360 cm.

First we find the HCF of 630 and 585.

$$\begin{array}{r|l} 582 & 630 \\ \hline & -585 \\ \hline & 45 \end{array} \quad \begin{array}{r|l} 585 & 1 \\ \hline -585 & \\ \hline 0 & \end{array}$$

$$\begin{array}{r|l} 45 & 360 \\ \hline & -360 \\ \hline & 0 \end{array} \quad 8$$

HCF of 360 and 45 is 45.

HCF of 630 and 585 is 45.

Now we find HCF of 45 and 360.

HCF of 45 and 360 is 45.

The greatest possible length of each piece is 45 cm.

9. We have 1359 and 1590.

Given that the remainders are 9 and 15.

So we subtract 9 and 15 from 1359 and 1590 respectively.

So we subtract 9 and 15 from 1359 and 1590 respectively.

1359 – 9 = 1350 and 1590 – 15 = 1575.

Now we find HCF of 1350 and 1575.

```
1350 | 1575 | 1
     –1350
     ------
      225 | 1350 | 6
          –1350
          -----
             0
```

HCF of 1350 and 1575 = 225.

Thus, the required greatest number is 225.

10. Other number = $\frac{\text{LCM} \times \text{HCF}}{\text{One number}} = \frac{2880 \times 144}{576} = \frac{414720}{576} = 720.$

11. The smallest sum of money is the LCM of 1, 2 and 5.

```
2 | 1, 2, 5
--+---------
5 | 1, 1, 5
--+---------
  | 1, 1, 1
```

LCM of 1, 2 and 5 is 10, which is the required smallest sum of money.

12. Given: length of the hall = 450 cm and its breadth = 3 m 50 cm = 350 cm.

Now we find HCF of 450 and 350.

```
350 | 450 | 1
    –350
    ----
    100 | 350 | 3
        –300
        ----
         50 | 100 | 2
            –100
            ----
              0
```

HCF of 450 and 350 = 50, which is the side of the largest square tile used to tiling the floor.

Exercise 3.1

1. (a) The natural numbers start from 1 and whole numbers start from 0.
Thus, the smallest whole number which is a natural number is 1.

(b) The whole number which is not a natural number is 0.

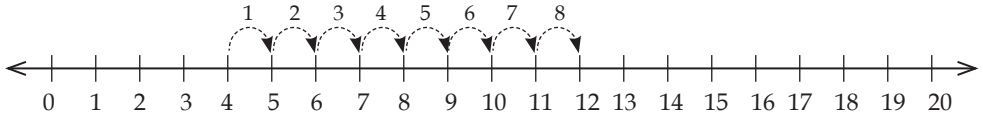
2 (a) The smallest 4-digit number = 1000.
Its predecessor = 1000 –1 = 999.

(b) The greatest 3-digit number = 999.
Its predecessor = 999 – 1 = 998.

3 (a) The smallest 2-digit number = 10.
Its successor = 10 +1 = 11.

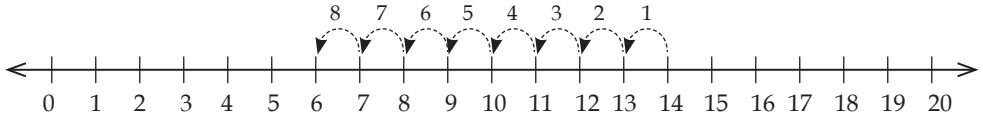
(b) The greatest 5-digit number = 99999.
Its successor = 99999 + 1 = 100000.

4 (a) Starting from 4, move eight steps forward. We reach at 12.



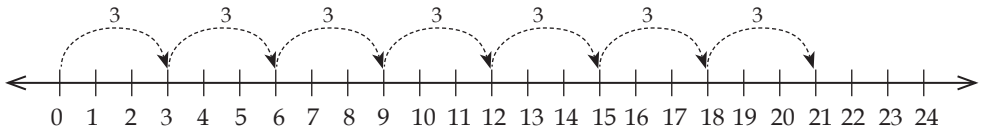
Thus, 4 + 8 = 12.

(b) Starting from 14, move eight steps backward. We reach at 6.



Thus, 14 – 8 = 6.

(c) Starting from 0, move seven steps each of three units forward. We reach at 21.



Thus, 7 + 3 = 21.

5 (a) We know that on a number line, a greater number lies to the right of a smaller number.
Thus, 785 lies to the right of 758 on the number line.

(b) Do the same as (a) yourself.

(c) Do the same as (a) yourself.

6 (a) LHS = 1287 – 287 = 1000 = RHS.
Thus, 1287 – 287 [=] 1000

(b) LHS = 41728 – 4172 = 37556
As 37556 is greater than 36815
Thus, 41728 – 4172 [>] 36815.

(c) (432 + 856) – 856 = 1288 – 856 = 432, which is greater than 0.
Thus, (432 + 856) – 856 [>] 0.

(d) 172 + 956 = 1128
and 286 – 158 = 128, which is greater than 1128.
Thus, 172 + 956 [>] 286 – 158.

7. Refer to the answers given in the textbook.

8. (a) As the whole numbers start from 0, so there are 20 + 1 = 21 whole numbers up to 20.

(b) As the natural numbers start from 1, so there are 20 natural numbers up to 20.

9. Smallest 5-digit whole number = 10,000
Smallest 5-digit natural number = 10,000
Difference between these numbers = 10,000 – 10,000 = 0.

10. Two whole numbers just after 12010 are 12010 + 1 = 12011 and 12010 + 2 = 12012.

Exercise 3.2

1. (a) Commutative property of addition
(b) Associative property of addition
(c) Commutative property of multiplication
(d) Associative property of multiplication
(e) Closure property of addition
(f) Closure property of multiplication

2. (a) We have 25 + 39 = 39 + _____
Using the commutative property of addition, we get 25 + 39 = 39 + **25**.

(b) We have 48 × _____ = 10 × 48
Using the commutative property of multiplication, we get 48 × **10** = 10 × 48.

(c) We have 12 + 16 + _____ = 16 + 12 + 20
Using the associative property of addition, we get 12 + 16 + **20** = 16 + 12 + 20.

(d) We have 9 × 36 × 15 = 9 × 15 × _____
Using the associative property of multiplication, we get 9 × 36 × 15 = 9 × 15 × **36**.

3. (a) 487 + 54 + 113 = 487 + 113 + 54 = 654.

(b) 9 + 17 + 25 + 21 + 23 = 9 + 21 + 17 + 23 + 25 = 30 + 40 + 25 = 70 + 25 = 95.

(c) 1,762 + 2,381 + 238 = 1,762 + 238 + 2,381 = 1,800 + 2,381 = 4,181.

(d) 42 + 156 + 988 + 144 = 42 + 988 + 156 + 144 = 1,030 + 300 = 1,330.

4. (a) $257 \times 40 \times 25 = 257 \times 1{,}000 = 2{,}57{,}000$.

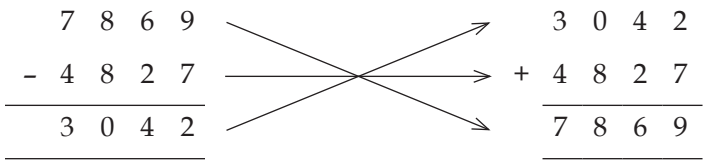
(b) $400 \times 78 \times 5 = 400 \times 5 \times 78 = 2{,}000 \times 78 = 1{,}56{,}000$.

(c) $15 \times 17 \times 6 = 15 \times 6 \times 17 = 90 \times 17 = 1{,}530$.

(d) $125 \times 4{,}876 \times 8 = 125 \times 8 \times 4{,}876 = 1{,}000 \times 4{,}876 = 48{,}76{,}000$.

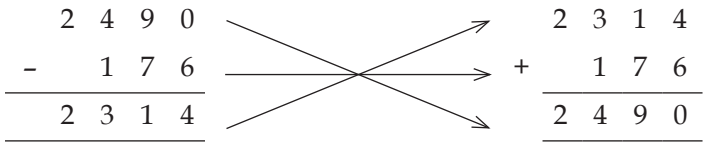
5. (a) We have 7869 – 4827.

Check



(b) We have 2490 – 176.

Check



Similar work can be done for (c) and (d).

6. (a) Subtracting ones place digits: 6 – 2 = 4.

As the difference between tens place digits is 1, so the missing digit should be 1.

We cannot subtract 4 from 2. So, we subtract 4 from 12 and get 8.

	1	2	7	6
–		4	**1**	2
		8	6	4

(b) As the ones digit in the sum is 0, so the missing digit should be 7. 3 + 7 = 10. Carry over 1 to the tens place.

Sum of digits in tens place = 1 (carry) + 5 = 6. But the tens place digit in the answer is 5, so the missing digit should be 9 as 6 + 9 = 15. Carry over 1 to the hundreds place.

The missing digit in the hundreds place should be 0 1 (carry) + 4 = 5.

The missing digit in the thousands place in the answer should be 3 as 2 + 1 = 3.

	2	4	**9**	3
+	1	**0**	5	**7**
	3	5	5	0

(c) As the ones digit in the sum is 2, so the missing digit should be 0. 10 – 8 = 2.

The tens place digit in the answer is 0, so the missing digit should be 0.

Now, 5 is left in the hundreds place. Subtracting, we get 5 – 5 = 0.

The thousands place digit in the answer is 0, so the missing digit should be 2 as 2 – 2 = 0.

The missing digit in the ten thousands place should be 1 as 5 – 1 = 4.

	5	**2**	6	**0**	**0**
–	1	2	5	9	8
	4	0	0	0	2

Similar work can be done for (d), (e) and (f).

Exercise 3.3

1. Refer to the answers given in the book.
2. (a) $78 \times 103 = 78 \times (100 + 3) = 78 \times 100 + 78 \times 3 = 7{,}800 + 234 = 8{,}034$.
   (b) $450 \times 101 = 450 \times (100 + 1) = 450 \times 100 + 450 \times 1 = 45{,}000 + 450 = 45{,}450$.
   (c) $673 \times 98 = 673 \times (100 - 2) = 673 \times 100 - 673 \times 2 = 67{,}300 - 1{,}346 = 65{,}954$.
   (d) $213 \times 99 = 213 \times (100 - 1) = 213 \times 100 - 213 \times 1 = 21{,}300 - 213 = 21{,}087$.
3. (a) $32 \times 6 + 15 \times 6 = 6\,(32 + 15) = 6 \times 47 = 282$.
   (b) $45 \times 15 - 45 \times 10 = 45\,(15 - 10) = 45 \times 5 = 225$.
   (c) $36 \times 12 + 36 \times 18 = 36\,(12 + 18) = 36 \times 30 = 1{,}080$.
   (d) $12 \times 98 + 26 = [12 \times (100 - 2)] + 26$
   $= [12 \times 100 - 12 \times 2] + 26$
   $= [1200 - 24] + 26$
   $= 1176 + 26 = 1202$.
4. Refer to the answers given in the book.
5. Quantity of petrol Mr Sinha bought on Friday = 54 litres
   Quantity of petrol he bought the next day = 48 litres
   Rate of petrol = ₹ 72 per litre
   We can write the above as: $(54 + 48) \times 72$
   Solving, we get: $102 \times 72 = (100 + 2) \times 72 = 100 \times 72 + 2 \times 72 = 7200 + 144 = 7{,}344$.
   Hence, Mr Sinha spent ₹ 7344 in all.
6. Cost of 1 litre of milk = ₹ 48
   Cost of 752 litres of milk = 752 × ₹ 48
   = ₹ [752 × (50 – 2)]
   = ₹ [752 × 50 – 752 × 2]
   = ₹ [37600 – 1504] = ₹ 36096.
7. Number of trees planted in one row = 785
   Number of rows in which trees planted = 302
   Total number of trees planted = 785 × 302
   = 785 × (300 + 2) = 785 × 300 + 785 × 2 = 2,35,500 + 1570 = 2,37,070.
   Hence, there are 2,37,070 plants in the garden.
8. Quantity of rice sold by shop A in one day = 10 kg
   Number days it sold rice = 25
   Total quantity of rice sold by shop A = 25 × 10 = 250 kg.
   Quantity of rice sold by shop B in one day = 25 kg
   Number days it sold rice = 10
   Total quantity of rice sold by shop B = 10 × 25 = 250 kg.
   Hence, both the shops sold same quantity of rice.

9. Cost of a pant = ₹ 385
   Cost of a shirt = ₹ 256
   Total sets of suit sold in a month = 41
   Total amount earned by the shopkeeper = 41 (₹ 385 + ₹ 385) = 41 × ₹ 641 = ₹ 26,281.
   Hence, the total amount earned by the shopkeeper in that month is ₹ 26,281.

Exercise 3.4

Refer to the answers given in the book.

Multiple Choice Questions

See the **Answers** given in the textbook.

Mental Maths

See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. 1 is the only natural number which when multiplied by itself gives the same number.
2. The correct arrangement of eight 8s is: 888 + 88 + 8 + 8 + 8.

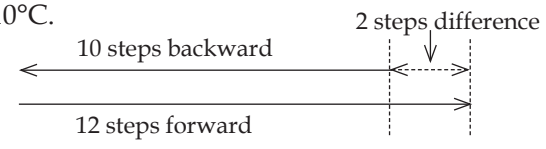
Chapter Test

1. (i) The division by zero (0) is not defined. Thus, the correct option is (d).
   (ii) The predecessor of 40100 = 40100 – 1 = 40099. Thus, the correct option is (a).
   (iii) Successor of 174823 = 174823 + 1 = 174824 and its predecessor = 174823 – 1 = 174822
   Difference = 174824 – 174822 = 2.
   Thus, the correct option is (b).
2. See the **Answers** given in the textbook.
3. Three natural numbers after 79899 are: 79899 + 1 = 79900, 79899 + 2 = 79901 and 79899 + 3 = 79902.
4. Product of the first 20 whole numbers = 0. So, the product of the first natural numbers is greater.
5. See the **Answers** given in the textbook.
6. (a) 3786 × 99 = 3786 × (100 – 1) = 378600 – 3786) = 3,74,814.

4 Integers

Exercise 4.1

1. The opposite of:
   (a) moving backward is moving forward.
   (b) 5 m below sea level is 5 m above sea level.
   (c) losing 10 kg is gaining 10 kg.
   (d) depositing money is withdrawal of money.
   (e) 10 km south is 10 km north.
   (f) increasing of ₹ 100 is decreasing ₹ 100.
   (g) profit of 5% is loss of 5%.
   (h) accelerating by 1 m/s is decelerating by 1 m/s.
2. (a) + ₹ 150 (b) – ₹ 100 (c) –15 (d) –₹ 50
3. See the **Answers** given in the book.
4. The opposite of:
   (a) 15 is –15 (b) –19 is +19 (c) 0 is 0 (d) 4 + 3 = 7 is –7
   (e) 11 – 7 = 4 is +4 (f) 1 is –1 (g) 2 – 0 = 2 is –2 (h) 0 – 5 = –5 is +5
5. The four negative integers smaller than –3 are –4, –5, –6 and –7.
6. The five negative integers greater than –26 are –25, –24, –23, –22 and –21.
   Note: There are many such numbers, so answer may differ.
7. (a) $-|16| = -16$ (b) $|-35| = 35$
   (c) $-|-25| = -25$ (d) $|5 + 18| = |23| = 23$
   (e) $|11 - 6| = |5| = 5$ (f) $|20 - 0| = |20| = 20$
   (g) $-|-0| = 0$ (h) $|-5 - 11| = |-16| = 16$
8. The integers lying between –5 and –15 are: –6, –7, –8, –9, –10, –11, –12, –13 and –14.
   Largest of these integers = –6;
   Smallest of these integers = –14
9. Temperature of Srinagar at one night = –2°C
   At midnight temperature became colder by = 8°C
   Temperature at midnight = –2°C – 8°C = –10°C.
10. Walking 10 steps backward = –10
    Following 12 steps forward = +12
    Difference = 12 – 10 = 2.



11. If 3 represents four points towards east, then –3 will represent four points towards west.
12. We know that every negative number is smaller than 0 and every positive number and 0

is smaller than every positive number. Thus:

(a) $0 > -2$ (b) $-6 > 5$ (c) $17 > 0$ (d) $13 < -|13|$

(e) $5 = +5$ (f) $-9 < -6$ (g) $-12 = -(3 \times 4)$ (h) $17 > -17$

13. The given integers in ascending order are:

(a) –9, –8, 0, 6, 14 (b) –987, –879, –850, –798, 100

14. (a) Here, difference between two consecutive integers is 2. Thus, the complete pattern is:–15, –13, –11, –11, –9, **–7**, **–5**, **–3**... .

(b) Here, difference between two consecutive integers is 10. Thus, the complete pattern is:–20, –10, 0, **10**, **20**, **30**, ...

15. (a) The complete pattern is: –2, –3, –5, –8, **–12**, **–17**, –23, –30

(b) The complete pattern is: –14, –144, **–144**, **–14444**, –144444, –1444444

Exercise 4.2

1. (a) When we move 6 numbers to the right of –2, we reach at 4.

(b) When we move 3 numbers to the left of 3, we reach at 0

2. See the **Answers** given in the book.

3. (a) $52 + (-18) = 52 - 18 = 34$.

(b) $361 + 205 = 566$.

(c) $-180 + 690 + (-15) = 690 - (180 + 15) = 690 - 195 = 495$.

(d) $158 + (-158) = 158 - 158 = 0$.

(e) $9 + (-5) + 3 = 9 + 3 - 5 = 12 - 5 = 7$.

Similar work to be done for (f), (g) and (h).

4. (a) $-25 - 17 = -42$. (b) $360 - (-480) = 360 + 480 = 840$.

(c) $0 - (-182) = 0 + 180 = 182$. (d) $-295 - (-295) = -295 + 295 = 0$.

(e) $0 - 392 = -392$.

Similar work to be done for (f), (g) and (h).

5. (a) $5 \times (-9) = -45$. (b) $36 \times 0 = 0$.

(c) $-2 \times 3 \times (-2) = 12$. (d) $-8 \times 4 = -32$.

(e) $-9 \times (-7) = 63$. (f) $-8 \times 6 \times 6 = -288$.

(g) $5 \times (-9) \times 2 \times (-1) = 90$. (h) $-9 \times (-9) \times (-9) = 729$.

Similar work to be done for (f), (g) and (h).

6. (a) $8 \div 8 = 1$. (b) $9 \div (-1) = -9$.

(c) $54 \div (-18) = -3$. (d) $-25 \div 5 = -5$.

(e) $(-15) \div (-15) = 1$. (f) $24 \div 4 = 6$.

(g) $-(-5) \div (-1) = 5 \div (-1) = -5$. (h) $(-1) \div 0$ = meaningless.

Similar work to be done for (f), (g) and (h).

7. (a) $7 - (-8) + 6 - (-2) = 7 + 8 + 6 + 2 = 23$.

(b) $-15 + 20 - 6 - 3 = -(15 + 6 + 3) + 20 = -24 + 20 = -4$.

(c) $28 - (+15) - 11 - (-6) = 28 - 15 - 11 + 6 = 28 + 6 - (15 + 11) = 34 - 26 = 8$.

(d) $6 + 9 - (-3) - 8 = 15 + 3 - 8 = 18 - 8 = 10$.

8. Sum of –186 and 490 = 304.
   Sum of 1980 and –437 = 1980 + (–437) = 1980 – 437 = 1543.
   Subtracting, 1543 – 304 = 1239.
   Thus, the required answer is 1239.
9. Other integer = sum of two integers – one integer = –486 – 289 = –775.
10. –85 + [(–15) – (–36)] = –85 + [–15 + 36] = –85 + 21 = –64.
11. Here, sum of two integers = 89 and one of the integers = –75.
    Other integer = 89 – (–75) = 89 + 75 = 164.
12. Amount of money deposited by Geeta = ₹ 7980 + ₹ 1050 = ₹ 9030.
    Amount of money withdrawal by her = ₹ 5997
    Amount of money withdrawal by her = ₹ 9030 – ₹ 5997 = ₹ 3033.
    Thus, the balance of money in her bank is ₹ 3033.
13. Temperature of Leh one night = –8°C
    The next day, temperature went up to by = 6°C
    Difference between temperature = 6°C – (–8°C) = 6°C + 8°C = 14°C.

Multiple Choice Questions

See the **Answers** given in the textbook.

Mental Maths

See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. Four pairs of integers whose sum is –5 are: 1, –6; –11, 6; 5, –10 and –18, 13.
2. Let the number is x.
   Then its additive inverse = $-x$
   According to the question: $-x + 8 = 23$
   $-x + 8 = 23$
   or $-x = 23 - 8 = 15$
   or $x = -15$.
   Thus, the required integer is –15.
3. The required integers are 0 and 7 as $7 + 0 = 7$ and $7 - 0 = 7$.
4. The greatest 2-digit number = 99 and its negative = –99.
   The greatest 1-digit number = 9
   The required difference = –99 – 9 = –108.

Chapter Test

1. See the **Answers** given in the textbook.
2. (a) We have –5, –11, 7, –18.
   Greatest integer = 7 and smallest integer = –18.
   (b) We have 28, –36, 156, –218, 0.
   Greatest integer = 156 and smallest integer = –218.
3. We know that every negative number is smaller than 0 and every positive number. Thus:
   (a) –25 $\boxed{<}$ 25 (b) –613 $\boxed{<}$ 61
   (c) 85 $\boxed{>}$ –89 (d) 0 $\boxed{<}$ 7
4. See the **Answers** given in the textbook.
5. The predecessor of: (a) 56 = 56 – 1 = 55.
   (b) –39 – 1 = –40.
6. Integers between:
   (a) –7 and 0 are: –6, –5, –4, –3, –2 and –1.
   (b) –4 and 4 are: –3, –2, –1, 0, 1, 2, and 3.
7. Successor of [–12 + (–3 + 4)] = [–12 + (–3 + 4)] + 1 = [–12 + 1] + 1 = –11 + 1 = –10.
8. See the **Answers** given in the textbook.
9. (a) 7 + (–3) + 4 – (7) = 7 –3 + 4 – 7 = 7 + 4 –3 – 7 = 11 – 10 = 1.
   (b) 15 + (–3) + (–3) + 2 = 15 – 3 – 3 + 2 = 15 + 2 – 6 = 17 – 6 = –11.
   (c) 176 + (–250) + (–160) + 300 = 176 + 300 – 250 – 160 = 476 – 410 = 66.
   (d) (–8) + (–16) + (–8) = –8 – 16 – 8 = –32.
10. (a) –15 – 15 = –30.
    (b) 0 – (–36) = 0 + 36 = 36.
    (c) –24 – 0 = –24.
    (d) 10 – (–50) = 10 + 50 = 60.
11. See the **Answers** given in the textbook.
12. (a) The value of |–(–8 – 6)| = |–(–14)| = |14| = 14.
    (b) The value of –|–2 + 9| = –|7| = –7.
    (c) The value of –|–7 + (–2)| = –|–7 – 2)| = –|–9| = –9.
    (d) The value of |–6 – (–8)| = |–6 + 8)| = |2| = 2.
13. (a) (–15) × (–2) + (–35) + 5 = 30 – 35 + 5 = 35 – 35 = 0.
    (b) (–7) – [(–24) + (–10) × 2] + (–3) – 6 = –7 – [–24 – 20] – 3 – 6 = –7 – 44 – 3 – 6 = –60.
14. Score of team A = –20 + 25 + 12 = 17.
    Score of team B = –7 + 18 + 17 = –7 + 35 = 28.

