MATRIX OLYMPIAD

The Most Innovative Talent Recognition Exam

MATHEMATICS

Class - VII

MATRIX

Few words for the Readers

Dear Reader,

"*Matrix Olympiad is established to encourage school students to go a step further than their regular studies, and get a chance and exposure to competition on a wide scale. It also helps students enhance their learning of basic cognitive skills and deeper knowledge of subjects like Science, Mathematics, English, Mental Ability, Social Studies. "Matrix Olympiad helps students nurture their minds for higher targets of tomorrow and enables them to study School for JEE, NEET, CLAT, NDA, Olympiads , NSEJS, NTSE , STSE etc.*"

The above thought has been our guiding principle while designing and collating the study material for **Matrix Olympiad** . And hence, we hope that this particular material will be helpful towards your preparation for **Matrix Olympiad**.

Our team at **MATRIX** has put in their best efforts for making this particular module interesting and relevant for you. Additional efforts have been made to ensure that the content is easy to understand and error free to the extent possible. However, there might remain some inadvertent errors in answer keys and theoretical portion and we would welcome your valuable feedback regarding the same.

If there are any suggestions for corrections, please write to us at **smd@matrixacademy.co.in** and we would be highly grateful.

Finally, we would like to end this message by a famous quote by Ernest Hemingway - "*There is no friend as loyal as a book*." So, please give your study material the time and attention it deserves, and it will surely help you reach newer heights in your fight with competition examinations.

With love and best wishes !
Team MATRIX

CONTENTS

INTEGERS

Concepts

📖 INTRODUCTION

In previous class, we have learnt that the numbers

$$....... -3, -2, -1, 0, 1, 2, 3, ...$$

are called integers. The numbers 1, 2, 3, 4, 5, 6, ..., i.e. natural numbers, are called positive integers and the numbers –1, –2, –3, –4, –5, –6,....... are called negative integers. The number 0 is simply an integer. It is neither positive nor negative. We will study about Addition,Subtraction, multiplication and divison of integers.

1. MULTIPLICATION OF INTEGERS

Rule 1 : Product of two integers with same sign is equal to the product of their numerical values with positive sign.

(–ve) × (–ve) = (+ve)
(+ve) × (+ve) = (+ve)

Example 1

(a) $(-2) \times (-4) = 8$

(b) $(7) \times (3) = 21$

Rule 2 : Product of two integers with opposite signs is equal to the product of their numerical values with negative sign.

(+ve) × (–ve) = (–ve)
(–ve) × (+ve) = (–ve)

Example 2

(a) $(+3) \times (-6) = -18$

(b) $(-5) \times (+4) = -20$

2. DIVISION OF INTEGERS

We know that division of whole numbers is an inverse process of multiplication. In this section, we shall extend the same idea to integers. For example, on dividing 20 by 5 means finding an integer which when multiplied with 5 gives us 20. Clearly, such an integer is 4. Therfore, we write

$$20 \div 5 = 4 \text{ or } \frac{20}{5} = 4$$

We have the following definitions:

Dividend : The number to be divided is called dividend.

Divisor : The number which divides is called the divisor.

Quotient : The result of division is called the quotient.

(i) If a and b are integers, then a ÷ b is not necessarily an integer.

For example, $\dfrac{15}{4}$, $\dfrac{-14}{3}$ are not integers.

(ii) If a is an integer different from 0, then a ÷ a = 1.

(iii) For every integer a, we have a ÷ 1 = a.

(iv) If a is a non-zero integer, then 0 ÷ a = 0.

(v) If a is an integer, then a ÷ 0 is not meaningful.

(vi) If a, b, c are integers, then

   (a) a > b $\Rightarrow$ a ÷ c > b ÷ c, if c is positive.

   (b) a > b $\Rightarrow$ a ÷ c < b ÷ c, if c is negative.

3. USE OF BRACKETS

In complex expressions, sometimes, it is necessary to have brackets within brackets. Since same type of brackets one within another can be confusing, so different types of brackets are used. Most commonly used brackets are :

Brackets symbol	Name
( )	Parentheses or common brackets
{ }	Braces or Curly brackets
[ ]	Brackets or square brackets or box brackets
—	Vinniculum

REMOVAL OF BRACKETS : In order to simplify expression involving more than one brackets, we use the folloiwng steps :

STEP I : See where the given expression contains a vinculum or not. If a vinculum is present, then perform operations under it. Otherwise go to next step.

STEP II : See the innermost bracket and perform operations within it.

STEP III : Remove the innermost bracket by using following rules:

   Rule 1: If a bracket is preceded by a plus sign, remove it by writing its terms as they are.

   Rule 2 : If a bracket is preceded by a minus sign, change positive signs within it to negative and vice-versa.

   Rule 3 : If there is no sign between a number and a grouping symbol, then it means multiplication.

Rule 4 : If there is a number before some brackets then we multiply the number inside the brackets with the number outside the brackets.

STEP IV : See the next innermost bracket and perform operations within it. Remove the second innermost bracket by using the rules given in step III. Continue this process till all the brackets are removed.

Example 1

Simplify: $27 - [\ 5 + \{\ 28 - (\ 29 - 7)\}]$

Solution :

We have,

$= 27 - [5 + \{28 - (29 - 7)\}]$

$= 27 - [5 + \{28 - 22\}]$ [Removing the innermost brackets]

$= 27 - [5 + 6]$ [Removing braces]

$= 27 - 11 = 16$

SE. 1

Simplify : $- 4 + 15 - 5 + 20$

Ans. $- 4 + 15 - 5 + 20 = - 4 - 5 + 15 + 20$

$= -9 + 35 = 26$

SE. 2

If $a = 25$, $b = 3$, which of the following is true ?

(i) $a - b = b - a$ (ii) $a - (-b) = a + b$

Ans. (i) $a - b = 25 - 3 = 22$

$b - a = 3 - 25 = - 22$

$a - b \neq b - a$

$\therefore$ (i) is false.

(ii) $a - (-b) = 25 - (-3) = 25 + 3 = 28$

$a + b = 25 + 3 = 28$

$a - (-b) = a + b$

$\therefore$ (ii) is true.

SE. 3

Sum of two integers is -30. If one of them is 15, find the other integer.

Ans. Sum of integers $= - 30$

One integer $= 15$

Other integer $= - 30 - 15 = - 45$

$\therefore$ Other integer is -45

SE. 4

Rehana had Rs. 2000 in her account in March 2007. She deposited Rs. 700 in April 2007 and withdrawn Rs. 1000 in May 2007. Find her balance at the end of May 2007.

Ans. Initial amount = Rs. 2000

Amount deposited = + Rs. 700

Amount withdrawn = – Rs. 1000

Her balance amount = Rs. 2000 + Rs. 700 – Rs. 1000 = Rs. 1700

SE. 5

Evaluate : (i) $26 \div \{(-13) \div 1\}$

(ii) $\{(-20) + 5\} \div \{(-5) + 2\}$

Ans. (i) $26 \div \{(-13) \div 1\} = 26 \div \{-13\} = - 2$

(ii) $\{-20 + 5\} \div \{-5 + 2\} = -15 \div \{-3\} = 5$

SE. 6

Subtract $- 134$ from the sum of 38 and -87.

Ans. Sum of 38 and $- 87$

$= 38 + (-87)$

$= 38 - 87 = - 49$

Now, $- 134$ is subtracted from $- 49$

$= - 49 - (-134)$

$= 85$

SE. 7

Verify the property

$a \times (b + c) = a \times b + a \times c$

If $a = -3$, $b = 7$, $c = -9$

Ans. As $a \times (b + c) = (a \times b) + (a \times c)$

$a = (-3)$, $b = 7$, $c = -9$

L.H.S. $= a \times (b + c)$

$= (-3) \times [7 + (-9)]$

$= (-3) \times (-2) = 6$

R.H.S. $= (a \times b) + (a \times c)$

$= (-3 \times 7) + [(-3) \times (-9)]$

$= -21 + 27 = 6$

$\therefore$ L.H.S. = R.H.S.

SE. 8

Find the value of

$[32 + 2 \times 17 + (-6)] \div 15$

Ans. We have,

$[32 + 2 \times 17 + (-6)] \div 15$

$= [32 + 34 + (-6)] \div 15$

= (66 − 6) ÷ 15

= 60 ÷ 15 = $\dfrac{60}{15}$ = 4

SE. 9

Simplify : {36 ÷ (−9)} ÷ {(−24) ÷ 6}

Ans. We have,

{36 ÷ (−9)} ÷ {(−24) ÷ 6}

$= \left\{ -\dfrac{|36|}{|9|} \right\} \div \left\{ -\dfrac{|24|}{|6|} \right\} = \left\{ -\dfrac{36}{9} \right\} \div \left\{ -\dfrac{24}{6} \right\}$

$= (-4) \div (-4) = \dfrac{|-4|}{|-4|} = \dfrac{4}{4} = 1$

SE. 10

Simplify : $39 - \left[23 - \left\{ 29 - (17 - \overline{9-3}) \right\} \right]$

Ans. We have,

$39 - \left[23 - \left\{ 29 - (17 - \overline{9-3}) \right\} \right]$

$39 - \left[23 - \left\{ 29 - (17 - 9 + 3) \right\} \right]$

[Removing vinculum]

$39 - \left[23 - \left\{ 29 - (17 - 6) \right\} \right]$

$39 - \left[23 - \left\{ 29 - 11 \right\} \right]$ [Removing parentheses]

= 39 − [23 − 18]

= 39 − 5 = 34

SE. 11

Simplify :

$118 - \left[121 \div (11 \times 11) - (-4) - \left\{ 3 - \overline{9-2} \right\} \right]$

Ans. We have,

$118 - \left[121 \div (11 \times 11) - (-4) - \left\{ 3 - \overline{9-2} \right\} \right]$

$118 - \left[121 \div (11 \times 11) - (-4) - \left\{ 3 - 9 + 2 \right\} \right]$

$= 118 - \left[121 \div (11 \times 11) - (-4) - \left\{ 3 - 7 \right\} \right]$

$= 118 - \left[121 \div 121 - (-4) - \left\{ 3 - 7 \right\} \right]$

$= 118 - \left[1 - (-4) - (-4) \right]$

$= 118 - \left[1 + 4 + 4 \right]$

$= 118 - 9 = 109$

SE. 12

In a class test containing 20 questions, 3 marks are given for every correct answer and -1 mark is given for every incorrect answer.

(i) Ritu attempt all questions but only 11 of her answers are correct. What is her total score ?

(ii) One of her friends attempt 8 questions but only one answer is incorrect. What is her friend's total score ?

Ans. (i) Marks given for one correct answer = 3

So, Marks given for 11 correct answer

= 3 × 11 = 33

Marks given for one incorrect answer = −1

So, Marks given for 9 incorrect answers

= −1 × 9 = -9

Therefore, Ritu's total score = 33 - 9 = 24

(ii) Marks given for one correct answer = 3

So, Marks given for 7 correct answer
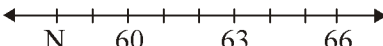
= 3 × 7 = 21

Marks given for one incorrect answer

= 1 × -1 = -1

Therefore, her friend's total score

= 21 - 1 = 20

ONLY ONE CORRECT TYPE

1. (–8) ÷ 0 =

    (A) –8   (B) 0

    (C) 8   (D) Not defined

2. Which one of the following pair of integers does not give the sum –7 ?

    (A) –5, –2,   (B) –13, 6

    (C) 8, –15   (D) –3, 4

3. The letter N represents which number ?

    (A) 58   (B) 59

    (C) 61   (D) 62

4. The value of $(-1)^{27} \times (-1)^{53} \times (-1)^4$ is

    (A) –1   (B) 1

    (C) –2   (D) 2

5. Which of the following is correct ?

    (A) –12 > –9   (B) –12 < –9

    (C) (–12) + 9 > 0   (D) (–12) × 9 > 0

6. (–1) + (–1) + (–1) + (–1) + ... 500 times =

    (A) 500   (B) 1

    (C) –1   (D) –500

7. If a = (–1) × (–1) ×(–1) ..... 100 times and b = (–1) × (–1) ×(–1) ..... 95 times, then a + b =

    (A) –1   (B) –2

    (C) 0   (D) 1

8. The value of (–7) + (–15) ÷ 3 + (–2) × 5 is

    (A) 22   (B) –42

    (C) –22   (D) 37

9. The sum of two integers is 93. If one of them is –59, then the other one is

    (A) 34   (B) –34

    (C) 152   (D) –152

10. What must be subtracted from –3 to get –9 ?

    (A) –6   (B) 12

    (C) 6   (D) –12

11. The value of 385 × 99 – (–385) is

    (A) 63698   (B) 38576

    (C) 38500   (D) 45600

12. An integer when divided by –5 gives 45. The integer is

    (A) –9   (B) 50

    (C) 225   (D) –225

13. The sum of two integers is 24. If one of them is –19, then the other is

    (A) 43   (B) –43

    (C) 5   (D) –5

14. What must be subtracted from –6 to obtain –14 ?

    (A) 8   (B) 20

    (C) –20   (D) –8

15. If a ÷ (–35) = –5, then the value of a is

    (A) –7   (B) 7

    (C) 90   (D) 175

16. On subtracting –14 from –18, we get

    (A) 4   (B) –4

    (C) –32   (D) 32

17. (–35) ×2 + (–35) × 8 =

    (A) –350   (B) –70

    (C) –280   (D) 350

18. By how much does 5 exceed –4 ?

(A) 1   (B) –1

(C) 9   (D) –9

19. If $x \div 29 = 0$, then $x =$

(A) 29   (B) –29

(C) 0   (D) None of these

20. If $x = (-10) + (-10) + \ldots 15$ times and $y = (-2) \times (-2) \times (-2) \times (-2) \times (-2)$, then $x - y =$

(A) 118   (B) –118

(C) –182   (D) 182

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from List – I and List – II are given as options (A), (B), (C) and (D) out of which one is correct.

1. Determine each of the following products and then match the following :

List – I	List – II
(P) $(-45) \times 50 \times (-10)$	(i) –1152
(Q) $(-2) \times 6 \times (-8) \times (-12)$	(ii) –1444
(R) -85×5	(iii) –425
(S) $76 \times (-19)$	(iv) 22500

(A) (P)→(i), (Q)→(ii), (R)→(iii), (S)→(iv)

(B) (P)→(iv), (Q)→(i), (R)→(iii), (S)→(ii)

(C) (P)→(ii), (Q)→(iii), (R)→(iv), (S)→(i)

(D) (P)→(iv), (Q)→(ii), (R)→(i), (S)→(iii)

2. Match the following :

List – I	List – II
(P) A certain freezing process requires that room temperature be lowered from 40°C at the rate of 3°C every hour. The room temperature after 10 hours the process begins (in °C) is	(i) –3
(Q) A plane is flying at a height of 5000 m above the sea level. At a particular point, it is exactly above a submarine floating 1450 m below the sea level. The vertical distance between them (in m) is	(ii) 35
(R) The product of two mumbers is –120. If one of them is 40, them the other number is	(iii) 6450
(S) Rita started a game of Monopoly with Rs. 90. She had to pay Rs. 30 as tax and she received Rs. 10 as rent of one of her sites. Again, she won Rs. 25 by way of lottery and was then fined Rs. 60 for over speeding. How much money was left with her (in Rs.) at the end of the game ?	(iv) 10

(A) (P)→(i), (Q)→(ii), (R)→(iii), (S)→(iv)

(B) (P)→(iii), (Q)→(i), (R)→(iv), (S)→(ii)

(C) (P)→(ii), (Q)→(iii), (R)→(iv), (S)→(i)

(D) (P)→(iv), (Q)→(iii), (R)→(i), (S)→(ii)

PARAGRAPH TYPE

PASSAGE # I

In a class test containing 10 questions, 5 marks are given for every correct answer and (–2) marks are given for every incorrect answer and 0 for question not attempted.

1. Mohan gets four correct and six incorrect answers. His score is

   (A) 8 Marks   (B) 0 Mark

   (C) 32 Marks   (D) 4 Marks

2. Reshma gets five correct and five incorrect answers, her score is

   (A) 0 Mark   (B) 8 Marks

   (C) 15 Marks   (D) 20 Marks

3. Heena gets two correct and five incorrect answers out of seven question she attempts. What is her score ?

   (A) 7 Mark   (B) 4 Marks

   (C) 10 Marks   (D) 0 Mark

PASSAGE # II

We first solve an equation, by removing vinculum first, then parentheses, then braces and finally square brackets.

4. Which of following gives the value –24 ?

   (A) $[(2 \times 19) - (6 - 1)]$

   (B) $2 \times \{(19 - 6) - 1\}$

   (C) $\{(2 \times 1) - (19 - 6)\}$

   (D) $2 \times \{1 - (19 - 6)\}$

5. Solve : $23 - [23 - \{23 - (23 - \overline{23 - 23})\}]$

   (A) 0   (B) 2

   (C) 3   (D) 9

6. Simplify : $63 - (-3)\{-2 - \overline{8 - 3}\} \div 3\{5 + (-2)(-1)\}$

   (A) 26   (B) 48

   (C) 62   (D) 96

NUMERICAL PROBLEMS

1. Simplify : [–33 –(–27)] + [88 + (–82)]

2. If a = –9 and b = –6, then find b – a.

4. The sum of two integer is –21. If one of them is –53, find the other integer.

5. Find the additive inverse of –6.

6. What must be subtracted from –3 to get –9 ?

7. Subtract the sum of –1082 and 878 from sum of 45 and –192.

8. The temperature of a hot iron rod is 250°C. Every minute the temperature drops down by 16°C. What will be the units place digit of the temperature of the iron rod after 12 minutes ?

9. Find the difference between the smallest positive integer and the greatest negative integer.

10. Find the additive inverse of the greatest negative integer.

VERY SHORT ANSWER TYPE

1. The product of two numbers is -180. If one number is 12, find the other number.

2. Sum of the two integers is 63. If one of them is-37, find the other

3. Calculate: (–6) + (6) + (–6) + (6) + (6)

5. Solve : $-a \times -b \times 0 \times -c \times -d$

SHORT ANSWER TYPE

1. Simplify each of the following and find the correct answer in the same order:

    (i) $39 - [23 - \{29 - (17 - \overline{9 - 3})\}]$

    (ii) $15 - (-3)\{4 - \overline{7 - 3}\} \div [3\{5 + (-3) \times (-6)\}]$

    For Q. 2 & 3

    In a class test containing 15 questions, 4 marks are given for every correct answer and (–2) marks are given for every incorrect answer.

2. Gurpreet attempts all questions but only 9 of her answer are correct. What is her total score ?

3. One of her friends gets only 5 answers correct. What will be her score ?

4. Solve : $25 - 5 \times 2 + 3 - 8 \div 2$.

5. The temperature at 12 noon was 10° above zero. If it decreases at the rate at 2°C per hour until midnight, at what time would the temperature be 8° C below zero ?

MULTIPLE CHOICE QUESTIONS

1. $(-1)^{234} \times (-5)^{546} \times (-2)^{786}$ results in a

    (A) Negative integer

    (B) Postive integer

    (C) Zero

    (D) None of these

2. A insect crawls up 5 cm every second on a 60cm vertical rod and then falls down 2 cm over the next second. How many seconds will it take to climb the rod.

    (A) 20 seconds　　　(B) 39 seconds

    (C) 60 seconds　　　(D) 30 seconds

3. Height of a place A is 1800 m above sea level. Another place B is 700 m below sea level. What is the difference between the levels of these two places ?

    (A) 2400 m　　　(B) 2500 m

    (C) 1100 m　　　(D) 1000 m

4. If a and b are integers , then a ÷ b

    (A) May or may not be integer

    (B) Always an integer

    (C) Never be an integer

    (D) None of these

5. The product of three integers are –600. If two of them are –15 and 10, the third integer is:

    (A) 4　　　　　(B) 5

    (C) 6　　　　　(D) 9

6. In the figure given below
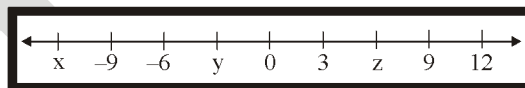
    Based on the number line, the value of x – y – z is :

    (A) –21

    (B) –15

    (C) –3

    (D) 15

7. If 23 integers are multiplied and the product is negative then which of the following statements can be true about them :

    (A) 10 are negative, 13 are positive

    (B) 14 are negative, 9 are positive

    (C) 12 are negative, 21 are positive

    (D) 17 are negative, 6 are positive

8. Find the value of the expression below :

   0–1+2–3+4–5+6–7+8–9+.......–17+18–19+20.

   (A) 10   (B) 0

   (C) –10   (D) 20

9. The product of 3 integers is odd. What can their sum be ?

   (A) odd   (B) even

   (C) positive   (D) negative

10. 1 –2 +3 –4 +5 –6 + ...+2009 –2010 +2011 –2012.

    (A) –2000   (B) –1

    (C) 1000   (D) –1006

Space for Notes :

Answer Key

EXERCISE I														
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
D	D	A	B	B	D	C	C	C	C	C	D	A	A	D
16	**17**	**18**	**19**	**20**										
B	A	C	C	B										

MATCH THE COLUMN

1. B   **2.** D

EXERCISE II

COMPREHENSION TYPE

1. A   **2.** C   **3.** D   **4.** D   **5.** A   **6.** C

NUMERICAL VALUE TYPE

1. 0   **2.** 3   **4.** 32   **5.** 6   **6.** 6   **7.** 57   **8.** 8
9. 2   **10.** 1

VERY SHORT ANSWER TYPE

1. −15   **2.** 100   **3.** 6   **5.** 0

SHORT ANSWER TYPE

1. (i) 34, (ii) 15   **2.** 24   **3.** 0   **4.** 14   **5.** 9 PM

MULTIPLE CHOICE QUESTIONS

1. B   **2.** B   **3.** B   **4.** A   **5.** A   **6.** B   **7.** D
8. A   **9.** A   **10.** D

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : INTEGERS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

FRACTIONS AND DECIMALS | 2

📖 INTRODUCTION

A fraction is a number of the form $\dfrac{a}{b}$, where a and b are integers and $b \neq 0$. The parts of a fraction are :

numerator $\rightarrow a$
$\qquad\qquad\quad \dfrac{}{} \leftarrow$ fraction bar
denominator $\rightarrow b$

1. TYPE OF FRACTIONS

1.1 LIKE FRACTIONS

Fractions having same denominator are called like fractions.

Example 1

$\dfrac{2}{9}, \dfrac{4}{9}, \dfrac{5}{9}$ and $\dfrac{8}{9}$ are like fractions.

1.2 UNLIKE FRACTION

Fraction with different denominators are called unlike fractions.

Example 1

$\dfrac{1}{2}, \dfrac{3}{4}, \dfrac{5}{6}$ and are unlike fractions

1.3 PROPER FRACTION

A fraction whose numerator is less than its denominator, but not equal to zero is called a proper fraction.

Example 1

$\dfrac{1}{2}, \dfrac{3}{4}, \dfrac{2}{7}, \dfrac{11}{20}$ etc.