As 28 > 17, so the team B scored better.

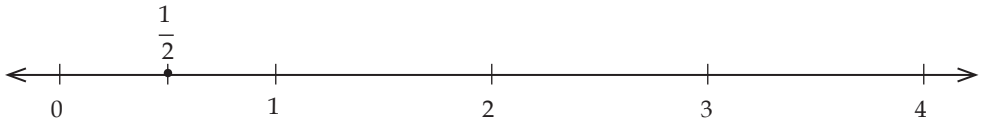
15. Marks given for every correct answer = 4
Marks deducted for every wrong answer = 2
Score of Vikas = (6 × 4) – (4 × 2) = 24 – 8 = 16.
Thus, Vikas scored 16 marks.

16. Minimum temperature of Shimla on Monday = –4°C
Temperature fell at midnight by = 4°C
Temperature of Shimla in the midnight by = –4°C – 4°C = –8°C.

5 Fractions

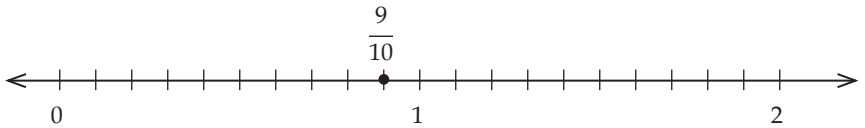
Exercise 5.1

1. Refer to the answers given in the book.
2. Refer to the answers given in the book.
3. Refer to the answers given in the book.
4. The numerator of a proper fraction is smaller than its denomination. Whereas the numerator of an improper fraction is smaller than its denomination. Thus, the given fraction is:
   (a) Proper fraction
   (b) Improper fraction
   (c) Proper fraction
   (d) Improper fraction as $2\frac{1}{2} = \frac{5}{2}$
5. (a) Improper fractions: $\frac{6}{5}, \frac{7}{2}$
   (b) Mixed fractions: $2\frac{1}{2}, 2\frac{1}{2}$
   (c) Proper fraction: $\frac{5}{7}, \frac{2}{19}$
   (d) Unit fractions: $\frac{1}{8}, \frac{1}{12}$
6. (a) To represent the given fraction on the number line, divide the unit length between 0 and 1 into two equal parts. The middle point represents the fraction.



   (b) To represent the given fraction on the number line, divide the unit length between 0 and 1 into four equal parts. The third point from 0 represents the fraction.

   (c) To represent the given fraction on the number line, divide the unit length between 0 and 1 into ten equal parts. The ninth point from 0 represents the fraction.



$\frac{144 \div 144}{720 \div 144}$

   (d) Similar work to be done.

Exercise 5.2

1. (a) By cross multiplication: $\frac{5}{11} \times \frac{2}{7}$

The cross products are: $5 \times 7 = 35$ and $11 \times 2 = 22$.

As $35 > 22$, so $\frac{5}{7}$ is smaller.

(b) A proper fraction is always smaller than an improper fraction. Thus, $\frac{5}{4}$ is smaller.

(c) By cross multiplication: $\frac{9}{16} \times \frac{7}{10}$

The cross products are: $9 \times 10 = 90$ and $16 \times 7 = 112$.

As $90 < 112$, so $\frac{9}{16}$ is smaller.

(d) The denominators of the given fractions are same, i.e., 47.

Comparing their numerators, we find $11 < 45$.

Thus, $\frac{11}{47}$ is smaller.

(e) The numerators of the given fractions are same, i.e., 9. The fraction with greater denominator is smaller.

Thus, $\frac{9}{25}$ is smaller.

(f) By cross multiplication: $\frac{8}{17} \times \frac{1}{2}$

The cross products are: $8 \times 2 = 16$ and $1 \times 17 = 17$.

As $16 < 17$, so $\frac{8}{17}$ is smaller.

Similar work to be done for (g) and (h).

2. (a) The denominators of the given fractions are same, but their numerators are different. Thus, these fractions are not equivalent.

(b) By cross multiplication: $\frac{3}{15} \times \frac{1}{5}$

The cross products are: $3 \times 5 = 15$ and $1 \times 15 = 15$.

As the cross products are equal, so these fractions are equivalent.

(c) By cross multiplication: $\frac{9}{17} \times \frac{3}{8}$

The cross products are: $9 \times 8 = 72$ and $3 \times 17 = 51$.

As the cross products are not equal, so these fractions are not equivalent.

(d) By cross multiplication: $\frac{4}{40} \times \frac{1}{5}$

The cross products are: $4 \times 5 = 20$ and $1 \times 40 = 40$.

As the cross products are not equal, so these fractions are not equivalent.

Similar work to be done for (e), (f), (g) and (h).

3. (a) We have $\frac{3}{7} = \frac{\square}{49} = \frac{15}{\square}$.

As 49 ÷ 7 = 7, so 3 × 7 = 21. Also, 15 ÷ 3 = 5, so 7 × 5 = 35.

Thus, $\frac{3}{7} = \frac{\boxed{21}}{49} = \frac{15}{\boxed{35}}$.

(b) We have $\frac{15}{35} = \frac{3}{\square} = \frac{\square}{28}$.

As 15 ÷ 3 = 5, so 35 ÷ 5 = 7. Also, 28 ÷ 7 = 4, so 3 × 4 = 12.

Thus, $\frac{15}{35} = \frac{3}{\boxed{7}} = \frac{\boxed{12}}{28}$

(c) We have $\frac{22}{\square} = \frac{2}{11} = \frac{\square}{99}$.

As 22 ÷ 2 = 11, so 11 × 11 = 121. Also, 99 ÷ 11 = 9, so 2 × 9 = 18.

Thus, $\frac{22}{\boxed{121}} = \frac{2}{11} = \frac{\boxed{18}}{99}$.

(d) We have $\frac{9}{90} = \frac{1}{\square} = \frac{\square}{100}$.

As 1 × 9 = 9, so 90 ÷ 9 = 10. Also, 100 ÷ 10 = 10, so 1 × 10 = 10.

Thus, $\frac{9}{90} = \frac{1}{\boxed{10}} = \frac{\boxed{10}}{100}$.

4. (a) The first four fractions equivalent to $\frac{9}{10}$ are: $\frac{9 \times 1}{10 \times 1}, \frac{9 \times 2}{10 \times 2}, \frac{9 \times 3}{10 \times 3}, \frac{9 \times 4}{10 \times 4}$

$= \frac{9}{10}, \frac{18}{20}, \frac{27}{30}, \frac{36}{40}$.

(b) The first four fractions equivalent to $\frac{2}{5}$ are: $\frac{2 \times 1}{5 \times 1}, \frac{2 \times 2}{5 \times 2}, \frac{2 \times 3}{5 \times 3}, \frac{2 \times 4}{5 \times 4}$

$= \frac{2}{5}, \frac{4}{10}, \frac{6}{15}, \frac{8}{20}$.

Similar work to be done for (c) and (d).

5. (a) We have $\frac{144}{720}$.

HCF of 144 and 720 is 144.

Dividing both the numerator and the denominator by the HCF, i.e., 144, we get

$\frac{144 \div 144}{720 \div 144} = \frac{1}{5}$, which is the simplest form of the given fraction.

(b) We have $\frac{75}{125}$.

HCF of 75 and 125 is 25.

Dividing both the numerator and the denominator by the HCF, i.e., 25, we get

$\frac{75 \div 25}{125 \div 25} = \frac{3}{5}$, which is the simplest form of the given fraction.

(c) We have $\frac{69}{345}$.

HCF of 69 and 345 is 69.

Dividing both the numerator and the denominator by the HCF, i.e., 69, we get

$\frac{69 \div 69}{345 \div 69} = \frac{1}{5}$, which is the simplest form of the given fraction.

(d) We have $\frac{84}{96}$.

HCF of 84 and 96 is 12.

Dividing both the numerator and the denominator by the HCF, i.e., 12, we get

$\frac{84 \div 12}{96 \div 12} = \frac{7}{8}$, which is the simplest form of the given fraction.

(e) We have $\frac{36}{72}$.

HCF of 36 and 72 is 36.

Dividing both the numerator and the denominator by the HCF, i.e., 36, we get

$\frac{36 \div 36}{72 \div 36} = \frac{1}{2}$, which is the simplest form of the given fraction.

Similar work to be done for (f), (g) and (h).

6. (a) We have $\frac{4}{8} \square \frac{1}{2}$.

By cross multiplication: $\frac{4}{8} \times \frac{1}{2}$

The cross products are: $4 \times 2 = 8$ and $8 \times 1 = 8$.

As the cross products are equal, so $\frac{4}{8} \boxed{=} \frac{4}{8}$.

(b) We have $\frac{18}{25} \square \frac{4}{5}$.

By cross multiplication: $\frac{18}{25} \times \frac{4}{5}$

The cross products are: $18 \times 5 = 90$ and $25 \times 4 = 100$.

As $90 < 100$, so $\frac{18}{25} \boxed{<} \frac{4}{5}$.

(c) We have $\frac{2}{3} \square \frac{3}{4}$.

By cross multiplication: $\frac{2}{3} \times \frac{3}{4}$

The cross products are: $2 \times 4 = 8$ and $3 \times 3 = 9$.

As $8 < 9$, so $\frac{2}{3} \boxed{<} \frac{3}{4}$.

(d) We have $\frac{5}{7} \square \frac{7}{5}$.

By cross multiplication: $\frac{5}{7} \times \frac{7}{5}$

The cross products are: $5 \times 5 = 25$ and $7 \times 7 = 49$.

As $25 < 49$, so $\frac{5}{7} \boxed{<} \frac{7}{5}$.

(e) We have $\frac{6}{16} \square \frac{3}{8}$.

By cross multiplication: $\frac{6}{16} \times \frac{3}{8}$

The cross products are: $6 \times 8 = 48$ and $3 \times 16 = 48$.

As $48 = 48$, so $\frac{6}{16} \boxed{=} \frac{3}{8}$.

Similar work to be done for (f), (g) and (h).

7. (a) We have $\frac{19}{41}, \frac{2}{41}, \frac{15}{41}, \frac{10}{41}$.

The denominators of the fractions are same, i.e., 41, so we compare the numerators.

As $2 < 10 < 15 < 19$, so the given fractions in ascending order are: $\frac{2}{41}, \frac{10}{41}, \frac{15}{41}, \frac{19}{41}$.

(b) We have $\frac{17}{85}, \frac{2}{5}, \frac{7}{17}, \frac{14}{85}$.

The LCM of the denominators is 85.

Now writing the fractions with denominator 85, we get

$$\frac{17}{85}, \frac{2 \times 17}{5 \times 17}, \frac{7 \times 5}{17 \times 5}, \frac{14}{85} = \frac{17}{85}, \frac{34}{85}, \frac{35}{85}, \frac{14}{85}$$

Comparing the numerators, we find that $14 < 14 < 34 < 35$, so the given fractions in ascending order are: $\frac{17}{85} < \frac{34}{85} < \frac{35}{85} < \frac{14}{85}$

or $\frac{14}{85} < \frac{17}{85} < \frac{2}{17} < \frac{7}{17}$.

(c) We have $\frac{6}{7}, \frac{3}{10}, \frac{2}{9}, \frac{4}{5}$.

The LCM of the denominators is 630.

Now writing the fractions with denominator 630, we get

$$\frac{6 \times 90}{7 \times 90}, \frac{3 \times 63}{10 \times 63}, \frac{2 \times 70}{9 \times 70}, \frac{4 \times 126}{5 \times 126}$$

$$= \frac{540}{630}, \frac{189}{630}, \frac{140}{630}, \frac{504}{630}$$

2	7, 10, 9, 5
3	7, 5, 9, 5
3	7, 5, 3, 5
5	7, 5, 1, 5
7	7, 1, 1, 1
	1, 1, 1, 1

LCM = $2 \times 3 \times 3 \times 5 \times 7$
= 630

Comparing the numerators, we find that $140 < 189 < 504 < 540$, so the given fractions in ascending order are: $\frac{140}{630}, \frac{189}{630}, \frac{504}{630}, \frac{540}{630}$ or $\frac{2}{9} < \frac{3}{10} < \frac{4}{5} < \frac{6}{7}$.

Similar work to be done for (f), (g) and (h).

8. (a) We have $\frac{19}{23}, \frac{5}{23}, \frac{17}{23}, \frac{11}{25}$.

The denominators of the fractions are same, i.e., 41, so we compare the numerators.

As $19 < 17 < 11 < 5$, so the given fractions in descending order are: $\frac{19}{41} > \frac{17}{41} > \frac{11}{41} > \frac{5}{41}$.

(b) We have $\frac{17}{85}, \frac{2}{5}, \frac{7}{17}, \frac{14}{85}$.

The LCM of the denominators is 85.

Now writing the fractions with denominator 85, we get

$$\frac{17}{85}, \frac{2 \times 17}{5 \times 17}, \frac{7 \times 5}{17 \times 5}, \frac{14}{85} = \frac{17}{85}, \frac{34}{85}, \frac{35}{85}, \frac{14}{85}$$

Comparing the numerators, we find that $35 > 34 > 17 < 14$, so the given fractions in ascending order are: $\frac{17}{85} < \frac{34}{85} < \frac{35}{85} < \frac{14}{85}$

(c) We have $\frac{3}{5}, \frac{7}{10}, \frac{11}{20}, \frac{13}{15}$.

The LCM of the denominators is 60.

Now writing the fractions with denominator 85, we get

$$\frac{3 \times 12}{5 \times 12}, \frac{7 \times 6}{10 \times 6}, \frac{11 \times 3}{20 \times 3}, \frac{13 \times 4}{15 \times 4} = \frac{36}{60}, \frac{42}{60}, \frac{33}{60}, \frac{52}{60}$$

Comparing the numerators, we find that $14 < 14 < 34 < 35$, so the given fractions in ascending order are: $\frac{52}{60} < \frac{42}{60} < \frac{36}{60} < \frac{33}{60}$ or $\frac{13}{15} < \frac{7}{10} < \frac{3}{5} < \frac{11}{20}$.

Similar work to be done for (d).

9. Time of walling by Rina = $\frac{4}{5} = \frac{16}{20}$

Time of walling by Nidhi = $\frac{3}{4} = \frac{15}{20}$

Comparing the numerators, we find that 16 > 15.

Thus, Rina walks for more time.

10. Part of book read by Nivedita on Monday = $\frac{2}{5} = \frac{6}{15}$

Part of book read by Nivedita on Tuesday = $\frac{1}{3} = \frac{2}{5}$

Part of book read by Nivedita on Wednesday = $\frac{4}{5}$

Now we have $\frac{2}{5}$, $\frac{1}{3}$ and $\frac{4}{5} = \frac{6}{15}$, $\frac{5}{15}$ and $\frac{12}{15}$. [LCM of denominators 3 and 5 = 15]

Comparing the numerators, we find that 12 > 6 > 5.

Thus, Nivedita read the major part of the book on Wednesday.

11. Fraction of students of class VI who come by bus = $\frac{25}{45} = \frac{5}{9}$

Fraction of students of class VII who come by bus = $\frac{28}{40} = \frac{7}{10}$

Comparing the numerators, we find that 12 > 6 > 5.

As = $\frac{5}{9}$ is greater than = $\frac{5}{9}$, so the greater fraction of students of class VII use the bus.

Exercise 5.3

1. (a) $\frac{3}{8} + \frac{2}{8} = \frac{3+2}{8} = \frac{5}{8}$.

(b) $\frac{9}{17} + \frac{2}{17} = \frac{9+2}{17} = \frac{11}{17}$.

(c) $\frac{15}{37} + \frac{22}{37} = \frac{15+22}{37} = \frac{37}{37} = 1$.

(d) $2\frac{3}{8} + 7\frac{1}{8} = \frac{19+57}{8} = \frac{76}{8} = 9\frac{4}{8} = 9\frac{1}{2}$.

(e) $6 + 3\frac{1}{4} + 2\frac{1}{2} = \frac{6}{1} + \frac{13}{4} + \frac{5}{2}$

$= \frac{24+13+10}{4} = \frac{47}{4} = 11\frac{3}{4}$. [LCM of 1, 2 and 4 is 4.]

(f) $7 + \frac{2}{15} + \frac{1}{5} = \frac{7}{1} + \frac{2}{15} + \frac{1}{5} = \frac{15+2+3}{15}$ [LCM of 1, 2 and 4 is 4.]

$= \frac{20}{15} = 1\frac{5}{15} = 1\frac{1}{3}$.

Similar work to be done for (f), (g) and (h).

2. (a) $\frac{9}{25} - \frac{3}{25} = \frac{9-3}{25} = \frac{12}{25}$.

(b) $\frac{16}{37} - \frac{15}{37} = \frac{16+15}{37} = \frac{1}{37}$.

(c) $\frac{18}{45} - \frac{3}{45} = \frac{18-3}{45} = \frac{17}{45}$.

(d) $8 - \frac{2}{5} = \frac{8}{1} - \frac{2}{5} = \frac{40-2}{5} = \frac{38}{5} = 7\frac{3}{5}$.

(e) $\frac{7}{14} - \frac{2}{7} = \frac{7}{14} - \frac{4}{14} = \frac{7-4}{14} = \frac{3}{14}$. [LCM of 7 and 14 is 14.]

(f) $6 - \frac{2}{3} = \frac{6}{1} - \frac{2}{3} = \frac{18-2}{3} = \frac{16}{3} = 5\frac{1}{3}$. [LCM of 1 and 3 is 3.]

(g) $9\frac{1}{4} - 3\frac{2}{5} = \frac{37}{4} - \frac{17}{5} = \frac{185-68}{20} = \frac{117}{20} = 5\frac{17}{20}$. [LCM of 1 and 3 is 3.]

Similar work to be done for (f), (g) and (h).

3. (a) We have $\frac{2}{5} + \frac{1}{4} - \frac{1}{2}$.

LCM of denominators 5, 4 and 2 is 20.

$\therefore \frac{2}{5} + \frac{1}{4} - \frac{1}{2} = \frac{2\times4 + 1\times5 - 1\times10}{20} = \frac{8+5-10}{20} = \frac{3}{20}$.

(b) We have $\frac{6}{7} + \frac{2}{3} - \frac{1}{6}$.

LCM of denominators 7, 3 and 6 is 42.

$\therefore \frac{6}{7} + \frac{2}{3} - \frac{1}{6} = \frac{6\times7 + 2\times14 - 1\times7}{42} = \frac{42+28-7}{42} = \frac{63}{42} = \frac{3}{2} = 1\frac{1}{2}$.

(c) We have $\frac{13}{24} + \frac{30}{48} - \frac{3}{12} - \frac{5}{6}$.

LCM of denominators 24, 48, 12 and 6 is 48.

$\therefore \frac{13}{24} + \frac{30}{48} - \frac{3}{12} - \frac{5}{6} = \frac{13\times3 + 30\times1 - 3\times4 - 5\times8}{48}$

$= \frac{39+30-12-40}{48} = \frac{69-52}{48} = \frac{17}{48}$.

(d) We have $12\frac{1}{2} - 6\frac{2}{3} + 1\frac{1}{5} = \frac{25}{2} - \frac{20}{3} + \frac{6}{5}$.

LCM of denominators 2, 3 and 5 is 30.

$\therefore \frac{25}{2} - \frac{20}{3} + \frac{6}{5} = \frac{25\times15 - 20\times10 + 6\times5}{30}$

$= \frac{375-200+30}{30} = \frac{405-200}{30} = \frac{205}{30} = 6\frac{25}{30} = 6\frac{5}{6}$.

Similar work to be done for (e), (f), (g) and (h).

4. Number of pencils Soni had = 21

Number of pencils she gave to her sister = 7

Fraction of total pencils she gave = $\frac{7}{21} = \frac{1}{7}$.

Thus, Soni gave $\frac{1}{7}$ of the pencils she had.

5. Quantity of sweets Seema had = 2 kg

Quantity of sweets she gave to Rita = $\frac{1}{4}$ of 2 kg = 0.5 kg.

Quantity of sweets she gave to Neha = $\frac{3}{8}$ of 2 kg = $\frac{3 \times 2}{8}$ kg = 0.75 kg.

Quantity of sweets left with Seema = 2 kg – (0.5 kg + 0.75 kg) = 2 kg – 1.25 kg = 0.75 kg.

Thus, 0.75 kg of sweets is left with Seema.

6. Radha weighs = $40\frac{1}{4}$ kg

Weight of Aditya = $40\frac{3}{8}$ kg + $4\frac{1}{5}$ kg

$= \frac{323}{8}$ kg + $\frac{21}{5}$ kg

$= \frac{323 \times 5}{40}$ kg + $\frac{21 \times 8}{40}$ kg

[LCM of 8 and 5 is 40.]

$= \frac{1615 + 168}{40}$ kg = $\frac{1783}{40}$ kg = $44\frac{23}{40}$ kg.

Thus, the weight of Aditya is $44\frac{23}{40}$ kg.

7. Part of the picture painted by Anu = $\frac{3}{5} = \frac{21}{35}$

Part of the picture painted by Sonu = $\frac{4}{7} = \frac{20}{35}$

Comparing the numerators, we find that 21 > 20.

As $\frac{21}{35} > \frac{20}{35}$ or $\frac{3}{5} > \frac{4}{7}$, so Anu painted more part of the picture.

Difference = $\frac{21}{35} - \frac{20}{35} = \frac{1}{35}$.

Thus, Anu painted more part of the picture than Sonu.

8. Share part invested by Gaurav = $\frac{2}{5}$

Share part invested by Rishi = $\frac{1}{6}$

Share part invested by Gautam = $1 - \frac{2}{5} - \frac{1}{6} = \frac{1}{1} - \frac{2}{5} - \frac{1}{6}$

$= \frac{30 - 12 - 5}{30} = \frac{13}{30}$. [LCM of 1, 5 and 6 is 30]

Thus, Share part invested by Gautam was $\frac{13}{30}$

Thus, Anu painted more part of the picture than Sonu.

9. Aurav travelled by bicycle = $3\frac{1}{2}$ km $\frac{7}{2}$ km

He travelled by bus = 4 km + $\frac{4}{1}$ km

He travelled by train = $11\frac{3}{4} = \frac{47}{4}$

Total distance travelled by Aurav = $\frac{7}{2} + \frac{4}{1} + \frac{47}{4}$

$= \frac{14 + 16 + 47}{4}$ [LCM of 1, 2 and 4 is 4.]

$= \frac{77}{4} = 19\frac{1}{4}$.

Thus, the total distance covered by Aurav is $19\frac{1}{4}$.

10. Other fraction = sum of fractions – one fraction

$= 20\frac{7}{8} - 11\frac{3}{4} = \frac{167}{8} - \frac{47}{4}$

$= \frac{167 - 94}{8} = \frac{73}{8} = 9\frac{1}{8}$. [LCM of 4 and 8 is 8.]

Thus, the other fraction is $9\frac{1}{8}$.

Multiple Choice Questions

See the **Answers** given in the textbook.

Mental Maths

See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. There are infinite number of fractions between 0 and 1.

2. We can write every whole number in the form of $\frac{p}{q}$. Thus, all whole numbers are fractions.
3. Prime numbers from 0 to 10 are: 2, 3, 5 and 7 = 4 numbers
   Total numbers from 0 to 10 = 11
   Required fraction = $\frac{4}{11}$.
4. As there are infinite numbers, so a fraction can have infinite equivalent fractions.
5. Let the numerator of the fraction be x.
   Then its denominator will be $x + 28$.
   According to the question,

$$\frac{x}{x+28} = \frac{5}{7}$$

$\Rightarrow \quad 7x = 5(x + 28)$

$\Rightarrow \quad 7x = 5(x + 28) = 5x + 140$

$\Rightarrow \quad 2x = 140$

$\Rightarrow \quad x = 140 \div 2 = 70$

and $x + 28 = 70 + 28 = 98$.

Thus, the required fraction is $\frac{70}{98}$.

Chapter Test

1. Similar to question 5 of Exercise 5.1.
2. Three required fractions are: $\frac{3}{4}$, $\frac{6}{7}$ and $\frac{9}{11}$.
3. The equivalent fraction of $\frac{3}{4}$:

   (a) with numerator 16 = $\frac{3 \times 4}{4 \times 4} = \frac{12}{11}$.

   (b) with numerator 20 = $\frac{3 \times 5}{4 \times 5} = \frac{15}{20}$.

   (c) with numerator 28 = $\frac{3 \times 7}{4 \times 7} = \frac{21}{28}$.

   (d) with numerator 12 = $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$.

4. Similar to question 6 of Exercise 5.2.
5. Similar to question 3 of Exercise 5.2.
6. Similar to question 2 of Exercise 5.2.
7. Three fractions equivalent to

(a) $\frac{9}{17}$ are: $\frac{9 \times 2}{17 \times 2}, \frac{9 \times 3}{17 \times 3}$ and $\frac{9 \times 4}{17 \times 4} = \frac{18}{34}, \frac{27}{51}$ and $\frac{27}{68}$.

(b) $\frac{4}{15}$ are: $\frac{4 \times 2}{15 \times 2}, \frac{4 \times 3}{15 \times 3}$ and $\frac{4 \times 4}{15 \times 4} = \frac{8}{30}, \frac{12}{45}$ and $\frac{16}{60}$.

Similar work to be done for (c) and (d).

8. Similar to question 5 of Exercise 5.2.
9. Similar to question 7 of Exercise 5.2.
10. Similar to question 3 of Exercise 5.3.
11. Time spend by Ravi in playing cricket = $2\frac{3}{4} = \frac{11}{4}$ hours

Time spend by him in swimming = $\frac{1}{2}$ hours

Difference between these two times = $\frac{11}{4} - \frac{1}{2} = \frac{11-2}{4} - \frac{9}{4} = 2\frac{1}{4}$ hours

Thus, Rave spends $2\frac{1}{4}$ hours more in playing cricket than swimming.

12. 1 rupee = 100 paise

Required fraction = $\frac{25}{100}$.

13. Sum of the given fractions = $\frac{19}{20} + \frac{11}{20} = \frac{30}{20} = \frac{3}{2}$, which is the required fraction.
14. Quantity of potatoes bought by Suhel = $7\frac{1}{4}$ kg = $\frac{30}{20}$

Quantity of potatoes consumed by Suhel = $3\frac{1}{2}$ kg = $\frac{30}{20}$

Quantity of potatoes left = $7\frac{1}{4}$ kg $- 3\frac{1}{2}$ kg

15. Fraction of students of class VIA who passed = $\frac{36}{46} = \frac{18}{23}$

Fraction of students of class VIB who passed = $\frac{30}{40} = \frac{3}{4}$

Now we have $\frac{18}{23}$ and $\frac{3}{4}$.

By cross multiplication: $\frac{18}{23} \times \frac{3}{4}$

The cross products are: $18 \times 4 = 72$ and $23 \times 3 = 69$.

As $72 > 69$, so the greater fraction of students of class VIA is passed.

16. The fraction of salary the man spends on ration = $\frac{2}{3}$

The fraction of salary the man spends on clothes = $\frac{1}{5}$

The fraction of salary the man spends on ration = $\frac{1}{10}$

The fraction of salary the man spends in all = $\frac{2}{3} + \frac{1}{5} + \frac{1}{10}$

$= \frac{20 + 6 + 3}{30} = \frac{29}{30}$.

17. Distance that Madhu jumped = 4 m

Distance that Neha jumped = 4 m – $\frac{4}{5} = \frac{20 - 4}{5} = \frac{16}{20} = \frac{4}{5}$.

18. Time taken by Sudha to walk across the school ground = $8\frac{1}{2}$ minutes

Time taken by Rahul to walk across the school ground = $\frac{15}{3}$ = 5 minutes

As $8\frac{1}{2} > 5$, so Rahul takes less time.

Now difference between these two times = $8\frac{1}{2} - \frac{5}{1} = \frac{17}{2} - \frac{5}{1} = \frac{17 - 10}{2} = \frac{7}{2} = 3\frac{1}{2}$.

Thus, Rahul takes less time than Sudha by $3\frac{1}{2}$ minutes.

6 Decimals

Exercise 6.1

1. (a) 0.5 (b) 0.16 (c) 0.04 (d) 0.086
   (e) 52.700 (f) 92.008
2. (a) 0.72 (b) 0.8 (c) 1.58 (d) 0.086
   (e) 0.07 (f) 0.002 (g) 95.0 (h) 0.67
3. (a) zero point one eight (b) sixty-nine point seven two
   (c) four point zero zero eight (d) six hundred fifty-two point one
   (e) five point two one seven (f) seven hundred two point nineteen
   (g) nine hundred fifty-seven point five seven
   (h) one thousand five point zero five nine
4. (a) 5.23 (b) 54.08 (c) 0.294 (d) 57.02
5. In the expanded form:
   (a) $58.2 = 50 + 8 + \frac{2}{10}$ (b) $0.286 = \frac{2}{10} + \frac{8}{100} + \frac{6}{1000}$
   (c) $92.3 = 90 + 2 + \frac{3}{10}$ (d) $7.852 = 7 + \frac{8}{10} + \frac{5}{100} + \frac{2}{1000}$
6. (a) $7 + 0.2 + 0.05 = 7.25$ (b) $0.2 + 0.06 + 0.008 = 0.268$
   (c) $9 + 0.04 = 9.04$ (d) $50 + 2 + 0.9 + 0.001 = 52.901$
   (e) $7 + 0.08 + 0.006 = 7.086$ (f) $90 + 7 + 0.030 = 997.030$
   (g) $70 + 8 + 0.2 + 0.009 = 78.209$ (f) $1 + 0.01 + 0.001 = 1.011$
7. (a) $7.254 = 7 + \frac{2}{10} + \frac{5}{100} + \frac{4}{1000}$
   (b) $24.76 = 20 + 4 + \frac{7}{10} + \frac{6}{100}$
   (c) $278.439 = 200 + 70 + 8 + \frac{4}{10} + \frac{3}{100} + \frac{9}{1000}$
   (d) $0.486 = \frac{4}{10} + \frac{8}{100} + \frac{6}{1000}$
8. (a) In the given series, the tenths digit decreases by 1. Thus, the next two numbers are 4.4 and 4.3.
   (b) In the given series, the decimal part increases by 0.111. Thus, the next two numbers are 0.345 and 0.456.
   (c) In the given series, the hundredths digit increases by 1. Thus, the next two numbers are 4.015 and 4.016.

(d) In the given series, the tenths digit increases by 1. Thus, the next two numbers are 15.51 and 15.61.

9. See the **Answers** given in the textbook.

10. The place value of the underlined digit in:

(a) 7$\underline{5}$.2 is 5. (b) 0.16$\underline{8}$ is 0.006 (c) 29.7$\underline{4}$3 is 0.04

(d) $\underline{6}$54.289 is 600. (e) 0.$\underline{4}$92 is 0.4.

11. See the **Answers** given in the textbook.

Exercise 6.2

1. We know that like decimals have same number of decimal places and unlike decimals have different number of decimal places. Thus, like decimals are:

(a) 4.20, 3.67, 0.80, 0.43 (b) 0.500, 1.780, 6.387, 4.500

(c) 1.789, 0.700, 6.850, 1.000 (d) 3.800, 4.920, 6.187

2. (a) Comparing the whole number parts, we find that $4 > 2$. Thus, $4.2 > 2.4$.

(b) Comparing the whole number parts, we find that $6 < 68$. Thus, $6.856 < 68.56$.

(c) Comparing the decimal numbers, we find that both the numbers are same. Thus, $9.200 = 9.2$.

(d) Whole number parts are same. Comparing the tenths place digits, we find that $9 > 8$. Thus, $0.98 > 0.876$.

Similar work to be done for (e), (f), (g) and (h).

3. (a) Comparing the whole number parts, we find that $2 < 4 < 7 < 8$. Thus, the given decimals in ascending order are: $2.9 < 4.6 < 7.2 < 8.8$.

(b) Comparing the whole number parts and tenths place digits, we find that the given decimals in ascending order are: $0.9 < 0.91 < 1.02 < 1.71$.

(c) Comparing the whole number parts, we find that 55.5 is the greatest. Comparing the other digits, we find that the given decimals in ascending order are: $5.5 < 5.505 < 5.555 < 55.5$.

(d) Comparing the whole number parts, we find that 0 is the smallest and 72 is the greatest. Comparing the other digits, we find that the given decimals in ascending order are: $0.725 < 7.2 < 7.25 < 72.5$.

4. (a) The whole number parts of all the decimals are same. Comparing the other digits, we find that the given decimals in descending order are: $4.201 > 4.2 > 4.09 < 4.0$.

(b) Comparing the whole number parts and tenths place digits, we find that the given decimals in descending order are: $352.0 > 35.2 > 3.52 < 0.352$.

(c) Comparing the whole number parts and other digits, we find that the given decimals in descending order are: $11.1 > 11.01 > 1.11 < 0.111$.

(d) Comparing the whole number parts and other digits, we find that the given decimals in descending order are: $672.5 > 67.52 > 67.25 < 6.275$.

5. See the **Answers** given in the textbook.

6. Observing the given number line, we find that the decimal represented by:

(a) P is 0.6. (b) Q is 1.1 (c) R is 2.8 (d) S is 3.3

Exercise 6.3

1. (a) We have 4.2 which has one decimal place. Thus, in fraction, it is $\frac{42}{10}$.

(b) We have 6.24 which has two decimal places. Thus, in fraction, it is $\frac{624}{100}$.

(c) We have 0.125 which has three decimal places. Thus, in fraction, it is $\frac{125}{1000}$.

(d) We have 3.66 which has two decimal places. Thus, in fraction, it is $\frac{366}{100}$.

(e) We have 36.5 which has one decimal place. Thus, in fraction, it is $\frac{365}{10}$.

Similar to be done for (f) to (j).

2. To convert a decimal into a fraction, we write 1 in the denominator, followed by as many zeroes as there are decimal places in the given decimal number. Thus:

(a) In decimal form, $\frac{9}{10}$ is written as 0.9.

(b) In decimal form, $\frac{16}{10}$ is written as 1.6.

(c) In decimal form, $\frac{7}{100}$ is written as 0.07.

(d) In decimal form, $\frac{52}{1000}$ is written as 0.052.

(e) In decimal form, $\frac{8}{1000}$ is written as 0.008.

Similar to be done for (f) to (j).

3. (a) $\frac{7}{5} = \frac{7 \times 2}{5 \times 2} = \frac{14}{10} = 1.4.$ (b) $\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} = 0.5$

(c) $\frac{3}{8} = \frac{3 \times 125}{8 \times 125} = \frac{375}{1000} = 0.375.$ (d) $\frac{1}{25} = \frac{1 \times 4}{25 \times 4} = \frac{4}{100} = 0.04.$

(e) $\frac{7}{125} = \frac{7 \times 8}{125 \times 8} = \frac{56}{1000} = 0.056.$ (f) $9\frac{1}{2} = \frac{19}{2} = \frac{19 \times 5}{2 \times 5} = \frac{95}{10} = 9.5.$

(g) $10\frac{2}{5} = \frac{22}{5} = \frac{22 \times 2}{5 \times 2} = \frac{44}{10} = 4.4.$ (h) $2\frac{1}{8} = \frac{17}{8} = \frac{17 \times 125}{8 \times 125} = \frac{2125}{1000} = 2.125.$

Similar to be done for (f) to (j).

3. (a)
$$\begin{array}{r|l} & 1.25 \\ \hline 4 & 5 \\ & -4 \\ \hline & 10 \\ & -8 \\ \hline & 20 \\ & -20 \\ \hline & 0 \end{array}$$

$\therefore$ Thus, $\frac{5}{4} = 1.25$.

(b)
$$\begin{array}{r|l} & 2.375 \\ \hline 8 & 19 \\ & -16 \\ \hline & 30 \\ & -24 \\ \hline & 60 \\ & -56 \\ \hline & 40 \\ & -40 \\ \hline & 0 \end{array}$$

$\therefore$ Thus, $2\frac{3}{8} = 2.375$.

(b)
$$\begin{array}{r|l} & 0.75 \\ \hline 20 & 150 \\ & -140 \\ \hline & 100 \\ & -8 \\ \hline & 20 \\ & -20 \\ \hline & 0 \end{array}$$

$\therefore$ Thus, $\frac{15}{20} = 0.75$.

Similar work to be done for (g) to (j).

4. A decimal number greater than 0.5 is greater than $\frac{1}{2}$. Thus, (c), (d), (f), (g) and (h) are greater than $\frac{1}{2}$.

$\frac{7}{1000}$

Exercise 6.4

1. We know that 100 p = ₹ 1.

(a) 2 p = ₹ $\frac{2}{100}$ = ₹ 0.02.

(b) 13 p = ₹ $\frac{13}{100}$ = ₹ 0.13.

(c) 20 p = ₹ $\frac{20}{100}$ = ₹ 0.20.

(d) 4 rupees 12 p = 412 p = ₹ $\frac{412}{100}$ = ₹ 4.12.

(e) 15 rupees 7 p = ₹ $\frac{1507}{100}$ = ₹ 15.07.

(f) 145 rupees 75 p = ₹ $\frac{14575}{100}$ = ₹ 145.75.

Similar work to be done for (g) and (h).

2. We know that 1000 g = 1 kg.

(a) 580 g = $\frac{580}{1000}$ kg = 0.580 kg.

(b) 7 g = $\frac{7}{1000}$ kg = 0.007 kg.

(c) 2785 g = $\frac{2785}{1000}$ kg = 2.785 kg.

(d) 1500 g = $\frac{1500}{1000}$ kg = 1.500 kg.

(e) 3 kg 150 g = 3150 g = $\frac{3150}{1000}$ kg = 3.150 kg.

(f) 780 kg 4 g = (780 × 1000 + 4) g = 780004 g = $\frac{780004}{1000}$ kg = 780.004 kg.

Similar work to be done for (g) and (h).

3. We know that 10 mm = 1 cm.

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

(b) 82 mm = $\frac{82}{10}$ cm = 8.2 cm.

(c) 432 mm = $\frac{432}{100}$ cm = 43.2 cm. (d) 4 cm 9 mm = 49 mm = $\frac{49}{10}$ cm = 4.9 cm.

(e) 27 cm 8 mm = 278 mm = $\frac{278}{10}$ cm = 27.8 cm.

Similar work to be done for (f) to (h).

4. We know that 100 cm = 1 m.

(a) 9 cm = $\frac{9}{100}$ cm = 0.09 m. (b) 56 cm = $\frac{56}{100}$ cm = 0.56 m.

(c) 286 cm = $\frac{286}{100}$ m = 2.86 m. (d) 1463 cm = $\frac{1463}{100}$ m = 14.63 m.

(e) 5 m 85 cm = 585 cm = $\frac{585}{100}$ m = 5.85 m.

(f) 781 mm = $\frac{781}{10}$ cm = $\frac{781}{1000}$ m = 0.781 m.

Similar work to be done for (g) to (h).

5. We know that 1000 m = 1 km.

(a) 5 m = $\frac{5}{1000}$ km = 0.005 km. (b) 27 m = $\frac{27}{1000}$ km = 0.027 km.

(c) 489 m = $\frac{489}{1000}$ km = 0.489 km. (d) 5326 m = $\frac{5326}{1000}$ km = 5.326 km.

(e) 7 km 9 m = 7009 m= $\frac{7009}{1000}$ km = 7.009 km.

Similar work to be done for (f) to (h).

6. (a) 8 L 25 mL = 8000 mL + 25 mL = 8025 mL= $\frac{8025}{1000}$ km = 8.025 mL. [1 L = 1000 mL]

(b) 8 mg = $\frac{8}{1000}$ g = 0.008 g. [1 g = 1000 mg]

(c) 36 g = $\frac{36}{1000}$ kg = 0.036 kg. [1 kg = 1000 g]

(d) 5 rupees 2 paise = 500 paise + 2 paise = 502 paise = $\frac{502}{100}$ rupees = 5.02 rupees.

Similar work to be done for (f) to (h).

7. (a) 0.6 + 0.9 = 1.5 (b) 8 + 0.4 = 8.04

(c) 7.5 + 3.5 = 11.0 (d) 3.257 + 2.650 = 8.04

(e) 5.3 + 13.48 = 18.78 (f) 5.15 + 3.14 = 8.29

(g) 206.887 + 63.524 = 270.411 (h) 4.57 + 9.50 + 8.15 = 22.22

8. (a) 3.0 – 1.25 = 1.75 (b) 13 – 5.56 = 7.44

(c) 7.0 – 0.55 = 6.45 (d) 7.75 – 5.21 = 2.54

(e) 11.111 – 1.1111 = 9.9999 (f) 30.775 – 25.26 = 5.515

Similar work to be done for (g) to (h).

9. (a) 5.33 + 2.5 = 7.58.
   (b) 3.5 + 1.3 – 4.2 = 4.8 – 4.2 = 0.6.
   (c) 4.28 + 5.24 – 3.5 = 9.52 – 3.50 = 6.02.
   (d) 4.26 – 2.35 + 3.50 = 7. 76 – 2.35 = 5. 41.
   (e) 8.000 – 13.428 + 5.530 = 13.530 – 13.428 = 0.002.
   (f) 13.121 + 12.210 – 12.210 = 13.121.
   (g) 45.16 + 493.28 – 507.34 = 538.44 – 507.34 = 31.10.
   (h) 105.27 + 20.20 – 30.27 = 125.47 – 30.27 = 95.20.
10. Distance walked by Rahul on Sunday = 8.62 km
    Distance walked by Rahul on Monday = 7.05 km
    Total distance walked by Rahul on three days = 21.01 km
    Distance walked by Rahul on Tuesday = 21.01 – (8.62 + 7.05) km
    = (21.01 – 15.67) km = 5.34 km.
    Thus the distance walked by Rahul was 5.34 km.

Multiple Choice Questions

See the **Answers** given in the book.

Mental Maths

1. $8\frac{1}{5} = \frac{41}{5} = \frac{41 \times 2}{5 \times 2} = \frac{82}{10} = 8.2$.
2. The length of the rod in metre = 5 m 20 cm = 5.20 m.
3. Number of rupees in 5 paise = $\frac{5}{100}$ = ₹ 0.05.
4. $0.25 = \frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$.
5. 582 g = $\frac{582}{1000}$ kg = 0.582 kg.
6. The place value of a digit at the tenths place is **ten** time the digit at ones place.
7. 5389 m = $\frac{5389}{1000}$ km = 5.389 km.
8. 0.672 lies between 0.671 and 0.673.
9. 8 hundreds + 5 tens + 6 ones + 2 tenths = 856.2.
10. In 5.286, the place value of 8 is **8 hundredths**.

HOTS (Higher Order Thinking Skills)

1. One tenth of a tens = $\frac{10}{10}$ = 1.

2. The required largest 3-digit number is 0.954.
3. Comparing the whole number parts, we find that $2 > 0$.
   Thus, 2.5 is greater than 0.025.

Chapter Test

1. See the **Answers** given in the textbook.
2. Similar to the solution of question 10 of Exercise 6.1.
3. Similar to the solution of question 5 of Exercise 6.1.
4. Similar to the solution of question 1 of Exercise 6.2.
5. The decimal for:
   (a) 5 hundredths is 0.05. (b) 2 thousandths is 0.002.
   (c) fifty-one and six tenths is 51.6. (d) $\frac{9}{1000}$ is 0.009.
   (e) $\frac{56}{10}$ is 5.6. (f) $\frac{34}{100}$ is 0.34. (g) $\frac{982}{10}$ is 98.2.
6. Similar to the solution of question 2 of Exercise 6.2.
7. Similar to the solution of question 2 of Exercise 6.3.
8. Similar to the solution of question 1 of Exercise 6.3.
9. Similar to the solution of question 3 of Exercise 6.2.
10. Similar to the solution of question 4 of Exercise 6.2.
11. (a) 0.4 + 7.23 = 7.27. (b) 6.900 + 25.100 + 3.78 = 35.78.
    (c) 8.26 + 15.000 + 3.1 + 0.381 = 26.741.
12. (a) 8.0 – 2.76 = 5.24. (b) 13.29 – 4.375 = 8.915.
    (c) 25 – 13.284 = 11.716.
13. Cost of a book = 175.75
    Cost of a book = 63.25
    Total of cost of both these items = ₹ 175.75 + ₹ 63.25 = ₹ 239.0.
    Thus, total amount spend by Shubham is ₹ 239.0.
14. Money saved by Poonam in January = ₹ 3740.25
    Money saved by Poonam in February = ₹ 8000
    Money saved by Poonam in March = ₹ 2609.65
    Total money saved by Poonam in these three months
    = ₹ 3740.25 + 8000 + ₹ 2609.65 = ₹ 14349.90.
15. The required number = 1000 – 295.35 = 704.65.
16. Distance travelled by Sudarshan in first hour = 8 km 25 m = 8.025 km
    Distance travelled by him in second hour = 9 km

Distance travelled by him in third hour = 7 km 985 m = 7.985 km
Total distance travelled in these three hours = 8.025 km + 9 km + 7.985 km = 25.010 km.
Thus, total distance travelled by Sudarshan is 25.010 km.

17. Quantity of milk sold by milkman in the morning = 20 L 750 mL = 21.750 L
Quantity of milk sold by him in the evening = 27 L
Total quantity of milk sold by him = 21.750 L + 27 L = 48.750 L
Quantity of milk milkman had = 50.500 L
Quantity of milk left with him = 50.500 L – 48.750 L = 1.750 L
Thus, 1.750 L milk is left unsold.

18. Part of property left by Pramod for wife = 0.4 parts
Part of property left by him for son = 0.25 parts
Part of property left by him for daughter = 1 – (0.4 + 0.25) parts = 1 – 0.65 = 0.35 parts.