1.4 IMPROPER FRACTION

A fraction whose numerator is equal to or greater than its denominator is called and improper fraction.

Example 1

$\dfrac{7}{8}, \dfrac{8}{5}, \dfrac{215}{15}, \dfrac{63}{15}$ etc.

1.5 MIXED FRACTION

A number which consists of two parts (i) a natural number (ii) a proper fraction is called a mixed fraction.

Example **1**

$2\dfrac{5}{13}, 1\dfrac{7}{8}, 18\dfrac{9}{17}$ etc, where $2, 1, 18$ are natural numbers and $\dfrac{5}{13}, \dfrac{7}{8}$ and $\dfrac{9}{17}$ are proper fractions.

$2\dfrac{5}{13} = 2 + \dfrac{5}{13}, 1\dfrac{7}{8} = 1 + \dfrac{7}{8}$ and $18\dfrac{9}{17} = 18 + \dfrac{9}{17}$

1.6 EQUIVALENT FRACTION

The fractions with equal ratios are called equivalent fractions.

Example **1**

$\dfrac{2}{3} = \dfrac{4}{6} = \dfrac{6}{9} = \dfrac{8}{12} = \dfrac{10}{15} = \dfrac{12}{18} = \dfrac{20}{30} = \dfrac{26}{39}$

Note :

1. If we multiply the numerator and the denominator by the same non-zero number, the value of the fraction remians unchanged.

2. If we divide the numerator and the denominator by the same non zero number, the value of the fractions remains unchanged.

1.7 RECIPROCAL FRACTION

The reciprocal fraction of a number k be $\dfrac{1}{k}$ i.e., the product of a reciprocal number with the number itself is unity

(i.e., 1) hence the reciprocal of 6 is $\dfrac{1}{6}$, the reciprocal of $\dfrac{1}{8}$ is 8, the reciprocal of $\dfrac{3}{5}$ is $\dfrac{5}{3}$.

1.8 COMPOUND FRACTION

The fraction of a fraction is called its compound fraction for examples $\dfrac{1}{3}$ of $\dfrac{1}{2}$

$\left(i.e., \dfrac{1}{3} \times \dfrac{1}{2} = \dfrac{1}{6} \right)$ is the compound fraction.

1.9 COMPLEX FRACTION

If the numerator or denominator or both of a fraction are again fractions then it is called a complex fraction.

Example **1**

$\dfrac{2/3}{7/8}, \dfrac{7/5}{2}, \dfrac{3/7}{8/9}, \dfrac{2}{3/7}$ etc.

Remember : $\dfrac{a/b}{c/d} = \dfrac{a}{b} \times \dfrac{d}{c}$

$\dfrac{a/b}{c} = \dfrac{a}{b \times c} \quad \Rightarrow \quad \dfrac{a}{b/c} = \dfrac{a \times c}{b}$

2. CONVERSION OF DECIMAL NUMBERS INTO DECIMAL FRACTION

Write the number of zeros as the number of digits in the decimal number preceded by 1, below the actual number without decimal point is :

$23.6 = \dfrac{236}{10}$, $4.579 = \dfrac{4579}{1000}$

$75.89 = \dfrac{7589}{100}$, $0.018870 = \dfrac{18870}{1000000} = \dfrac{1887}{100000}$

3. CONVERSION OF DECIMAL FRACTIONS INTO DECIMAL NUMBERS

Count the number of zeros in the denominator and then count the same number of digits in the numerator starting from the unit digit of the numerator moving to the left and then place the decimal point at :

$\dfrac{2375}{10} = 237.5$, $\dfrac{2375}{100} = 23.75$, $\dfrac{2375}{1000} = 2.375$, $\dfrac{2375}{100000} = 0.02375$, $\dfrac{2375}{1000000} = 0.002375$ etc.

SE. 1

What number should be added to $\dfrac{5}{11}$ to get $\dfrac{7}{11}$?

Ans.   Sum of fractions = $\dfrac{7}{11}$

One of the fraction = $\dfrac{5}{11}$

Other fraction = $\dfrac{7}{11} - \dfrac{5}{11} = \dfrac{2}{11}$

SE. 2

A piece of wire is of length $8\dfrac{1}{4}$ m. It is cut into two pieces. The length of one piece is $4\dfrac{3}{4}$ m. What is the length of the other piece?

Ans.   Total length of wire = $8\dfrac{1}{4}$ m = $\dfrac{33}{4}$ m

Length of one piece = $4\dfrac{3}{4}$ m

Length of one piece = $4\dfrac{3}{4}$ m = $\dfrac{19}{4}$ m

Length of other piece = $\dfrac{14}{4}$

SE. 3

The sides of a triangle are $\dfrac{7}{2}$ cm, $\dfrac{11}{4}$ cm and $\dfrac{16}{5}$ cm . Find its perimeter.

Ans.   Perimeter of triangle = Sum of all sides

$= \dfrac{7}{2} + \dfrac{11}{4} + \dfrac{16}{5}$ cm

$= \dfrac{70}{20} + \dfrac{55}{20} + \dfrac{64}{20} = \dfrac{189}{20}$ cm

[L.C.M (2, 4, 5) = 20]

$= 9\dfrac{9}{20}$ cm

SE. 4

Find :

(i) $\dfrac{1}{4}$ **of a rupee**   **(ii)** $\dfrac{3}{4}$ **of a day**

(iii) $\dfrac{7}{25}$ **of a kg**   **(iv)** $\dfrac{2}{3}$ **of an hour**

Ans.   (i) $\dfrac{1}{4}$ of a rupee = $\dfrac{1}{4}$ of 100 paise

$= \dfrac{1}{4} \times 100$ paise = 25 paise

(ii) $\dfrac{3}{4}$ of a day = $\dfrac{3}{4}$ of 24 hours

$= \dfrac{3}{4} \times 24 = 18$ hours

(iii) $\dfrac{7}{25}$ of a kg = $\dfrac{7}{25}$ of 1000 gm

$= \dfrac{7}{25} \times 1000$ gm = 280 gm

(iv) $\dfrac{2}{3}$ of an hour = $\dfrac{2}{3}$ of 60 mins

$= \dfrac{2}{3} \times 60$ mins = 40 mins

SE. 5

Which is greater : $\dfrac{3}{4}$ of 36 or $\dfrac{4}{5}$ of 35?

Ans. $\dfrac{3}{4}$ of 36 = $\dfrac{3}{4} \times 36 = 27$ and $\dfrac{4}{5}$ of 35

$= \dfrac{4}{5} \times 35 = 28$

Since, $28 > 27 \Rightarrow \frac{4}{5}$ of $35 > \frac{3}{4}$ of 36

SE. 6

Vineeta reads a book for $1\frac{4}{5}$ hours everyday. She reads the entire book in 10 days. How many hours in all were required by her to read the book?

Ans. In one day, she reads for $1\frac{4}{5}$ hours = $\frac{9}{5}$ hours in

10 days, she read for $\frac{9}{5} \times 10 = 18$ hours

So, 18 hours were required by her to read the book.

SE. 7

The steel needed for the construction of a bridge is 640 tonnes. If the contractor has already purchased 0.65 part of the steel, how many more tonnes of steel to be purchased for completion of the bridge?

Ans. Total quantity of steel required = 640 tonnes
This quantity is the total one and whole part required for construction of bridge. Out of this, the part of the purchased = 0.65
Balance that still needs to be purchased
= 1 – 0.65 = 0.35 part
Hence, quantity of steel to be purchased
= 0.35 × 640 = 224 tonnes

SE. 8

Vinay covers $7\frac{1}{2}$ km in one hour. How much distance will he cover in $2\frac{4}{5}$ hours?

Ans. $7\frac{1}{2}$ km = $\frac{15}{2}$ km and $2\frac{4}{5}$ hours = $\frac{14}{5}$ hours

Distance covered in one hour = $\frac{15}{2}$ km

So, distance covered in $\frac{14}{5}$ hours = $\frac{15}{2} \times \frac{14}{5}$ km

= 21 km

Thus, Vinay will cover 21 km in $2\frac{4}{5}$ hours.

SE. 9

If the cost of 17 m of cloth is ₹ $77\frac{5}{7}$. Find its cost per metre.

Ans. Cost of 17 m of cloth = ₹ $77\frac{5}{7}$ = ₹ $\frac{544}{7}$

Cost of 1m of cloth = ₹ $\frac{544}{7} \div 17 = \frac{544}{7} \times \frac{1}{17}$

= ₹ $\frac{32}{7}$ = ₹ $4\frac{4}{7}$

Hence, the cost of cloth is ₹ $4\frac{4}{7}$ per metre.

SE. 10

Find 3.705 × 10000.

Ans. Number of zeroes in 10000 = 4.
Move decimal point 4 places to the right in 3.705
∴ 3.705 × 10000 = 37050

SE. 11

A film show casted 3.75 hours. Out of this, 0.23 hours were spent on advertisement and trailers. What was the actual duration of the film?

Ans. The duration of a film show = 3.75 hours.
Time spent on advertisement and trailers = 0.23 hour
Actual duration film = 3.75 – 0.23 = 3.52 hours

SE. 12

Cost of one book is ₹ 34.75. Find the cost of 25 such books.

Ans. Cost of 1 book = ₹ 34.75

Cost of 25 books = ₹ (25 × 34.75)

First we multiply 25 × 3475, we get 86875 and places decimal point after 2 digit from right

∴ ₹ 34.75 × 25 = ₹ 868.75

Hence, cost os 25 such books = ₹ 868.75

SE. 13

Find the area of square whose side is 6.25 m.

Ans. Area of square = Side × Side

Side of square = 6.25 m

∴ Area of square = 6.25 × 6.25 m²

To multiply 6.25 m and 6.25 m, first multiply 625 by 625 = 390625 and place decimal point after four digits from the right.

6.25 × 6.25 = 39.0625 m²

∴ Area of square = 39.0625 m²

SE. 14

Samson carries a bag weighing 5.5 kg. How many grams is it?

Ans. 1 kg = 1000 gm

∴ 5.5 kg = 5.5 × 1000 gm = 5500 gm

(By shifting decimal by 1 places to the right)

SE. 15

If 2.54 cm make an inch, how many inches will 60.96 cm make?

Ans. 2.54 cm = 1 inch

∴ 1 cm = $\dfrac{1}{2.54}$ inch

⇒ 60.96 cm = $\dfrac{60.96}{2.54}$ inch

∴ $\dfrac{60.96}{2.54} = \dfrac{60.96}{2.54} \times \dfrac{100}{100} = 24$

⇒ **60.96 cm = 24 inches**

SE. 16

The cost of a book is 25.75. How many books can be purchased for ₹ 2472?

Ans. The number of books can be purchased

$= 2472 \div 25.75 = 2472 \times \dfrac{1}{25.75} = \dfrac{247200}{2575} = 96$

SE. 17

A tank is filled with $149\dfrac{1}{2}$ litres of water. How many buckets with capacity of $6\dfrac{1}{2}$ litres each can be filled from the tank?

Ans. Volume of water in tank = 149.5 litres

Volume of bucket = 6.5 litres

Number of buckets = $149.5 \div 6.5 = 149.5 \times \dfrac{1}{6.5}$

$= \dfrac{1495}{65} = 23$

ONLY ONE CORRECT TYPE

1. Which among the following is mixed as well as proper fraction.

   (A) $2\dfrac{3}{4}$ (B) $\dfrac{12}{35}$

   (C) Does not exist (D) None

2. If $\dfrac{5}{10} = \dfrac{m-2}{30}$, then the value of m is :

   (A) 15 (B) 17

   (C) 20 (D) 7

3. If $\dfrac{10}{x} + \dfrac{6}{x} + \dfrac{8}{x} = 2$, then the value of x is :

   (A) 16 (B) 12

   (C) 6 (D) 3

4. The result obtained after subtracting the sum of $9\dfrac{3}{4}$ and $5\dfrac{5}{6}$ from the sum of $11\dfrac{2}{5}$ and $7\dfrac{1}{3}$ is :

   (A) $4\dfrac{3}{20}$ (B) $3\dfrac{3}{20}$

   (C) $3\dfrac{5}{20}$ (D) $3\dfrac{7}{20}$

5. If $\dfrac{4}{7} + \dfrac{2}{7} = \dfrac{y}{21}$, then the value of y is :

   (A) 18 (B) 6

   (C) 20 (D) 2

6. If $2\dfrac{1}{2} + 3\dfrac{1}{2} + 4\dfrac{1}{2} = x$, then $x - 5\dfrac{1}{2} =$

   (A) 6 (B) 5

   (C) 4 (D) 8

7. $\left(\dfrac{1}{4} \text{ of } 2\dfrac{2}{7}\right)$ when multiplied by $6\dfrac{3}{10} \times 2\dfrac{1}{7} \times \dfrac{35}{9}$ gives x, and $y = \dfrac{5}{6}$, then $\dfrac{x}{y}$ is :

   (A) $2^2 \times 3^2$ (B) $2^3 \times 3^2$

   (C) $2^2 \times 3^3$ (D) 2×3^4

8. If $1 + 1 \div \left\{1 + 1 \div \left(1 + \dfrac{1}{3}\right)\right\}$ is simplified, then the answer is :

   (A) $1\dfrac{2}{7}$ (B) $1\dfrac{3}{4}$

   (C) $1\dfrac{4}{7}$ (D) $1\dfrac{5}{7}$

9. If $\dfrac{c}{d} = 1 \div \dfrac{3}{4}$, then $\dfrac{5}{6} + \dfrac{c}{d}$ is :

   (A) $\dfrac{13}{3}$ (B) $\dfrac{13}{2}$

   (C) $\dfrac{13}{6}$ (D) $\dfrac{13}{4}$

10. The figure ⬕ ⬕ ⬕ = ⬕ represents:

    (A) $3 \times \dfrac{2}{3} = 2$ (B) $4 \times \dfrac{1}{3} = \dfrac{4}{3}$

    (C) $3 \times \dfrac{1}{4} = \dfrac{3}{4}$ (D) $3 \times \dfrac{5}{12} = 1\dfrac{1}{4}$

11. Evalute the expression $6\dfrac{1}{4} \times 0.25 + 0.75 - 0.3125$.

    (A) 5.9675 (B) 4.2968

    (C) 2.1250 (D) 0.0306

12. $58.326 \times 4639 \times 0.0081$ is the same as :

    (A) $5.8326 \times 4.639 \times 8.1$

    (B) $5.8326 \times 4.639 \times 0.81$

    (C) $58326 \times 4639 \times 0.0000081$

    (D) None of these

13. If $\dfrac{547.527}{0.0082} = x$, then the value of $\dfrac{547527}{82}$ is :

    (A) $\dfrac{x}{10}$ (B) $10x$

    (C) $100x$ (D) $\dfrac{x}{100}$

14. The value of $\left(1+\dfrac{1}{1\times 2}+\dfrac{1}{1\times 2\times 4}\right)$ up to 3 places of decimal is :

    (A) 1.641

    (B) 1.293

    (C) 0.641

    (D) 1.625

15. The expression of $\dfrac{1}{15}+\left(\dfrac{4}{15}+\dfrac{1}{3}\right)$ is equivalent to

    (A) $\dfrac{1}{9}$ (B) 9

    (C) $\dfrac{1}{5}$ (D) $\dfrac{2}{3}$

16. The sum of $3\dfrac{4}{5}+2\dfrac{7}{10}+4\dfrac{8}{15}$ is

    (A) $\dfrac{68}{15}$ (B) $\dfrac{331}{30}$

    (C) $\dfrac{27}{10}$ (D) $\dfrac{325}{30}$

17. $0.4 \times 0.4 \times 0.4$ is equal to :

    (A) 6.4

    (B) 0.64

    (C) 0.064

    (D) 0.0064

TRUE/FALSE TYPE

1. Reciprocal of an improper fraction is an improper fraction.

2. $2\dfrac{2}{5} \div 2\dfrac{1}{5} = 2$

3. $0.04 \div 0.2 = 0.2$

4. $0.2 \times 0.3 = 0.6$

5. $16\dfrac{3}{4} \times 6\dfrac{2}{5} = 107\dfrac{3}{10}$

PARAGRAPH TYPE

PASSAGE # I

For addition and subtraction of like fractions, the numerators are added and the denominator remains the same. For adding or subtracting unlike fractions, change them into equivalent like fractions and then add or subtract.

1. Find the sum $3\dfrac{4}{5}+2\dfrac{3}{10}+1\dfrac{1}{15}$

   (A) $\dfrac{42}{9}$ (B) $8\dfrac{1}{3}$

   (C) $1\dfrac{1}{3}$ (D) $7\dfrac{1}{6}$

2. Simplify : $8\dfrac{5}{6}-3\dfrac{3}{8}+1\dfrac{7}{12}$

   (A) $7\dfrac{1}{24}$ (B) $8\dfrac{1}{9}$

   (C) $6\dfrac{8}{11}$ (D) $4\dfrac{1}{53}$

3. The cost of a pen is ₹ $16\dfrac{3}{5}$ and that of a pencil is ₹ $4\dfrac{3}{4}$. Which costs more and by how much?

   (A) pen, ₹ $\dfrac{81}{4}$ (B) pencil, ₹ $7\dfrac{3}{9}$

   (C) pen, ₹ $11\dfrac{17}{20}$ (D) pencil, ₹ $6\dfrac{1}{9}$

PASSAGE # II

Product of two fractions $\dfrac{a}{b}$ and $\dfrac{c}{d}=\dfrac{a}{b}\times\dfrac{c}{d}=\dfrac{a\times c}{b\times d}$

Division of two fractions $\dfrac{a}{b}\times\dfrac{c}{d}=\dfrac{a}{b}\div\dfrac{c}{d}=\dfrac{a}{b}\times\dfrac{d}{c}$

4. Find $\dfrac{7}{8}$ of a day.

    (A) 20 hours   (B) 21 hours

    (C) $\dfrac{7}{8}$ hours   (D) 1 hour

5. Sapna earns ₹ 12000 per month. She spends $\dfrac{7}{8}$ of her income and deposits rest of the money in a bank. How much money does she deposit in the bank each month.

    (A) ₹ 10,500   (B) ₹ 11,000
    (C) ₹ 1500   (D) ₹ 5000

6. At a charity show, the price of each ticket was ₹ $10\dfrac{1}{2}$. The total amount collected by a boy was ₹ $283\dfrac{1}{2}$. How many tickets were sold by him?

    (A) 21   (B) 27
    (C) 4   (D) 19

MATCH THE COLUMN TYPE

1. Simplify and match the following :

Column I	Column II
(P) $4\dfrac{3}{10}-1\dfrac{2}{5}+8\dfrac{1}{9}$	(i) 6.83
(Q) $0.25+9.81\times6.4+4\dfrac{1}{9}$	(ii) −90.31
(R) $6\dfrac{1}{3}-4\dfrac{7}{9}\times0.8+4.32$	(iii) 67.145
(S) $2\dfrac{7}{12}+\dfrac{5}{9}-0.9345\times100$	(iv) 11.01

    (A) (P) → (i), (Q) → (ii), (R) → (iii), (S) → (iv)

    (B) (P) → (iii), (Q) → (i), (R) → (iv), (S) → (ii)

    (C) (P) → (ii), (Q) → (iii), (R) → (iv), (S) → (i)

    (D) (P) → (iv), (Q) → (iii), (R) → (i), (S) → (ii)

2. | Column I | Column II |
    |---|---|
    | (P) Suman studies for $5\dfrac{2}{3}$ hrs daily. She devotes $2\dfrac{4}{5}$ hrs of her time for Science and Maths. The time she devotes for other subjects (in hours) is | (i) 775 |
    | (Q) A piece of wire is of length $12\dfrac{3}{4}$ m. If it is cut into two pieces in such a way that the length of one piece is $5\dfrac{1}{4}$ then the length of the other piece (in metres) is | (ii) $2\dfrac{13}{15}$ |
    | (R) The area of rectangular part which is $41\dfrac{2}{3}$ m long and $18\dfrac{3}{5}$ m broad (in m²) is | (iii) 64 |
    | (S) The cost of $6\dfrac{1}{4}$ kg of apples is ₹ 400. At what rate per kg (in ₹) are the apples being sold? | (iv) $7\dfrac{1}{2}$ |

    (A) (P) → (i), (Q) → (ii), (R) → (iii), (S) → (iv)

    (B) (P) → (iii), (Q) → (i), (R) → (iv), (S) → (ii)

    (C) (P) → (iii), (Q) → (iv), (R) → (i), (S) → (ii)

    (D) (P) → (ii), (Q) → (iv), (R) → (i), (S) → (iii)

VERY SHORT ANSWER TYPE

1. Simplify : $3\dfrac{1}{5} + 2\dfrac{1}{10} - 1\dfrac{1}{2} - \dfrac{1}{4}$

2. Sameera purchased 3.5 kg apples and 4.75 kg oranges. What is the total weight of fruits purchased by her?

3. If cost of 7 kg of rice is ₹ 140.70, then what is the cost of 1 kg rice?

4. Simplify : $\dfrac{14}{25} \times \dfrac{35}{51} \times \dfrac{34}{49}$

5. The side of an equilateral triangle is 3.5 cm. Find its perimeter.

6. A cartoon contains 16 boxes of nails and each box weights 4.75 kg. How much would a carton of nails weight?

7. A book consists of 216 pages . During last week Vikas read $\dfrac{3}{4}$ of the book. How many pages did he read?

8. Divide the sum of $3\dfrac{1}{4}$ and 3 by $2\dfrac{3}{5}$.

9. Find reciprocal of :

    (i) 5   (ii) $\dfrac{1}{3}$

    (iii) $\dfrac{7}{9}$ (iv) $4\dfrac{1}{5}$

10. Find the multiplication of 4.2, 3.8 and 7.6.

SHORT ANSWER TYPE

1. The cost of 7.5 kg of rice is ₹ 262.5. Find the cost of 1 kg of rice.

2. The sum of two numbers is $13\dfrac{1}{4}$. If one number is $5\dfrac{3}{4}$, find the other.

3. Product of two decimals is 13.25. If one of them is 5.75, find the other decimal.

4. Renu spends $\dfrac{4}{5}$ of ther income on household expenses. Her monthly income is ₹ 15000. How much does she saves every month?

5. Simplify : $2\dfrac{2}{17} \times 7\dfrac{2}{9} \times 1\dfrac{33}{52}$

6. A tin contains 18 kg ghee. After consuming $\dfrac{2}{3}$ of it, how much ghee is left in the tin?

7. Divide 36 by $6\dfrac{2}{3}$ and subtract the quotient from $7\dfrac{3}{5}$.

8. Divide : (i) $0.2856 \div 12$ (ii) $36.25 \div 25$

9. A car covers a distance of 89.1 km in 2.2 hours. What is the distance covered by it in 1 hour?

10. Tom studies for $5\dfrac{1}{4}$ hours daily. He devotes $2\dfrac{3}{4}$ hours of his time for English and Mathematics . How much time does he devote for other subjects?

LONG ANSWER TYPE

1. The perimeter of the given figure is 18 m and the area of rectangular part ACEF is $8\dfrac{1}{2}$ m². Find the length and breadth of the rectangular part.
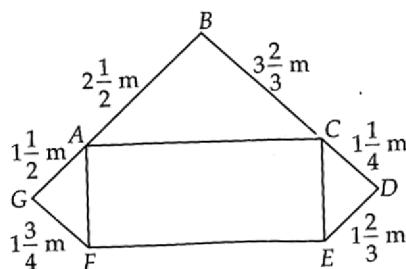
2. A social service group buys 43.7 kg of rice at ₹ 12 per kg and distributes it equally amongst 152 poor people. What is the cost of the quantity of rice that each person gets?

3. A grocer buys 5.5 kg of sugar at ₹ 14.38 per kg. He then mixes all the sugar and repacks it in 250 g packets. How many packets of sugar does the grocer have and what is the price of each packet ?

4. Find the reciprocal of the sum of $1\frac{7}{9}$ and $1\frac{9}{7}$.

5. A mat is divided into 9 colourful blocks. if $\frac{1}{3}$ of the mat is red in colour, $\frac{1}{3}$ of the mat is blue and $\frac{1}{3}$ of the mat is yellow, find the number of blocks of each colour.

NUMERICAL PROBLEMS

1. How many pieces of equal size can be cut from a rope of 30 metres long, each measuring $3\frac{3}{4}$ metres?

2. Michael purchased a notebook for ₹ 23.75, a pencil for ₹ 3.75 and a pen for ₹15.90. He gave a 50 rupee note to the shopkeeper. The amount he got back is ₹ _____,

3. The value of $\frac{3}{4} \div \frac{5}{36}$ is

4. By what number should $2\frac{3}{5}$ be multiplied to get $5\frac{1}{5}$

5. The value of $2.08 \div (0.26)$ is

6. The value of $1.02 + 0.17$ is

7. A fraction is in its lowest form if its numerator and denominator have no common factor other than

8. $\frac{2}{8}$ of day = _____ hours.

9. What should be the sum of numerator and denominator if $\frac{5}{8}$ is divided by $\frac{25}{32}$?

10. If the cost of $4\frac{1}{4}$ kg of sugar is ₹68, then find the cost of 1 kg of sugar.

Answer Key

EXERCISE I														
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
C	B	B	B	A	B	A	C	C	C	C	C	B	D	D
16	**17**													
B	C													

TRUE/ FALSE

1.   F   2.   F   3.   T   4.   F   5.   F

PARAGRAPH / FILL IN THE BLANKS

1.   D   2.   A   3.   C   4.   B   5.   C   6.   B

MATCH THE COLUMN

1.   D   2.   D

EXERCISE II

VERY SHORT ANSWER TYPE

1. $3\frac{11}{20}$ **2.** 8.25 kg   **3.** Rs. 20.10   **4.** $\frac{4}{15}$ **5.** 10.5 cm   **6.** 76 kg

7. 162   **8.** $\frac{125}{52}$ **9.** 121.296   **10.** (i) $\frac{1}{5}$ (ii) 3   (iii) $1\frac{2}{7}$ (iv) $\frac{5}{21}$

SHORT ANSWER TYPE

1. Rs. 35   2. $7\frac{1}{2}$ 3. 2.304   4. Rs. 3000   5. 25   6. 6 kg   7. $2\frac{1}{5}$

8. (i) 0.0238   (ii) 1.45   9. 40. 5 km   10. $2\frac{1}{2}$ hours

LONG ANSWER TYPE

1. $1\frac{1}{2}$ m   2. Rs. 3.45   3. Rs. 3.595   4. $\frac{63}{256}$ 5. 3

INTEGER ANSWER TYPE

1.   8   2.   6.60   3.   5.4   4.   2   5.   8   6.   1.19   7.   1

8.   6   9.   9   10.   16

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : FRACTIONS AND DECIMALS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

DATA HANDLING

3

Concepts

Introduction

📖 INTRODUCTION

Consider the following list of marks (out of 100) scored by 30 students in a test :

$$55, \ 65, \ 15, \ 40, \ 35, \ 70, \ 90, \ 92, \ 84, \ 85$$
$$70, \ 75, \ 65, \ 72, \ 80, \ 78, \ 64, \ 88, \ 78, \ 76$$
$$55, \ 54, \ 52, \ 72, \ 70, \ 90, \ 85, \ 75, \ 65, \ 80$$

We find that each entry in the above list is a numerical fact which is called an observation. Such a collection of observations gathered initially is called raw data. Data are of two types :

(i) Primary data   (ii) Secondary data

⇒ **PRIMARY DATA :-** When an investigator collects data himself with a definite plan or design in his (her) mind, it is called primary data.

⇒ **SECONDARY DATA :-** Data which are not originally collected by the investigator but they are obtained from published or unpublished sources are known as secondary data.

Secondary data are collected by an individual or an institution for some purpose and are used by someone else in another context.

1. ORGANISATION OF DATA

After the collection of data, the investigator has to find ways to condense them in tabular from in order to study their salient features. Such an arrangement is called presentation of data.

The raw data can be arranged in any one of the following ways:

- Serial order of alphabetical order
- Ascending order
- Descending order

2. FREQUENCY DISTRIBUTION

Frequency table or frequency distribution is a method to present raw data in the from which one can easily understand the information contained in the raw data.

The construction of a frequency distribution from the given raw data is done by the use of the method of tally marks.

In the first column of the frequency table we write all possible values of the variable from the lowest to the highest.The process will be clear from the following example of the number of children in 20 families.:

1, 1, 2, 3, 4, 3, 2, 1, 1, 4, 5, 2, 4, 2, 2, 1, 3, 3, 2, 5

The data may be put in the form of a frequency distribution as follows:

No. of children	Tally Marks	Frequency
1	₩	5
2	₩I	6
3	IIII	4
4	III	3
5	II	2
Total		20

Example **1**

Given below are the ages of 25 students in a school. Prepare a discrete frequency distribution.

15, 16, 16, 14, 17, 17, 16, 15, 15, 16, 16, 17, 15, 16, 16, 14, 16, 15, 14, 15, 16, 16, 15, 14, 15

Solution :

Frequency distribution of ages of 25 students :

Age	Tally Bars	Frequency
14	||||	4
15	⫲⫲ |||	8
16	⫲⫲ ⫲⫲	10
17	|||	3
Total		25

3. RANGE

The difference between the lowest and highest values.

Example **1**

In {4, 6, 9, 3, 7} the lowest value is 3, and the highest is 9, so the range is 9 - 3 = 6.

4. MEASURES OF CENTRAL TENDENCY

There are some values that describe the data by identifying the central position within that set of data. These are referred to as measure of central tendency or measures of central location. There are three types of commonly used measures of central tendency: mean, median and mode.

Mean / Arithmetic Mean:-

Arithmetic mean or mean of a given data is defined as the sum of all the observations of the data divided by the total number of observations.

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Total number of observations}}$$

Note : Mean is also known as average.

Example **1**

The heights of 5 persons are 144 cm, 152cm, 151 cm, 158 cm and 155 cm respectively. Find the mean height of given data.

Solution :

We have,

Sum of the given observations

= (144 + 152 + 151 + 158 + 155) = 760 cm

Number of observations = 5

$\therefore$ Mean height $= \dfrac{\text{Sum of the observations}}{\text{Number of observations}} = \dfrac{760}{5} = 152$ cm

Hence, the mean height is 152 cm.

5. MEDIAN

The median (means middle value) of a group of numbers is the number in the middle, when the numbers are arranged in an ascending or descending order.

When the number of collection is odd, then the middle number is the median and when the number of collection is even, then the median is the average of the two middle numbers.

Example 1

If the marks secured in Mathematics test (out of 25) by 10 students are as follows :

18, 25, 23, 20, 9, 15, 10, 5, 16, 24, then calculate the median.

Solution :

Arranging the observations in ascending order, we have

5, 9, 10, 15, 16, 18, 20, 23, 24, 25

Here, the number of observations is 10, which is even.

So, the two middle number are 16 and 18.

$\therefore$ Median $= \dfrac{16+18}{2} = \dfrac{34}{2} = 17$ Hence, median is 17.

6. MODE

The mode of a group of numbers is the number that appears most often i.e., the number whose frequency is maximum.

Example 1

Find the mode, if the following numbers of goals were scored by a team in a series of 10 matches.

2, 3, 0, 1, 3, 4, 3, 4, 5, 3 (Also prepare frequency table).

Solution :

Let us prepare frequency table.

Number of goals	Tally Marks	Frequency
0	|	1
1	|	1
2	|	1
3	||||	4
4	||	2
5	|	1

The mode is 3, as it occurs most frequently (4 times).

7. USE OF BAR GRAPHS

A bar graph is a pictorial representation of the numerical data using bars (rectangles) of uniform width, erected vertically (or horizontally) with equal spacing between them. The lengths of the bars depend upon the frequency and the scale chosen.

$\Rightarrow$ **Construction of a bar graph**

The following steps are taken into consideration while constructing a bar graph.

Step 1: Take a graph paper, draw two lines perpendicular to each other, and call them horizontal and vertical axes.

Step 2: Along the horizontal axis, take the values of the variables, and along the vertical axis, take the frequencies and lable them accordingly.

Step 3: Along the horizontal axis, choose a uniform width for the bars and a uniform gap between the bars, according to the space available.

Step 4: Along the vertical axis, choose a suitable scale to determine the heights of the bars. The scale is chosen according to the space available.

Step 5 : Calculate the heights of the bars, according to the chosen scale and frequency. Draw the bars.

8. DOUBLE BAR GRAPHS

Mr. Khanna asked his students about their interest in different subjects. He found that 20 boys and 15 girls like Mathematics while 10 boys and 12 girls are interested in Science. Also, 14 boys and 10 girls like Social studies. He asked the students to provide all this information to him properly recorded.

Shikha organised and tabulated the data as follows :

Subjects	Boys	Girls	Total
Mathematics	20	15	35
Science	10	12	22
Social Studies	14	10	24

Now, Anuj, Prashant and Tiya made the graphs respectively :

• Based on number of students interested in each subject.

• Two graph based on number of boys and girls interested in each subject.

• Three graphs based on number of students, interested in Mathematics, Science and Social Studies.

Mr. Sharma said that all the facts can be combined into one graph where the data can be represented about boys, girls and all the three subjects. This is called a double bar graph. It tells us about the number of boys and girls interested in each subject and also compares the interest of boys and girls in each subject.

9. PROBABILITY

The chance of happening of an event is called Probability of the event happening. Probability tells us how likely an event is going to occur. It does not tell us what is going to happen. We often make predictions about the chances of an event happening.

● There is an even chances of an event happening if the chance of an event happening is the same as the chance of the event not happening.

For example: if we toss a coin, then either head will come up or the tail will come up. Thus, there is an even chance of getting a head when a coin is tossed.

● There is a good chance of an event happening if the event is more likely to happen than not to happen.

For example : if a student works hard, then it is a good chance that he will stand first in the annual examination.

● There is a poor chance of an event happening if the event is less likely to happen than not to happen.

For example: it is poor chance that a cricket match played between India and Sri Lanka results in tie.

● An impossible event has no chance to happen.

For example: It is impossible (no chance) to get 8, when a die is rolled.

● Some events surely happen. These are called certain events.

For example: If we throw a ball upward, then it will certainly return to the earth.

$$\text{Probability} = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$

SE. 1

Given below is the data showing the number of children in 20 families of a locality :

3, 1, 3, 2, 2, 2, 0, 3, 4, 2, 1, 3, 2, 4, 1, 2, 2, 3, 1, 3.

Arrange the data in ascending order and then prepare a frequency table.

Ans. Arranging the data in ascending order, we get 0, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4.

Now, we may prepare the frequency table of the given data, as shown below:

Number of Children	Tally Marks	Number of families (Frequency)
0	I	1
1	IIII	4
2	ℕ II	7
3	ℕ I	6
4	II	2

SE. 2

Given below are the heights (in cm) of 16 girls in a class:

154, 150, 152, 154, 154, 150, 148, 152, 152, 152, 154, 150, 152, 154, 152, 152.

Arrange the data in ascending order and prepare the frequency table.

Ans. Arranging the given data in ascending order, we get

148, 150, 150, 150, 152, 152, 152, 152, 152, 152, 152, 154, 154, 154, 154, 154,

Now, we prepare the frequency table, as shown below :

Height (in cm)	Tally Marks	Number of girls (Frequency)
148	I	1
150	III	3
152	ℕ II	7
154	ℕ	5

SE. 3

The pocket-expenses of Rahul during a week are : Rs. 15.40, Rs. 18.00, Rs. 16.50, Rs. 14.75, Rs. 12.60 and 17.25.

Find his mean pocket-expenses.

Ans. Sum of the pocket-expenses = Rs. (15.40 + 18.00 + 16.50 + 14.75 + 12.60 + 17.25) = 94.50

Total number of days = 6

∴ Mean pocket-expenses

$$= \frac{\text{Total pocket} - \exp\text{enses}}{\text{Total number of days}} = \text{Rs.} \left(\frac{94.50}{6}\right)$$

= Rs. 15.75

Hence, the mean pocket-expenses of Rahul is Rs. 15.75.

SE. 4

The heights of 7 players in a group are :

175cm, 158 cm, 180 cm, 164 cm, 182 cm, 160 cm and 171 cm.

Find their mean height.

Ans. Sum of the height of the players = (175 + 158 + 180 + 164 + 182 + 160 + 171) cm = 1190 cm

Number of players = 7

∴ Mean height

$$= \frac{\text{Sum of the heights of the players}}{\text{Number of players}}$$

$$= \frac{1190}{7} \text{ cm} = 170 \text{ cm}$$

Hence, the mean height of the players is 170 cm.

SE. 5

The weights of 10 students (in kg) are 40, 52, 34, 47, 31, 35, 48, 41, 44, 38. Find the median weight.

Ans. Arranging the weights in ascending order, we have

31, 34, 35, 38, 40, 41, 44, 47, 48, 52

Hence n = 10, which is even.

$$\therefore \text{ Median weight} = \frac{1}{2} \times \{5^{th} \text{ term} + 6^{th} \text{ term}\}$$

$$= \frac{1}{2} \times \{40 + 41\} = \frac{81}{2} = 40.5 \text{ kg.}$$

Hence, median weight = 40.5 kg

SE. 6

Find the median of the given data:

10, 16, 13, 15, 22, 18, 19

Ans. Arranging the number in ascending order, we have

10, 13, 15, 16, 18, 19, 22.

Number of observations is 7, which is an odd number. So, the median will be the middle number i.e., 16.

SE. 7

The marks secured in English test (out of 30) by 10 students are as follows :

22, 25, 23, 20, 28, 16, 13, 5, 18, 25

Calculate the median.

Ans. Arranging the observations in ascending order, we have

5, 8, 13, 16, 18, 20, 22, 23, 25, 25

Here the number of observations is ten which is even. So

$$\text{Median} = \frac{18 + 20}{2} = \frac{38}{2} = 19$$

Hence, median of the given marks is 19.

SE. 8

The height of 10 students of Class VII are given below (in centimetres): 141, 151, 148, 162, 136, 143, 161, 150, 135, 145.

Find the range of the heights.

Ans. The lowest observation = 135 cm

The highest observation = 162 cm

Range = highest observation – lowest observation

= 162 –135 = 27 cm

Hence, the range is 27 cm.

SE. 9

The marks (out of 100) obtained by a group of students in Mathematics test are : 88, 74, 90, 88, 40, 46, 58, 96, 82 and 78. Find :

(a) mean marks obtained by the group.

(b) median of the marks obtained.

(c) mode of the marks obtained.

(d) range of the marks obtained.

Ans. Arranging the marks in ascending order.

40, 46, 58, 74, 78, 82, 88, 88, 90, 96

(a) Mean = $\dfrac{\text{Sum of all observations}}{\text{Total number of observations}}$

$$= \frac{40 + 46 + 58 + 74 + 78 + 82 + 88 + 88 + 90 + 96}{10}$$

$$= \frac{740}{10} = 74$$

(b) Since, the number of observations is even, so the median will be the average of the two middle numbers,

$$\text{Median} = \frac{78 + 82}{2} = \frac{160}{2} = 80$$

(c) Since, 88 occurs maximum number of times i.e., 2 times. Hence, the mode is 88.

(d) The lowest observation is 40 and the highest obseravtion is 96.

So, Range = 96 – 40 = 56.

SE. 10

Read the graph and answer the following questions:

(a) Give a suitable title to the bar graph.

(b) In which part the expenditure on eduction is maxiumu in 1990 ?

(c) In which part the expenditure gone up from 1990 to 2000 ?

Ans. (a) Expenditure on education in four countries.

(b) Expenditure on eduction in 1990 is maximum in Australia.

(c) The expenditure has gone up from 1990 to 2000 in East Africa and Latin America.

SE. 11

To know about the liking of Science as a subject, a survey of 200 students was conducted and the data obtained is given below: Liking -125; Disliking -75

Find the probability that a student chosen at random,

(a) does not like Science as a subject.

(b) likes Science as a subject.

Ans. Total number of students = 200

Number of students like Science as a subject

= 125

Number of students does not like Science as a subject = 75

(a) Probability of student does not like Science as a subject = $\dfrac{75}{200} = \dfrac{3}{8}$

(b) Probability of student likes. Science as a subject = $\dfrac{125}{200} = \dfrac{5}{8}$

SE. 12

The daily maximum and minimum temperature of a city during one week in the month of April is given below. Construct a double bar graph using this data.

	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Maximum Temperature(°C)	17.2	15.8	28.2	16.5	25.2	29.2	26.3
Minimum Temperature(°C)	12.8	8.8	20.9	10.3	19.4	21.3	19.3

Ans.
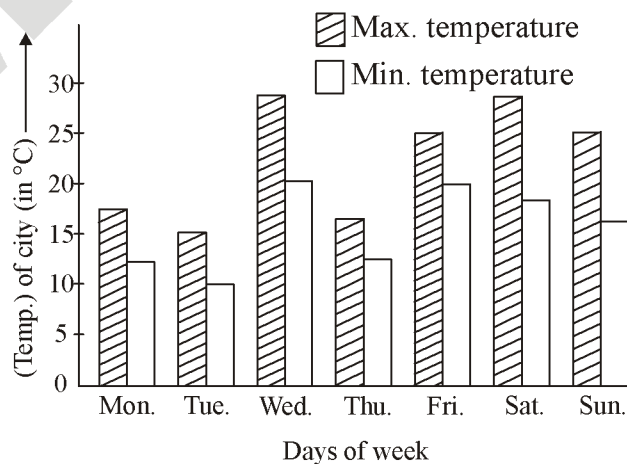
SE. 13

Pocket money received by 7 students is given below: Rs. 24, 22, 30, 28, 32, 26, 34.

Find the range, mean, mode and the median of the data.

Ans. First arrange the given values in ascending order.

22, 24, 26, 28, 30, 32, 34

Range = (Highest – Lowest) observation

$= 34 - 22 =$ Rs. 12

Median = middle observation = 28

Mode = No mode as no value is repeating

$$\text{Mean} = \frac{\text{Sum of Observations}}{\text{Number of observations}}$$

$$= \frac{22 + 24 + 26 + 28 + 30 + 32 + 34}{7}$$

$$= \frac{196}{7} = 28$$

Space for Notes :

ONLY ONE CORRECT TYPE

1. The probability of choosing a boy from a class of 34 students, if there are 13 girls, is :

   (A) $\dfrac{21}{34}$ (B) $\dfrac{13}{34}$

   (C) $\dfrac{7}{34}$ (D) $\dfrac{15}{34}$

2. The average of the marks in Maths of 100 students in a class was 72. The mean of marks for boys was 75, while their number was 70. The mean of marks of girls in the class was

   (A) 35 (B) 65
   (C) 68 (D) 86

3. A letter is chosen at random from the word 'PROBABILITY'. The probability that its is a vowel is

   (A) $\dfrac{3}{11}$ (B) $\dfrac{6}{11}$

   (C) $\dfrac{4}{11}$ (D) $\dfrac{7}{11}$

4. Eight sided dice are used in adventure games. They are marked with the numbrs 1 to 8. The score is the upper most face. The probability of scoring a square number is

   (A) $\dfrac{3}{8}$ (B) $\dfrac{1}{2}$

   (C) $\dfrac{1}{8}$ (D) $\dfrac{1}{4}$

5. A box contains 50 coloured balls. What is the total number of white balls in the box if the probability of selecting an white ball is 0.4 ?

   (A) 20 (B) 15
   (C) 10 (D) 40

6. The given double graph shows the average heights of boys and girls at specific ages. Which conclusion is supported by the graph ?
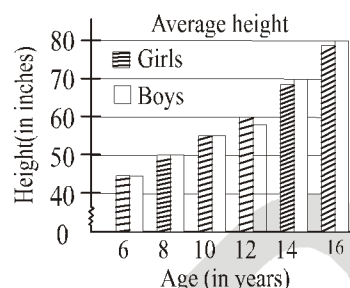
   (A) Girls are taller than boys until the age of 14.

   (B) Girls and boys grow the same amount each year.

   (C) After the age of 14, boys grow faster than girls.

   (D) Boys are always taller than girls.

7. The following bar graph shows the rainfall at selected locations in certain months.
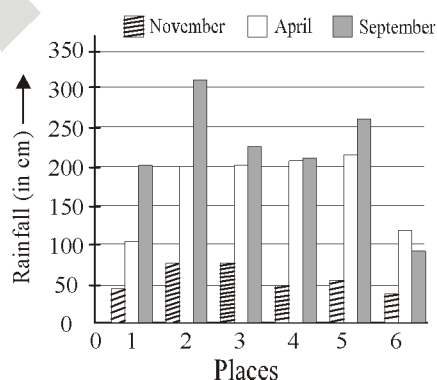
   Which of the following statements is correct ?

   (A) November rainfall exceeds 100cm in each location

   (B) September rainfall exceeds April rainfall by 50cm in each location

   (C) November rainfall is lower than April rainfall in each location

   (D) None of the above.

8. The data given below are the times in minutes, it takes seven students to go to school from their homes. Which statement about the data is false ?

11, 6, 22, 7, 10, 6, 15

(A) The median is 11   (B) The mean is 11

(C) The range is 16   (D) The mode is 6

9. From a series of 50 observations, an observation with the value of 45 is dropped, but the mean remains the same. What was the mean of 50 observation ?