19. Vegetables carrying by Sunita = 7.25 kg
Vegetables carrying by Geeta = 8 kg 500 g = 8.500 kg
As 8.500 > 7.25, so Geeta is carrying more vegetables.
Difference = 8.5 kg – 7.25 kg = 1.25 kg.
Thus, Geeta is carrying 1.25 kg more vegetables than Sunita.

20. Marks scored by Ruchir = 59 marks
Marks scored by Gaurav = 59 + 15.5 = 74.5 marks.

7 Introduction to Algebra

Exercise 7.1

1. (a) 2 more than $x = x + 2$.
   (b) Four times $a = 4a$.
   (c) 4 less than $b = b - 4$.
   (d) Seven times x less than $11 = 7x - 11$.
   (e) One-fourth of y multiplied by the sum of 2 and $x = \frac{y}{4}(x + 2)$.
   (f) Sum of a and b divided by $4 = \frac{a + b}{4}$
   (g) a taken away from the product of 6 and $b = 6b - a$.
   (h) 4 added to the quotient of x and $y = \frac{x}{y} + 4$.
2. (a) a^6 (a) $4x^2y^4$ (c) q^4r^1 (d) $7a^4$
   (e) y^{15} (f) $5a^2b^3c^4$
3. (a) $a \times a \times a \times b \times c \times c$
   (b) $8 \times x \times x \times x \times x \times x \times x \times x \times x \times x$
   (c) $12 \times x \times y \times z \times z$
   (d) $10 \times a \times b \times b \times b \times c \times c \times c \times c$
4. (a) $4 + x$ (b) $d = 2r$ (c) $15 + c$ (d) $z - 6$

Exercise 7.2

1. (a) $2a + 4$ is a binomial as it has two terms.
   (b) $2x - 2z + \frac{4}{3}$ is a trinomial as it has three terms.
   (c) $7 \times a = 7a$ is a monomial as it has one term.
   (d) $a^2 + 2b + b^2 - 7$ is a polynomial as it has more than three terms.
   (e) $pq^2 \times a \times 7 \times ab = pq^2a7ab$ is a monomial as it has one term.
   (f) $y^2 + 2y$ is a binomial as it has two terms.
   (g) abc is a monomial as it has one term.
   (h) $8x + 9y \times 3x = 8x + 27yx$ is a binomial as it has two terms.
2. (a) In $5x - 7y + 8$, the numerical coefficient of x is 5 and of y is -7.
   (b) In $2x^2 - 3x^3 - 5x + 5$, the numerical coefficient of x^2 is 2, of x^3 is -3, and of x is -5.
   Similar work to be done for (c) and (d).
3. (a) The coefficient of x in $-5x$ is -5.
   (b) The coefficient of x^2 in $-x^2$ is -1
   (c) The coefficient of a in $2ab$ is $2b$.
   (d) The coefficient of y^2 in $-2xy^2$ is $-2x$.
4. Refer to the **Answers** given in the book.
5. (a) In $4y^2 - 2xy + 4$, the term containing y is $-2xy$. The coefficient of y in it is $-2x$.

(b) In $2y - y^2 + 7$, the term containing y is $2y$. The coefficient of y in it is 2.

(c) In $2 + p + 2y$, the term containing y is $2y$. The coefficient of y in it is 2.

(d) In $xy^2 - 2y$, the term containing y is $-2y$. The coefficient of y in it is -2.

6. Refer to the **Answers** given in the book.

7. The constant term in the given expression is

(a) 4 (b) –5 (c) –3 (d) –8

8. Given: $a = 3$, $b = -2$ and $c = 1$.

(a) $7a - 2b + 5 = 7 \times 3 - 2 \times (-2) + 5 = 21 + 4 + 5 = 30$.

(b) $3a^2 - b^3 + 8c = 3 \times 3^2 - (-2)^3 + 8 \times 1 = 3 \times 9 + 8 + 8 = 43$.

(c) $a^3 - b^3 + c^3 - 2abc = 3^3 - (-2)^3 + 1^3 - 2 \times 3 \times (-2) \times 1 = 27 + 8 + 1 + 12 = 48$.

(d) $8b - 4c^3 = 8 \times (-2) - 4 \times 1^3 = -16 - 4 = -20$.

9. (a) The required algebraic expression is $7a + 2y + 5$.

(b) The required algebraic expression is $3xy - 2z - 5$.

(c) The required algebraic expression is $2x^3 + 4xy - 3x + 4xy^3$.

(d) The required algebraic expression is $x^2 + xy - 3x^2y + 4xz$.

10. Refer to the **Answers** given in the book.

Multiple Choice Questions

1. Multiple is a fundamental operation, it is not related to an algebraic expression. Thus, the correct option is (d).
2. Factor is term of an algebraic expression but not a branch of mathematics. Thus, the correct option is (c).
3. '8 more than x' can be expressed as $x + 8$. Thus, the correct option is (a).
4. 'The sum of x and y is equal to the sum of y and x' can be expressed as $x + y = y + x$. Thus, the correct option is (b).
5. In an algebraic expression, literals stand for unknown quantities. Thus, the correct option is (a).

For 6 to 10, see the **Answers** given in the book.

Mental Maths

1. Perimeter of a square having side x is $\mathbf{4x}$.
2. In $2x - 8 + x^2$, the constant term is **–8**.
3. '3 subtracted from one-fourth of x' is $\frac{x}{4} - 3$.
4. A number having a fixed value is known as **constant**.
5. Coefficient of –x is **–1**.
6. Factors of $9x^3y$ are **9**, $\boldsymbol{x^2}$ and $\boldsymbol{y}$.
7. Perimeter of an equilateral triangle having side s is $\mathbf{3s}$.
8. In algebra, $x \times y$ means xy and in arithmetic 3×4 means **12**.

HOTS (Higher Order Thinking Skills)

1. The greater number = sum of two numbers – smaller number = $10 - x$.
2. The digit at the ones place = $2 \times y = 2y$.
3. The succeeding number = $x + 2$
   The preceding number = $x - 2$

Chapter Test

1. See the **Answers** given in the textbook.
2. (a) In $7x - 4y$, the numerical coefficient of term $7x$ is 7 and that of $-4y$ is -4.
   (b) The numerical coefficient of: $2a^2$ is 2; $-5b$ is -5; $2xy^2$ is; $-abc$ is -1 and ba is 1.
3. Refer to the **Answers** given in the book.
4. The terms of the expression $\frac{x^4}{4} - 2x^2 + 4y^2 - xy$ are: $\frac{x^4}{4}$, $-2x^2$, $4y^2$ and $-xy$.
   For factors, see the **Answers** given in the book.
5. Refer to the **Answers** given in the book.
6. (a) monomial (b) trinomial (c) binomial (d) monomial
   (e) trinomial (f) monomial (g) trinomial (h) trinomial
7. (a) $9abc$ → $9, a, b, c$ (b) $4x^2yz$ → $4, x, x, y, z$

   Similar work to be done for (c) and (d) .
8. Refer to the **Answers** given in the book.
9. Refer to the **Answers** given in the book.
10. Refer to the **Answers** given in the book.

8 Linear Equations

Exercise 8.1

1. (a) Let x be number, then the required statement is $x + 5 = 11$.
   (b) Let x be number, then the required statement is $7x = 42$.
   (c) Let x be number, then the required statement is $2x - 3 = 14$.
   (d) Let x be number, then the required statement is $5x = x + 7$.
   (e) Let x be number, then the required statement is $\frac{4}{5}x + 4 = 16$.
2. (a) Subtracted 7 from four times a number gives 18.
   (b) 3 added to a number gives 11.
   (c) Two-fifths of a number is equal to 9.
   (d) Subtracted 1 from one-third of a number is equal to 7.
3. (a) no (b) yes (c) no (d) yes
4. Refer to the **Answers** given in the textbook.
5. (a) We have $4y - 9 = 11$.
   Substituting $y = 5$ in LHS, we get
   $4y - 9 = 4 \times 5 - 9 = 20 - 9 = 11 = \text{RHS}$.
   Hence, verified.
   (b) We have $3m = 9$.
   Substituting $m = 3$ in LHS, we get
   $3m = 3 \times 3 = 9 = \text{RHS}$.
   Hence, verified.
   (c) We have $\frac{p}{4} = 6$.
   Substituting $p = 24$ in LHS, we get
   $\frac{24}{4} = 6 = \text{RHS}$.
   Hence, verified.
   (d) We have $3x - 7 = 5x + 3$.
   Substituting $x = -5$ in LHS, we get
   $3x - 7 = 3 \times (-5) - 7 = -15 - 7 = -22$.
   Now substituting $x = -5$ in RHS, we get
   $5x + 3 = 5 \times (-5) + 3 = -25 + 3 = -22$.
   As LHS = RHS, hence verified.
6. (a) We have $7 + 3x = -2$.

Value of x	LHS	RHS	Is LHS = RHS
1	$7 + 3 \times 1 = 10$	–2	no
–1	$7 + 3 \times (-1) = 7 - 3 = 4$	–2	no
–2	$7 + 3 \times (-2) = 7 - 6 = 1$	–2	no
–3	$7 + 3 \times (-3) = 7 - 9 = -2$	–2	yes

From the table, we find that $x = -3$ is the solution of the given equation.

(b) We have $2a + 5 = 17$.

Value of a	LHS	RHS	Is LHS = RHS
1	$2 \times 1 + 5 = 2 + 5 = 7$	17	no
2	$2 \times 2 + 5 = 4 + 5 = 9$	17	no
3	$2 \times 3 + 5 = 6 + 5 = 11$	17	no
4	$2 \times 4 + 5 = 8 + 5 = 13$	17	no
5	$2 \times 5 + 5 = 10 + 5 = 15$	17	no
6	$2 \times 6 + 5 = 12 + 5 = 17$	17	yes

From the table, we find that $a = 6$ is the solution of the given equation.

(c) We have $\frac{y}{4} - 4 = 2$.

Value of y	LHS	RHS	Is LHS = RHS
2	$\frac{2}{4} - 4 = \frac{1-8}{2} = \frac{-7}{2}$	2	no
8	$\frac{8}{4} - 4 = 2 - 4 = -2$	2	no
16	$\frac{16}{4} - 4 = 4 - 4 = 0$	2	no
20	$\frac{20}{4} - 4 = 5 - 4 = 1$	2	no
24	$\frac{24}{4} - 4 = 6 - 4 = 2$	2	yes

From the table, we find that $y = 24$ is the solution of the given equation.

(d) We have $p - \frac{2}{3} = 8$.

Value of p	LHS	RHS	Is LHS = RHS
$\frac{2}{3}$	$\frac{2}{3} - \frac{2}{3} = 0.$	8	no
$\frac{8}{3}$	$\frac{8}{3} - \frac{2}{3} = \frac{6}{3} = 2.$	8	no

$\frac{11}{3}$	$\frac{11}{3} - \frac{2}{3} = \frac{9}{3} = 3.$	2	no
$\frac{23}{3}$	$\frac{23}{3} - \frac{2}{3} = \frac{21}{3} = 7.$	2	no
$\frac{26}{3}$	$\frac{26}{3} - \frac{2}{3} = \frac{24}{3} = 8.$	2	yes

From the table, we find that $p = \frac{26}{3}$ is the solution of the given equation.

(e) Similar work to be done.

(f) Similar work to be done.

(g) Similar work to be done.

(h) Similar work to be done.

7. (a) We have $3p + 9 = 18$.

$\Rightarrow 3p + 9 - 9 = 18 - 9$ [Subtracting 9 from both sides]

$\Rightarrow 3p = 9$

$\Rightarrow 3p \div 3 = 9 \div 3$ [Dividing both sides by 3]

$\therefore p = 3.$

(b) We have $\frac{15x}{4} = 30.$

$\Rightarrow \frac{15x}{4} \times 4 = 30 \times 4$ [Multiplying both sides by 4]

$\Rightarrow 15x = 120$

$\Rightarrow 15x \div 15 = 120 \div 15$ [Dividing both sides by 15]

$\therefore x = 8.$

(c) We have $\frac{a}{8} = \frac{3}{4}.$

$\Rightarrow \frac{a}{8} \times 8 = \frac{3}{4} \times 8$ [Multiplying both sides by 8]

$\Rightarrow a = 6.$

(d) We have $3(x + 3) = 18.$

$\Rightarrow 3x + 9 = 18.$

$\Rightarrow 3x + 9 - 9 = 18 - 9$ [Subtracting 9 from both sides]

$\Rightarrow 3x = 9$

$\Rightarrow 3x \div 3 = 9 \div 3$ [Dividing both sides by 3]

$\therefore x = 3.$

(e) We have $\frac{m}{2} - 4 = \frac{m}{3} + \frac{3}{4}.$

$\Rightarrow \frac{m}{2} - 4 + 4 = \frac{m}{3} + \frac{3}{4} + 4$ [Subtracting 4 from both sides]

$\Rightarrow \frac{m}{2} = \frac{m}{3} + \frac{19}{4}$

$\Rightarrow \frac{m}{2} - \frac{m}{3} = \frac{m}{3} - \frac{m}{3} + \frac{19}{4}$ [Subtracting $\frac{m}{3}$ from both sides]

$\Rightarrow \frac{3m - 2m}{6} = \frac{19}{4}$

$\Rightarrow \frac{m}{6} \times 6 = \frac{19}{4} \times 6$ [Multiplying both sides by 6]

$\Rightarrow m = \frac{57}{2} = 28\frac{1}{2}$.

(f) We have $2(y + 4) + 3(y - 2) = 2$.

$\Rightarrow 2y + 8 + 3y - 6 = 2$

$\Rightarrow 2y + 3y + 2 = 2$

$\Rightarrow 5y + 2 = 2$

$\Rightarrow 5y + 2 - 2 = 2 - 2$ [Subtracting 9 from both sides]

$\Rightarrow 5y = 0$

$\Rightarrow 5y \div 5 = 0 \div 5$ [Dividing both sides by 3]

$\therefore y = 0$.

(g) Similar work to be done.

(h) Similar work to be done.

Exercise 8.2

1. Let x be the length of the field. Then $x = 21 \text{ m} \times 2 = 42 \text{ m}$.
   Thus, the length of the field is 42 m.
2. Let x be speed of the car.
   Then according to the question,
   $5x = 220$
   $\Rightarrow 5x \div 5 = 220 \div 5$ [Dividing both sides by 3]
   $\Rightarrow x = 44$
   Thus, the speed of the car is 44 km/h.
3. Let the number be x.
   Then according to the question,
   $x + 7 = 48$
   $\Rightarrow x + 7 - 7 = 48 - 7$ [Subtracting 7 from both sides]
   $\Rightarrow x = 41$
   Thus, the number is 41.
4. Let the number be x.
   Then according to the question,
   $5x - 15 = 30$

$\Rightarrow 5x - 15 + 15 = 30 + 15$ [Subtracting 4 from both sides]

$\Rightarrow 5x = 45$

$\Rightarrow 5x \div 5 = 45 \div 5$ [Dividing both sides by 5]

$\therefore x = 9$

Thus, the number is 9.

5. Let Reena's present age be x years.

Then Raju's age will be $(x + 5)$ years.

According to the question,

$x + x + 5 = 19$

$\Rightarrow 2x + 5 = 19$

$\Rightarrow 2x + 5 - 5 = 19 - 5$ [Subtracting 4 from both sides]

$\Rightarrow 2x = 14$

$\Rightarrow 2x \div 2 = 14 \div 2$ [Dividing both sides by 2]

$\therefore x = 7$

$\therefore x + 5 = 7 + 5 = 12.$

Thus, Reena's present age is 7 years and Raju's present age is 12 yeas.

6. Let Seema's present age be x years.

Then Imran's age will be $2x$ years.

According to the question,

$2x - x = 17$

$\Rightarrow x = 17$

$\therefore 2x = 17 \times 2 = 34.$

Thus, Seema's present age is 17 years and Imran's present age is 34 yeas.

7. Let the breadth of the rectangle be x m. Then its length will be $2x$ m.

According to the question,

Perimeter of the rectangle = 240 m

$\Rightarrow$ 2(length + breadth) = 240 m

$\Rightarrow 2(2x + x) = 240$

$\Rightarrow 3x = 120$

$\therefore x = 120 \div 3 = 40$ m.

$\therefore 3x = 40 \times 2 = 80$ m.

Thus, the breadth of the rectangle is 40 m and its length is 80 m.

8. Let the three consecutive numbers be x, $x + 1$ and $x + 2$.

Then according to the question,

$x + x + 1 + x + 2 = 36$

$\Rightarrow 3x + 3 = 36$

$\Rightarrow 3x = 36 - 3 = 33$

$\therefore\ x = 33 \div 3 = 11$ m.

$\therefore\ x + 1 = 11 + 1 = 12$ and $x + 2 = 11 + 2 = 13$.

Thus, the three consecutive numbers are 11, 12 and 13.

9. Let the shortest side of the triangle be x m. Then its longest side will be $2x$ m.

According to the question,

Perimeter of the triangle = 14 m

$\Rightarrow\ x + 2x + x + 2 = 14$ m

$\Rightarrow\ 4x + 2 = 14$ m

$\Rightarrow\ 4x = 14 - 2 = 12$ m

$\therefore\ x = 12 \div 4 = 3$ m.

$\therefore\ 2x = 3 \times 2 = 6$ and $x + 2 = 3 + 2 = 5$.

Thus, the three sides of the triangle are 3 m, 6 m and 5 m.

10. Let the present age Poonam's daughter be x years.

Then Poonam's age will be $4x$ years.

According to the question,

$4x + x = 35$

$\Rightarrow\ 5x = 35$

$\Rightarrow\ 5x \div 5 = 35 \div 5$ [Dividing both sides by 5]

$\therefore\ x = 7$

$\therefore\ 4x = 4 \times 7 = 28$.

Thus, Poonam's present age is 28 years and her daughter's present age is 7 yeas.

11. Let the length of the side of the square be x cm.

Then according to the question,

Perimeter of the square = Length of the wire

$\Rightarrow\ 4 \times$ side = 44 cm

$\Rightarrow\ 4x = 44$ cm

$\Rightarrow\ 4x \div 4 = 44$ cm $\div 4$ [Dividing both sides by 4]

$\therefore\ x = 11$ cm.

Thus, the length of the side of the square so formed is 11 cm.

12. Let the present age of John be x years. Then after 20 years, his age will be $(x + 20)$ years.

According to the question,

$3x = x + 20$

$\Rightarrow\ 3x - x = 20$ [By transposition]

$\Rightarrow\ 2x = 20$

$\Rightarrow\ 2x \div 2 = 20 \div 2$

$\therefore\ x = 10$

Thus, John's present age is 10 years.

Multiple Choice Questions

See the **Answers** given in the book.

Mental Maths

See the **Answers** given in the book.

HOTS (Higher Order Thinking Skills)

1. My present age is $3x - 2$ kg.
2. Let the number is x.

   Then according to the question

   $4x - (3 + 2) = 31$

   $\Rightarrow \quad 4x - 5 = 31$

   $\Rightarrow \quad 4x = 31 + 5 = 36$

   $\Rightarrow \quad x = 36 \div 4 = 9.$

   Thus, the required number is 9.

Chapter Test

1. See the **Answers** given in the book.
2. See the **Answers** given in the book.
3. (a) We have $3x + 9 = 15$.

   LHS $= 3x + 9 = 3 \times 2 + 9 = 15 =$ RHS. [Substituting $x = 2$]

   As LHS = RHS, so $x = 2$ is the solution of the given equation.

   (b) We have $\frac{x}{8} + 5 = 20$.

   LHS $= \frac{x}{8} + 5 = \frac{2}{8} + 5 = \frac{1 + 10}{2} = \frac{11}{2} \neq$ RHS. [Substituting $x = 2$]

   As LHS ≠ RHS, so $x = 2$ is not the solution of the given equation.

   (c) We have $7x - 8 = x + 2$.

   LHS $= 7x - 8 = 7 \times 2 - 8 = 14 - 8 = 6.$ [Substituting $x = 2$]

   RHS $= x + 2 = 2 + 2 = 4.$ [Substituting $x = 2$]

   As LHS ≠ RHS, so $x = 2$ is not the solution of the given equation.

   (d) Similar work to be done as (a).
4. Similar work to be done as Question 6 of Exercise 8.1.
5. (a) We have $2p - 4 = 16$.

   $\Rightarrow \quad 2p - 4 = 16$

   $\Rightarrow \quad 2p = 16 + 4 = 20$ [By transposition]

   $\Rightarrow \quad p = 20 \div 2 = 10$

   Thus, $p = 10$ is the solution of the given equation.

(b) We have $7 + \frac{y}{8} = 10$.

$\therefore\ 7 + \frac{y}{8} = 10$

$\Rightarrow\ \frac{y}{8} = 10 - 7 = 3$ [By transposition]

$\Rightarrow\ \frac{y}{8} \times 8 = 3 \times 8$ [Multiplying both sides by 8]

$\Rightarrow\ y = 24$

Thus, $y = 24$ is the solution of the given equation.

(c) Similar work to be done as (a).

(d) We have $9y + 18 = 18y$.

$\therefore\ 9y - 18y = -18$ [By transposition]

$\Rightarrow\ -9y = -18$

$\Rightarrow\ y = 2$ [Dividing both sides by 8]

Thus, $y = 2$ is the solution of the given equation.

6. (a) We have $x - 9 = 7$.

$\therefore\ x = 7 + 9 = 16$ [By transposition]

$x = 16$.

Thus, $x = 16$ is the solution of the given equation.

(b) We have $2a + 3 = 15 - a$.

$\therefore\ 2a + a = 15 - 3$ [By transposition]

$\Rightarrow\ a = 12$.

Thus, $a = 12$ is the solution of the given equation.

(c) We have $\frac{5x}{4} + 7 = 22$.

$\therefore\ \frac{5x}{4} = 22 - 7 = 15$ [By transposition]

$\Rightarrow\ \frac{5x}{4} \times 4 = 15 \times 4$ [Multiplying both sides by 4]

$\Rightarrow\ 5x = 60$

$\Rightarrow\ 5x \div 5 = 60 \div 5$ [Dividing both sides by 5]

$\Rightarrow\ x = 12$.

Thus, $x = 12$ is the solution of the given equation.

(d) We have $14 - 2y = 4$.

$\therefore\ -2y = 4 - 14$ [By transposition]

$\Rightarrow\ -2y = -14$

$\Rightarrow\ -2y \div (-2) = -10 \div (-2)$ [Dividing both sides by –2]

$\Rightarrow\ y = 5$.

Thus, $y = 5$ is the solution of the given equation.

(e) Similar work to be done as (b).

(f) Similar work to be done as (b).

(g) Similar work to be done as (b).

(h) We have $\frac{4x}{3} = \frac{4}{3}$.

$\therefore\ 4x \times 3 = 4 \times 3$ [By cross multiplication]

$\Rightarrow\ 12x = 12$

$\Rightarrow\ 12x \div 2 = 12 \div 12$ [Dividing both sides by 12]

$\Rightarrow\ x = 1$.

Thus, $x = 1$ is the solution of the given equation.