(A) 50   (B) 49

(C) 45   (D) 40

10. The mean of 10 numbers is 7. If each number is multiplied by 12, then the mean of new set of numbers is

(A) 82   (B) 48

(C) 78   (D) 84

11. The arithmetic mean of the scores of a group of students in a test was 52. The brightest 20% of them secured a mean score of 80 and the dullest 25%, a mean score of 31. The mean score of the remaining 55% is

(A) 45%   (B) 50

(C) 51.4% (approx)   (D) 54.6% (approx)

12. If the median of $\frac{x}{5}, x, \frac{x}{4}, \frac{x}{2}$ and $\frac{x}{3}$ (where x > 0) is 8, then the value of x would be :

(A) 24   (B) 32

(C) 8   (D) 16

13. On the probability line, we would describe the event –A new but born child will be a girl as

(A) Unlikely   (B) Even chance

(C) Certain   (D) Impossible

14. In a class there are 14 boys and 10 girls. If one child is absent, the probability that it is a boy is

(A) $\frac{5}{12}$ (B) $\frac{7}{12}$

(C) $\frac{10}{14}$ (D) $\frac{1}{3}$

Direction (17-18): The bar graph given below shows the interest of boys and girls in different activities.
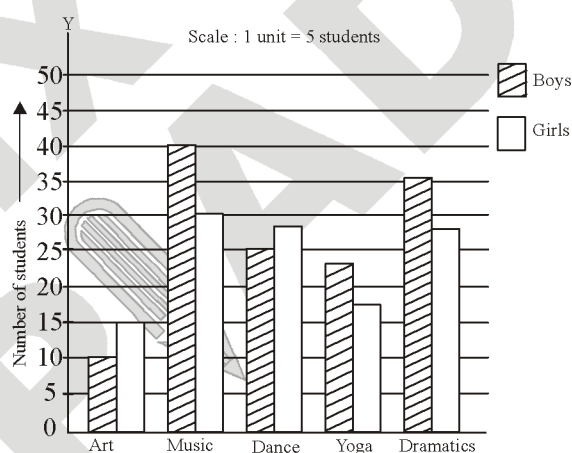
15. In which two activities, 55 girls are interested together ?

(A) Art and music

(B) Music and dance

(C) Dance and yoga

(D) Yoga and dramatics

16. How many less boys are interested in yoga, dance and art altogether than girls ?

(A) 15   (B) 10

(C) 25   (D) 20

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from List – I and List – II are given as options (A), (B), (C) and (D) out of which one is correct.

1. Determine each of the following products and then match the following :

List – I	List – II
(P) Value which occurs most often in a set of data is called	(i) Frequency
(Q) The middle value when the set of data is arranged in assending order is called	(ii) Range
(R) Difference between the highest and lowest values of a set of data is called	(iii) Mode
(S) The number of times a particular observation occurs is called	(iv) Median

(A) (P) → (iii), (Q) → (iv), (R) → (ii), (S) → (i)

(B) (P) → (iii), (Q) → (i), (R) → (iv), (S) → (ii)

(C) (P) → (ii), (Q) → (iii), (R) → (iv), (S) → (i)

(D) (P) → (iv), (Q) → (i), (R) → (ii), (S) → (iii)

2. When a die is rolled, then match the following :

List – I	List – II
(P) Probability of getting a prime number is	(i) 2/3
(Q) Probability of getting a number less than smallest prime number is	(ii) 1/3
(R) Probability of getting an odd prime number is	(iii) 1/6
(S) Probability of getting a factor of 6 is	(iv) 1/2

(A) (P) → (i), (Q) → (ii), (R) → (iii), (S) → (iv)

(B) (P) → (iii), (Q) → (i), (R) → (iv), (S) → (ii)

(C) (P) → (iv), (Q) → (iii), (R) → (ii), (S) → (i)

(D) (P) → (iv), (Q) → (i), (R) → (ii), (S) → (iii)

FILL IN THE BLANKS

1. A year has 12 months is a _____ event (certain/ impossible/likely)

2. The probability of an impossible event is ____.

3. A probability scale has values between ____ and _____.

4. When you toss a coin, heads and tails have an ____ chance of happening.

5. An event with a 70% probability is a _____ event. (likely/even chance/unlikely)

6. The difference between the highest and lowest values of observations in a set of data is called the ____

7. The mean of the first five multiples of 2 is _____.

8. If the data set has even number of values, the median is the ____ of two _____ values.

9. The mode of the data set 4, 8, 4, 11, 4, 12, 8 is ____

10. If there are 19 values in a data set arranged in descending order, then the median is the ____ term.

NUMERICAL VALUE TYPE

1. Find the mean of the given data
   8, 2, 3, 4, 1, 3, 2, 4, 5, 4, 2, 3, 4, 6, 9.

2. An unbaised coin is tossed. Find the probability of getting a tail.

3. If the data 7, 8, k, 11, 15 is in ascending order and median is 10, then find the value of k.

4. The mode of data 1, 3, 12, 10, 8, 4, 5, 4, 3, 2, 1, 4 is 60 ÷ k. Find the value of k.

5. From a pack of 52 cards, the probability of picking up a spade card is

6. Find the sum of digits of range of data:
   13, 18, 20, 15, 12, 17, 9, 14, 11 and 16

7. If the mean of observations 14, 5, 4, 8, 2, 3, x is x, then find the value of x.

8. If the mean of n observations is 5 and sum of observations is 25, then find n.

9. In a box, there are 16 stamps. Each stamp is marked with distinct numbers from 1 to 16. If the probability of drawing a stamp marked even number is $\frac{1}{k}$, then find k.

10. The range of data 11, 40, 36, 10, 25, 30, 15, 14 is k. Find k.

VERY SHORT ANSWER TYPE

1. Find the mean of 4, 6, 7, 9 and 4.

2. When a coin is flipped once, what is the probability of getting a head ?

3. What is bar graph ?

4. The mode of the data; 20, 23, 22, 23, 22, 20, x, 21 is 22. Find the value of x.

5. If the mean of 4, x and y is 6, then find the mean of x, y and 10.

6. If the mean of 2, 3, x, 7, 8 is x, then find the value of x.

7. Find the range of the data: 14, 15, 16, 18, 19, 25, 30, 41, 26, 16, 13, 18, 20 and 26.

8. Find the mode of the data 2, 4, 6, 4, 6, 7, 6, 7 and 8.

9. Find the mode of the data 7, 8, 9, 10, 7, 11, 10, 7, 6.

10. Find the mean of first five prime numbers.

SHORT ANSWER TYPE

1. Find the median of the data 9, 12, 11, 10, 8, 9.

2. The marks obtained by 15 students in an examination are given below:
   40, 20, 24, 19, 20, 35, 12, 48, 29, 40, 45, 48, 42, 23, 35.
   Find the average marks of the students.

3. The height of 7 students (in cm) are given as :
   120, 126, 132.4, 121.5, 120.3, 132, 125
   Find the median height of students.

4. The mean of 4 numbers is 6 and the mean of other 6 numbers is 9. Find the mean of all the numbers.

5. The mean height of a group of 30 students is 150 cm. If a 150 cm tall student is included in the group then find the mean height of the new group.

6. A bag contains 4 red, 6 blue and 7 yellow balls. One ball is selected at random. What is the probability that it is blue or yellow ball ?

7. What is the probability of the given spinner landing on Rs. 100 ?

Space for Notes :
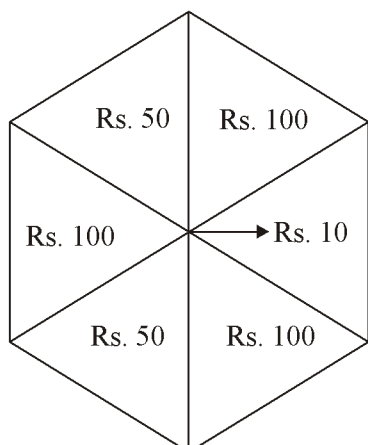
8. One of 26 letter keys on a type writer is pressed. What is the probability that the key prints a letter other than 'A' ?

9. What is the probability of drawing a red face card from a pack of 52 cards.

10. The percentage of marks obtained by a student in various exams are given below. Represent the data by a bar graph.

Name of the exam	Percentage of marks
UT – 1	50
UT – 2	85
Quarterly	60
UT – 3	80
Half yearly	68
UT – 4	75
Annual	70

Answer Key

EXERCISE I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	A	C	C	A	C	D	C	A	B	B	C

16
A

MATCH THE COLUMN

1. A **2.** C

FILL IN THE BLANKS

1. Certain **2.** 0 **3.** 0, 1 **4.** Even **5.** Likely **6.** Range

7. 6 **8.** Mean, Middle **9.** 4 **10.** 10th

EXERCISE II

NUMERICAL VALUE TYPE

1. 4 **2.** 0.5 **3.** 10 **4.** 15 **5.** 0.25 **6.** 2 **7.** 6

8. 5 **9.** 2 **10.** 30

VERY SHORT ANSWER TYPE

1. 6 **2.** 0.50 **4.** 22 **5.** 8 **6.** 5 **7.** 28 **8.** 6

9. 7 **10.** 5.6

SHORT ANSWER TYPE

1. 9.5 **2.** 32 **3.** 125 **4.** 7.8 **5.** 150 **6.** $\dfrac{13}{17}$ **7.** 0.50

8. $\dfrac{25}{26}$ **9.** $\dfrac{3}{26}$

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : FRACTIONS AND DECIMALS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

SIMPLE EQUATIONS

4

1. VARIABLE

The word variable means something whose value can be changed. The value of variable is not fixed. They are usually denoted by small alphabets x, y, z, u, v, w etc.

2. EXPRESSION

It can be formed using various operations like addition, subtraction, multiplication and division on variables.

3. EQUATION

An equation is a condition on variable. In an equation, there is always a sign of equality. This equality sign indicates that the value of the expression to the right side of equality sign should be equal to the value of the expression to the left side of equality sign.

Note : (i) An equation must contain sign of equality "=".

(ii) An equation remain same when the expressions on the left and right side are interchanged.

4. FRAMING ALGEBRAIC EQUATION

To frame an algebraic equation for given condition, we represent what is to be found out by means of a variable say x or y .

5. ROOT OF AN EQUATION

The value of variable which makes Left hand side (L.H.S.) of the equation equal to Right hand side(R.H.S.) of the equation is called the root of the equation.

6. SIMPLE LINEAR EQUATIONS IN ONE VARIABLE

We have come across some number games like

$\bigcirc + 3 = 8,$

Where we have to fill in the circle with any possible number to make the sentence true.

Suppose we replace the circle by the letter x.

x + 3 = 8

x + 3 = 8 is called an equation in one unknown x.

A solution or root of an equation is a value of the unknown that will make the equation true. For example, x = 5 is a solution of the above equation but x = 1 is not. To solve an equation means to find the solution (s) to the equation. A simple equation is in the form of ax + b = c, where a, b and c are constants . We can relate the idea of a balance to a linear equation to help us solve it. Let us illustrate how this can be done by using the equation 2x + 3 = 9.

Suppose the values on both sides of an equation represent masses. Let's place these masses on the left–hand side (LHS) and the right–hand side (RHS) of a balance as shown below.

Balance   Equation
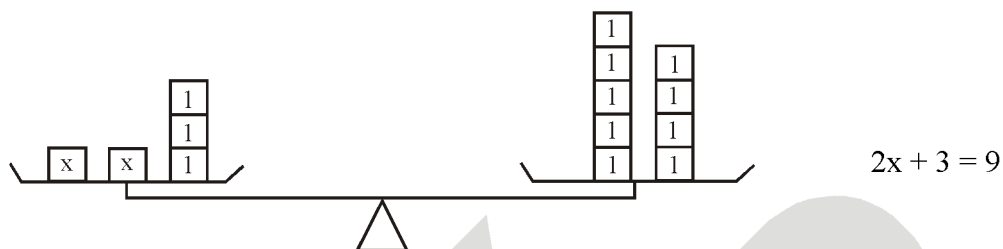
$2x + 3 = 9$

Divide each side into equal parts:
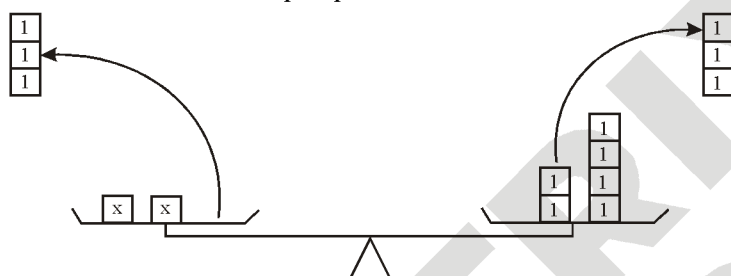
Subtract 3 from both sides ;

$2x + 3 - 3 = 9 - 3$

$2x = 6$

Divide each side into equal parts :
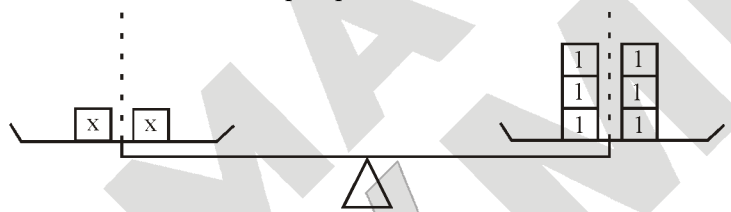
Divide both sides by 2; $\dfrac{2x}{2} = \dfrac{6}{2}$

The parts on both sides are equal.
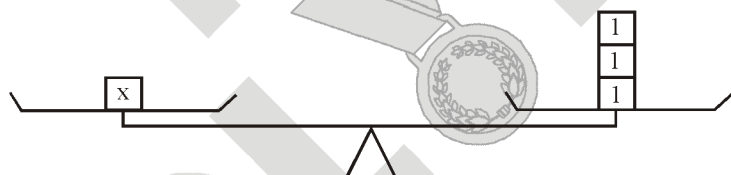
$x = 3$

Hence $x = 3$ is a solution of the equation $2x + 3 = 9$.

In general, an equation remains unchanged when both sides are added, subtracted, multiplied or divided by the same number.

7. EQUATIONS INVOLVING BRACKETS

We apply the distributive law of multiplication over addition which help us to solve equations involving brackets.

Example 1

Solve the equation $9(x + 1) = 2(3x + 8)$

Solution :

$9(x + 1) = 2(3x + 8)$

$9x + 9 = 6x + 16$ Expand each sides.

$9x + 9 - 6x = 6x + 16 - 6x$ Subtract 6x from both sides.

$3x + 9 - 9 = 16 - 9$ Subtract 9 from both sides.

$\dfrac{3x}{3} = \dfrac{7}{3} \Rightarrow x = \dfrac{7}{3}$ Divide by 3 in both side.

8. SIMPLE FRACTIONAL EQUATIONS

When the unknown of an equation is in the denominator of a term, the equation is called a fractional equation. Examples of fractional equation are :

$$\frac{6}{x-2} = 3 \text{ and } \frac{1}{x+3} = \frac{2}{x}$$

We can use multiplication to transform simple fractional equations into linear equations. In solving fractional equations, it is important to check the solutions. They cannot be those values that make a denominator of the original equation zero.

Example 1

Solve the equation $\dfrac{6}{x-2} = 3$

Solution :

$\dfrac{6}{x-2} = 3$ Multiplying both sides by x – 2, we have:

$(x - 2)\left(\dfrac{6}{x-2}\right) = (x - 2)(3)$

$6 = 3 (x - 2) \Rightarrow 6 = 3x - 6 \Rightarrow 3x = 12$

$x = \dfrac{12}{3} \Rightarrow \therefore x = 4$

♦ **Forming Linear Equations to Solve Problems :**

Sometimes we can use linear equations to represent real–life situations. Then by solving the linear equations, we can actually provide solutions to real–life problems. It is therefore useful to learn how to form linear equations from given information.

In the following class activity, we refer to the problem posed at the beginning of this chapter. Here, we shall learn how we can use linear equation to solve for any unknown quantity.

Example 1

The sum of three consecutive integers is 111. Find the integers.

Solution :

Step 1 : We are going to find the three integers.
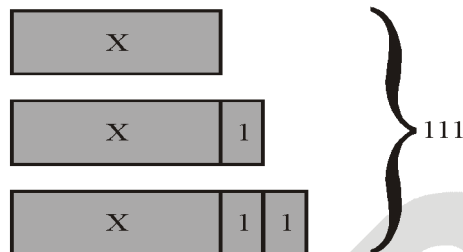
$\therefore$ the equations
$3x + 3 = 111$.

Step 2 : Let x be the smallest integer.

Step 3 : Middle integer = x + 1, Largest integer = x + 2

Step 4 : Sum of 3 integers = 111 $\therefore$ x + (x + 1) + (x + 2) = 111, 3x + 3 = 111

Step 5 : 3x + 3 – 3 = 111 – 3, subtract 3 from both side.

$\Rightarrow$ 3x = 108 $\Rightarrow$ x = 36

Step 6 : The three integers are 36, 37 and 38.

SE. 1

Solve the equation x – 5 = 11.

Ans.　x – 5 = 11

x – 5 + 5 = 11 + 5　　　Add 5 to both sides.

x = 16

SE. 2

Solve the equation x + 6 = 13.

Ans.　x + 6 = 13

x + 6 – 6 = 13 – 6

Subtract 6 from both sides x = 7

SE. 3

Solve the equation $\dfrac{x}{4} = 7$.

Ans.　$\dfrac{x}{4} = 7$

$\dfrac{x}{4} \times 4 = 7 \times 4$　　Multiply both sides by 4.

x = 28.

SE. 4

Solve the equation –6x = 8.

Ans.　–6x = 8

$\dfrac{-6x}{-6} = \dfrac{8}{-6}$　　　Divide both sides by – 6

$x = -\dfrac{4}{3}$.

SE. 5

Solve the equation $8 - \dfrac{3}{5}x = -2$

Ans.　$8 - \dfrac{3}{5}x = -2$

$8 - \dfrac{3}{5}x - 8 = -2 - 8$　　Subtract 8 from both side.

$-\dfrac{3}{5}x = -10$

$-\dfrac{3}{5}x \times \left(-\dfrac{5}{3}\right) = -10 \times \left(-\dfrac{5}{3}\right)$　Multiply both side by $\left(\dfrac{-5}{3}\right)$.

$x = \dfrac{50}{3}$

SE. 6

Solve the equation $\dfrac{5(2x-9)}{3} - 8 = 2x$

Ans.　$\dfrac{5(2x-9)}{3} - 8 = 2x$

$5(2x-9) - 3(8) = 3(2x)$

Multiply both sides by 3. Remove the brackets.

10x – 45 – 24 = 6x

Subtract 6x from both sides.

10x – 69 – 6x = 0

Add 69 to both sides.

4x = 69

Divide both sides by 4.

$x = \dfrac{69}{4}$

SE. 7

Solve the equation $\dfrac{2x+2}{5} = \dfrac{4x-7}{6}$

Ans.　$\dfrac{2x+2}{5} = \dfrac{4x-7}{6}$

$30\left(\dfrac{3x+2}{5}\right) = 30\left(\dfrac{4x-7}{6}\right)$

Multiply both sides by 30.

6(3x + 2) = 5(4x – 7)

18x + 12 = 20x – 35

18x + 12 – 20x = – 35

Subtract + 20x from both side.

–2x = –35 – 12

Subtract 12 from both side.

$$x = \frac{-47}{-2} = \frac{47}{2} = 23\frac{1}{2}$$

Divide both side by – 2.

SE. 8

Solve the equation $\dfrac{y}{5} + \dfrac{y-3}{2} = 7$

Ans. $\dfrac{y}{5} + \dfrac{y-3}{2} = 7$

$$10\left(\frac{y}{5}\right) + 10\left(\frac{y-3}{2}\right) = 10(7)$$

$$2y + 5(y - 3) = 70$$

Multiply both sides by 10 which is the LCM of 2 and 5.

2y + 5y – 15 = 70

7y = 70 + 15

$$y = \frac{85}{7}$$

$$\therefore \ y = 12\frac{1}{7}$$

SE. 9

Four quantities x, u, v and t are related by the formula

$$s = \frac{1}{2}(u + v)t$$

Find the value of v given that u = 10, s = 15 and t = 3.

Ans.   Putting u = 10, s = 15 and t = 3 into $s = \dfrac{1}{2}(u + v)t$,

we have the equations :

$$15 = \frac{1}{2}(10 + v)(3) \qquad \text{v is the unknown.}$$

$$15 \times \frac{2}{3} = 10 + v \qquad \text{Solve for v}$$

10 = 10 + v

v = 10 – 10

$$\therefore \ v = 0.$$

SE. 10

Solve the equation $\dfrac{t}{(t+3)} = 1\dfrac{1}{4}$

Ans. $\dfrac{t}{(t+3)} = 1\dfrac{1}{4}$

Multiplying both sides by 4(t + 3), we have:

$$4(t + 3) \times \frac{t}{(t+3)} = 4(t + 3) \times \frac{5}{4}$$

4t = 5(t + 3)

4t = 5t + 15

t = – 15

ONLY ONE CORRECT TYPE

1. If $7x + 3 = 17$, then what is value of $7x - 3$?

   (A) 14   (B) 11

   (C) 0   (D) –3

2. Find the value of x so that

   $0.5x - [-(0.8 - 0.2x)] = 0.2 - 0.3x$.

   (A) 0.1   (B) –1

   (C) 2   (D) 3

3. A person travelled $\left(\dfrac{5}{8}\right)^{th}$ of the distance by train, $\left(\dfrac{1}{4}\right)^{th}$ by bus and the remaining 15 km by boat. The total distance travelled by him was

   (A) 90km   (B) 120km

   (C)150km   (D) 180km

4. 4 is added to a number and the sum in multiplied by 5. If 20 is subracted from the product and the difference is divided by 8, the result is equal to 10. The number is

   (A) 16   (B) 12

   (C) 8   (D) 20

5. If $\dfrac{x-1}{x+1} = \dfrac{7}{9}$, then the value of x is

   (A) 6   (B) 7

   (C) 8   (D) 10

6. The sum of two consecutive odd number is 36. The smaller one is

   (A) 15   (B) 17

   (C) 19   (D) 13

7. Two complementary angles differ by 10°. The larger angle is

   (A) 60°   (B) 50°

   (C) 64°   (D) 54°

8. Solve for m : $3m + 2(m + 2) = 20 - (2m - 5)$

   (A) 2   (B) 3

   (C) 5   (D) 6

9. On adding 5 to thrice of number gives 50. The number is

   (A) 15   (B) 30

   (C) 40   (D) 5

10. If $m - \dfrac{m-1}{2} = 1 - \dfrac{m-1}{3}$, then the value of m is

    (A) $\dfrac{2}{3}$ (B) 1

    (C) $\dfrac{5}{7}$ (D) 6

11. Two supplementry angles differ by 70°. Find the measure of smaller one.

    (A) 55°   (B) 65°

    (C) 125°   (D) 85°

12. The ages of A and B are in the ratio 5 : 3. After 6 years, their ages will be in the ratio 7 : 5. The sum of their present ages is

    (A) 9 years   (B) 10 years

    (C) 15years   (D) 24 years

13. A number has two digits whose sum is 6. If one part exceeds one-seventh of the other part by 8, then the greater part is

    (A) 23   (B) 24

    (C) 26   (D) 25

14. A father is 28 years older than his son. If 3 years hence, he will be 5 times as old as his son then, the present of the father is

    (A) 24 years   (B) 31 years

    (C) 29 years   (D) 32 years

15. The three angles of a triangle are $(3y)°$, $(2y + 60)°$ and $(5y – 40)°$. Find the value of 'y'.
(A) 13   (B) 15
(C) 16   (D) 17

16. One third of a number exceeds one sixth of the number by 4. What is the number ?
(A) 24   (B) 8
(C) 12   (D) 16

17. I thought of a number, multipled by 3 and added 7 to it. I get the same answer as multiplying the same number by 4 and subtracting 12 from it. Find the number.
(A) 17   (B) 19
(C) 18   (D) 13

18. If $2m – 6 = 14$, then the value of $3m – 6$ is
(A) 18   (B) 16
(C) 12   (D) 24

19. Which of the following equations does not give 3 as its solution ?
(A) $3x – 1 = 8$
(B) $2(5y – 3) – 4 = 20$
(C) $\dfrac{8x}{3} + 4 = 12$
(D) $15y – \dfrac{4}{5} = \dfrac{1}{5}$

20. Two number are in the ratio 2 : 3. If 2 is added to first number and 10 is added to second number, then their ratio becomes 1 : 2. The numbers are
(A) 10, 15
(B) 4, 6
(C) 12, 18
(D) 8, 12

PARAGRAPH TYPE

PASSAGE # I

The perimeter of a rectangular plot is 96 meters.