7. (a) We have $3y - 7 = 9$.

LHS = $3 \times 3 - 7 = 9 - 7 = 2 \neq$ RHS. [Substituting $y = 3$]

As LHS = RHS, so $y = 3$ is not the root of the given equation.

(b) Similar work to be done as (a).

(c) We have $\frac{a}{9} = 7$.

LHS = $\frac{a}{9} = \frac{63}{9} = 7 =$ RHS. [Substituting $a = 63$]

As LHS = RHS, so $a = 63$ is the root of the given equation.

(d) We have $4x - 7 = 2x - 3$.

LHS = $4 \times 2 - 7 = 8 - 7 = 1$ [Substituting $x = 2$]

RHS = $2 \times 2 - 3 = 4 - 3 = 1$ [Substituting $x = 2$]

As LHS = RHS, so $x = 2$ is the root of the given equation.

8. Perimeter of a rectangle = 2 (length + breadth)

$\therefore\ p = 2(x + y)$

9. Let the number be x.

Then according to the question, $x + 7 = 45$

$\therefore\ x = 45 - 7 = 38$.

Thus, the required number is 38.

10. Let the cost of a pen be x.

Then according to the question,

$4x = 36 \quad \Rightarrow\ 4x \div 4 = 36 \div 4$

$\therefore\ x = 9$

Thus, the cost of each pen is ₹ 9.

11. Let the of girls in the school be x.

Then the number of boys will be $x - 237$.

According to the question,

$x + x - 237 = 2313$

$\Rightarrow\ 2x = 2313 - 237 = 2076 \quad \Rightarrow\ x = 2076 \div 2 = 1038$.

$x - 237 = 1038 - 237 = 801$.

Thus, the number of girls and boys in the school are respectively 1030 and 801.

9 Ratio and Proportion

Exercise 9.1

1. (a) We have $45 : 90 = \frac{45}{90} = \frac{45 \div 45}{90 \div 45} = \frac{1}{2}$. [HCF of 45 and 90 is 45.]

(b) We have $42 : 56 = \frac{42}{56} = \frac{42 \div 14}{56 \div 14} = \frac{3}{4}$. [HCF of 42 and 56 is 14.]

(c) We have $144 : 16 = \frac{144}{16} = \frac{144 \div 16}{16 \div 16} = \frac{9}{1}$. [HCF of 144 and 16 is 16.]

(d) We have $753 : 198 = \frac{753}{198} = \frac{756 \div 3}{198 \div 3}$ [HCF of 753 and 198 is 3.]

$= \frac{251}{66} = 3\frac{53}{66}$.

2. (a) We have to find ratio of 45 min to 1 h. [1 h = 60 min]

$\therefore\ 45 : 60 = \frac{45}{60} = \frac{45 \div 15}{60 \div 15} = \frac{3}{5} = 3 : 5.$ [HCF of 45 and 90 is 45.]

(b) We have to find ratio of 6 kg to 250 g. [1 kg = 1,000 g]

$\therefore\ 6{,}000 : 250 = \frac{6{,}000}{250} = \frac{6{,}000 \div 250}{250 \div 250} = \frac{24}{1} = 24 : 1.$ [HCF of 6,000 and 250 is 250.]

(c) We have to find ratio of 900 p to ₹ 4. [₹ 1 = 100 p]

$\therefore$ 900 p to 400 p $= \frac{900}{600} = \frac{900 \div 300}{600 \div 300} = \frac{3}{2} = 3 : 2.$ [HCF of 900 and 600 is 300.]

(d) We have to find ratio of 3 min 15 s to 2 min 6 s. [₹ 1 = 100 p]

$\therefore$ 900 p to 400 p $= \frac{900}{600} = \frac{900 \div 300}{600 \div 300} = \frac{3}{2} = 3 : 2.$ [HCF of 900 and 600 is 300.]

3. (a) We have 6 km : 300 m.

$\therefore$ 6 km : 300 m = 6,000 m : 300 m [1 km = 1,000 m]

$= \frac{6000}{300} = \frac{6{,}000 \div 300}{300 \div 300} = \frac{20}{1} = 20 : 1.$ [HCF of 6,000 and 300 is 300.]

(b) We have 2 days : 12 h.

$\therefore$ 2 days : 12 h = 48 h : 12 h [1 day = 24 h]

$= \frac{48}{12} = \frac{48 \div 12}{12 \div 12} = \frac{4}{1} = 4 : 1.$ [HCF of 48 and 12 is 12.]

(c) We have 60 min : h.

$\therefore$ 60 min : 3 h = 60 min : 180 min [1 h = 60 min]

$= \frac{60}{180} = \frac{60 \div 60}{180 \div 60} = \frac{1}{3} = 1 : 3.$ [HCF of 60 and 180 is 60.]

(d) We have 205 mL : 4 L.

$\therefore$ 250 mL : 4 L = 250 mL : 4,000 mL [1 L = 1,000 mL]

$= \frac{250}{4{,}000} = \frac{250 \div 250}{4{,}000 \div 250} = \frac{1}{16} = 1 : 16.$ [HCF of 250 and 4000 is 250.]

4. (a) We have 2 : 5 and 3 : 9.

$\therefore$ 2 : 5 and 3 : 9 = $\frac{2}{4}$ and $\frac{3}{9}$

$\Rightarrow$ 2 × 9 3 × 4 [By cross multiplication]

$\Rightarrow$ 18 12

As 18 is greater than 12, so 2 : 5 is greater than 3 : 9.

(b) We have 5 : 10 and 3 : 15.

$\therefore$ 5 : 10 and 3 : 15 = $\frac{5}{10}$ and $\frac{3}{15}$

$\Rightarrow$ 5 × 15 3 × 10 [By cross multiplication]

$\Rightarrow$ 75 30

As 75 is greater than 30, so 5 : 10 is greater than 3 : 15.

Similar work will be done for (c) and (d).

5. (a) We have $\frac{15}{10} = \frac{\square}{2}$.

Let $\square = x$.

Then $\frac{15}{10} = \frac{x}{2}$

$\Rightarrow$ 15 × 2 = 10 × x [By cross multiplication]

$\Rightarrow$ $x = \frac{15 \div 2}{10} = 3.$

Thus, $\frac{15}{10} = \frac{\boxed{3}}{2}$.

(b) We have $\frac{9}{11} = \frac{27}{\square}$.

Let $\square = x$.

Then $\frac{9}{11} = \frac{27}{x}$

$\Rightarrow$ 9 × x = 11 × 27 [By cross multiplication]

$\Rightarrow$ $x = \frac{11 \div 27}{9} = 33.$

Thus, $\frac{9}{11} = \frac{27}{\boxed{33}}$.

(c) We have $\frac{6}{7} = \frac{54}{\square}$.

Let $\square = x$.

Then $\frac{6}{7} = \frac{54}{x}$

$\Rightarrow 6 \times x = 7 \times 54$ [By cross multiplication]

$\Rightarrow x = \frac{7 \div 54}{6} = 63.$

Thus, $\frac{6}{7} = \frac{54}{\boxed{63}}$.

(d) We have $\frac{\square}{24} \quad \frac{}{6}$.

Let $\square = x$.

Then $\frac{x}{24} = \frac{5}{6}$

$\Rightarrow 6 \times x = 5 \times 24$ [By cross multiplication]

$\Rightarrow x = \frac{4 \div 24}{6} = 16.$

Thus, $\frac{\boxed{16}}{24} = \frac{5}{6}$.

6. Let be $4x$ and $5x$ the required shares.

Then $4x + 5x = 459$

$\Rightarrow 9x = 459$

$\Rightarrow x = \frac{459}{9} = 51.$

$\therefore 4x = 51 \times 4 = 204$ and $5x = 51 \times 5 = 255$.

Thus, the required shares are 204 and 255.

7. Let $2x$, $3x$ and $5x$ be the angles of the triangle.

Then $2x + 3x + 5x = 180°$ [Angle sum property of a triangle]

$\Rightarrow 10x = 180°$

$\Rightarrow x = 180° \div 10 = 18°$

$\therefore 2x = 18° \times 2 = 36°$, $5x = 18° \times 3 = 54°$ and and $5x = 18° \times 5 = 90°$.

Thus, the angles of the triangle are 36°, 54° and 90°.

8. Let $3x$ and $2x$ be the shares of the sons.

Then $3x + 2x =$ ₹ 20,000

$\Rightarrow 5x =$ ₹ 20,000

$\Rightarrow x =$ ₹ 20,000 ÷ 5 = ₹ 4,000

$\therefore$ $2x = 2 \times ₹\ 4{,}000 = ₹\ 8{,}000$ and $3x = 3 \times ₹\ 4{,}000 = ₹\ 12{,}000$.

Thus, the shares of the two sons are ₹ 8,000 and ₹ 12,000.

9. **Given:** Ratio of the length and breadth of the rectangle = 5 : 2 and its breadth = 150 m.

Let the length of the rectangle be x.

Then according to the question,

$5 : 2 = x : 150$

$\Rightarrow \frac{5}{2} = \frac{x}{150}$

$\Rightarrow 150 \times 5 = 2 \times x$ [By cross multiplication]

$\Rightarrow x = \frac{150 \times 5}{2} = 75 \times 5 = 375.$

Thus, the length of the rectangle is 375 m.

10. Let the numbers be $11x$ and $13x$.

Then $11x + 13x = 480$

$\Rightarrow 24x = 480$

$\Rightarrow x = 480 \div 24 = 20.$

$\therefore$ $11x = 11 \times 20 = 220$ and $13x = 13 \times 20 = 260$.

Thus, the required numbers are 220 and 260.

11. **Given:** Earnings of Mr Suri = ₹ 75,000 and spending = ₹ 60,000.

His savings = ₹ 75,000 – ₹ 60,000 = ₹ 15,000.

(a) Ratio of eanings to expenditure = 75,000 : 60,000

= 75,000 ÷ 15,000 : 60,000 ÷ 15,000 [HCF of 75,000 and 60,000 is 15,000.]

= 5 : 4.

(b) Ratio of eanings to savings = 75,000 : 15,000

= 75,000 ÷ 15,000 : 15,000 ÷ 15,000 [HCF of 75,000 and 15,000 is 15,000.]

= 5 : 1.

Thus the required ratio is 5 : 1.

(c) Ratio of expenditure to savings = 60,000 : 15,000

= 60,000 ÷ 15,000 : 15,000 ÷ 15,000 [HCF of 60,000 and 15,000 is 15,000.]

= 4 : 1.

12. **Given:** Ratio of zinc and copper in an alloy = 3 : 5.

Let the weight of zinc be x kg.

Then according to the question,

$3 : 5 = x : 40.5$

$\Rightarrow \frac{3}{5} = \frac{x}{40.5}$

$\Rightarrow 3 \times 40.5 = 5 \times x$ [By cross multiplication]

$\Rightarrow x = \frac{3 \times 40.5}{5} = 3 \times 8.1 = 24.3.$

Thus, the weight of zinc in the alloy is 24.3 kg.

13. **Given:** Ratio of the number of boys and girls = 7 : 9.

Let the number of boys and girls be 7x and 9x.

Then according to the question,

$7x + 9x = 144$

$\Rightarrow 16x = 144$

$\Rightarrow x = \frac{144}{16} = 9.$

$\therefore 7x = 7 \times 9 = 63.$

Thus, the number of boys is 63.

14. We know that speed = distance ÷ time.

Speed of the train = 210 km ÷ 3 h = 70 km per hour

Speed of the bus = 140 km ÷ 4 h = 35 km per hour

$\therefore$ Ratio of their speeds = 70 : 35 = 70 ÷ 35 : 35 ÷ 35 = 2 : 1. [HCF of 70 and 35 is 35.]

Exercise 9.2

1. (a) We have 7 : 14 : : 42 : 84.

Product of means = 14 × 42 = 588.

Product of extremes = 7 × 84 = 588.

As product of means = product of extremes, so 7 : 14 : : 42 : 84 is a proportion.

(b) We have 16 : 24 : : 20 : 36.

Product of means = 24 × 20 = 480.

Product of extremes = 16 × 36 = 576.

As product of means ≠ product of extremes, so 16 : 24 : : 20 : 36 is not a proportion.

(c) We have 12 : 18 : : 18 : 24.

Product of means = 18 × 18 = 324.

Product of extremes = 12 × 24 = 288.

As product of means ≠ product of extremes, so 12 : 18 : : 18 : 24 is not a proportion.

(d) We have 150 : 100 : : 600 : 400.

Product of means = 100 × 600 = 6,000.

Product of extremes = 150 × 400 = 6,000.

As product of means = product of extremes, so 15 : 100 : : 600 : 400 is a proportion.

2. (a) We have 5 : 10 : : 10 : 20.

Here, second and third terms are equal, i.e., 10.

Therefore, 5 : 10 : : 10 : 20 is a continued proportion.

(b) We have 12 : 8 : : 16 : 8.
Here, second and third terms are not equal.
Therefore, 12 : 8 : : 16 : 8 is not a continued proportion.

(c) We have 6 : 15 : : 15 : 38.
Here, second and third terms are equal, i.e., 15.
Therefore, 6 : 15 : : 15 : 38 is a continued proportion.

(d) We have 9 : 18 : : 18 : 36.
Here, second and third terms are equal, i.e., 18.
Therefore, 9 : 18 : : 18 : 36 is a continued proportion.

3. (a) We have x : 4 : : 44 : 11.
Product of means = 4 × 44 = 176.
Product of extremes = x × 11 = 11x.
Now, 11x = 176 [product of extremes = product of means]
$\Rightarrow$ x = 176 ÷ 11 = 16.
Thus, the value of x is 16.

(b) We have 10 : 20 : : 20 : x.
Product of means = 20 × 20 = 400.
Product of extremes = 10 × x = 10x.
Now, 10x = 400 [product of extremes = product of means]
$\Rightarrow$ x = 400 ÷ 10 = 40.
Thus, the value of x is 40.

(c) We have 18 : x : : 15 : 30.
Product of means = x × 15 = 15x.
Product of extremes = 18 × 30 = 540.
Now, 15x = 540 [product of extremes = product of means]
$\Rightarrow$ x = 540 ÷ 15 = 36.
Thus, the value of x is 36.

(d) We have 20 : 12 : : x : 18.
Product of means = 12 × x = 12x.
Product of extremes = 20 × 18 = 360.
Now, 12x = 360 [product of extremes = product of means]
$\Rightarrow$ x = 360 ÷ 12 = 30.
Thus, the value of x is 30.

$\frac{45}{90} = \frac{45 \div 45}{90 \div 45} = \frac{1}{2}$. [HCF of 45 and 90 is 45.]

4. (a) We have 16, 8.
Let the third proportion be x.

Then 16 : 8 : : 8 : x are in proportion.

$\therefore$ $8 \times 8 = 16 \times x$ [product of means = product of extremes]

$\Rightarrow$ $x = (8 \times 8) \div 16 = 64 \div 16 = 4$.

Thus, the third proportional is 4.

(b) We have 5, 15.

Let the third proportion be x.

Then 5 : 15 : : 15 : x are in proportion.

$\therefore$ $15 \times 15 = 5 \times x$ [product of means = product of extremes]

$\Rightarrow$ $x = (15 \times 15) \div 5 = 225 \div 5 = 45$.

Thus, the third proportional is 45.

(c) We have 5, 10.

Let the third proportion be x.

Then 5 : 10 : : 10 : x are in proportion.

$\therefore$ $10 \times 10 = 5 \times x$ [product of means = product of extremes]

$\Rightarrow$ $x = (10 \times 10) \div 5 = 100 \div 5 = 20$.

Thus, the third proportional is 20.

(d) Similar work to be done.

5. (a) We have to find mean proportion between 8 and 32.

Let the mean proportion be x.

Then 8 : x : : x : 32 are in proportion.

$\therefore$ $x \times x = 8 \times 32$ [product of means = product of extremes]

$\Rightarrow$ $x \times x = 256 = 16 \times 16$

$\Rightarrow$ $x = 16$.

Thus, the mean proportional is 16.

(b) We have to find mean proportion between 12 and 108.

Let the mean proportion be x.

Then 12 : x : : x : 108 are in proportion.

$\therefore$ $x \times x = 12 \times 108$ [product of means = product of extremes]

$\Rightarrow$ $x \times x = 1{,}296 = 36 \times 36$

$\Rightarrow$ $x = 36$.

Thus, the mean proportional is 36.

(c) We have to find mean proportion between 54 and 6.

Let the mean proportion be x.

Then 54 : x : : x : 6 are in proportion.

$\therefore$ $x \times x = 54 \times 6$ [product of means = product of extremes]

$\Rightarrow$ $x \times x = 324 = 18 \times 18$

$\Rightarrow$ $x = 18$.

Thus, the mean proportional is 18.

(d) Similar work to be done.

6. Let the cost of 45 pens be ₹ x.

Then 18 : 360 : : 45 : x are in proportion.

$\therefore$ $18 \times x = 360 \times 45$ [product of means = product of extremes]

$\Rightarrow$ $x = (360 \times 45) \div 18 = ₹\ 900$.

Thus, the cost of 45 pens is ₹ 900.

7. Let the smaller number be x.

Then 11 : 13 : : x : 117 are in proportion.

$\therefore$ $13 \times x = 11 \times 117$ [product of means = product of extremes]

$\Rightarrow$ $x = (11 \times 117) \div 13 = 99$.

Thus, the smaller number is 99.

8. Let the distance travelled in 75 L petrol be x km.

Then 750 : 30 : : x : 75 are in proportion.

$\therefore$ $30 \times x = 750 \times 75$ [product of means = product of extremes]

$\Rightarrow$ $x = (750 \times 75) \div 30 = 1{,}875$ km.

Thus, the smaller number is 1,875 km.

9. Let the required length of cloth purchased be ₹ x.

Then 175 : 5 : : 875 : x are in proportion.

$\therefore$ $175 \times x = 875 \times 5$ [product of means = product of extremes]

$\Rightarrow$ $x = (875 \times 5) \div 175 = 25$ m.

Thus, the required length of cloth that would be purchased is 25 m.

10. Let the fourth term of the proportion be x.

Then 34 : 51 : : 36 : x are in proportion.

$\therefore$ $34 \times x = 51 \times 36$ [product of means = product of extremes]

$\Rightarrow$ $x = (51 \times 36) \div 34 = 54$.

Thus, the fourth term of the proportion is 54.

Exercise 9.3

1. Cost of 12 pens = ₹ 180

$\therefore$ Cost of 1 pen = ₹ $180 \div 12$

$\therefore$ Cost of 20 pens = ₹ $(180 \div 12) \times 20$ = ₹ (15×20) = ₹ 300.

Thus, the cost of 20 pens is ₹ 300.

Proportion method:

Pens	Cost (in ₹)
12	180
20	x

We have 12 : 20 : : 180 : x

$12 \times x = 180 \times 20$

$x = (180 \times 20) \div 12 = 3{,}600 \div 12 = ₹\ 300$

Thus the cost of 20 pens is ₹ 300.

2. Quantity of apples bought for ₹ 400 = 5 kg

$\therefore$ Quantity of apples bought for ₹ 1 = (5 ÷ 400) kg

$\therefore$ Quantity of apples bought for ₹ 1,200 = [(5 ÷ 400) × 1,200] kg = 15 kg.

Thus, 15 kg apples can be purchased with ₹ 1,200.

3. Distance travelled by the bus in 12 h = 540 km

Distance travelled by the bus in 1 h = (540 ÷ 12) km

Distance travelled by the bus in 7 h = (540 ÷ 12) × 7 = 315 km.

Thus, the bus will cover 315 km in 7 hours.

4. Annual income of Mukesh = ₹ 84,000

His income in 1 month = ₹ 84,000 ÷ 12 [1 year = 12 months]

His income in 18 month = ₹ (84,000 ÷ 12) × 18 = ₹ 1,26,000.

Thus, Mukesh's income for 18 months is ₹ 1,26,000.

5. (a) Quantity of petrol consumed to cover 176 km = 8 L

Quantity of petrol consumed to cover 1 km = (8 ÷ 176) L

Quantity of petrol consumed to cover 880 km = [(8 ÷ 176) × 880] L = 40 L.

Thus, the quantity of petrol required for covering 880 km is 40 L.

(b) Distance covered by the car in 8 L of petrol = 176 km

Distance covered by the car in 1 L of petrol = 176 ÷ 8 km

Distance covered by the car in 25 L of petrol = (176 ÷ 8) × 25 km = 550 km.

Thus, the distance covered by the car in 25 L of petrol is 550 km.

6. Neha saves ₹ 72,000 in = 6 months.

She would save ₹ 1 in = 6 ÷ 72000 months

She would save 2,40,000 in = (6 ÷ 72,000) × 2,40,000 months = 20 months.

Thus, Neha would save ₹ 2,40,000 in 20 months.

7. Length of cloth that can be bought for ₹ 135 = 9 m

Length of cloth that can be bought for ₹ 1 = (135 ÷ 9) m

Length of cloth that can be bought for ₹ 150 = (9 ÷ 135) × 150 m = 10 m.

Thus, 10 metres of cloth can be bought for ₹ 150.

8. (a) Weight of 35 books = 7 kg

Weight of 1 book = 7 ÷ 35 kg

Weight of 25 books = (7 ÷ 35) × 25 = 5 kg

(b) Number of books that weigh 7 kg = 35

Number of books that weigh 1 kg = 7 ÷ 35

Number of books that weigh 25 kg = (7 ÷ 35) × 25 = 5 books.

Thus, 5 books weigh 25 kg.

9. Number of apples in 20 boxes = 500

Number of apples in 1 boxes = 500 ÷ 20

Number of apples in 15 boxes = (500 ÷ 20) × 15 = 375 apples.

Thus, 15 boxes contain 375 apples.

10. Number of sweets in 5 bags = 90

Number of sweets in 1 bag = 90 ÷ 5 = 18

Number of sweets in 7 bags = 18 × 7 = 126 sweets.

Thus, 7 bags will contain 126 sweets.

Multiple Choice Questions

1. If a, b, c, d are in proportion, then $ad = bc$. So, the option (c) is correct.
2. If a, b, c are in continued proportion, then $b^2 = ac$. So, the option (b) is correct.
3. A triangle has 3 sides and 3 angles. Their ratio is 3 : 3. So, the option (c) is correct.
4. See the **Answers** given in the textbook.
5. Here, the total number of balls = red balls + white balls = $x + y$.

   Ratio of red balls to the total number of balls = $\frac{x}{x+y}$. So, the option (a) is correct.
6. See the **Answers** given in the textbook.
7. The ratio of one week to a day is 7 : 1. So, the option (d) is correct.
8. See the **Answers** given in the textbook.
9. Greater number = 7 × (36 ÷ 4) = 63. So, the option (a) is correct.
10. The value of $x = \frac{12 \times 3}{4} = 9$. So, the option (c) is correct.

Mental Maths

See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. If the denominator and numerator of a fraction are even, their ratio will not be in the lowest term. For example, $\frac{4}{36} = \frac{1}{9}$.
2. Let the number 50-paise coins in the bag be $2x$ and that 2-rupee coins be x.