1. The length of the plot is 6 m more than twice its breadth. The length and breadth respectively of the plot are
(A) 34 m, 14 m   (B) 20 m, 15 m
(C) 68 m, 40 m   (D) 96 m, 12 m

2. The length is 2 m greater then its breadth. The length and breadth respectively of the plot are :
(A) 34 m, 14 m   (B) 20 m, 18 m
(C) 25 m, 23 m   (D) 42 m, 40 m

3. The breadth is 4 m less than its length. The length and breadth respectively of the plot are
(A) 12 m, 8 m
(B) 34 m, 30 m
(C) 20 m, 16 m
(D) 26 m, 22 m

PASSAGE # II

By transposing a term of an equation, we simply mean changing its sign and carrying it to the other side of the equation.

4. Solve for x : $3(x – 3) = 5(2x + 1)$
(A) 2   (B) 4
(C) –2   (D) $\dfrac{3}{2}$

5. Solve for $x : 2x - 3 = \dfrac{3}{10}(5x - 12)$
(A) $-\dfrac{6}{5}$ (B) $\dfrac{4}{5}$
(C) $\dfrac{8}{9}$ (D) $-\dfrac{16}{9}$

6. Solve for $x : \dfrac{x+2}{6} - \left[\dfrac{11-x}{3} - \dfrac{1}{4}\right] = \dfrac{3x-4}{12}$

(A) $\dfrac{6}{11}$ (B) 10

(C) 14   (D) 11

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which, one is correct

1. Solve the following equations for x :

List-I   List-II

(P) $5(2x–3)–3(3x–7)–5$ 1. $\dfrac{1}{2}$

(Q) $2(x–2)+3(4x–1)=0$ 2. $–6$

(R) $\dfrac{x-2}{4}+\dfrac{1}{3}=x-\dfrac{2x-1}{3}$ 3. $\dfrac{1}{6}$

(S) $\dfrac{x}{2}+\dfrac{x}{4}=\dfrac{1}{8}$ 4. $–1$

(A) (P) → (i),(Q) → (ii), (R) → (iii), (S) → (iv)

(B) (P) → (iii), (Q) → (i), (R) → (iv), (S) → (ii)

(C) (P) → (ii), (Q) → (iii), (R) → (iv), (S) → (i)

(D) (P) → (iv), (Q) → (i), (R) → (ii), (S) → (iii)

2. Match the following :

List-I   List-II

(P) The fifth part of a number when increased by 5 equals its fourth part decreased by 5. The number is   1. 9

(Q) Two third of a number is greater than one-third of a number by 3. The number is   2. 15

(R) A number when multiplied by 4, exceed by 45. The number is   3. 46

(S) A number is as much greater than 21 as it is less than 71. The number is   4. 200

(A) (P) → (i), (Q) → (ii), (R) → (iii), (S) → (iv)

(B) (P) → (iii), (Q) → (i), (R) → (iv), (S) → (ii)

(C) (P) → (ii), (Q) → (iii), (R) → (iv), (S) → (i)

(D) (P) → (iv), (Q) → (i), (R) → (ii), (S) → (iii)

VERY SHORT ANSWER TYPE

1. Sovle for $x : 3x + \dfrac{1}{5} = 2 - x$

2. The sum of three times a number and 11 is 32. Find the number.

3. Solve by trial and error method, the equation $4x - 2 = 13 - x$.

4. Solve by trial and error method, the equation $3x + 4 = 5x - 4$

5. Write equation for the following statements :
   (i) The sum of number x and 4 is 9.
   (ii) One-fourth of a number x minus 4 gives 4.
   (iii) The number b divided by 5 gives 6.
   (iv) If you add 3 to one-third of z, you get 30.

6. The length of a rectangular plot exceeds its breadth by 5 metres. If the perimeter of the plot is 142 metres. Find the dimensions of the plot

7. Solve : $5x - 6 = 4x - 2$

8. If $45 - [28 - \{37 - (15 - x)\}] = 58$, then find the value of x.

9. If two supplementary angles differ by 54°, then find the angles.

SHORT ANSWER TYPE

1. Write each of the following statements as an equation:
   (i) Five times a number x is equal to 30.
   (ii) If 7 is taken away from the number y, the result is 4.
   (iii) Ten more than y is 15.
   (iv) Thrice a number x decreased by 5 is equal to 27.
   (v) 20 decreased by a number x is equal to 15.
   (vi) x decreased by 5 is 12.

2. Solve the following equation and check your answer.
   $7x + 10 = 4x + 40$

3. Solve the following equation and check your answer
   $6y - 2 = 2y + 22$

4. Solve : $2y + \dfrac{11}{4} = \dfrac{1}{3}y + 2$

5. Solve : $\dfrac{5x - 4}{8} - \dfrac{x - 3}{5} = \dfrac{x + 6}{4}$

6. Solve : $\dfrac{2}{3}(x - 5) - \dfrac{1}{4}(x - 2) = \dfrac{9}{2}$

8. The length of a rectangle is three times its width. If the perimeter of the rectangle is 96 metres, find the length and breadth of the rectangle.

9. There are only 50 paise coins in a purse. If the total value of the money in the purse is Rs. 125, then find the number of coins in the purse.

10. After 15 years Vikas will be four times as old as he is now. Find his present age.

LONG ANSWER TYPE

1. Solve the following equation and check your answer:
   $6(3x + 2) - 5(6x - 1) = 3(x - 8) - 5(7x - 6) + 9x$

2. Solve : $x - \left(2x - \dfrac{3x - 4}{7}\right) = \dfrac{4x - 27}{3} - 3$

3. The total cost of three prizes is Rs. 2550. If the cost of second prize is $\left(\dfrac{3}{4}\right)^{th}$ of the first prize and the cost of 3rd prize is $\dfrac{1}{2}$ of the second prize, then find the cost of each prize.

4. Two equal sides of an isosceles triangle are $4x - 2$ and $3x - 4$. If the third side is $2x - 1$, then find each side and perimeter of the triangle.

5. Solve the following equation and check your answer :

$$\frac{3}{4}(7x-1)-\left(2x-\frac{1-x}{2}\right)=x+\frac{3}{2}$$

NUMERICAL PROBLEMS

1. If $5y-7=8$, then find the value of y.

2. If a number x increased by 5 equals 32, then find the value of x.

3. Find x, if $3x-13=312-2x$.

4. Manu is 4 years older than his sister Anu. If the sum of their ages is 20 years, then the age of Anu is _____ years.

5. The sum of three numbers is 25. The second number is twice the first and the third exceeds the second by 5. Find the third number.

6. The perimeter of a rectangle is 40 m. Its length is 4 m more than its breadth. Its breadth is _____ m.

7. Five times a number plus two, is 32. What is the number?

8. Rakhi is 26 years younger then her mother. After 9 years Rakhi's mother will be twice as old as Rakhi. Present age of Rakhi is _____ years.

9. Find x; $5x+1=3x+11$.

10. What is the value of P that makes the statement $P+\{-4-(2-8-4)=8$ true?

Space for Notes :

Answer Key

EXERCISE I							ANSWER KEY							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
B	B	B	A	C	B	B	B	A	B	A	D	B	D	C
16	**17**	**18**	**19**	**20**										
A	B	D	D	C										

PARAGRAPH TYPE

1. A   **2.** C   **3.** D   **4.** C   **5.** A   **6.** D

MATCH THE COLUMN

1. D   **2.** D

EXERCISE II

VERY SHORT ANSWER TYPE

1. $x = \dfrac{9}{20}$ **2.** 7   **3.** 3   **4.** 4   **5.** (i) $x + 4 = 9$, (ii) $\dfrac{x}{4} - 4 = 4$, (iii) $\dfrac{b}{5} = 6$,   (iv) $\dfrac{1}{3}z + 3 = 30$

6. $l = 38m$, $b = 33m$ **7.** 4   **8.** 19   **9.** 63°

SHORT ANSWER TYPE

1. (i) $5x = 30$, (ii) $y - 7 = 4$, (iii) $y + 10 = 15$, (iv) $3x - 5 = 27$, (v) $20 - x = 15$, (vi) $x - 5 = 12$

4. $y = -\dfrac{9}{20}$ **5.** 8   **6.** $\dfrac{88}{5}$ **8.** $l = 36m$, $b = 12m$ **9.** 250   **10.** 5years

LONG ANSWER TYPE

1. $x = -1$ **2.** 6   **3.** Rs. 1200, Rs. 900, Rs. 450   **4.** 55 units   **5.** 1

INTEGER ANSWER TYPE

1. 3   **2.** 27   **3.** 65   **4.** 8   **5.** 13   **6.** 8   **7.** 6

8. 17   **9.** 5   **10.** 2

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : FRACTIONS AND DECIMALS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

LINES AND ANGLES — 5

📖 INTRODUCTION

In geometry, we have four simple ideas or imaginary things i.e. point, line, plane and space and everything else is built on these simple concepts.

1. POINT

We use a dot, like point P, to represent a point. A point is a location and it has absolutely no dimensions i.e. no length, no width and no depth.

Line, Ray & Line Segment :

Line	Ray	Line segment
(i) A line $\overleftrightarrow{AB}$ is a represented by	A ray $\overrightarrow{AB}$ is represented as	A line segment is represented by $\overline{AB}$
(ii) A line has no end point	A ray has one end point	A line segment has two end points.
(iii) A line does not have a Definite length.	A ray does not have a definite length.	A line segment has a definite length.

2. TWO LINES CAN BE RELATED TO EACH OTHER IN FOUR DIFFERENT WAYS

2.1 INTERSECTING LINES

Lines that have just one point in common are called **Intersecting Lines**.

Intersecting lines
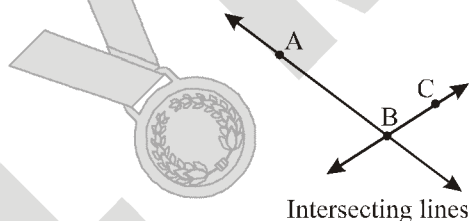
2.2 PARALLEL LINES

Lines that lie in the same plane but never intersect even if produced endlessly in both directions are called **Parallel Lines**.

Parallel lines
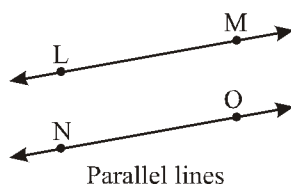
2.3 PERPENDICULAR LINES

Two intersecting lines that form a right angle are called **Perpendicular Lines**.

Perpendicular lines
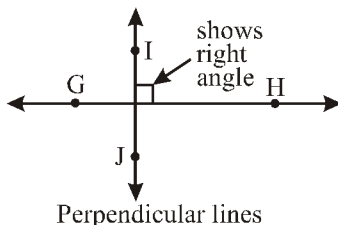
2.4 SKEW LINES

Lines that are not in the same plane and do not intersect are called **skew lines**.

Skew lines
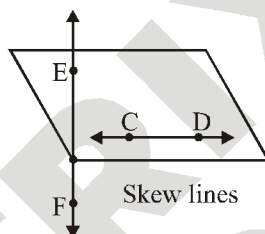
3. PLANE

The set of points all lying on one surface is called a plane. A wall, or surface of a table, floor etc. are all examples of a plane. A plane actually extends endlessly and the surface of a plane has no thickness. At least three points not on the same line are needed to define a plane.
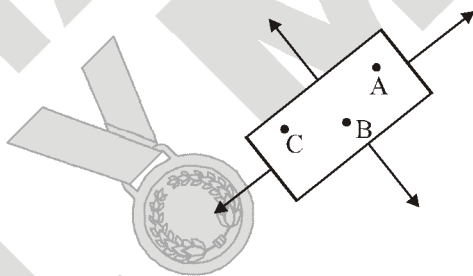
4. ANGLE

Two rays that share a common end point form an angle. The common end point is called the vertex.
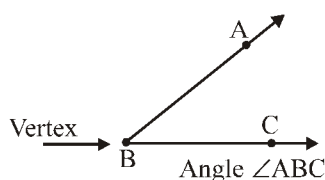
Angle ∠ABC

We measure the size of an angle in degrees using a protractor.

5. TYPES OF ANGLES

5.1 STRAIGHT ANGLE

An angle measuring 180° is called a straight angle.
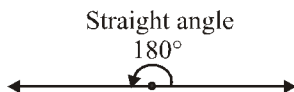
Straight angle
180°

5.2 ACUTE ANGLE

An angle whose measure lies between 0° and 90° is called an acute angle.

Acute angle
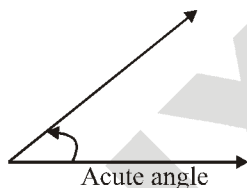
5.3 OBTUSE ANGLE

An angle whose measure lies between 90° and 180° is called an obtuse angle.

Obtuse angle
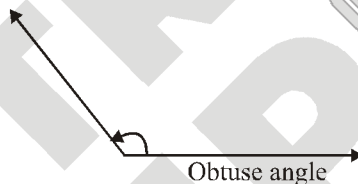
5.4 RIGHT ANGLE

An angle whose measure is equal to 90° is called a right angle.

Right angle = 90°
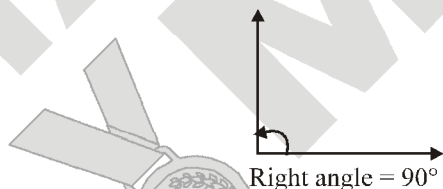
5.5 REFLEX ANGLE

An angle whose measure lies between 180° and 360° is called a reflex angle.

Right angle = 90°
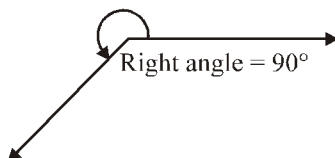
6. MORE TYPES OF ANGLES

6.1 COMPLEMENTARY ANGLES

Two angles are called complementary angles if the sum of their degree measures equal to 90°. One of the complementary angles is called the complement of the other.
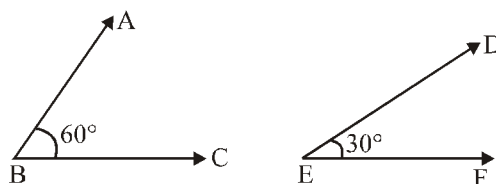
∵ ∠ABC + ∠DEF = 60° + 30° = 90°

∴ Angles ABC and DEF are complementary angles.

6.2 SUPPLEMENTARY ANGLES

Two angles are called supplementary angles, if the sum of their degree measures equal to 180°. One of the supplementary angles is called the supplement of the other.
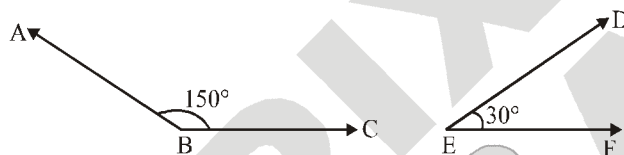
∵ ∠ABC + ∠DEF = 150° + 30° = 180°

∴ Angles ABC and DEF are supplementary angles.

6.3 ADJACENT ANGLES

Two angles having a common vertex and a common side (ray) are called adjacent angles. In the figure given below a and b are adjacent angles having a common vertex O and a common ray OC.
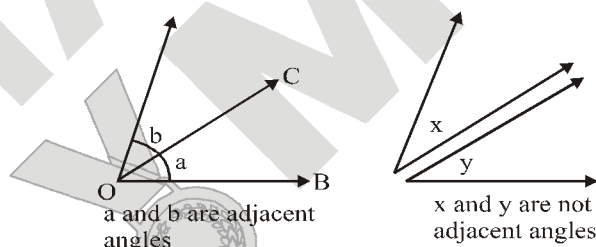
6.4 LINEAR PAIR

Two adjacent angles form a linear pair if they are supplementary i.e. their sum is 180°.
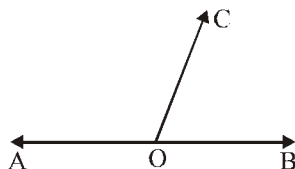
∵ ∠AOB = 180° (a straight line)

∴ ∠AOC and ∠COB make a linear pair.

6.5 ANGLES AT POINT

Sum of the angles around a point is 360°.
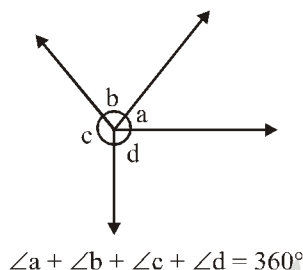
$$\angle a + \angle b + \angle c + \angle d = 360°$$

6.6 VERTICALLY OPPOSITE ANGLES

Vertically opposite angles are pairs of angles formed by two intersecting lines opposite to each other. They are always equal (or congruent).
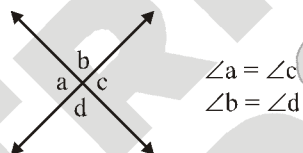
$\angle a = \angle c$
$\angle b = \angle d$

7. SOME IMPORTANT PROPERTIES

1. If two straight lines intersect then the adjacent angles are supplementary (i.e. form a linear pair).

    For the two intersecting lines l and m,

    $\angle a + \angle b = 180°, \angle b + \angle c = 180°$

    $\angle c + \angle d = 180°, \angle d + \angle a = 180°$
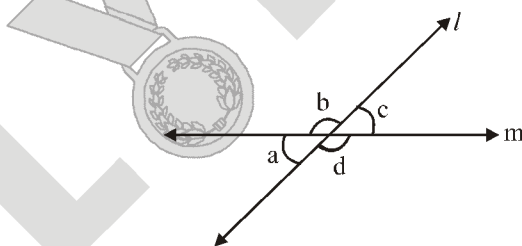
    All these pairs of angles lie on a straight line and therefore form a straight angle.

2. If two straight lines intersect, then the vertically opposite angles are equal.
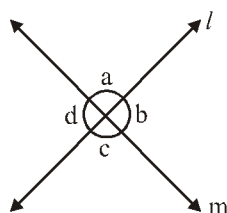
Proof :

∵ ∠a + ∠d = 180° (straight ∠)

∠a + ∠b = 180°   (straight ∠)

∴ ∠a + ∠d = ∠a + ∠b

⇒ ∠d = ∠b

Similarly, we can show that ∠a = ∠c.

3.   If two angles having a common arm are supplementary then other two arms lie on a straight line.
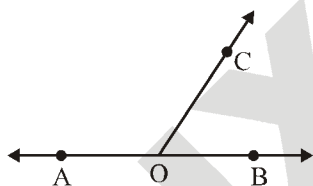
i.e. if ∠AOC + ∠BOC = 180° then ∠AOB is a straight angle and hence AOB is a straight line.

⇒ AO and OB lie on a straight line.

8. PARALLEL LINES

Lines in a plane which do not intersect are called parallel lines. A pair of parallel lines *l* and *m*, are always the same distance (perpendicular distance) apart.
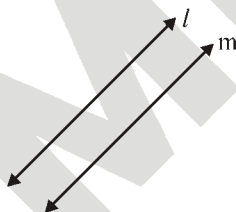
9. TRANSVERSAL

A line which intersects two or more given lines in distinct points is called a transversal to the given lines. In the given figures

(a) and (b), line pq is transversal of lines *l* and m.

(a)   (b)
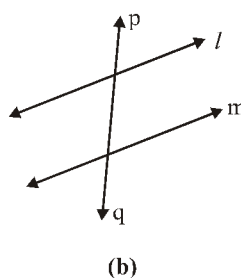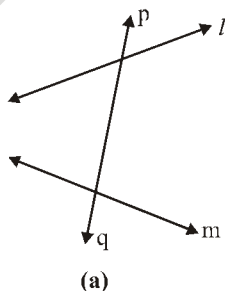
When two parallel lines are cut by a transversal, eight angles are formed, which may be classified as under.

9.1 CORRESPONDING ANGLES

There are four pairs of corresponding angles. i.e. ($\angle$a, $\angle$e) ($\angle$c, $\angle$g) ($\angle$b, $\angle$f) ($\angle$d, $\angle$h) and they are equal.
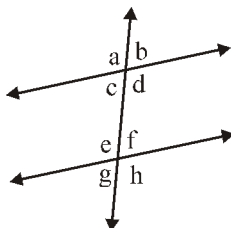
9.2 ALTERNATE ANGLES

($\angle$d, $\angle$e) and ($\angle$c, $\angle$f) are alternate interior angles.

($\angle$a, $\angle$h) and ($\angle$b, $\angle$g) are alternate exterior angles.

The alternate interior angles are also equal.
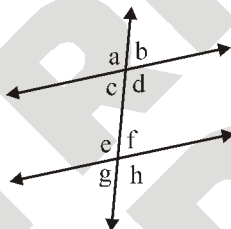
9.3 ALLIED ANGLES (CO-INTERIOR ANGLES)

Interior angles are on the same side of the transversal are called co-interior angles and these angles are always supplementary, i.e.,

$\angle$c + $\angle$e = 180°, $\angle$d + $\angle$f = 180°

Theorem : If two parallel lines are intersected by a transversal, then

(A) Corresponding angles are equal

(B) Alternate Interior angles are equal

(C) Alternate exterior angles are equal

(D) Co-interior angles are supplementary.

Conversely : If two straight lines are intersected by a transversal such that :

(A) Corresponding angles are equal

Or

(B) Alternate angles are equal

Or

(C) Co-interior angles are supplementary, then the two lines are parallel to each other.

Two lines parallel to the same line :

Two lines parallel to the same given line are parallel to each other.

Proof : Let *l*, *m* and *n* be three lines such that *l* || *m* and *l* || *n*. Let t be the transversal cutting these lines.
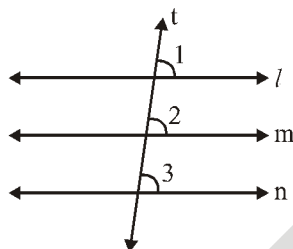
Since : *l* || *m*, therefore, $\angle 1 = \angle 2$ (corresponding angles)

Also, *l* || *n*, therefore, $\angle 1 = \angle 3$ (corresponding angles)

∴ $\angle 2 = \angle 3$ (both equal to the same $\angle 1$)

But these are corresponding angles

∵   m || n

Two lines perpendicular to the same line : Two lines in a plane, perpendicular to the same given line are parallel to each other.