   Then value of 50-paise coins = ₹ $\frac{2x}{2}$ = ₹ x.

   Value of 2-rupee coins = ₹ $2x$.

   Now, according to the question,

   $x + 2x = 24$

   $3x = 24$

$x = 24 \div 3 = 8$.

$2x = 2 \times 8 = 16$.

Thus, the number of 50-paise coins is 16 and that of 2-rupee coins is 8.

Chapter Test

1. (a) We have to find ratio of 8 days to 48 h.

$\therefore$ 8 days to 48 h = 192 h : 48 h [1 day = 24 h]

Now, $192 : 48 = \frac{192}{48} = \frac{192 \div 48}{48 \div 48} = \frac{4}{1} = 4 : 1$. [HCF of 192 and 48 is 48.]

(b) We have to find ratio of 3 dozen to 3 score.

$\therefore$ 3 dozen : 3 score = 36 : 60 [1 dozen = 12 and 1 score = 20]

Now, $36 : 60 = \frac{36}{60} = \frac{36 \div 12}{60 \div 12} = \frac{3}{5} = 3 : 5$. [HCF of 36 and 60 is 12.]

(c) We have to find ratio of 1 min to 15 s.

$\therefore$ 1 min : 15 s = 60 s : 15 s [1 min = 60 s]

Now, 60 s to 15 s $= \frac{60}{15} = \frac{60 \div 15}{15 \div 15} = \frac{4}{1} = 4 : 1$. [HCF of 60 and 15 is 15.]

2. (a) We have 75 : 125.

$\therefore 75 : 125 = \frac{75}{125} = \frac{75 \div 25}{125 \div 25} = \frac{3}{5} = 3 : 5$. [HCF of 75 and 125 is 25.]

(b) We have 90 : 105.

$\therefore 90 : 105 = \frac{90}{105} = \frac{90 \div 15}{105 \div 15} = \frac{6}{7} = 6 : 7$. [HCF of 90 and 105 is 15.]

(c) We have 144 : 252.

$\therefore 144 : 252 = \frac{144}{252} = \frac{144 \div 36}{252 \div 36} = \frac{4}{7} = 4 : 7$. [HCF of 144 and 252 is 36.]

3. (a) We have $3 : 9 = x : 27$.

Product of means $= 9 \times x = 9x$.

Product of extremes $= 3 \times 27 = 51$.

Now, $9x = 81$ [product of means = product of extremes]

$\Rightarrow x = 81 \div 9 = 9$.

Thus, the value of x is 9.

(b) We have $36 : 18 = 30 : x$.

Product of means $= 18 \times 30 = 540$.

Product of extremes $= 36 \times x = 36x$.

Now, $36x = 540$ [product of extremes = product of means]

$\Rightarrow x = 540 \div 36 = 15$.

Thus, the value of x is 15.

(b) We have $x : 5 = 4.5 : 9$.

Product of means = $5 \times 4.5 = 22.5$.

Product of extremes = $9 \times x = 9x$.

Now, $9x = 22.5$ [product of extremes = product of means]

$\Rightarrow x = 22.5 \div 9 = 2.5$.

Thus, the value of x is 2.5.

4. We know that terms a, b, c are said to be in continued proportion, if $b^2 = ac$.

(a) We have 24, 30, 48.

To be it in continued proportion:

24 : 30 : : 30 : 48

Product of means = $30 \times 30 = 900$.

Product of extremes = $24 \times 48 = 1152$.

As product of means ≠ product of extremes, so the given numbers are not in continued proportion.

(b) We have 14, 42, 126.

To be it in continued proportion:

14 : 42 : : 42 : 126

Product of means = $42 \times 42 = 1{,}764$.

Product of extremes = $14 \times 126 = 1{,}764$.

As product of means = product of extremes, so the given numbers are in continued proportion.

(c) We have 48, 60, 75.

To be it in continued proportion:

48 : 60 : : 60 : 75

Product of means = $60 \times 60 = 3{,}600$.

Product of extremes = $48 \times 75 = 3{,}600$.

As product of means = product of extremes, so the given numbers are in continued proportion.

5. Let be $4x$ and x the required shares.

Then $4x + x =$ ₹ 400

$\Rightarrow 5x =$ ₹ 400

$\Rightarrow x = \frac{400}{5} =$ ₹ 80.

$\therefore 4x = 80 \times 4 =$ ₹ 320.

Thus, the required shares are ₹ 320 and ₹ 80.

6. **Given:** Number of boys = 430 and number of girls = 550.

Total number of students = 430 + 550 = 980 students.

(a) Ratio of girls to boys = 550 : 430

$= \frac{550}{430} = \frac{550 \div 10}{430 \div 10} = \frac{55}{43}$ = 55 : 43. [HCF of 550 and 430 is 10.]

(b) Ratio of boys to the total number of students = 430 : 980

$= \frac{430}{980} = \frac{430 \div 10}{980 \div 10} = \frac{43}{98}$ = 43 : 98. [HCF of 430 and 980 is 10.]

(c) Ratio of girls to the total number of students = 550 : 980

$= \frac{550}{980} = \frac{550 \div 10}{980 \div 10} = \frac{55}{98}$ = 55 : 98. [HCF of 550 and 980 is 10.]

7. Distance travelled by the train in 3 h = 255 km

Distance travelled by the train in 1 h = (255 ÷ 3) km

Distance travelled by the train in 5.5 h = (255 ÷ 3) × 5.5 km = 85 × 5.5 km = 467.5 km.

Thus, the train will cover 467.5 km in 5.5 hours.

8. Earning of the worker for 1 h = ₹ 20

Earning of the worker for 1 day = ₹ 20 × 8 = ₹ 160 [Worker worked 8 h per day.]

Earning of the worker for 8 days = ₹ 160 × 8 = ₹ 1,280.

Thus, the worker would earn ₹ 1,280 in one week including Sunday.

9. Let the shares of the three sons be $5x$, $6x$ and $7x$.

Then according to the question,

$5x + 6x + 7x$ = ₹ 1800

$18x$ = ₹ 1800

x = ₹ 1800 ÷ 18 = ₹ 100.

$5x$ = ₹ 100 × 5 = ₹ 500, $6x$ = ₹ 100 × 6 = ₹ 600 and $7x$ = ₹ 100 × 7 = ₹ 700.

Thus, the shares of the sons are: ₹ 500, ₹ 600 and ₹ 700.

10. **Given:** Cost of 8 shirts = ₹ 9,600.

(a) Cost of 1 shirt = ₹ 9,600 ÷ 8 = ₹ 120.

Cost of 12 shirt = ₹ 120 × 12 = ₹ 1,440.

Thus, ₹ 1,440 are needed to buy 12 shirts.

(b) Cost of 1 shirt = ₹ 9,600 ÷ 8 = ₹ 120.

Number of shirts that can be bought for ₹ 12,000 ÷ ₹ 120 = 100.

Thus, 100 shirts can be bought for ₹ 12,000.

10 Basic Geometrical Ideas

Exercise 10.1

1. (a) A, B, C and D are points.
   (b) BA, BC and BD are rays.
2. (a) It is a line segment. (b) It is a line.
   (c) It is a ray. (d) It is a ray.
3. From the figure:
   (a) lines intersecting at A are m and p.
   (b) pairs of intersecting lines are: m, p; n, p; o, p; m, o; n, o; m, q; n, q; o, q
   (c) pair of parallel lines is m, n.
   (d) lines having point of intersection B are n and p.
   (e) collinear points are: A, B, E; B, D; A, F, C; C, D
   (f) two non-intersecting lines are: m and n.
   (g) concurrent lines are n, o and q.
   (h) point of intersection of m and p is A.
   (i) point of intersection of p and n is AB.
4. (a) Line segments: BC and DC (b) Rays: BA and DE
5. Refer to the **Answers** given in the book.
6. Refer to the **Answers** given in the book.
7. (a) Infinite number of lines can be drawn passing through a point.
   (b) Only one line can be drawn passing through two points.
   (c) We can not draw passing through three non-collinear points.
8. Refer to the **Answers** given in the book.

Exercise 10.2

1. (a) open curve (b) open curve (c) closed curve (d) open curve
2. Figures in (a) and (d) do not intersect, so they are simple closed figures.
3. Refer to the **Answers** given in the book.
4. (a) It is plane ABDC. (d) It is plane LMN.
5. (a) It has three sides, so it is a triangle.
   (b) It has six sides, so it is a hexagon.
   (c) It has eight sides, so it is a octagon.
   (d) It has four sides, so it is a quadrilateral.
   (e) It has five sides, so it is a pentagon.

(f) It has seven sides, so it is a heptagon.

6. (a) It is formed of straight lines, so it is a polygon.
   (b) It is not formed of straight lines, so it is not a polygon.
   (c) It is not formed of straight lines, so it is not a polygon.
7. Refer to the **Answers** given in the book.

Exercise 10.3

1. (a) Arms: QP and QR; vertex: Q
   (b) Arms: BA and BC; vertex: B
   (c) Arms: ED and EF; vertex: E
2. Points lying:
   (a) in the interior of ΔPQR are: D, E and F.
   (b) in the exterior of ΔPQR are: A, H and I.
   (c) on the ΔPQR are: B, C and G.
3. (a) The given figure is formed of six angles: $\angle POQ$, $\angle QOR$, $\angle ROS$, $\angle POR$, $\angle QOS$ and $\angle POS$.
   (b) In the given figure, adjacent angles are: $\angle SOR$, $\angle ROQ$; $\angle ROQ$, $\angle QOP$; $\angle SOQ$, $\angle QOP$; $\angle POR$, $\angle ROS$.
   (c) In the given figure, no pair forms a straight angle, so there is no linear pair.
4. Refer to the **Answers** given in the book.
5. (a) In the given ΔABC, the sides opposite to vertex C are: AE, AD and AB.
   (b) The altitude of ΔABC is AD.
   (c) The median of ΔABC is AE.
   (d) The angles opposite to side AC are: $\angle ABC$, $\angle ADC$ and $\angle AEC$.
6. Refer to the **Answers** given in the book.
7. (a) Do it yourself.
   (b) Do it yourself.

Exercise 10.4

1. (a) **Angles:** $\angle PQR$, $\angle QRS$, $\angle RSP$, $\angle SPQ$; **Sides:** PQ, QR, RS, SP.
   (b) **Angles:** $\angle LMN$, $\angle MNO$, $\angle NOL$, $\angle OLM$; **Sides:** LM, MN, NO, OL.
2. (a) The sides of the given quadrilateral are: BC, CD, DE and EB.
   (b) The diagonals of the given quadrilateral are: BD and CE.
   (c) In the given figure, two pairs of opposite angles are: $\angle EBC$, $\angle EDC$; $\angle BED$, $\angle BCD$.
   (d) In the given figure, two pairs of adjacent angles are: $\angle EBC$, $\angle BCD$; $\angle BED$, $\angle EDC$.
   (e) In the given figure, two pairs of opposite angles are: $\angle EBC$, $\angle EDC$; $\angle BED$, $\angle BCD$.
   (f) In the given figure, two pairs of adjacent sides are: EB, BC; BC, CD.

3. Refer to the **Answers** given in the book.
4. Do it yourself.

Exercise 10.5

1. In the given figure:
   (a) centre is O
   (b) diameter is PQ
   (c) radius is OP or OQ or OT.
   (d) chord is PQ or RS.
   (e) minor sector is QOTN.
   (f) major segment is RTQS.
2. Refer to the **Answers** given in the book.
3. Do it yourself.
4. (a) Diameter of the circle = 2 × radius = 2 × 3.8 cm = 7.6 cm.
   (b) Diameter of the circle = 2 × radius = 2 × 7 cm = 14 cm.
5. Radius of the circle = diameter ÷ 2 = 9 cm ÷ 2 = 4.5 cm.
6. Refer to the **Answers** given in the book.
7. (a) The shape of the half of a *chapati* is a semicircle.
   (b) The shape of the full moon is a circle.
8. Refer to the **Answers** given in the book.

Multiple Choice Questions

1. A line segment can be measured, so the correct option is (d).
2. The middle letter of an angle, say ∠ABC, represents its vertex. So the correct option is (b).
3. The complete distance of around a circle is called its circumference. So the correct option is (b).
4. The magnitude of an angle does not depend on the length of its sides. So the correct option is (c).
5. If two angle have a common arm and their sum is 180°, they are adjacent as well as they for linear pair. So the correct option is (c).
6. Three or more lines passing through the same point are concurrent lines. So the correct option is (d).
7. A ray has only one endpoint. So the correct option is (b).
8. The letter does not have intersecting lines. So the correct option is (c).
9. Every point in the interior of a circle is less than its radius. So the correct option is (c).
10. The diameter of circle divides it into two equal parts each of which is called a semicircle. So the correct option is (a).

Mental Maths

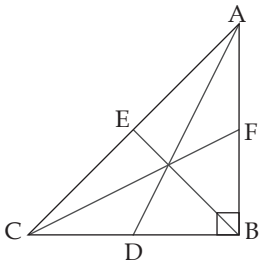
See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. A line has infinite number of points.
2. Let the number is x. The single point at which three or more lines intersect each other is called a point of concurrency. Whereas the point where two lines intersect is called the point of intersection.
3. Such two lines are intersecting lines.

Chapter Test

1. See the **Answers** given in the book.
2. See the **Answers** given in the book.
3. (a) Eight angles are formed in the given figure. They are: $\angle ABO$, $\angle BAO$, $\angle AOB$, $\angle AOC$, $\angle BOD$, $\angle COD$, $\angle DOC$, and $\angle COD$.
   (b) Two angles are formed in the given figure. They are: $\angle POR$ and $\angle QRS$.
4. In the given figure:
   line segments are: PQ, QR, RS, ST and PT; vertices are: P, Q, R, S and T.
5. (a) The required triangles are: ΔACD and ΔABD.
   (b) The required chords are: AC, CD, AB, and BD.
   (c) The required triangles are: ΔAOB and ΔBOD.
   (d) The required quadrilateral is: ABDC.
6. The required figure is given alongside in which AD, BE and CF are medians of ΔABC:

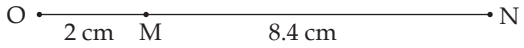


7. See the **Answers** given in the book.
8. (a) pentagon (b) hexagon (c) quadrilateral (d) quadrilateral
   (e) triangle (f) decagon
9. Do it yourself.
10. The geometrical path formed by the horse and the rope is a circle.

11 Geometrical Shapes

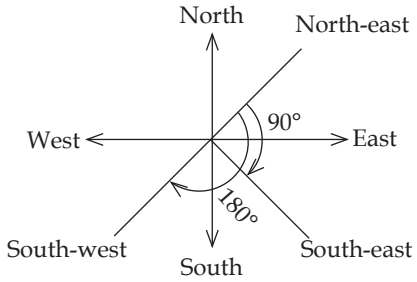
Exercise 11.1

1. By visual comparing the line segments, we observe that: CD is the largest and AB is the smallest line segment.
2. Observing the given figure, we find that:
   (a) AB < BC (b) AC = AB (c) AD > AO
   (d) BE + FC (e) AB > AD (c) BD > AC
3. Do it yourself.
4. The given figure is a rectangle and its diagonal is the longest. Thus, the longest line segment is BC.
5. The length of MN is 8.4 cm – 2 cm = 6.4 cm.



Exercise 11.2

1. (a) It is a complete angle. (b) It is a reflex angle.
   (c) It is an acute angle. (d) It is a right angle
   (e) It is a reflex angle. (f) It is a straight angle.
   (g) It is an acute angle. (f) It is an obtuse angle.
2. The given diagram shows the movement of Mudit. From the diagram, we see that:
   (a) when Mohit turns a right angle clockwise, he will face in the south-east direction.
   (b) when Mohit turns a straight angle clockwise, he will face in the south-west direction.



3. (a) In moving from 4 to 7, the hour hand turns through $3 \times 30° = 90°$.
   Required fraction $= \frac{90°}{360°} = \frac{1}{4}$.
   (b) In moving from 12 to 6, the hour hand turns through $6 \times 30° = 180°$.
   Required fraction $= \frac{180°}{360°} = \frac{1}{2}$.

(c) In moving from 9 to 12, the hour hand turns through $3 \times 30° = 90°$.

Required fraction $= \frac{90°}{360°} = \frac{1}{4}$.

(b) In moving from 3 to 12, the hour hand turns through $9 \times 30° = 270°$.

Required fraction $= \frac{270°}{360°} = \frac{3}{4}$.

4. See the **Answers** given in the book.
5. See the **Answers** given in the book.
6. (a) Right angles: $\angle PNO$, $\angle PNM$; straight angle: $\angle MNO$
   (b) Acute angle: $\angle BOC$; Obtuse angle: $\angle AOC$; straight angle: $\angle AOB$
7. Do it yourself.
8. (a) (i) $\angle ABC$= obtuse angle (ii) $\angle ADC$ = obtuse angle
   (iii) $\angle BCD$ = acute angle (iv) $\angle AOC$ = straight angle
   (b) (i) $\angle POQ$ = acute angle (ii) $\angle QOR$ = straight angle
   (iii) $\angle RSO$ = acute angle (iv) $\angle POS$ = straight angle

Exercise 11.3

1. (a) As two sides of the given triangle are equal, so it is an isosceles triangle.
   (b) As all the three sides of the given triangle are equal, so it is an equilateral triangle.
   (c) As all sides of the given triangle are of different measures, so it is a scalene triangle.
   (e) As two sides of the given triangle are equal, so it is an isosceles triangle.
2. (a) By the angle sum property of a triangle:

   $50° + 90° + x = 180°$

   $\Rightarrow 140° + x = 180°$

   $\Rightarrow x = 180° - 140° = 40°$.

   As one angle of the triangle is 90°, so it is a right triangle.

   (b) By the angle sum property of a triangle:

   $55° + 45° + x = 180°$

   $\Rightarrow 100° + x = 180°$

   $\Rightarrow x = 180° - 100° = 80°$.

   As all the angles of the triangle are less than 90°, so it is an acute triangle.

   (c) By the angle sum property of a triangle:

   $45° + 45° + x = 180°$

   $\Rightarrow 90° + x = 180°$

   $\Rightarrow x = 180° - 90° = 90°$.

   As one angle of the triangle is 90°, so it is a right triangle.

   (d) By the angle sum property of a triangle:

$35° + 110° + x = 180°$

$\Rightarrow 145° + x = 180°$

$\Rightarrow x = 180° - 145° = 35°$.

As one angle of the triangle is more than 90°, so it is an obtuse triangle.

3. (a) $110° + x = 180°$ [straight angle]

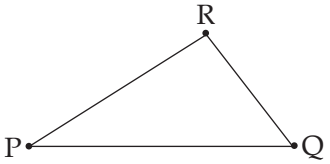
$x = 180° - 110° = 70°$.

(b) $30° + 100° + x = 180°$ [angle sum property of a triangle]

$x = 180° - 130° = 50°$.

4. See the **Answers** given in the book.

5. The figure formed by three non-collinear points P, Q and R is shown below. From the figure, we show that:



(a) the angle opposite to side PQ is $\angle R$.

(b) the angle opposite to PR is $\angle Q$.

(c) the side opposite to $\angle P$ is QR.

(d) the side opposite to vertex R is PQ.

6. The third angle = 180° – (sum of two angles)

= 180° – (35° + 65°) = 180° – 100° = 80°.

Thus, the third angle of the triangle is 80°.

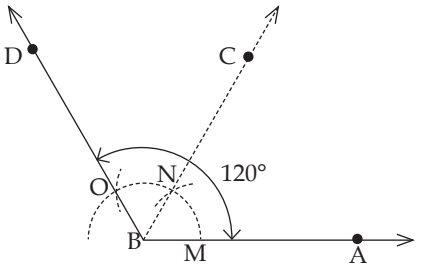
7. **Given:** one angle of the right triangle = 45°.

As one angle of a right triangle is 90°

$\therefore$ The third angle = 180° – (sum of two angles)

= 180° – (45° + 90°) = 180° – 135° = 45°.

Thus, the third angle of the right triangle is 45°.



8. Let the angles of the triangle be $2x$, $3x$ and $4x$.

Then by the angle sum property of a triangle:

$2x + 3x + 4x = 180°$

$\Rightarrow 9x = 180°$

$\Rightarrow x = 180° \div 9 = 20°$

$\therefore 2x = 2 \times 20° = 40°$; $3x = 3 \times 20° = 60°$ and $4x = 4 \times 20° = 80°$.

Thus, the angles of the triangle are 40°, 60° and 80°.

9. **Given:** One angle of the triangle = 100°. Also given that other two angles are equal.

Let each of the equal angles be x.

Then by the angle sum property of the triangle:

$100° + x + x = 180°$

$\Rightarrow 2x = 180° - 100° = 80°$

$\Rightarrow x = 80° \div 2 = 40°$

Thus, the angles of the triangle are 40°, 40° and 100°.

10. (a) All the sides of ΔABC are of different measures. Thus, it is a scalene triangle.
    (b) All the sides of ΔXYZ are equal. Thus, it is an equilateral triangle.
    (c) Two sides of ΔPQR are equal and one angle is 90°. Thus, it is an isosceles right triangle.
    (d) One angle of ΔRST is obtuse angle, i.e., 100°. Thus, it is an obtuse-angled triangle.

Exercise 11.4

1. Do it yourself.
2. (a) The diagonals are AC and BD.
   (b) The side opposite to AB is DC.
   (c) The side adjacent to AD is AB.
   (d) Two pairs of adjacent angles are $\angle A$, $\angle B$ and $\angle B$, $\angle C$.
   (e) Two pairs of opposite angles are $\angle A$, $\angle C$ and $\angle B$, $\angle D$.
3. See the **Answers** given in the book.
4. See the **Answers** given in the book.
5. **Given:** Diagonals are 6 cm and 8 cm.

   The quadrilateral with these diagonals is not a rectangle because the diagonals of a rectangle are equal.
6. (a) The quadrilateral is a kite.
   (b) Both the angles are equal. (c) It is of 90°.

Exercise 11.5

1. No, it is not a regular polygon because angles of a regular polygon are equal but the angles of rhombus are not equal.
2. (a) It is a regular polygon.
   (b) It is not a regular polygon.
   (c) It is a regular polygon as all its sides are equal.
   (d) It is a regular polygon as all its angles are equal.
   (e) It is not a regular polygon.
   (f) It is not a regular polygon.
3. Do it yourself.
4. (a) It is not a polygon because it is made of curved lines.
   (b) It is a polygon because it is made of line segments.
   (c) It is not a polygon because it is made of curved lines.
   (d) It is a polygon because it is made of line segments.
5. (a) It is a regular polygon. (b) It is an irregular polygon.
   (c) It is an irregular polygon. (d) It is a regular polygon.
   (e) It is a regular polygon.

Exercise 11.6

1. See the **Answers** given in the book.
2. (a) It is a plane figure. (b) It is a solid figure.
   (c) It is a plane figure. (d) It is a plane figure.
   (e) It is a plane figure. (f) It is a plane figure.
   (g) It is a solid figure. (h) It is a plane figure.
3. See the **Answers** given in the book.
4. See the **Answers** given in the book.
5. Do it yourself.
6. The base of a square pyramid is square while that of a triangular pyramid is a triangle.
7. The base and lateral faces of all tetrahedrons are triangular in shape, so all tetrahedrons are triangular pyramid.
8. Do it yourself.