Proof : Let m and n be two lines each perpendicular to a given line *l*
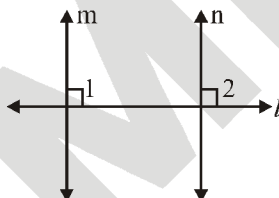
i.e. $m \perp l$ and $n \perp l \Rightarrow \angle 1 = 90°$ and $\angle 2 = 90°$

∴ $\angle 1 = \angle 2$

But these are corresponding angles ∴ m || n.

SE. 1

Find the value of x.
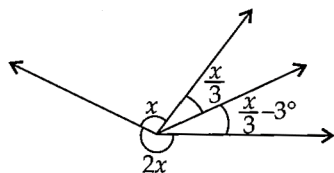
Ans. $x + \dfrac{x}{3} + \dfrac{x}{3} - 3° + 2x = 360°$ (Complete angle)

$\dfrac{3x + x + x - 9° + 6x}{3} = 360°$

$\Rightarrow 11x - 9° = 360° \times 3 = 1080°$

$\Rightarrow 11x = 1080° + 9°$

$\Rightarrow 11x = 1089°$

$\Rightarrow x = \dfrac{1089°}{11} = 99°$

SE. 2

Find the value of x.
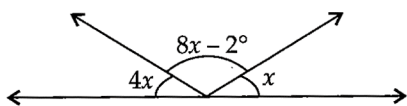
Ans. $4x + 8x - 2° + x = 180°$ (Straight line)

$\Rightarrow 13x - 2° = 180°$

$\Rightarrow 13x = 182°$

$\Rightarrow x = \dfrac{182°}{13} = 14°$

SE. 3

Given $l \parallel m$, find the measure of x.
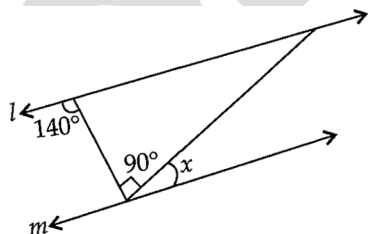
Ans. Since $l \parallel m$

$\therefore 140° = 90 + x$ (Alternate interior angles)

$\Rightarrow 140° - 90° = x \Rightarrow x = 50°$

SE. 4

In the given figure, AB || CD and EA || DF. If ∠GAB = 75°, ∠ADF = 80°, ∠EAB = x and ∠CDF = y. Find angle x and y ?
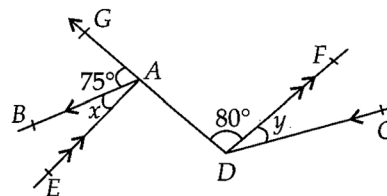
Ans. EA || DF and AD is transversal.

$\therefore$ ∠EAD = ∠ADF = 80°

               (Alternate interior angles)

Now, ∠GAB + ∠EAB + ∠EAD = 180°

75° + x + 80° = 180°   (Straight line)

x + 155° = 180° $\Rightarrow$ x = 180° − 155° = 25°

$\therefore$ ∠BAD = x + 80° = 25° + 80° = 105°

Again AB || CD and AD is a transvesrsal

$\therefore$ ∠ADC = ∠BAD   (Alternate interior angles)

$\Rightarrow$ 80° + y = 105°

y = 105° − 80° = 25°

$\therefore$ x = 25° and y = 25°

SE. 5

Is AB || CD?
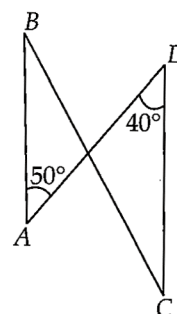
Ans. Transversal AD cuts two lines AB and CD.

So, ∠BAD and ∠CDA is a pair of alternate angles.

But ∠BAD = 50°, ∠CDA = 40°

Thus, alternate angles are not equal.

$\therefore$ AB and CD are not parallel to each other.

SE. 6

Find the values of the angles x, y and z.
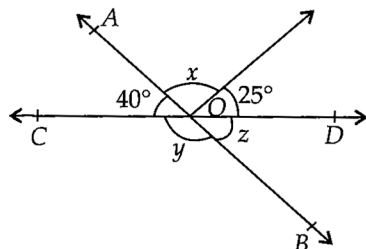
Ans. Since z and $\angle AOC$ are vertically opposite angles.

∴ z = 40°

40° + x + 25° = 180°   (Straight angle)

⇒ x + 65° = 180°

⇒ x = 180° – 65° = 115°

Also, y + z = 180°   (Linear pair of angles)

⇒ y = 180° – 40° = 140°

∴ x = 115°, y = 140°, z = 40°

SE. 7

An angle is equal to four times its complement. Determine its measure

Ans. Let the measure of the required angle be x.

Required angle = 4 × complement of the angle

x = 4 × (90° – x)

⇒ x = 360° – 4x

⇒ x + 4x = 360°

⇒ 5x = 360°

∴ $x = \dfrac{360°}{5} = 72$

SE. 8

Line AB and CD intersect at O. If $\angle 3 = 70°$. Find all other angles.
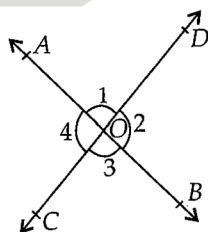
Ans. Since CD is a straight line and OB stands on it

∴ $\angle 2$ and $\angle 3$ form a linear pair of angles.

$\angle 2 + \angle 3$ form a linear pair of angles.

⇒ $\angle 2 = 180° – 70° = 110°$

Since, $\angle 1 = \angle 3$ (Vertically opposite angles)

∴ $\angle 1 = 70°$

Also, $\angle 4 = \angle 2 = 110°$ (Vertically opposite angles)

∴ $\angle 1 = 70°$, $\angle 2 = 110°$, $\angle 3 = 70°$ and $\angle 4 = 110°$

SE. 9

In the given figure, side BC of ΔABC has been produced to D. Line CE || BA. If $\angle ABC = 70°$, $\angle BAC = 40°$, find :

(i) $\angle ACE$ (ii) $\angle ECD$ (iii) $\angle ACD$
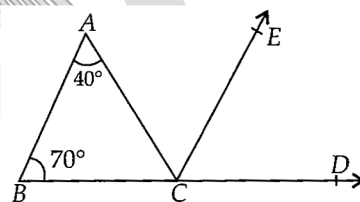
Ans. (i) CE || BA and AC is a transversal.

∴ $\angle BAC = \angle ACE$ (Alternate interior angles)

⇒ $40° = \angle ACE$

Hence, $\angle ACE = 40°$

(ii) AB || EC and BD is a transversal, intersecting the parallel lines at B and C.

$\angle ABC = \angle ECD$ (Corresponding angles)

⇒ $\angle ECD = 70°$

(iii) $\angle ACD = \angle ACE + \angle ECD$

⇒ $\angle ACD = 40° + 70° = 110°$

SE. 10

AB || CD and EF is a transversal intersecting the parallel lines AB and CD and G and H respectively. Find x and y.
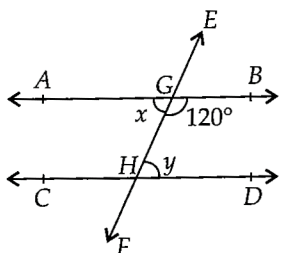
Ans. ∠AGH and ∠BGH form a linear pair of angles.

∴ x + 120° = 180°

⇒ x = 180° – 120° = 60°

AB ∥ CD, EF is a transversal.

⇒ ∠x = ∠y (Alternate interior angles)

⇒ x = y ⇒ y = 60°

SE. 11

PQ ∥ SR and PS ∥ QR. Find the values of x and y.
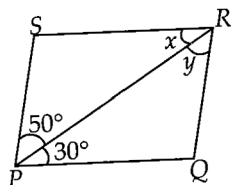
Ans. PQ ∥ SR and RP is a transversal.

∴ ∠SRP = ∠RPQ   (Alternate interior angles)

⇒ x = 30°

Now, SP ∥ RQ and PR is a transversal.

∴ ∠SPR = ∠PRQ   (Alternate interior angles)

⇒ 50° = y

Hence, x = 30° and y = 50°

SE. 12

Find the values of x, y, z. Given PQ ∥ SR and PS ∥ QR.
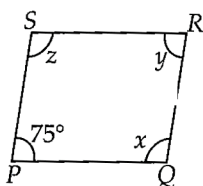
Ans. PQ ∥ SR and SP is a transversal. Sum of interior angles on the same side of transversal is 180°.

∴ ∠RSP + ∠SPQ = 180°

∴ z + 75° = 180°

⇒ z = 180° – 75° = 105°

Now, SP ∥ RQ and SR is a transversal. Sum of interior angles on the same side of transversal is 180°

∴ ∠PSR + ∠SRQ = 180° ⇒ z + y = 180°

⇒ y = 180° – 105° = 75°

Similarly, SR ∥ PQ, RQ is a transversal.

∴ ∠SRQ + ∠RQP = 180° [Co-interior angles]

⇒ y + x = 180° ⇒ 75° + x = 180°

x = 180° – 75° = 105°

∴ x = 105°, y = 75° and z = 105°

SE. 13

In the given figure, PQ ∥ RS and AB is transversal intersecting PQ and RS at L and M respectively. If ∠SMB = 120°, then find the values of ∠QLM, ∠LMS, ∠PLM.
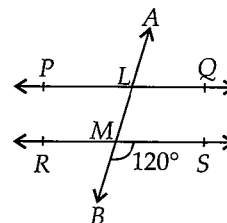
Ans. PQ ∥ RS and AB is a transversal.

(i) ∠QLM = ∠SMB   (Corresponding angle)

⇒ ∠QLM = 120°

(ii) ∠BMS + ∠LMS = 180° (Linear pair angles)

⇒ 120° + ∠LMS = 180°

⇒ ∠LMS = 180° – 120° = 60°

(iii) ∠PLM = ∠LMS   (Alternate interior angles)

⇒ ∠PLM = 60°

SE. 14

In the given figure AB || CD and EF and GH are two transversals, find the values of a, b, c, d.
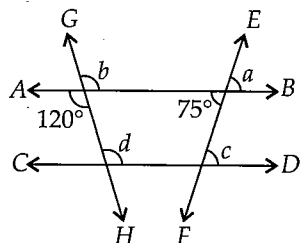
Ans. AB || CD and EF is a transversal.

c = 75°   (Alternate interior angles)

Again c = a   (Corresponding angles)

∴ a = 75°

Now, AB || CD and GH is a transversal.

∴ d = 120°   (Alternate interior angles)

Again b = d   (Corresponding angles)

∴ b = 120°

∴ a = 75°, b = 120°, c = 75° and d = 120°

SE. 15

In the given figure, show that AB || EF.
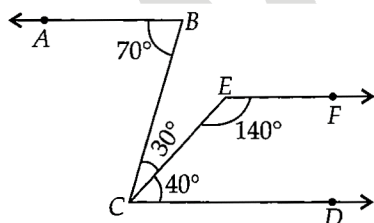
Ans. ∠ABC = 70°   (Given)   --- (i)

∠BCD = ∠BCE + ∠ECD

⇒ ∠BCD = 30° + 40°

⇒ ∠BCD = 70°   --- (ii)

From (i) and (ii), we get

∠ABC = ∠BCD

Since, sum of the interior angles made by the transversal on its same side is 180°.

∴ EF || CD

Since AB || CD and EF || CD

∴ AB || EF

ONLY ONE CORRECT TYPE

1. In the given figure, the value of x is :
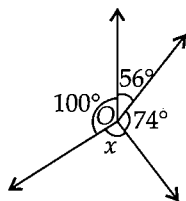
(A) 130°   (B) 56°
(C) 100°   (D) 74°

2. In the adjoining figure, the value of $\angle AOC$ such that $\overline{AOB}$ is a line segment is
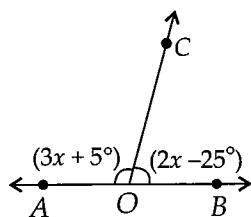
(A) 40°   (B) 55°
(C) 125°   (D) 180°

3. The supplement of an acute angle is _____ angle.
(A) Acute   (B) Obtuse
(C) Right   (D) Straight

4. In the figure, PQ is a

(A) Line   (B) Ray
(C) Line segment   (D) Ray or line

5. In the figure, find the value of x and y respectively.
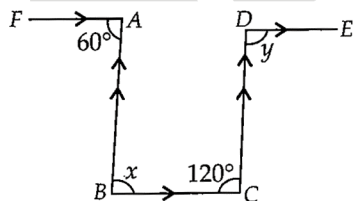
(A) 60°,120°   (B) 70°, 110°
(C) 50°, 130°   (D) 80°, 110°

6. In the figure, if AOB is a straight line, then find the value of x.
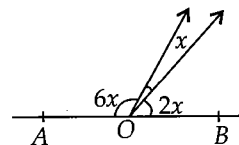
(A) 40°   (B) 15°
(C) 20°   (D) 50°

7. In the given figure, if $\angle POR = 90°$ and OQ bisects $\angle POS$, then find the value of $2y + z$.
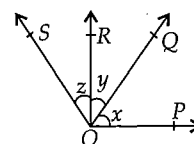
(A) 60°   (B) 45°
(C) 90°   (D) 30°

8. Find the two supplementary angles, if angle are in the ratio 7 : 11.
(A) 70°,120°   (B) 60°, 120°
(C) 70°, 110°   (D) 50°, 130°

9. In the following figure, find the value of x. If AB || CD.
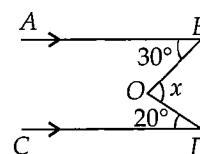
(A) 30°   (B) 20°
(C) 10°   (D) 50°

10. What is the value of x in the given figure?
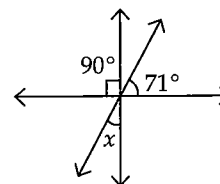
(A) 71°   (B) 90°
(C) 19°   (D) 24°

11. Find the value of x in the figure given below.
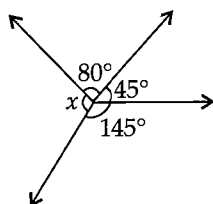
(A) 90°   (B) 45°
(C) 80°   (D) 145°

12. Two angles are complementary and equal, then find each of the angles.

(A) 90°, 90°   (B) 45°, 45°

(C) 180°, 180°   (D) 135°, 45°

13. If an angle is its own supplementary angle, then its measure is

(A) 30°   (B) 45°

(C) 60°   (D) 90°

14. Find ∠AOC, if ∠BOC = 60°.
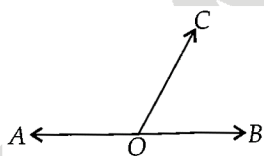
(A) 120°   (B) 90°
(C) 60°   (D) 45°

15. The supplement of an angle of 45° is
(A) 45°   (B) 135°
(C) 155°   (D) 90°

16. In the given figure, AOB is straight line and the ray OC stands on it. If ∠BOC = 130°, then find ∠AOC.
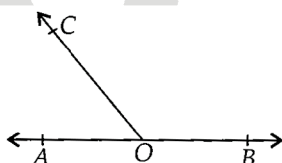
(A) 50°   (B) 70°
(C) 20°   (D) 160°

17. In the given figure, two straight lines AB and CD intesect at a point O.
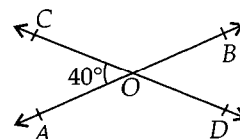
If ∠AOC = 40°, then ∠BOD = ?
(A) 140°   (B) 50°
(C) 40°   (D) 160°

18. In the given figure, rays OA, OB, OC and OD are such that ∠AOB = 50°, ∠BOC = 90°, ∠COD = 70° and ∠AOD = x. The value of x is
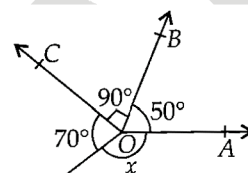
(A) 50°   (B) 70°
(C) 150°   (D) 90°

19. In the given figure, ABC is a straight line. Find ∠CBD.
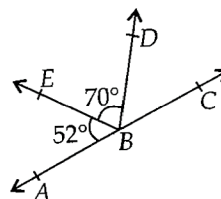
(A) 58°   (B) 62°
(C) 73°   (D) 25°

20. In the given figure, ΔABC is an equilateral triangle ∠ACD is 134°. Find ∠BCD
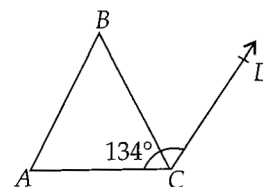
(A) 88°   (B) 98°
(C) 74°   (D) 64°

21. In the figure, ABCE is a parallelogram. Find ∠ADC.
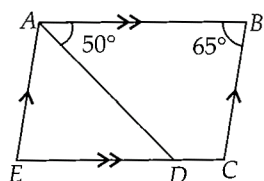
(A) 130°   (B) 150°
(C) 50°   (D) 115°

22. In the figure AD and CF are straight lines. Find ∠EBF
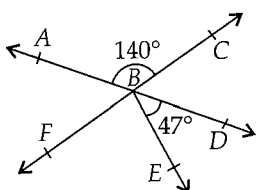
(A) 93°   (B) 140°
(C) 47°   (D) 107°

23. In the given figure, two lines l and m are intersect at O. Find the value of z.
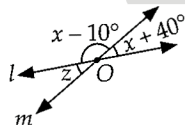
(A) 75°   (B) 115°
(C) 65°   (D) 105°

24. The difference in the measure of two complementary angles is 24°. Find the measure of the angles.

(A) 54°, 36°   (B) 64°, 26°
(C) 57°, 33°   (D) 44°, 46°

25. In the given figure, two lines AB and CD intersect each other other at O. Find the value of x.
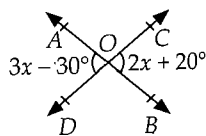
(A) 120°   (B) 60°
(C) 50°   (D) 70°

26. In the given figure, transversal p cuts parallel l and m. Find the value of z.
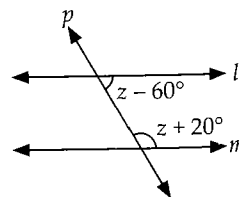
(A) 110°   (B) 70°
(C) 220°   (D) 120°

27. In the adjacent figure, which of the following are not adjacent angles?
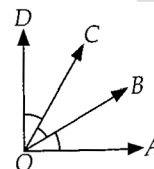
(A) ∠AOB and ∠BOD
(B) ∠BOC and ∠COD
(C) ∠AOB and ∠COD
(D) ∠AOC and ∠COD

28. In the given figure, p ∥ q and t is transversal. Find the value of a and b (respectively), if a = 3b
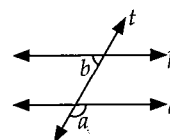
(A) 135°, 45°   (B) 130°, 55°
(C) 155°, 55°   (D) 45°, 135°

29. In the figure, DE ∥ AB, ∠DEC = 56°, ∠EDC = 39°. Find the value of a and b respectively.
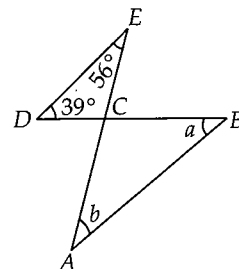
(A) 56°, 39°   (B) 85°, 56°
(C) 39°, 56°   (D) 39°, 85°

30. In the given figure, x = y = z. Find y + z.
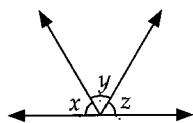
   (A) 60°   (B) 120°
   (C) 130°   (D) 100°

31. In the given figure *l* is a line. Find the supplement angle of k.
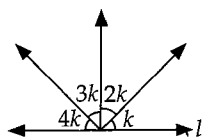
   (A) 36°   (B) 72°
   (C) 18°   (D) 162°

32. Find the angle which is equal to one-fifth of its complement.
   (A) 15°   (B) 75°
   (C) 18°   (D) 72°

33. In the figure, ABCD is a trapezium FG is a straight line. Find $\angle EBF$.
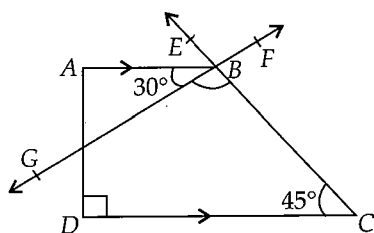
   (A) 70°   (B) 105°
   (C) 150°   (D) 60°

34. Which of the following is false?
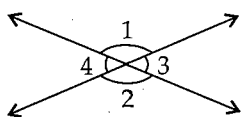
   (A) $\angle 1 = \angle 2$ (B) $\angle 1 + \angle 3 = 180°$
   (C) $\angle 1 = \angle 4$ (D) $\angle 3 = \angle 4$

35. An angle is greater than 50°. Its complementary angle is :
   (A) Greater than 40°
   (B) Less than 40°
   (C) Equal to 40°
   (D) Less than or equal to 40°

36. In the given figure p || q. What is the measure of x?
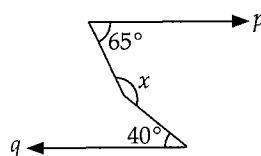
   (A) 165°   (B) 105°
   (C) 155°   (D) 175°

37. In the given figure *l* || m. Find the measure of θ.
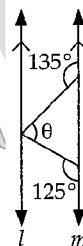
   (A) 100°   (B) 80°
   (C) 70°   (D) 160°

38. LN is a line. Find y, if 2x + z = 3y.
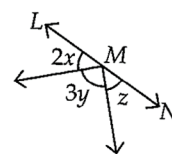
   (A) 80°   (B) 100°
   (C) 90°   (D) 30°

39. In the given figure, if ÐBOC = 7x + 20° and $\angle COA = 3x + 30°$, then the value of x for which AOB becomes a straight line is :
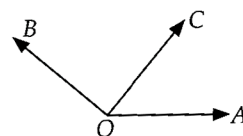
   (A) 13°   (B) 14°
   (C) 20°   (D) 21°

PARAGRAPH TYPE

PARAGRAPH # 1

Observe the following figure.
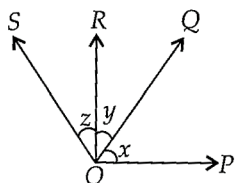
1. If x = 25°, y = 60°, then find ∠POR.
   - (A) 90°   (B) 85°
   - (C) 45°   (D) 95°

2. If ∠SOQ = 100°, ∠QOR = 55°, then find ∠SOR.
   - (A) 55°   (B) 105°
   - (C) 45°   (D) 60°

3. If $x = \dfrac{1}{3}$ of right angle, $y = \dfrac{2}{3}$ of right angle and

   $z = \dfrac{1}{2}$ of right angle , then ∠POS =
   - (A) 60°   (B) 45°
   - (C) 90°   (D) 135°

PARAGRAPH # 2

Two angles whose sum is 180° are called supplementary angles.