Multiple Choice Questions

1. The minimum number of sides of a polygon is 3. So the correct option is (b).
2. The complete revolution of a ray forms a complete angle. So the correct option is (d).
3. The angle formed on a straight line is 180° or 2 right angles. So the correct option is (c).
4. See the **Answers** given in the book.
5. A triangle does not have any diagonal. So the correct option is (a).
6. We cannot have two acute angles whose sum is a straight angle. So the correct option is (d).
7. See the **Answers** given in the book.
8. A trapezium is not a parallelogram. So the correct option is (c).
9. A trapezium has only one pair of parallel sides. So the correct option is (b).
10. See the **Answers** given in the book.

Mental Maths

See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. A triangle cannot have two obtuse angles or two right angles because their sum is more than or equal to 180°. But the sum of all three angles of a triangle is 180°.
2. Yes, a right-angled triangle can be a scalene triangle.
3. A rhombus and a square are the only quadrilaterals whose diagonal divides it into two isosceles triangles.

Chapter Test

1. See the **Answers** given in the book.
2. (a) We have 50°, 70°, 60°. As all angles are acute angles, so the triangle is and acute-angled triangle.
   (b) We have 100°, 35°, 45°. As one of the angles is obtuse angle, so the triangle is an obtuse-angled triangle.
   (c) We have 90°, 45°, 45°. As one of the angles is right angle and other angles are equal, so the triangle is an isosceles right triangle.
   (d) We have 60°, 60°, 60°. All angles are equal each of 60°, so the triangle is an equilateral triangle.
3. See the **Answers** given in the book.
4. Let the two unknown angles of the right-angled triangle are $x°$ and $2x°$.
   Then by the angle sum property of a triangle:
   $\Rightarrow 90° + x° + 2x° = 180°$
   $\Rightarrow 3x° = 180° - 90° = 90°$
   $\Rightarrow x° = 90° \div 3 = 30°$.
   $\Rightarrow 2x° = 30° \times 2 = 60°$
   Thus, the angles of the triangle are 30°, 60° and 90°.
5. Let each of the equal angles of the triangle be $x°$.
   Then by the angle sum property of a triangle:
   $80° + x° + x° = 180°$
   $\Rightarrow 2x° = 180° - 80° = 100°$
   $\Rightarrow x° = 100° \div 2 = 50°$.
   Thus, the equal angles of the triangle are 50° each.
6. By the angle sum property of a quadrilateral:
   $\Rightarrow 70° + 100° + 80° + x° = 360°$
   $\Rightarrow 250° + x° = 360°$
   $\Rightarrow x° = 360° - 250 = 110°$.
   Thus, the fourth angle of the quadrilateral is 110°.
7. We know that the opposite angles of a parallelogram are equal.
   So the angle opposite to 80° is of 80°.
   Sum angles of other two angles of the parallelogram = $360° - (80° + 80°) = 360° - 160° = 200$.
   Other two angles of the parallelogram = $200° \div 2 = 100°$.
   Thus, the other angles of the parallelogram are 80°, 100° and 100°.
8. A square is the only quadrilateral having equal sides and equal angles.
9. See the **Answers** given in the book.
10. See the **Answers** given in the book.

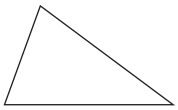
12 Symmetry

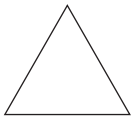
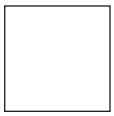
Exercise 12.1

1. Figures in (a) and (c) are symmetrical.
2. See the **Answers** given in the book.
3. See the **Answers** given in the book.
4. Four symmetrical objects in our surroundings are book, computer monitor, TV screen and human face.
5. Four symmetrical letters of English alphabet are A, B, H and M.
6. Four non-symmetrical objects are umbrella, scalene triangle, school bag and leaf.

Exercise 12.2

1. Four non-symmetrical letters of English alphabet are F, G, J and N.
2. See the **Answers** given in the book.
3. (a) The line of symmetry in the given figure is line *n*.
   (b) The line of symmetry in the given figure is line *n*.
4. See the **Answers** given in the book.
5. See the **Answers** given in the book.
6. (a) The given figure is a circle which has infinite number of lines of symmetry.
   (b) The given figure has four lines of symmetry.
   (c) The given figure has two lines of symmetry.
   (d) The given figure has three lines of symmetry.
   (e) The given figure has four lines of symmetry.
7. Letters M and E have one line of symmetry each.
8. Do it yourself.
9. See the **Answers** given in the book.
10. Do it yourself.
11. The complete table is given below.

Shape	Figure	No. of lines of symmetry
Scalene triangle		nill

Equilateral triangle		three
Rectangle		two
Square		four

Multiple Choice Questions

1. A triangle may or may not have a line of symmetry. So the correct option is (b).
2. A rectangle is symmetrical about the line joining the midpoints of its opposite sides. So the correct option is (c).
3. See the **Answers** given in the textbook.
4. An isosceles right-angled triangle has one line of symmetry. So the correct option is (a).
5. A circle has infinite number of lines of symmetry. So the correct option is (d).
6. A trapezium (isosceles trapezium) has one line of symmetry. So the correct option is (b).
7. The letter H has both vertical and horizontal lines of symmetry. So the correct option is (c).
8. A regular polygon has lines of symmetry equal to the number of its sides. So the correct option is (c).

Mental Maths

See the **Answers** given in the textbook.

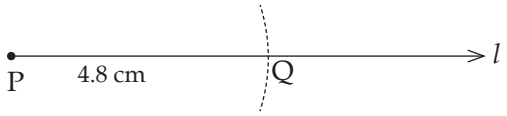
Chapter Test

1. See the **Answers** given in the book.
2. See the **Answers** given in the book.
3. Figures in (a) and (c) are symmetrical about the dotted lines.
4. Do it yourself.
5. See the **Answers** given in the book.
6. See the **Answers** given in the book.
7. See the **Answers** given in the book.
8. The rectangle has only two lines of symmetry.
9. A circle has infinite number of lines of symmetry.
10. The line of symmetry of an angle is the bisector of the angle.

13 Constructions

Exercise 13.1

1. (a) **Steps of construction:**
   - Draw a line l and mark a point A on it.
   - Open the arms of the compass. Place its pointed end on the 0 mark of the ruler and stretch its other arm to 4.8 cm mark.
   - Without changing the opening of the compass, place its pointed end on the point A and draw an arc cutting the line l at a point B.

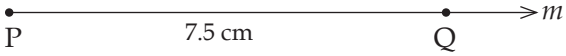


   Thus, AB is the required line segment of length 4.8 cm.

   (b) Similar work to be done as (a).

   (c) Similar work to be done as (a).

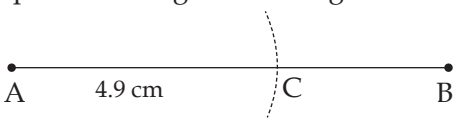
2. **Steps of construction:**
   - Draw a line m and mark a point P on it.
   - Place the ruler along the line m in such a way that its 0 mark is at the point P.
   - Mark a point Q against the 7.5 mark of the ruler.



   Thus, PQ is the required line segment of length 7.5 cm.

3. **Steps of construction:**
   - Draw a line segment AB of length 7.3 cm.
   - Open the arms of the compass. Place its pointed end on the 0 mark of the ruler and stretch its other arm to 4.9 cm mark.
   - Without changing the opening of the compass, place its pointed end on the point A and draw an arc cutting the line segment AB at a point C.

   Thus, AC is the required line segment of length 4.9 cm.



   Measuring the length of BC, we find that BC = 2.4 cm.

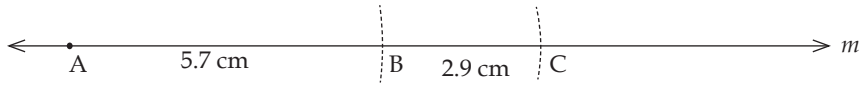
4. **Steps of construction:**

   Draw two line segments PQ and RS of lengths 5.7 cm and 2.9 cm respectively.

   (a) • Draw a line m and mark a point A on it.

- With A as centre and radius PQ (5.7 cm), draw an arc cutting the line at a point B.
- With B as centre and radius RS (2.9 cm), draw another arc cutting the line *m* at a point C.

Thus, AC is the required line segment equal to PQ + RS = 5.7 cm + 2.9 cm = 8.6 cm.

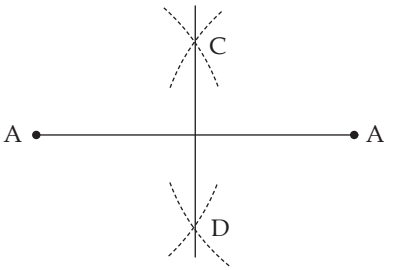


(b)
- Draw a line *m* and mark a point A on it.
- With A as centre and radius PQ (5.7 cm), draw an arc cutting the line at a point B.
- With A as centre and radius RS (2.9 cm), draw another arc cutting the line *m* at a point C.

Thus, AC is the required line segment equal to PQ – RS = 5.7 cm – 2.9 cm = 2.8 cm.

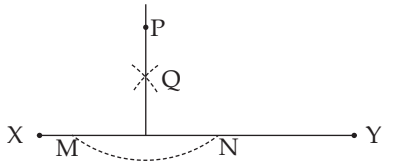
(c) PQ + RS is same as RS + PQ. So follow the same steps as in (a) above.

5. **Steps of construction:**
- Draw a line segment AB of 5.8 cm.
- With A as centre and radius more than half of AB, draw an arc above and below of the line segment AB.
- With A as centre and same radius, draw another arc intersecting the previous arcs at points C and D.



Thus, CD is the required perpendicular bisector of AB.

6. **Steps of construction:**
- Draw a line segment XY of 6.2 cm and take a point P outside it.
- With P as centre and any suitable radius, draw an arc cutting the line segment XY at M and N.
- With M and N as centres and radius more than half of MN, draw arcs intersecting each other at a point Q.
- Join P and Q.

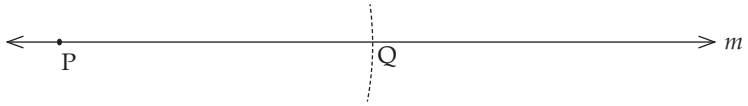


Thus, PQ is the required perpendicular to XY from the point P not lying on it.

7. **Steps of construction:**
- Draw a line segment XY of a suitable length.
- Draw a line *m* and take a point P on it.
- Take the compass and place its pointed end on the point X. Open the compass such that its other arm is on the point Y.

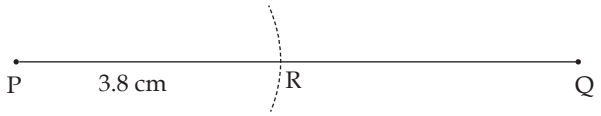
- Without changing the opening of the compass, place its pointed end on the point P and draw an arc cutting the line *m* at a point Q.

  Thus, PQ is the required line segment equal to XY.



8. **Steps of construction:**
   - Draw a line segment PQ = 8 cm.
   - With P as centre and radius 3.8 cm, draw an arc cutting the line segment PQ at a point say R.

     Thus, PR is the required line segment.



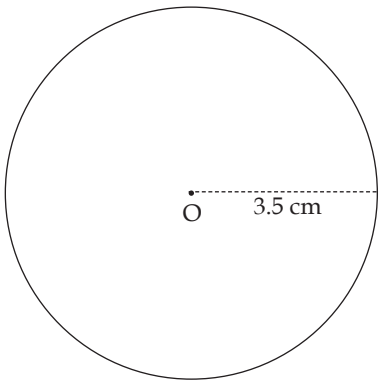
   Measuring the remaining length of PQ, we find that RQ = 4.2 cm.

   Now, PR + QR = 3.8 cm + 4.2 cm = 8 cm, which is equal to PQ.

Exercise 13.2

1. (a) **Steps of construction:**
   - Mark a point O on a page of your exercise book.
   - Open the arms of the compass. Place its pointed end on the 0 mark of the ruler and stretch its other arm to 3.5 cm mark.
   - Place the pointed end of the compass on the point O.
   - Without changing the opening of the compass and holding it firmly, rotate the pencil end till it makes a complete turn.

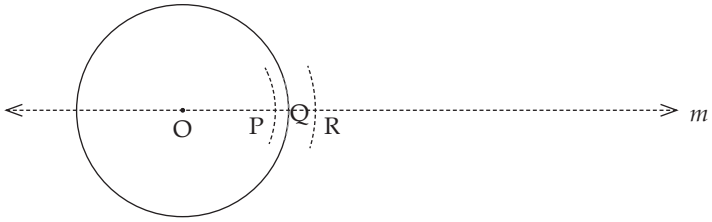
     Thus, the figure so drawn is the required circle of radius 3.5 cm.



   (b) Similar work to be done as (a).

   (c) Similar work to be done as (a).

2. **Steps of construction:**
   - Follow the steps of Q 1 (a) to draw the circle of radius 4 cm.
   - Draw a line *m* passing through the centre O.
   - With O as centre and radius 3.5 cm, draw an arc to cut the line *m* at a point P.
   - With O as centre and radius 4 cm, draw another arc to cut the line *m* at a point Q.
   - With O as centre and radius 5 cm, draw another arc to cut the line *m* at a point R.



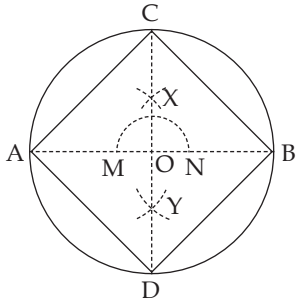
Observing the figure so drawn, we find that:

(a) the point R lies in the exterior of the circle.

(a) the point Q lies R lies on the circle.

(a) the point P lies in the interior of the circle.

3. **Steps of construction:**



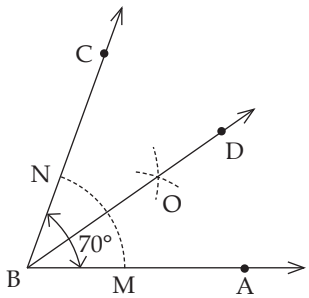
- Following the steps of Q 1(a), draw a circle of radius = 6 cm ÷ 2 = 3 cm and mark its centre as O.
- Take two points A and B on the circle.
- Draw a line segment passing through the centre O to join A and B.
- With O as centre and a convenient radius, draw an arc cutting AB at M and N.
- With M and N as centres and radius more than half of AB, draw two arcs cutting each other at points X and Y.
- Join MN and produce it to meet the circle at points C and D. CD is the diameter which is perpendicular to AB.
- Join AC, AD, BC and BD. P and Q. The figure so formed is a square.

4. **Steps of construction:**

- Following the steps of Q 1(a), draw two circles of radii 3 cm and 4 cm.
- Mark their centre as O.

Such circles are called **concentric circles**.

5. **Steps of construction:**



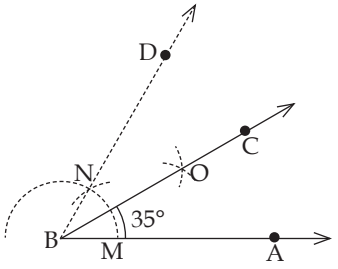
- Draw a ray BA.
- Take the protractor and place it in such a way that its central point lies on B and its base line is along the ray AB.
- Mark a point C against 70 mark of the protractor and remove it.
- Join A to C.

  Thus, ∠ABC so obtained is the required angle of 70°.
- With B as centre and a suitable radius, draw an arc which cuts AB at M and BC at N.
- With M and N as centres and the same radius, draw arcs cutting each other at a point O.

- Produce BO to D.

  Thus, BD is the bisector of ∠ABC.

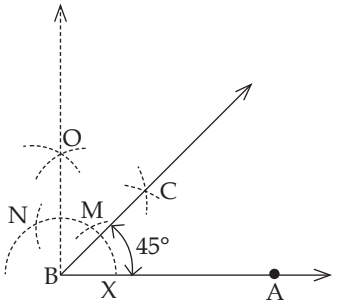
6. (a) **Steps of construction:**



- Draw a ray BA.
- With B as centre and a suitable radius, draw an arc cutting BA at M.
- With B as centre and same radius, draw an arc cutting the arc drawn above at N and produce it to D.
- With M and N as centres and a suitable radius, draw arc cutting each other at a point O.
- Join BA and produce it to C.

  Thus, ABC is the required angle of 35°.

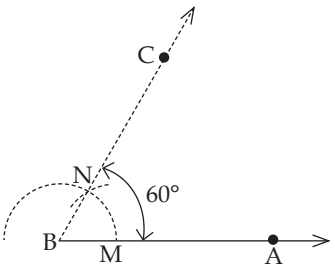
(b) **Steps of construction:**



- Draw a ray BA.
- With B as centre and a suitable radius, draw an arc cutting BA at X.
- With X as centre and same radius, draw another arc cutting the arc drawn in step 2 at M.
- With M as centre and same radius, draw another arc cutting the arc drawn in step 2 at N.
- With M and N as centres and a suitable radius, draw arcs cutting each other at a point O which cuts the arc drawn in step 2 at Y.
- Join BA. The angle ABO so formed is of 90°.
- With X and Y as centres and a suitable radius, draw arcs cutting each other at a point C.
- Join BC.

  Thus, ∠ABC is the required angle of 45°.

(c) **Steps of construction:**



- Draw a ray BA.
- With B as centre and a suitable radius, draw an arc cutting BA at M.
- With B as centre and same radius, draw an arc cutting the arc drawn above at N and produce it to D.

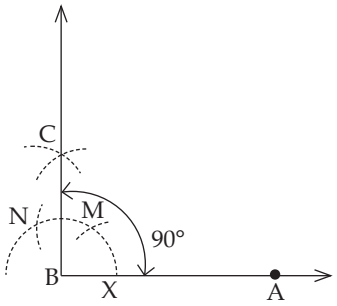
  Thus, ∠ABC is the required angle of 60°.

(d) **Steps of construction:**

- Draw a ray BA.
- With B as centre and a suitable radius, draw an arc cutting BA at X.

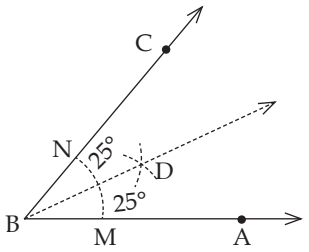
- With X as centre and same radius, draw an arc cutting the arc drawn ins step 2 at M.
- With M as centre and same radius, draw another arc cutting the arc drawn ins step 2 at N.
- With M and N as centres and a suitable radius, draw arcs cutting each other at a point C.
- Join BC.

Thus, ∠ABC is the required angle of 90°.

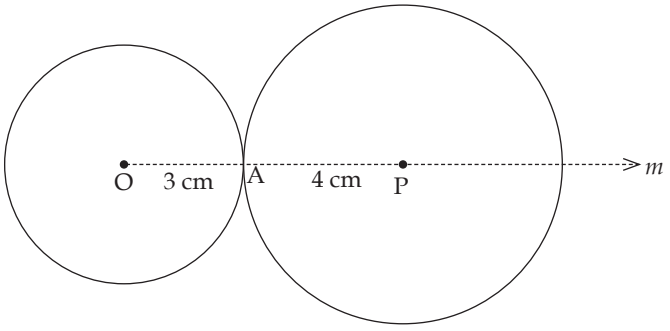


7. **Steps of construction:**
   - Draw ∠ABC using the protractor.
   - With B as centre and a suitable radius, draw an arc which cuts AB at M and BC at N.
   - With M and N as centres and the same radius, draw arcs cutting each other at a point D.

   Thus, BD is the bisector of ∠ABC.



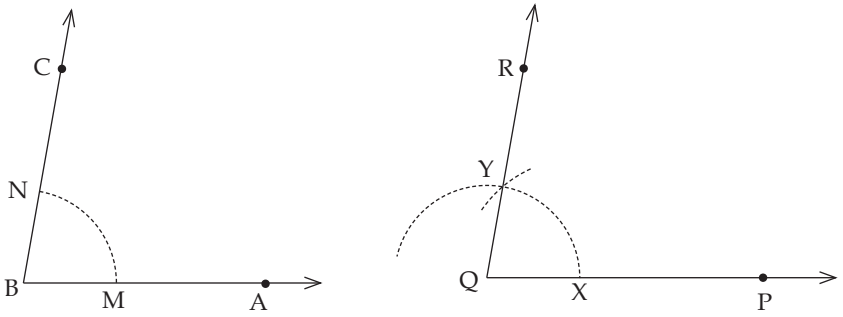
8. **Steps of construction:**
   - Mark a point O on a page of exercise book.
   - With O as centre and radius 3 cm, draw a circle.
   - Draw a line *m* from the centre O which cuts the circle at a point say A.
   - With A as centre and radius 4 cm, draw an arc cutting the line at a point P.
   - With P as centre and radius 4 cm, draw a circle which touches the circle with centre O at the point A.



Measuring the diameters of the circles drawn using the ruler, we find it as 14 cm.

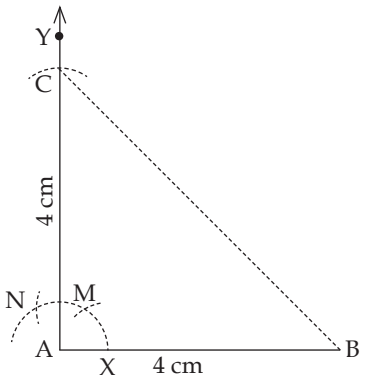
9. **Steps of construction:**
   - Draw a ∠ABC = 80° using the protractor.
   - Draw a ray QP.
   - With centre B and a suitable radius, draw an arc cutting the side AB at M and BC at N.
   - With Q as centre and same radius, draw an arc cutting the ray QP at a point X.
   - With X as centre and radius MN, draw an arc cutting the previous arc at a point Y and produce it to R.

     Thus, ∠PAR is the required triangle equal to ∠ABC.



10. **Steps of construction:**
   - Draw a line segment AB = 4 cm.
   - At A, draw a ray AY making an angle of 90° with AB as drawn in Q6(d).
   - With A as centre and radius 4 cm, draw an arc cutting the ray AY at C.
   - Join B to C.

     Thus, figure so formed is an isosceles right-angled triangle ∠BAC.



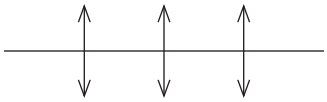
Multiple Choice Questions

1. Two perpendicular lines intersect each other at right angles. So the correct option is (a).
2. Bisecting means dividing into two equal parts. So the correct option is (a).
3. Two-third of a right angle = (2 × 90°) ÷ 3 = 60°. So the correct option is (d).
4. Radius of a circle is half of its diameter. So the correct option is (b).
5. See the **Answers** given in the textbook.
6. See the **Answers** given in the textbook.
7. Only on perpendicular can be drawn from a point to a ray. So the correct option is (a).
8. Only one circle can be drawn with a given radius. So the correct option is (a).