4. Two supplementary angles are in the ratio 5 : 13. Find the angles.
   - (A) 50°, 130°
   - (B) 130°, 60°
   - (C) 90°, 90°
   - (D) 70°, 110°

5. The angles are supplementary and the larger is 20° less than three times the smaller angle. Find the angles.
   - (A) 80°, 100°
   - (B) 90°, 90°
   - (C) 50°. 130°
   - (D) 140°, 40°

6. The angles are supplementary and the smaller of the angles is half the larger. Find the angles.
   - (A) 110°, 70°
   - (B) 60°, 120°
   - (C) 80°. 100°
   - (D) 50°, 130°

MATCH THE COLUMN TYPE

1. Match the following

Column I	Column II
(P) Two angles whose sum is 90° are called	(1) Adjacent Angles
(Q) Two angles whose sum is 180° are called	(2) Complementary angles
(R) Two angles that are formed by two intersecting lines, which are not adjacent	(3) Supplementary
(S) Two angles with a common vertex, a opposite angles common arm and the other arms sides of the common arm of the opposite arm from	(4) Vertcially opposite angles

   - (A) P-1, Q-2, R-3, S-4
   - (B) P-3, Q-1, R-4, S-2
   - (C) P-2, Q-3, R-4, S-1
   - (D) P-4, Q-2, R-1, S-3

2. Match the following

Column I	Column II
(P) If the measure of two supplement angles are $(3x + 15°)$ and $(2x + 5°)$, then value of x is	(i) 62°
(Q) The complement angle of $\frac{2}{5}$ of 70° is	(ii) 32°
(R) Two complementary angles are in the ratio 7 : 8. The largest angle is	(iii) 48°
(S) The supplement angle of $\frac{3}{4}$ of 160° is	(iv) 60°

(A) (P)→(ii), (Q)→(i), (R)→(iii), (S)→(iv)
(B) (P)→(iii), (Q)→(i), (R)→(iv), (S)→(ii)
(C) (P)→(ii), (Q)→(iii), (R)→(iv), (S)→(i)
(D) (P)→(iv), (Q)→(ii), (R)→(i), (S)→(iii)

TRUE / FALSE

1. Two obtuse angles cannot be complement of each other.

2. Interior angles on the same side of the transversal are supplementary if the lines are parallel.

3. The distance between two parallel lines is not always same.

4. Complementary angle of 45 is 45.

5. If two lines in a plane do not intersect then lines are parallel.

VERY SHORT ANSWER TYPE

1. Find the angle which is its own complement.

2. Find the angle which is triple of its supplement.

3. In the adjoining figure, it is given that ∠A = 60°, CE ∥ BA and ∠ECD = 65°. Find ∠ACB.
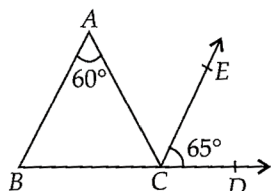
4. In the adjoining figure, it is given that OA ∥ EC and OB ∥ ED. Prove that ∠AOB = ∠CED.
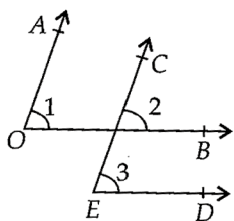
5. In the given figure, AB is a straight line and ∠BOC = 65°, find the measure of ∠AOC.
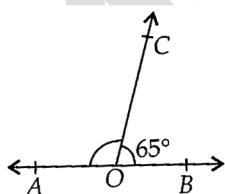
6. In the adjoining figure, what value of x will make AOB a straight line?
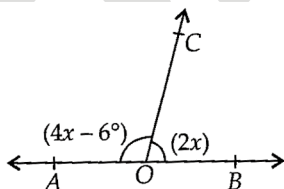
7. In the figure COB is a straight line. Find the value of x.
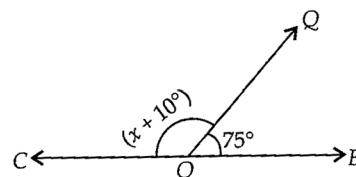
8. In the given figure, find x, y and z.
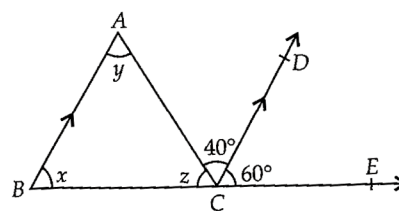
LONG ANSWER TYPE

1. In the given figure, AB ∥ CD and CA has been produced to E so that ∠BAE = 125°.
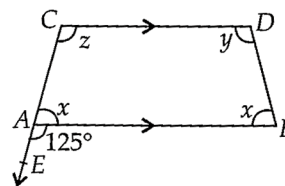
If ∠BAC = x, ∠ABD = x, ∠BDC = y and ∠ACD =z, then find the values of x, y, z.

2. In each of the given figure, two lins *l* and *m* are cut by a transversal *t*. Find whether *l* ∥ *m*.
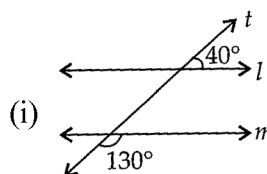
(i)
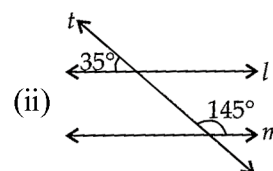
(ii)
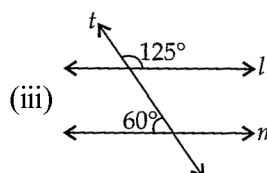
(iii)

3. In the given figure, AB || CD || EF and AD || BE. Find x, y and z
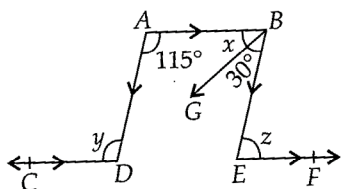
4. In the given figure, EF || GH.
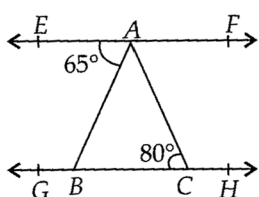
Determine :

(i) ∠ABC   (ii) ∠ACH

(iii) ∠BAC   (iv) ∠CAF.

5. In the following figure, AB || CD. Find the unknown angles.
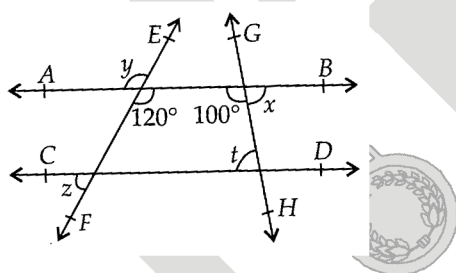
Answer Key

EXERCISE I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	C	B	C	A	C	C	C	D	C	A	B	D	A	B
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	C	C	A	C	A	A	B	C	C	A	C	A	C	B
31	32	33	34	35	36	37	38	39						
D	A	B	C	B	C	B	D	A						

PARAGRAPH

1.   B   2.   C   3.   D   4.   A   5.   C   6.   B

MATCH THE COLUMN

1.   C   2.   A

TRUE/FALSE

1.   T   2.   T   3.   F   4.   T   5.   T

EXERCISE II

VERY SHORT ANSWER TYPE

1. $45°$ 2. $135°$ 3. $\angle ACB = 55°$ 5. $\angle AOC = 115°$

6. $x = 31°$ 7. $95°$ 8. $X = 60°, Y = 40°, 3 = 80°$

LONG ANSWER TYPE

1. $x = 55°, y = 125°, z = 125°$ 2. (i) No (ii) Yes (iii) No   3. $x = 35°, y = 115°$ and $z = 65°$

4. (i) $65°$ (ii) $100°$ (iii) $35°$ (iv) $80°$ 5. $x = 80°, t = 80°, y = 120°$ and $z = 60°$

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : FRACTIONS AND DECIMALS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

THE TRIANGLES AND ITS PROPERTIES

6

1. TRIANGLE

A triangle is the simplest polygon (closed figure) having three sides and three angles. The adjoining figure shows a triangle ABC usually written as $\triangle$ABC, with the three sides AB, BC and CA, the three angles $\angle$BAC, $\angle$ABC, $\angle$ACB and three vertices A, B and C. The three sides and three angles of a triangle are called its **elements** or **parts.**
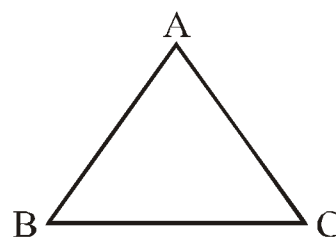
1.1 TYPES OF TRINAGLES

(A) ON THE BASES OF SIDES

Name of triangles	Geometric properties
Equilateral triangle	(i) All three sides are of equal length. (ii) It has three lines of symmetry. (iii) Every angle in the triangle is 60°. $\therefore$ p = q = r = 60°
Isosceles triangle	(i) Two sides are equal. (ii) It has one line of symmetry. (iii) The two angles opposite to the two equal sides are of the same size. $\therefore$ q = r
Scalene triangle	(i) All three sides are unequal. (ii) No lines of symmetry. (iii) All angles are unequal.

(B) ON THE BASES OF ANGLES

Name of triangles	Geometric properties
Acute angled triangle	All interior angels are acute angles (less than 90°). $\therefore$ p, q and r are less than 90°.
Obtuse angled triangle	One of the interior angles is an obtuse angle (greater than 90°).
Right angled triangle	One of the interior angle is a right angle. (equal to 90°)

1.2 EXTERIOR ANGLE AND INTERIOR OPPOSITE ANGLES

When any side of a triangle is extended beyond the vertex, it forms an exterior angle with the other side at the same vertex.
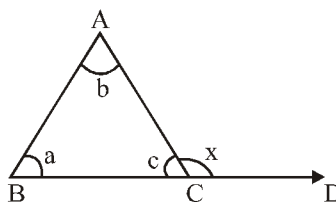
In the adjoining triangle ABC, BC is extended upto D. Thus it forms exterior angle $\angle x$ with AC. $\angle a$ and $\angle b$ are called the interior opposite angles to the exterior angle $\angle x$.

2. THE ANGLES SUM PROPERTY OF A TRIANGLE

Theorem-1 : The sum of the three angles of a triangle is 180°.

Given : ABC is a triangle

To prove that :

$\angle BAC + \angle ABC + \angle ACB = 180°$

Construction : Produce BC to D, and through C draw CK ∥ BA.
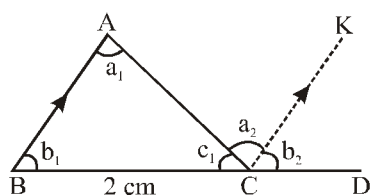
$\angle a_1 = \angle a_2$ ($\because$ AB ∥ KC; alternate angles)

$\angle b_1 = \angle b_2$ ($\because$ AB ∥ KC; corresponding angles)

$\therefore \quad \angle a_1 + \angle b_1 = \angle a_2 + \angle b_2$

$\angle a_1 + \angle b_1 + \angle c_1 = \angle a_2 + \angle b_2 + \angle c_1$ (adding $\angle c$ both sides)

$\angle BAC + \angle ABC + \angle ACB = 180°$ ($\because$ BCD is a straight line)

Property : 1

An exterior angle of a triangle = sum of the interior opposite angles.

As we can see in the figure of the first proof of the above theorem. $\angle ACD$ is the exterior angle of $\triangle ABC$ at C.

$\angle ACD = \angle a_2 + \angle b_2$

But it is known that $\angle a_2 = \angle a_1$ and $\angle b_2 = \angle b_1$,

$\therefore \quad \angle ACD = \angle a_1 + \angle b_1$

$\Rightarrow$ exterior angle = sum of the interior opposite angles.

Property : 2

An exterior angle is always greater than either of the two interior opposite angles.

Since the exterior angle is equal to sum of the interior opposite angles, it follows that it is greater than either of the interior opposite angles.

$\angle ACD = a_1 + b_1 \Rightarrow \angle ACD > a_1$ and $\angle ACD > b_1$

3. SOME PROPERTIES OF AN ISOSCELES TRIANGLE AND AN EQUILATERAL TRIANGLE

Property : 1

Given : If two sides of a triangle are equal, then the angles opposite those sides are equal.

Proof : Isosceles $\triangle ABC$ is given and AB = BC.

We wish to prove that $\angle A = \angle C$.

Construction : We begin by drawing the bisector of $\angle B$, namely BD.
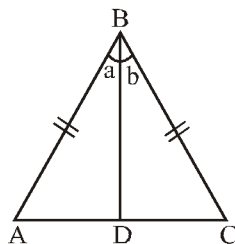
$\underline{AB} = BC$ (Given)

$\angle a = \angle b$ (Construction)

$BD = BD$ (Common)

$\therefore \ \Delta ABD \cong \Delta CBD$ (SAS congruency)

$\therefore \ \ \angle A = \angle C$

(Corresponding parts of congruent triangles (CPCT) are equal)

Property : 2

If two angles of a triangle are equal the sides opposite those angles are also equal.

Property : 3

The angles of an isosceles right angled triangle are 45°, 45° and 90°.

Proof : ΔABC is right angled isosceles triangle with $AB = BC$ and $\angle B = 90°$.
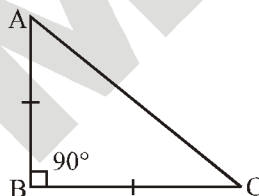
$AB = BC \Rightarrow \angle C = \angle A$ (Angles opposite equal sides are equal)

$\angle A + \angle B + \angle C = 180°$ (Angle sum property)

$\Rightarrow \angle A + 90° + \angle C = 180° \Rightarrow \angle A + \angle C = 180° - 90° \Rightarrow \angle A + \angle C = 90°$

But it is given that $\angle A = \angle C$

$\therefore \ \ \angle A = \angle C = 45°$

Property : 4

In an equilateral triangle all the three angles are equal and each angle is equal to 60°.

Proof : ΔABC is an equilateral triangle with $AB = BC = CA$
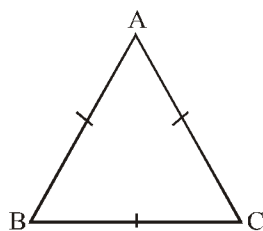
AB = AC $\Rightarrow$ $\angle C$ = $\angle B$ ...(i)

AB = BC $\Rightarrow$ $\angle C$ = $\angle A$ ...(ii)

& BC = CA $\Rightarrow$ $\angle A$ = $\angle B$ ...(iii)

($\because$ Angles opposite equal sides are equal)

From (i) and (ii) it follows $\angle A$ = $\angle B$ = $\angle C$.

Also $\angle A$ + $\angle B$ + $\angle C$ = 180° (Angle sum property of a Δ)

$\therefore$ From $\angle A$ = $\angle B$ = $\angle C$ it follows that $\angle A$ = $\angle B$ = $\angle C$ = 60°.

Property : 5

If all the three angles of a triangle are equal, it is an equilateral triangle.

Example **1**

In the triangle ABC, $\angle A$: $\angle B$: $\angle C$ = 1 : 2 : 3. Find the angles of the triangle.

Solution :

Let $\angle A$ = x, $\angle B$ = 2x and $\angle C$ = 3x.

By the angle sum property of a triangle.

$\angle A$ + $\angle B$ + $\angle C$ = 180° $\Rightarrow$ x + 2x + 3x = 180°

$\Rightarrow$ 6x = 180° $\Rightarrow$ x = $\dfrac{180°}{6}$ = 30°

$\therefore$ $\angle A$ = x = 30°, $\angle B$ = 2x = 2 × 30° = 60 and $\angle C$ = 3x = 3 × 30 = 90°

4. PYTHAGORAS THEOREM

Theorem states that, 'In any right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides of the triangle. The side opposite to the right angle is the hypotenuse. In ΔABC, $\sqrt{B}$ = 90°, AC the hypotenuse . If two sides of a right angle are represented by x and y and hypotenuse is represented by z, then $x^2 + y^2 = z^2$.
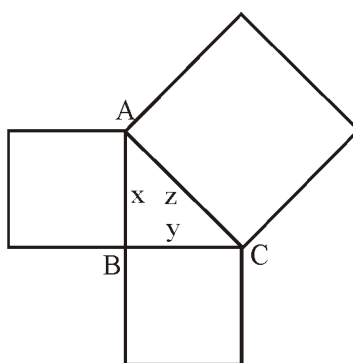
5. IMPORTANT DEFINATIONS

Concurrent lines in a triangle

If a number of straight lines intersect at one common point, they are called concurrent lines.

Altitude

In a triangle, the perpendicular drawn from a vertex to its opposite side is called an altitude.
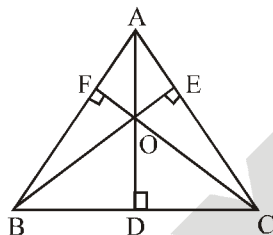
In the above figure, AD, BE and CF are the three altitudes of ΔABC.

The three altitudes of a triangle always meet at a single common point called the orthocenter, denoted by 'O' which can lie inside or outside the triangle.

In a right angled triangle it lies at the vertex containing the right angle.

In an isosceles triangle it lies on the altitude drawn to the base.

Median

The straight line joining any vertex to the midpoint of the opposite side of a triangle is known as a median. In the figure below, AF, BE and CD are the medians of ΔABC.
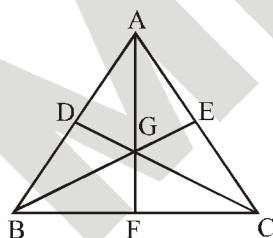
The three medians meet at a common point called the centroid of the triangle and is denoted by G. Centroid is the centre of gravity of all the triangles. Centroid divides each median in the ratio of 2 :1.

A median divides a triangle into two triangles of equal area.

Angular bisectors

The line segments which bisect the angles of a triangle are called the angular bisectors. The line segments which bisect the angles of a triangle internally are called the internal bisectors. In the figure below, AD, BE and CF are the angular bisectors of ΔABC.
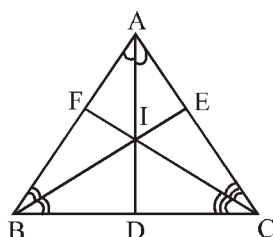
SE. 1

In the given figure, P is a point on the side BC of $\triangle ABC$. Prove that $(AB + BC + AC) > 2AP$.
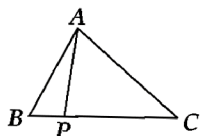
Ans. We know that in triangle, the sum of any two sides is greater than the third side,

In $\triangle ABP$; $AB + BP > AP$ ...(i)

In $\triangle APC$; $PC + AC > AP$ ...(ii)

Now, adding (i) and (ii), we get

$AB + BP + PC + AC > AP + AP$

$\Rightarrow AB + BC + AC > 2AP$

SE. 2

The adjoining figure has been obtained by using two triangles, Prove that

$\angle A + \angle B + \angle C + \angle D + \angle E + \angle F = 360°$.
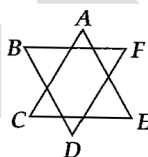
Ans. We know that the sum of the angles of a triangle is 180°.

In $\triangle ACE$; $\angle A + \angle C + \angle E = 180°$ ...(i)

In $\triangle BDF$; $\angle B + \angle D + \angle F = 180°$ ...(ii)

On adding (i) and (ii), we get

$\angle A + \angle B + \angle C + \angle D + \angle E + \angle F = 360°$

SE. 3

Find the values of the unknown variable in the figure given below.
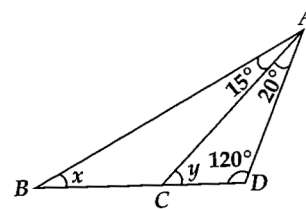
Ans. In $\triangle ACD$,

$y + 120° + 20° = 180°$ (Angle sum property)

$\Rightarrow y + 140° = 180°$

$\Rightarrow y = 180° - 140° = 40°$

For $\triangle ABC$, y is an exterior angle

$\therefore x + 15° = y$ (Exterior angle property)

$\Rightarrow x + 15° = 40°$

$\Rightarrow x = 40° - 15° = 25°$

SE. 4

Two poles of height 9 m and 14 m stand upright on a plane ground. If the distance between their feet is 12 m, find the distance between their tops.
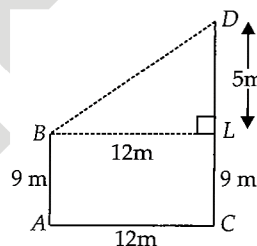
Ans.

Let AB and CD be the given poles such that

AB = 9m, CD = 14 m and AC = 12 m.

Join BD.

From B, draw $BL \perp CD$.

$\therefore DL = (CD - CL) = (CD - AB) = (14 - 9)m$

= 5 m

BL = AC = 12 m

Now, in right $\triangle BLD$, by Pythagoras theorem, we have

$BD^2 = BL^2 + DL^2$

$= (12)^2 + (5)^2 = 144 + 25 = 169 = (13)^2$

$\Rightarrow BD = 13$ m.

Hence, the distance between their tops is 13m.

SE. 5

The lengths of the sides of two triangles are given below. Which of them is right angled?
(i) a = 7 cm, b = 24 cm and c = 25 cm
(ii) a = 8 cm, b = 5 cm and c = 10 cm

Ans. (i) Here a = 7 cm, b = 24 cm and c = 25 cm.
The largest side is c = 25 cm.
Now, $a^2 + b^2 = (7)^2 + (24)^2 = 49 + 576 = 625 = (25)^2 = c^2$
$\Rightarrow a^2 + b^2 = c^2$
Hence, given triangle is right angled
[by the converse of Pythagoras theorem].
(ii) Here a = 8 cm, b = 5 cm and c = 10 cm.
The largest side is c = 10 cm
Now, $a^2 + b^2 = (8)^2 + (5)^2 = 64 + 25 = 89 \neq (10)^2$
Now, $a^2 + b^2 \neq c^2$
Hence, given triangle is not right angled.

SE. 6

Exterior angle ACD = 115° and ∠ABC and ∠BAC are in the ratio 2 : 3. Find all the angles of the triangle.
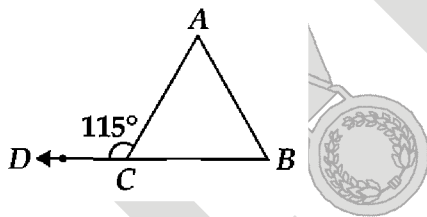
Ans. Let ∠ABC = 2x and ∠BAC = 3x.
∠ACD = ∠ABC + ∠BAC (Exterior angle property)
$\Rightarrow$ 115° = 2x + 3x $\Rightarrow$ 5x = 115° $\Rightarrow$
$x = \dfrac{115°}{5} = 23°$
$\Rightarrow$ ∠ABC = 2x = 2 × 23° = 46°
$\Rightarrow$ ∠BAC = 3x = 3 × 23° = 69°
Also, ∠ACB + ∠ACD = 180° (Linear pair)
$\Rightarrow$ ∠ACB + 115° = 180°

$\Rightarrow$ ∠ACB = 180° – 115° = 65°
Thus, ∠ACB = 65°, ∠ABC = 46° and ∠BAC = 69°

SE. 7

Find the values of the unknown variables in the given figure.
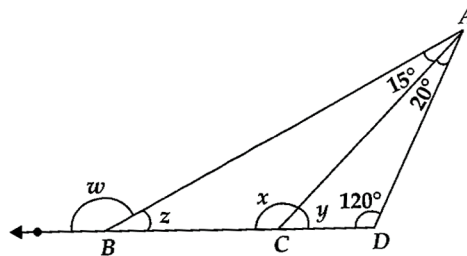
Ans. In ΔACD,
20° + 120° + y = 180° (Angle sum property)
$\Rightarrow$ y = 180° – 120° – 20° = 40°
Also, x = 20° + 120° [Exterior angle property]
= 140°
In ΔABC,
15° + x + z = 180°   (Angle sum property)
$\Rightarrow$ z = 180° – x – 15° = 180° – 140° – 15° = 25°
Now, w + z = 180° (Linear pair)
$\Rightarrow$ w = 180° – z = 180° – 25° = 155°
Hence, x = 140°, y = 40°, z = 25° and w = 155°

SE. 8

Check, whether the given dimensions represent the sides of a triangle or not.
(i) 5cm, 7 cm and 9 cm
(ii) 1.8 cm, 2.8 cm and 4.8 cm

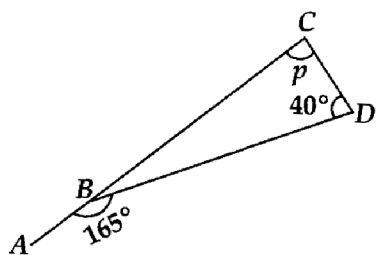*Ans.* (i) 5 cm + 7 cm = 12 cm > 9 cm
5 cm + 9 cm = 14 cm > 7 cm
7 cm + 9 cm = 16 cm > 5 cm
Hence, 5 cm, 7 cm and 9 cm represent the sides of a triangle.

(ii) 1.8 cm + 2.8 cm = 4.6 cm < 4.8 cm

Hence, 1.8 cm, 2.8 cm and 4.8 cm do not represent the sides of triangle.

SE. 9

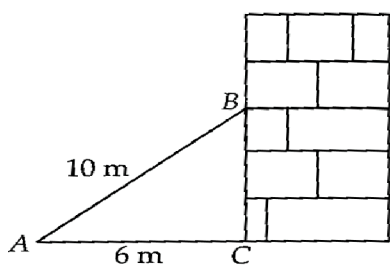Calculate the value of p in the figure, given that ABC is a straight line.

Ans.   40° + p = 165°   (Exterior angle property)

So, p = 165° – 40° = 125°

SE. 10

A 10 m long ladder is placed against a wall of a building. How high against the wall does the ladder reach? (If the distance between ladder foot and building is 6m).

Ans.

Let AB represent the ladder.

$\triangle ABC$ is right-angled triangle.

So, by Pythagoras theorem

$AB^2 = BC^2 + AC^2$

$\Rightarrow (10)^2 = BC^2 + (6)^2$

$\Rightarrow 100 = BC^2 + 36$

$\Rightarrow 100 - 36 = BC^2$

$\Rightarrow 64 = BC^2$

$\therefore BC = 8$ m

Thus, the ladder reaches a height of 8 m against the wall.

SE. 11

In the given figure, find x.
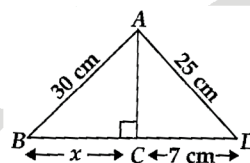
Ans.   In $\triangle ADC$,

$AD^2 = AC^2 + CD^2$ (Pythagoras Theorem)

$\Rightarrow (25)^2 = AC^2 + (7)^2 \Rightarrow 625 = AC^2 + 49$

$\Rightarrow AC^2 = 625 - 49 = 576 = (24)^2$

$\therefore$ In $\triangle ABC$,

$AB^2 = AC^2 + BC^2$ (Pythagoras Theorem)

$\Rightarrow (30)^2 = (24)^2 + x^2$

$\Rightarrow x^2 = 900 - 576 = 324 = (18)^2$

$\therefore x = 18$ cm

SE. 12

An 8 m high pole is 9 m away from a building. If the distance between the top of the pole and the top of the building is 15 m, then find the height of the building.

Ans.   Let AC be the height of the building. ED be the height of the pole, AE be the distance between their tops and CD be the distance between the foot of the pole and foot of the building. From E, draw perpendicular EB on AC.
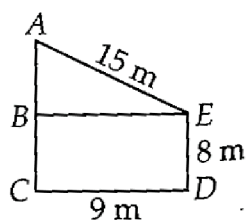
EB ⊥ AC,

AE = 15 m

BE = CD = 9 m

In the right-angled ΔABE,

$AE^2 = AB^2 + BE^2$

$\Rightarrow 15^2 = AB^2 + 9^2$

$\Rightarrow 225 = AB^2 + 81$

$\Rightarrow AB^2 = 225 - 81 = 144 = (12)^2$

$\therefore AB = 12$ m

Since, AC = AB + BC

and BC = ED = 8 m
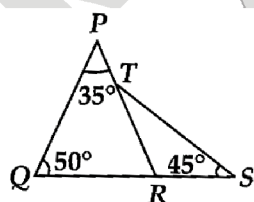
$\therefore$ AC = 12 + 8 = 20 m

Hence, height of building is 20 m.

SE. 13

In the given figure, find ∠PTS.

Ans. For ΔPQR, ∠PRS is an exterior angle.

$\therefore$ ∠PRS = ∠PQR + ∠QPR = 50° + 35° = 85°

For ΔRST, ∠PTS is an exterior angle

$\therefore$ ∠PTS = ∠SRT + ∠RST

$\Rightarrow$ ∠PTS = 85° + 45° = 130°

(∠SRT = ∠PRS = 85°)

SE. 14

In figure, D and E are the points on sides AB and AC of ΔABC such that DE ∥ BC. If ∠A = 40° and ∠B = 30°, find :

(i) x   (ii) y   (iii) z
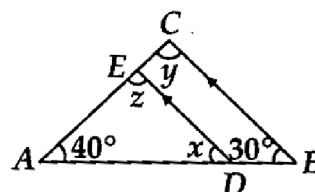
Ans. (i) ∠ADE = ∠ABC

(Corresponding angles as DE ∥ BC)

$\Rightarrow$ x = 30°   (∵ ∠ABC = 30°)

(ii) In ΔABC, we have

∠A + ∠B + ∠C = 180°

(Given : ∠A = 40° and ∠B = 30°)

$\Rightarrow$ 70° + y = 180°

$\Rightarrow$ y = 180° – 70° = 110°

(iii) In ΔADE, we have,

x + 40° + z = 180°   (Angle sum property)

$\Rightarrow$ 30° + 40° + z = 180°

$\Rightarrow$ 70° + z = 180°
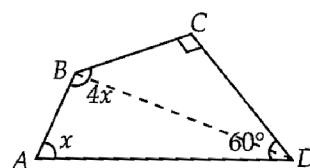
$\Rightarrow$ z = 180° – 70° = 110°

SE. 15

Find the value of x for the figure.
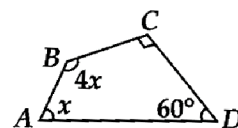
Ans.

Join BD,.

In $\triangle$ABD ; $\angle$ABD + $\angle$ADB + $\angle$BAD = 180°

.....(i)

[Angle sum property]

In $\triangle$BCD; $\angle$BCD + $\angle$CBD + $\angle$BDC = 180°

.....(ii)

[Angle sum property]

Adding (i) and (ii), we get

$\angle$BAD + $\angle$ABD + $\angle$CBD + $\angle$BCD + $\angle$ADB + $\angle$BDC = 180° + 180°

$\Rightarrow$ $\angle$BAD + $\angle$ABC + $\angle$BCD + $\angle$ADC = 360°

$\Rightarrow$ x + 4x + 90° + 60° = 360°

$\Rightarrow$ 5x + 150° = 360° $\Rightarrow$ 5x = 360° – 150° = 210°

$\Rightarrow$ x = 42°

ONLY ONE CORRECT TYPE

1. A triangle whose lengths of sides are 5 cm, 12 cm and 13 cm. The triangle is :
   (A) obtuse - angled triangle
   (B) Acute - angled triangle
   (C) Right angled triangle
   (D) Triangle is not formed

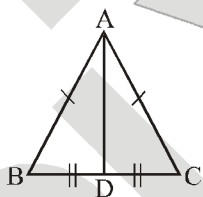2. Side BC of a triangle ABC has been produced to point D., If angle ACD = 115° and angle A = 45°, then angle C is :
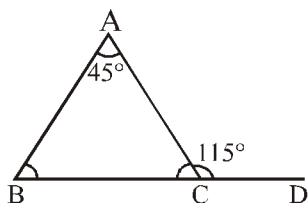
   (A) 65°   (B) 80°
   (C) 100°   (D) 60°

3. In a ΔABC, If AB + BC = 10 cm, BC + CA = 12 cm, CA + AB = 16 cm, then the perimeter of the triangle is :
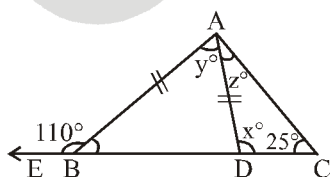   (A) 19 cm   (B) 17 cm
   (C) 28 cm   (D) None of these

4. In the following figure, If AB = AC and BD = DC, then ∠ADC =

   (A) 60°   (B) 120°
   (C) 90°   (D) 45°

5. In the given figure, find ∠z =
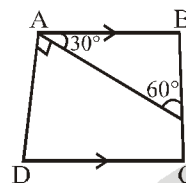

   (A) 40°   (B) 110°
   (C) 45°   (D) 90°

6. In a ΔABC
   (A) AB – BC > CA   (B) AB + BC < CA
   (C) AB – BC = CA   (D) AB + BC > CA

7. AB || DC, then ∠ADC is equal to :

   (A) 90°   (B) 45°
   (C) 60°   (D) 75°

8. The triangle formed by BC = 7.2 cm, AC = 6 cm and ∠C = 120° is :
   (A) An acute angled triangle
   (B) An obtuse angled triangle
   (C) A right angled triangle
   (D) No triangle is formed

9. The top of a broken tree touches the gorund at a distance of 15 m from its base. If the tree is broken at a height of 8 m from the ground, then the actual height of the tree is :
   (A) 20 m   (B) 25 m
   (C) 30 m   (D) 17 m

10. ABC is an isosceles triangle with AB = AC and AD is altitude, then :
    (A) ∠B > ∠C   (B) ∠B < ∠C
    (C) ∠B = ∠C   (D) ∠B ≤ ∠C

11. If two triangles are formed by dividing a square into half, what is the measure of each angle ?
    (A) 50°, 50°, 80°   (B) 90°, 45°, 45°
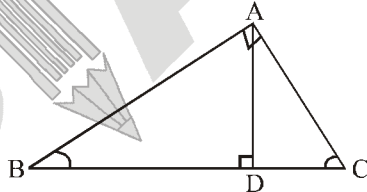   (C) 65°, 65°, 5°   (D) 60°, 60°, 60°

12. If two sides of an isosceles triangles are 3 cm and 8 cm, then the length of the third side is :
    (A) 3 cm   (B) 8 cm
    (C) 3 cm or 8 cm (D) 5 cm

13. The three angles of a triangle are in the ratio 1 : 2 : 1, then the greatest angle is :

    (A) 45°   (B) 90°

    (C) 60°   (D) 120°

14. Which of the following cannot be side of a triangle ?

    (A) 2.5 cm, 6.5 cm, 6 cm

    (B) 3 cm, 4 cm, 5 cm

    (C) 2 cm, 3 cm, 5 cm

    (D) 1.5 cm, 2 cm, 2.5 cm

15. If the two legs of a right angled triangle are equal and the square of the hypotenuse is 100 cm^2, then the length of each leg is :

    (A) 10 cm   (B) $5\sqrt{2}$ cm

    (C) $10\sqrt{2}$ cm   (D) $13\sqrt{2}$ cm

16. One of the exterior angle of a triangle is 70°, Interior opposite angles are in the ratio 2 : 5. The angles are :

    (A) 20°, 50°, 110°   (B) 70°, 20°, 90°

    (C) 45°, 45°, 90°   (D) 60°, 60°, 60°

17. Two chimneys 18 m and 13 m high stand upright on a ground. If their feet is 12 m apart, then the distance between their tops is :

    (A) 5 m   (B) 31 m

    (C) 13 m   (D) 18 m

18. Two angles of a triangle are 60°, then the triangle is :

    (A) Right angled triangle

    (B) Scalene triangle

    (C) Obtuse angled triangle

    (D) Equilateral triangle

19. In the figure, the measure of angle BAD is twice the measure of angle BAC.
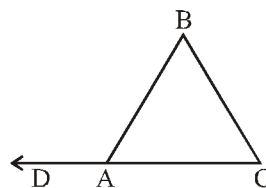
    What is the measure of angle BAC ?

    (A) 120°   (B) 45°

    (C) 60°   (D) 90°

20. The perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm is :

    (A) 82 cm   (B) 49 cm

    (C) 98 cm   (D) 80 cm

21. In $\triangle ABC$, $\angle BAC = 90°$ and $AD \perp BC$. If $\angle BAD = 40°$, then $\angle ACD$ is :

    (A) 40°   (B) 50°

    (C) 140°   (D) 60°

22. The lengths of two sides of a triangles are 6 cm and 8 cm. Between which two numbers can length of the third side fall ?

    (A) 1 to 12   (B) 2 to 14

    (C) 3 to 16   (D) 1 to 15

23. In $\triangle ABC$, If AB = BC and $\angle B = 80°$ then $\angle C$

    (A) 50°   (B) 100°

    (C) 130°   (D) 60°

24. An exterior angle of a triangle is _____ the sum of its interior opposite angles.

    (A) Greater than   (B) Less than

    (C) Equal to   (D) Greater or equal to

25. If the area of a triangle with base x is equal to the area of a square with side x, then the altitude of the triangle is :
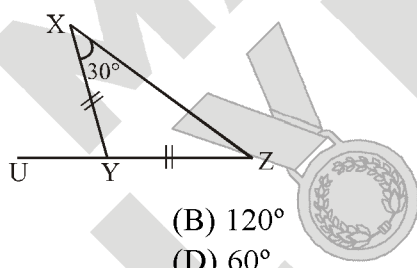
(A) $\frac{x}{2}$ (B) x

(C) 2x   (D) 3x

26. In a ΔPQR, PQ = PR and ∠Q is twice that of ∠P. Then ∠Q =

(A) 72°   (B) 36°

(C) 144°   (D) 108°

27. Which of the following statements is correct ?

(A) The difference of any two sides is less than the third side

(B) A triangle cannot have two obtuse angles

(C) A triangle cannot have an obtuse angle and a right angle

(D) All the above

28. The value of ∠XYU in the given figure is :

(A) 30°   (B) 120°
(C) 90°   (D) 60°

PARAGRAPH TYPE

PASSAGE # 1

In a right Δ ABC in which ∠C = 90°
we have $AB^2 = BC^2 + AC^2$
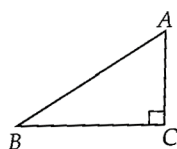
1. The hypotenuse of a right angled triangle is 17 cm. If one of the remaining two sides is 8 cm, find the length of the other side.

(A) 10 cm   (B) 15 cm
(C) 13 cm   (D) 7 cm

2. The lengths of the sides of two triangles are given below. Which of the following is a right angled triangle?

(i) a = 12 cm, b = 35 cm and c = 37 cm
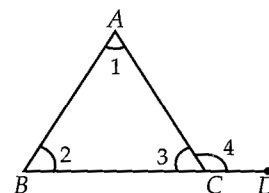(ii) a = 13 cm, b = 5 cm and c = 15 cm

(A) only (i)   (B) only (ii)
(C) both (i) and (ii)   (D) None of these

3. A man goes 15 m due east and then 8 m due north. How far is he from his initial position?
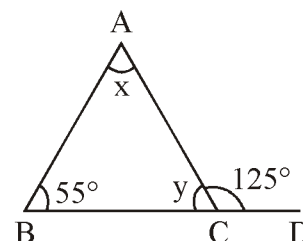
(A) 17 m   (B) 19 m
(C) 21 m   (D) 23 m

PASSAGE # 2

If a side of a triangle is produced then the exterior angle so formed is equal to the sum of the two interior opposite angles, i.e.,

4. In the given figure, find the values of x and y respectively.

(A) 75°, 50°   (B) 95°, 45°
(C) 70°, 55°   (D) 90°, 45°

5. One side of a triangle is produced and the exterior angle so formed is 120°. If the interior opposite angles are in the ratio 3 : 5, find the measure of each angle of the triangle.

(A) 45°, 75°, 60°　　　(B) 40°, 70°, 70°

(C) 45°, 70°, 65°　　　(D) 40°, 75°, 65°

6. If the side of a triangle are produced in order, then the sum of the exterior angles so formed is :

(A) 180°　　　　　　(B) 270°

(C) 90°　　　　　　(D) 360°

TRUE FALSE TYPE

1. Sum of the two angles of a triangle is always greater than the third angle.

2. The sum of the measures of three angles of a triangle is greater than 180°.

3. It is possible to have a right angle in equilateral triangle.

4. It is possible to have a triangle in which two angles are acute.

5. It is possible to have a triangle in which all angles are greater than 60°.
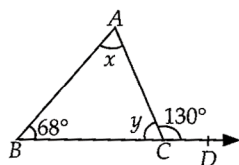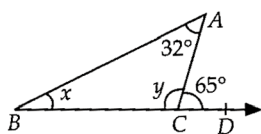
Space for Notes :

VERY SHORT ANSWER TYPE

1. In a $\triangle ABC$, $\angle A = 65°$, $\angle B = 35°$, find the measure of $\angle C$.

2. In the given figure, find $\angle ACD$.
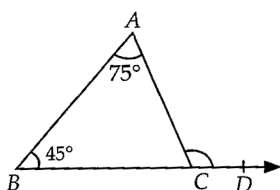


3. In the given figure, find the value of x and y.

4. In the given figure, find the value of x and y.

5. It is possible to draw a triangle whose sides are 5 cm, 8 cm, 9 cm?

6. What is the measure of each angle of an equilateral triangle?

7. In a $\triangle XYZ$, if $\angle X = 90°$ and $\angle Z = 48°$, find $\angle Y$.

8. In a $\triangle ABC$, right angled at B, if AB = 3 cm, BC = 4 cm, then find CA.

9. How many lines of symmetry are there in an equilateral triangle?

10. In $\triangle ABC$, Find $\angle A + \angle B$, if the exterior angle of $\angle C$ is 135°.

SHORT ANSWER TYPE

1. Find the angles of a $\triangle ABC$ which are in the ratio 11 : 13 : 12.

2. It is possible to draw a triangle whose sides are 5 cm, 7 cm and 12 cm?

3. Two angles of triangle are equal and the third angle measures 80°. Find the measure of each of the unknown angles.

4. In $\triangle PQR$, QR || ST, find the value of a, b and c.
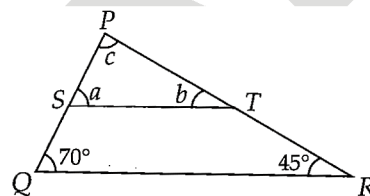
5. The given figure is formed up of two triangles. Find $\angle ABD + \angle DBC + \angle BCD + \angle CDB + \angle BDA + \angle DAB$.
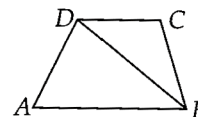

6. Determine whether the triangle whose lengths are 5 cm, 12 cm and 13 cm is a right-angled triangle.

7. Three squares have area 25cm^2, 16cm^2 and 9cm^2, will the squares exactly surround the edges of a right angled triangle?

8. What is the length of the ractangle?
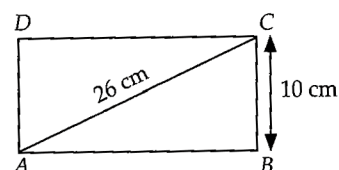
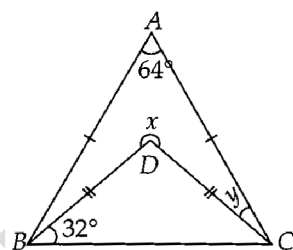9. The angles of a triangle are in the ratio 3 : 5 : 10. Find the measure of each angle.

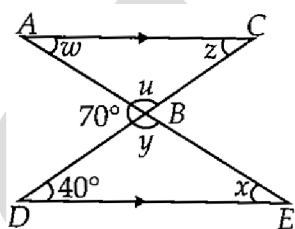10. Find all the angles of the triangle in the figure given below :
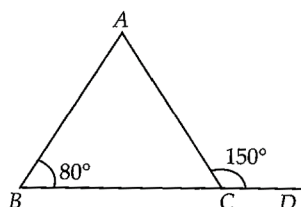
LONG ANSWER TYPE

1. One of the exterior angles of a triangle is 80° and the interior opposite angles are in the ratio 5 : 3. Find all the angles of the triangle.

2. Find x and y respectively.

3. In the given figure given below, find the angles x, y, z. u and w.

4. Find the perimeter of the rectangle whose length is 40 cm and one diagonal is 41 cm.

5. In a ΔPQR, if $6 \angle R = 4\angle Q = 3\angle P$. then find $\angle P$, $\angle Q$, $\angle R$.

Space for Notes :

Answer Key

EXERCISE I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	A	A	C	C	D	C	B	B	C	B	B	B	C	B
16	17	18	19	20	21	22	23	24	25	26	27	28		
A	C	D	C	C	A	B	A	C	C	A	D	D		

PARAGRAPH

1. B   **2.** A   **3.** A   **4.** C   **5.** A   **6.** D

TRUE / FALSE

1. F   **2.** F   **3.** F   **4.** T   **5.** F

EXERCISE II

VERY SHORT ANSWER TYPE

1. 80°   **2.** 120°   **3.** x = 62°, y = 50°   **4.** x = 33°, y = 115°   **5.** Yes

6. 60°   **7.** 42°   **8.** 5 cm   **9.** 3   **10.** 135°

SHORT ANSWER TYPE

1. 55°, 65°, 60°   **2.** No   **3.** 50°   **4.** a = 70°, b = 45°, c = 65°

5. 360°   **6.** Yes   **7.** Yes   **8.** 24 cm

9. 30°, 50°, 100°   **10.** ∠BAC = 70° ; ∠ACB = 30°

LONG ANSWER TYPE

1. 30°, 50°, 100°   **2.** x = 244°, y = 26°   **3.** x = 30°, y = 110°, z = 40°, μ = 110°, w = 30°

4. 98 cm   **5.** ∠P = 80°, ∠Q = 60°, ∠R = 40°

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : FRACTIONS AND DECIMALS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

MATRIX

JEE Division | NEET Division

⌂ Piprali Road, Sikar, Rajasthan 332001 | ☏ 01572-241911, 01572-243911

MATRIX HIGH SCHOOL
Pre-foundation & Schooling Division

⌂ Piprali Road, Sikar, (Raj.) 332001 | Bikaner Bypass Road, Near Gokulpura Village, Sikar (Raj.) 332021 | ☏ 01572-242911

Scan QR to Register

Visit us www.mof.matrixedu.in

f @matrixsikar   @matrix_sikar   @MatrixSikar   /c/matrixacademy