9. A line segment consists of infinite number of points and thus infinite perpendiculars can be drawn. So the correct option is (d).
10. A ruler and compass are used to bisect a line segment. So the correct option is (d).

Mental Maths

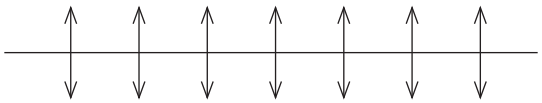
1. Three perpendicular lines are needed to divide a line segment into four equal parts.



2. See the **Answers** given in the textbook.
3. Two arcs are drawn to draw an angle of 60°.
4. Two perpendicular lines make a right angle. So we draw two perpendiculars to draw a right angle.
5. The distance between the centre and the circumference is called the radius.
6. See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

1. Seven perpendicular lines are needed to divide a line segment into eight equal parts.



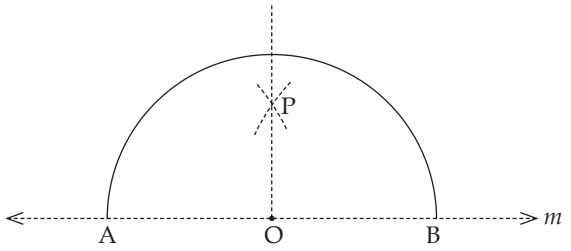
2. Fifteen perpendicular lines are needed to divide a line segment into sixteen equal parts.
3. A ray perpendicular to a line make a right angle.

Chapter Test

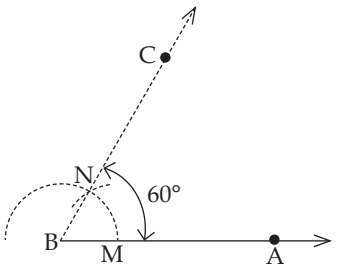
1. Similar to construction of Q. 5 of Exercise 13.2.
2. Similar to construction of Q. 6(c) of Exercise 13.2.
3. **Steps of construction:**
   - Draw a line m and take a point O on it.
   - With O as centre and radius 6.2 cm, draw an arc cutting the line m at two points A and B.

     The figure so obtained is a semicircle with diameter AB.
   - With A and B as centres and radius more than the radius of semicircle, draw two arcs to cut each other at a point P.
   - Join O to P.

     Thus, OP is the line of symmetry of the semicircle.



4. **Steps of construction:**



- Draw a ray BA.
- With B as centre and a suitable radius, draw an arc cutting BA at M.
- With B as centre and same radius, draw an arc cutting the arc drawn above at N and produce it to D.

Thus, $\angle ABC$ is the required angle of 60°.

(a) Draw the bisector of the angle as Q. 5 of Exercise 13.2.

(b) Draw the angle equal to the given angle as Q. 9 of Exercise 13.2.

(c) To draw the angle double of the given angle, i.e., 120°, taking N as centre and radius MN, draw an arc cutting the arc drawn in step 2 at O. Join B to O and produce it to D. Thus, $\angle ABD$ is of 120°.

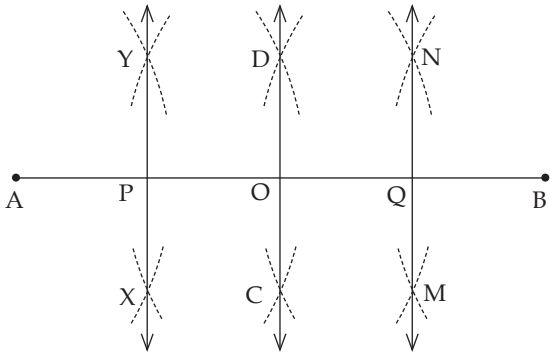
5. Similar to construction of Q. 5 of Exercise 13.2.

6. See the **Answers** given in the book.

7. **Steps of construction:**

- Draw a line segment AB = 6.8.
- With A as centre and radius more than half of AB, draw arcs below and above AB.
- With B as centre and same radius, draw arcs below and above AB cutting the arcs drawn in step 2 at points C and D.
- Join C and D intersecting the line segment AB at O. The line CD divides the line segment AB into two equal parts.
- With O and B as centres and radius more than OB, draw arcs above and below to cut each other at M and N. Join M and N. The line so drawn is the bisector of OB.
- Similarly, draw bisector XY of OA, which intersects AB at P.

Thus, P, O and Q divide AB into four equal parts.



8. Similar to construction of Q. 6 of Exercise 13.1.

14 Perimeter and Area

Exercise 14.1

1. (a) Perimeter of the figure = 8 cm + 6 cm + 4 cm + 3 cm = 21 cm.
   (b) Perimeter of the figure = 12 cm + 4 cm + 2 cm + 3 cm + 3 cm + 2 cm + 4 cm = 30 cm.
   (c) Perimeter of the figure = 2 × (6 cm + 3 cm + 5 cm + 3 cm) = 2 × 17 cm = 34 cm.
   (d) Perimeter of the figure = 2 cm + 4 cm + 1.5 cm + 5 cm + 5 cm + 1.5 cm + 4 cm = 23 cm.
   (e) Perimeter of the figure = 8 cm + 4 cm + 3 cm + 3 cm + 4 cm = 22 cm.
   (b) Perimeter of the figure = 4 × 4 cm = 16 cm.
2. Perimeter of the rectangle = 2 (length + breadth)
   = 2 × (15.5 cm + 7.5 cm) = 2 × 23 cm = 46 cm.
3. Perimeter of the rhombus = 4 × length of side = 4 × 4.5 cm = 18 cm.
   = 2 × (15.5 cm + 7.5 cm) = 2 × 23 cm = 46 cm.
4. Perimeter of the rectangle = 34 cm
   $\Rightarrow$ 2 (length + breadth) = 34 cm
   $\Rightarrow$ length + 6.5 cm = 34 cm ÷ 2 = 17 cm
   $\Rightarrow$ length = 17 cm – 6.5 cm = 10.5 cm.
   Thus, the length of the rectangle is 10.5 cm.
5. Let the breadth of the rectangle be x cm, then its length will be $2x$.
   $\therefore$ Perimeter of the rectangle = 36 cm
   $\Rightarrow$ 2 (length + breadth) = 36 cm
   $\Rightarrow$ 2 ($2x + x$) = 36 cm
   $\Rightarrow$ 2 × $3x$ = 36 cm
   $\Rightarrow$ $6x$ = 36 cm
   $\Rightarrow$ x = 36 cm ÷ 6 = 6 xm, and $2x$ = 6 cm × 2 = 12 cm.
   Thus, the length and breadth of the rectangle are respectively 12 cm and 6 cm.
6. Length of fencing of the square is equal to its perimeter.
   Perimeter of the square park = 4 × side = 4 × 225 m = 900 m.
   Cost of fencing = 900 m × ₹ 25.50 = ₹ 22,950.
   Thus, the cost of fencing the square park is ₹ 22,950.
7. Length of fencing of the rectangular is equal to its perimeter.
   Perimeter of the rectangular garden = 2 × (length + breadth)
   = 4 × (825 m + 650 m) = 2 × 1475 m = 2,950 m.
   Cost of fencing = 2,950 m × ₹ 25.50 = ₹ 44,987.50.
   Thus, the cost of fencing the square park is ₹ 44,987.50.

8. The length of wire used to make every figure is its perimeter.
   (a) Perimeter of the equilateral triangle = 120 m
   $3 \times$ side = 120 m
   side = 120 m $\div$ 3 = 40 m.
   Thus, the length of each side of the equilateral triangle is 40 m.
   (b) Perimeter of the square = 120 m
   $4 \times$ side = 120 m
   side = 120 m $\div$ 4 = 30 m.
   Thus, the length of each side of the square is 30 m.
   (c) Perimeter of the regular hexagon = 120 m
   $6 \times$ side = 120 m
   side = 120 m $\div$ 6 = 20 m.
   Thus, the length of each side of the regular hexagon is 20 m.
   (d) Perimeter of the regular pentagon = 120 m
   $5 \times$ side = 120 m
   side = 120 m $\div$ 5 = 24 m.
   Thus, the length of each side of the regular pentagon is 24 m.
9. Similar to solution of Q. 8(a).
10. Distance covered in one round = perimeter of the playground
   = 2(length + breadth) = 2 (80 m + 40.5 m) = $2 \times$ 120.5 m = 241 m.
   Distance covered in one round = 241 m $\times$ 3 = 723 m.
   Thus, the distance covered by Ravi in three rounds is 723 m.

Exercise 14.2

1. (a) Number of full squares = 5
   Number of squares which are more than half = 7
   Number of half squares = 0
   Area of the figure = 5 + 9 + 0 = 14 cm^2.
   (b) Number of full squares = 3
   Number of squares which are more than half = 5
   Number of half squares = 4
   Area of the figure = 3 + 5 + (4 $\div$ 2) = 4 + 2 = 10 cm^2.
   (c) Number of full squares = 6
   Number of squares which are more than half = 7
   Number of half squares = 0
   Area of the figure = 6 + 7 + 0 = 13 cm^2.
2. (a) Area of the rectangle = length $\times$ breadth

= 10 m × 70 cm = 10 m × 0.70 m = 7 m^2. [1 m = 100 cm]

(b) Area of the rectangle = length × breadth

= 7.5 cm × 4.5 cm = 33.75 cm^2.

(c) Area of the rectangle = length × breadth

= 8 m 25 cm × 5.6 cm [1 m = 100 cm]

= 825 cm × 5.6 cm = 4,620 cm^2.

(d) Area of the rectangle = length × breadth

= 6 m × 3 m 8 cm [1 m = 100 cm]

= 8 m × 3.08 m = 18.48 m^2.

3. (a) Area of the square = side × side = 15 cm × 15 cm = 225 cm^2.

(b) Area of the square = side × side = 7.5 cm × 7.5 cm = 56.25 cm^2.

(c) Area of the square = side × side = 8.5 cm × 8.5 cm = 72.25 cm^2.

4. (a) Area of the rectangle = length × breadth

= 15 cm × 10 cm = 150 cm^2.

(b) Area of the square = side × side

= 13 cm × 13 cm = 169 cm^2.

As 169 cm^2 > 150 cm^2, so the square has greater area.

5. Area of the square = side × side

= 0.18 m × 0.18 m = 0.0324 m^2. [1 m = 100 cm]

6. Area of the rectangular plot of land = length × breadth

= 350 m × 200 m = 70,000 m^2.

$\therefore$ Cost of fencing = 70,000 × ₹ 72 = ₹ 50,40,000.

7. Area of the floor = length × breadth = 300 cm × 200 cm = 60,000 cm^2.

Area of a tile = side × side = 20 cm × 20 cm = 400 cm^2.

Number of tiles required to cover floor = $\frac{\text{Area of the floor}}{\text{Area of 1 tile}} = \frac{60{,}000 \text{ cm}^2}{400 \text{ cm}^2}$ = 150 tiles.

Thus, 150 tile are required to cover the floor of the room.

8. Let x cm be the side of a square.

Then area of the square = side × side = $x \times x = x^2$ cm^2.

If the side is halved, new side will be $\frac{x}{2}$ cm.

Area of the new square = side × side = $\frac{x}{2}$ cm × $\frac{x}{2}$ cm = $\frac{x}{2}$ cm^2.

Thus, if the side of the square is halved, its area will become one-fourth the original square.

9. Given: Length of the hall = 21 m and its breadth = 15 m.

Area of the hall = length × breadth = 21 m × 15 m = 315 m^2.

Breadth of the carpet = 105 cm = 1.05 m

Length of the carpet = area of the hall ÷ breadth of the carpet

$315\ m^2 \div 1.05\ m = 300\ m.$

Cost of carpeting the hall = 300 × ₹ 75 = ₹ 22,500.

Thus, the required cost of carpeting the hall is ₹ 22,500.

10. Perimeter of the square = 480 m [Given]

$4 \times side = 480\ m$

$side = 480 \div 4 = 120\ m$

Now area of the square = side × side = 120 m × 120 m = 14,400 m^2.
Thus, the area of the square is 14,400 m^2.

Multiple Choice Questions

1. We calculate the area of a hall to find the cost of flooring. So the correct option is (b).
2. The length of a photograph is equal to its perimeter. So the correct option is (a).
3. The side of a regular hexagon with perimeter 54 cm = 54 cm ÷ 6 = 9 cm. So the correct option is (b).
4. The perimeter of the equilateral triangle = 3 × 6 cm = 18 cm. So the correct option is (b).
5. Let the side of the triangle are $2x$, $3x$ and $4x$.

   Then perimeter of the triangle = 36 cm [Given]

   $2x + 3x + 4x = 36$ cm

   $9x$ cm = 36 cm

   x = 36 cm ÷ 9 = 4 cm.

   Sides of the triangle are: 2 × 4 cm = 8 cm, 3 × 4 cm = 12 cm and 4 × 4 cm = 16 cm.

   So the correct option is (c).
6. The perimeter of the isosceles triangle = 19 cm

   ⇒ 7 cm + 7 cm + third side = 19 cm

   ⇒ 14 cm + third side = 19 cm

   ⇒ third side = 19 cm – 14 cm = 5 cm.

   So the correct option is (d).
7. Side of the square = perimeter ÷ 4 = 36 cm ÷ 4 = 9 cm.

   Area of the square = side × side = 9 cm × 9 cm= 81 cm^2.

   So the correct option is (c).
8. Let the length and breadth be respectively are $4x$ and $5x$.

   Perimeter of the rectangle = 90 cm

   ⇒ 2(length + breadth) = 90 cm

   ⇒ $2(4x + 5x) = 90$ cm

   ⇒ $2 \times 9x = 90$ cm ⇒ x = 90 cm ÷ 18 = 5 cm.

   Length of the rectangle = $4x = 4 \times 5$ cm = 20 cm.

So the correct option is (a).

9. Side of the square = perimeter ÷ 4 = 50 cm ÷ 4 = 12.5 cm.
So the correct option is (a).

10. Length of the cardboard = Its area ÷ breadth = 288 cm^2 ÷ 16 = 18 cm.
So the correct option is (c).

Mental Maths

1. Area of a square = 100 cm^2
$\Rightarrow$ side × side = 10 cm × 10 cm
$\Rightarrow$ side = 10 cm.
$\therefore$ Perimeter of the square = 4 × side = 4 × 10 cm = 40 cm.
2. See the **Answers** given in the textbook.
3. See the **Answers** given in the textbook.
4. See the **Answers** given in the textbook.
5. The perimeter of a 10-sided regular polygon = 10 × 10 m = 100 m.
6. See the **Answers** given in the textbook.

HOTS (Higher Order Thinking Skills)

Area of a small square = 4 × side = 4 × 4 cm = 16 cm^2
Total area of the small squares formed = 128 cm^2
Length of the wire = Total area of small squares ÷ area of a small square
= 128 cm^2 ÷ 16 cm = 9 cm.
Thus, the length of the wire is 9 cm.

Chapter Test

1. Similar work to be done as the solution of Q. 1 of Exercise 14.1.
2. (a) Area of the rectangle = length × breadth = 15 cm × 10 cm = 150 cm^2.
Its perimeter = 2(length + breadth) = 2(15 cm + 10 cm) = 2 × 25 cm = 50 cm.
(b) Area of the rectangle = length × breadth = 6.5 cm × 3 cm = 19.5 cm^2.
Its perimeter = 2(length + breadth) = 2(6.5 cm + 3 cm) = 2 × 9.5 cm = 19 cm.
(c) Area of the rectangle = length × breadth = 12.5 cm × 3.5 cm = 43.75 cm^2.
Its perimeter = 2(length + breadth) = 2(12.5 cm + 3.5 cm) = 2 × 16 cm = 32 cm.
(d) Area of the rectangle = length × breadth = 10.4 cm × 5.4 cm = 56.16 cm^2.
Its perimeter = 2(length + breadth) = 2(10.4 cm + 5.4 cm) = 2 × 15.8 cm = 31.6 cm.
3. (a) Area of the square = side × side = 4.8 cm × 4.8 cm = 23.04 cm^2.
Its perimeter = 4 × side = 4 × 4.8 cm = 19.2 cm.
(b) Area of the square = side × side = 9 cm × 9 cm = 81 cm^2.
Its perimeter = 4 × side = 4 × 9 cm = 36 cm.

(c) Area of the square = side × side = 10.5 cm × 10.5 cm = 110.25 cm^2.
Its perimeter = 4 × side = 4 × 10.5 cm = 42 cm.

4. See the **Answers** given in the book.

5. Area of the floor = length × breadth = 20.5 m × 15 m = 307.5 m^2.
Area of the square carpet = side × side = 10 m × 10 m = 100 m^2.
∴ Area of the floor which is not carpeted = 307.5 m^2 × 100 m^2 = 207.5 m^2.

6. Area of the room = length × breadth = 12 m × 6 m = 72 m^2.
Area of the occupied by a person = 1.5 m^2.
∴ Number of people that can be sited in the room
= area of the room ÷ area of a person
= 72 m^2 ÷ 1.5 m^2 = 48 people.
Thus, 48 people can be sited in the room.

7. Perimeter of the rectangular park = 640 m
2(length + breadth) = 640 m
length + 120 m = 640 m ÷ 2 = 320 m
length = 320 m – 120 m = 200 m
Area of the rectangular park = length × breadth = 200 m × 120 m = 24,000 m^2.
Thus, the length of the park is 200 m and its area is 24,000 m^2.

8. Area of 1 carpet = 15 m × 20 m = 300 m^2.
Area of 30 carpets = 300 × 30 = 9,000 m^2, which is the area of the ground.
Thus, the area of the ground is 9,000 m^2.

9. Area of the rectangular ground = length × breadth = 300 m × 200 m = 60,000 m^2.
Rate of tiling the ground = 15 per 100 sq m
Cost of tiling the ground = ₹ $\frac{60{,}000\ m^2 \times 15}{100\ m^2}$ = ₹ 600 × 15 = ₹ 9,000.
Thus, the cost of tiling the ground is ₹ 9,000.

10. Area of the square = side × side = 12 cm × 12 cm = 144 cm^2.
Given that area of the square is equal to the area of the rectangle.
Area of the rectangle = 144 cm^2
length × breadth = 144 cm^2
16 cm × breadth = 144 cm^2
breadth = 144 cm^2 ÷ 16 cm = 9 cm.
Thus, the breadth of the rectangle is 9 cm.

Exercise 15.1

1. See the **Answers** given in the book.
2. See the **Answers** given in the book.
3. The given data in array is:

   101, 101, 101, 102, 103, 105, 105, 105, 110, 115, 115, 119, 120, 120, 120

   The frequency distribution table of the data is given below.

Height (in cm)	Tally Marks	Frequency (Number of students)
101	|||	3
102	|	1
103	|	1
105	|||	3
110	|	1
115	||	2
119	|	1
120	|||	3
Total		**15**

4. The given data is tabulated below.

Marks	Tally Marks	Frequency (Number of students)
8	|	1
9	|||	3
10	|	1
11	|||	3
11	|	1
12	𝍸	5
13	|	1
15	𝍸	5
16	|	1
17	|||	3
18	|	1
20	|||	3
Total		**25**

(a) Number of students who got marks below 10 = 1 3 = 4 students

(b) Number of students who got full marks = 3 students

(c) Number of students who got marks between 10 and 15 = 1 + 5 + 1 = 7 students

5. In the given pictograph, 1 symbol = 10 cm rainfall

(i) The city having the maximum rainfall is Chennai.

(ii) (a) Rainfall in Patna = 2 × 10 cm = 20 cm.

(b) Rainfall in Mumbai = 2 × 10 cm = 20 cm.

(c) Rainfall in Delhi = 3 × 10 cm = 30 cm.

(d) Rainfall in Chennai = 4 × 10 cm = 40 cm.

(iii) Difference in rainfall between Delhi and Patna = 30 cm – 20 cm = 10 cm.

6. Do it yourself or see the **Answers** given in the book.

7. See the **Answers** given in the book.

Exercise 15.2

1. For the bar graph, see the **Answers** given in the book. From the data, we observe that:

(a) The maximum number of persons visited the book fair on Saturday, i.e., 250 people.

(b) The minimum number of persons visited the book fair on Tuesday, i.e., 130 people.

(c) Number of people visited the book fair on Tuesday is 150 people.

2. From the bar graph, we observe that:

(a) The minimum number of bags were produced on Tuesday.

(b) The maximum number of bags were produced on Wednesday.

(c) The equal number of bags were produced on Monday and Friday.

(d) Total number of bags produced during the week = 125 + 75 + 225 + 175 + 125 + 200 = 925 bags.

3. From the bar graph, we observe that:

(a) The least number of newspaper circulated in the town is of language Urdu.

(b) The difference between the number of Bengali newspapers and English newspapers circulated = 700 – 600 = 100 newspapers.

(c) The equal number of bags were produced on Monday and Friday.

(d) Total number of newspapers circulated in the town

= 400 + 800 + 300 + 600 + 100 + 700

= 2,900 newspapers.

(e) Ascending order of newspapers circulated in the town is: 100, 300, 400, 600, 700, 800.

4. See the **Answers** given in the book.

5. See the **Answers** given in the book.

Multiple Choice Questions

1. The collection of numbers to get particular information is called data. So the correct option is (b).
2. Data can be expressed using symbols, pictures and graph. So the correct option is (d).
3. Each item in the data is called an observation. So the correct option is (c).
4. The number of times a particular value occurs is called frequency. So the correct option is (a).
5. In 1, 5, 7, 2, 5, 7, 2, the number 7 occurs two times, so its frequency is 2. So the correct option is (b).
6. In a bar graph, the width of the rectangle is always equal. So the correct option is (c).
7. A bar graph can be drawn horizontally and vertically. So the correct option is (c).
8. See the **Answers** given in the book.
9. See the **Answers** given in the book.
10. The sum of all the frequencies is always is equal to the number of observation. So the correct option is (d).

Mental Maths

See the **Answers** given in the book.

Chapter Test

1. See the **Answers** given in the book.
2. See the **Answers** given in the book.
3. See the **Answers** given in the book.
4. Observing the pictograph, we find that:
   (a) The enrolment of students in the year 2014 = 4.5 × 100 = 450 students.
   (b) The maximum number of enrolment of students was in the year 2015.
   (c) The number of students admitted in the year 2014 = 450 students
   The number of students admitted in the year 2011 = 250 students
   The required difference = 450 – 250 = 200 students.
   (d) The enrolment of students in the year 2012 = 4 × 100 = 400 students
   The enrolment of students in the year 2013 = 3 × 100 = 300 students
   Required ratio = 400 : 300 = 400 ÷ 100 : 300 ÷ 100 = 4 : 3.
5. See the **Answers** given in the book.
6. For the bar graph, see the **Answers** given in the book. From the data, we observe that:
   (a) Information given in the graph is about the number of passengers travelling by train for various destinations.

(b) Number of passengers get down at Tundla = 80 passengers.

(c) The maximum number of passengers are for Ghaziabad.

(d) The maximum number of passengers travelled = 120

The minimum number of passengers travelled = 60

Required ratio = 120 : 60 = 2 : 1.

7. See the **Answers** given in the book.