Kendriya Vidyalaya Sangathan's Symbol

KENDRIYA VIDYALAYA SANGATHAN

CHANDIGARH – REGION

Study Material

TERM-2

CLASS -VII

Subject- Mathematics

Session: 2021-22

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Study Material, Term-II, Class VII, Mathematics

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Prescribed Books:

1) Mathematics Textbook for Class VII, NCERT Publications
2) Mathematics Lab Manual class VI to VIII, published by NCERT

Split – Up of Syllabus as per Academic Plan for the Year 2021-22

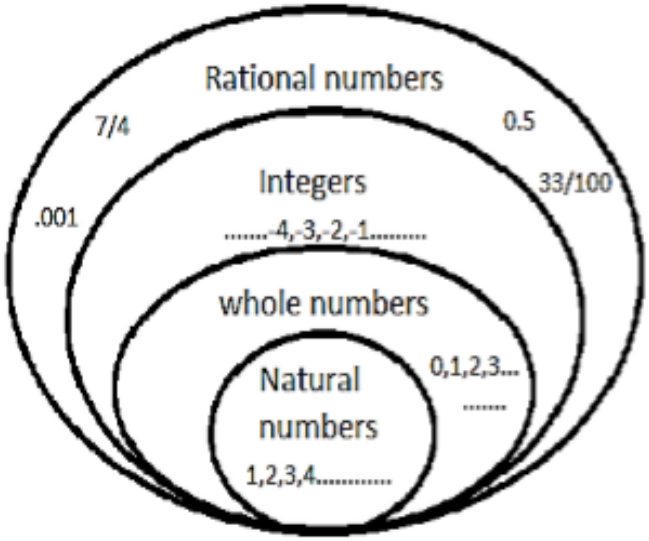
Name of the Chapter	Month
Chapter 9, Rational Numbers (08 Periods)	October
Chapter 10, Practical Geometry (08 Periods) Chapter 11, Perimeter and Area (14 Periods)	November
Chapter 12, Algebraic Expressions (12 Periods) Chapter 13, Exponents and Powers (12 Periods)	December
Chapter 14, Symmetry (08 Periods)	January
Chapter 15, Visualizing Solid Shapes (10 Periods)	February

CHAPTER – 9
RATIONAL NUMBERS

KEY POINTS

Rational Numbers

Rational Numbers are the numbers that can be expressed in the form p/q where p and q are integers ($q \neq 0$). It includes all natural, whole numbers, fractions and integers.



Equivalent Rational Numbers

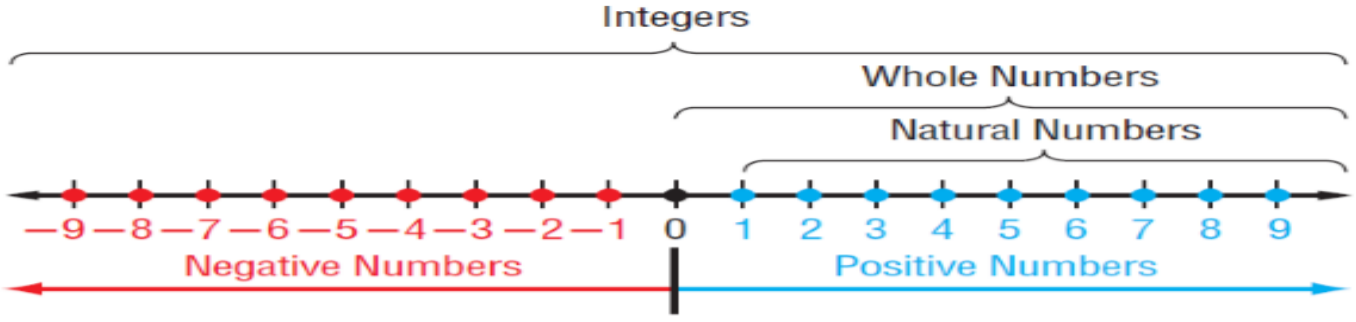
By multiplying or dividing the numerator and denominator of a rational number by the same integer, we can obtain another rational number equivalent to the given rational number.
Numbers are said to be equivalent if they are proportionate to each other

Positive and Negative Rational Numbers

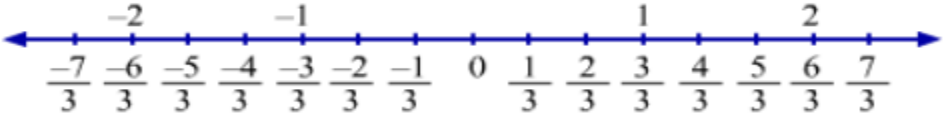
1. Positive Rational Numbers are the numbers whose both the numerator and denominator are positive.
Example: $\frac{3}{4}, \frac{19}{7}$ etc.
2. Negative Rational Numbers are the numbers whose one of the numerator or denominator is negative.
Example: $\frac{-3}{4}, \frac{19}{-7}$ etc.
Remark: The number 0 is neither a positive nor a negative rational number.

Rational Numbers on the Number Line

Representation of whole numbers, natural numbers and integers on a number line is done as follows



Rational Numbers can also be represented on a number line like integers i.e. positive rational numbers are on the right to 0 and negative rational numbers are on the left of 0.
Representation of rational numbers can be done on a number line as follows



Rational Numbers in Standard Form

A rational number is in the standard form if its denominator is a positive integer and there is no common factor between the numerator and denominator other than 1.

If any given rational number is not in the standard form then we can reduce it to its standard form or the lowest form by dividing its numerator and denominator by their HCF ignoring its negative sign.

Example

Find the standard form of $\frac{12}{18}$.

Solution

$$\frac{12}{18} \div \frac{6}{6} = \frac{2}{3}$$

$\frac{2}{3}$ is the standard or simplest form of $\frac{12}{18}$.

Comparison of Rational Numbers

1. To compare the two positive rational numbers we need to make their denominator same, then we can easily compare them
2. To compare two negative rational numbers, we compare them ignoring their negative signs and then reverse the order,
3. If we have to compare one negative and one positive rational number then it is clear that the positive rational number will always be greater as the positive rational number is on the right to 0 and the negative rational numbers are on the left of 0.

Rational Numbers between Rational Numbers

To find the rational numbers between two rational numbers, we have to make their denominator same then we can find the rational numbers.

Remark: There are "n" numbers of rational numbers between any two rational numbers.

Operations on Rational Numbers

1. Addition

a. Addition of two rational numbers with the same denominator: We can add it using a number line.

b. Addition of two Rational Numbers with different denominator: If we have to add two rational numbers with different denominators then we have to take the LCM of denominators and find their equivalent rational numbers with the LCM as the denominator, and then add them

c. Additive Inverse: Like integers, the additive inverse of rational numbers is also the same. a + (-a) = 0

2. Subtraction

If we have to subtract two rational numbers then we have to add the additive inverse of the rational number that is being subtracted to the other rational number. a - b = a + (-b)

3. Multiplication

a. Multiplication of a Rational Number with a Positive Integer:

To multiply a rational number with a positive integer we simply multiply the integer with the numerator and the denominator remains the same.

b. Multiplication of a Rational Number with a Negative Integer:

To multiply a rational number with a negative integer we simply multiply the integer with the numerator and the denominator remains the same and the resultant rational number will be a negative rational number.

c. Multiply of a Rational Number with another Rational Number:
To multiply a rational number with another rational number we have to multiply the numerator of two rational numbers and multiply the denominator of the two rational numbers.

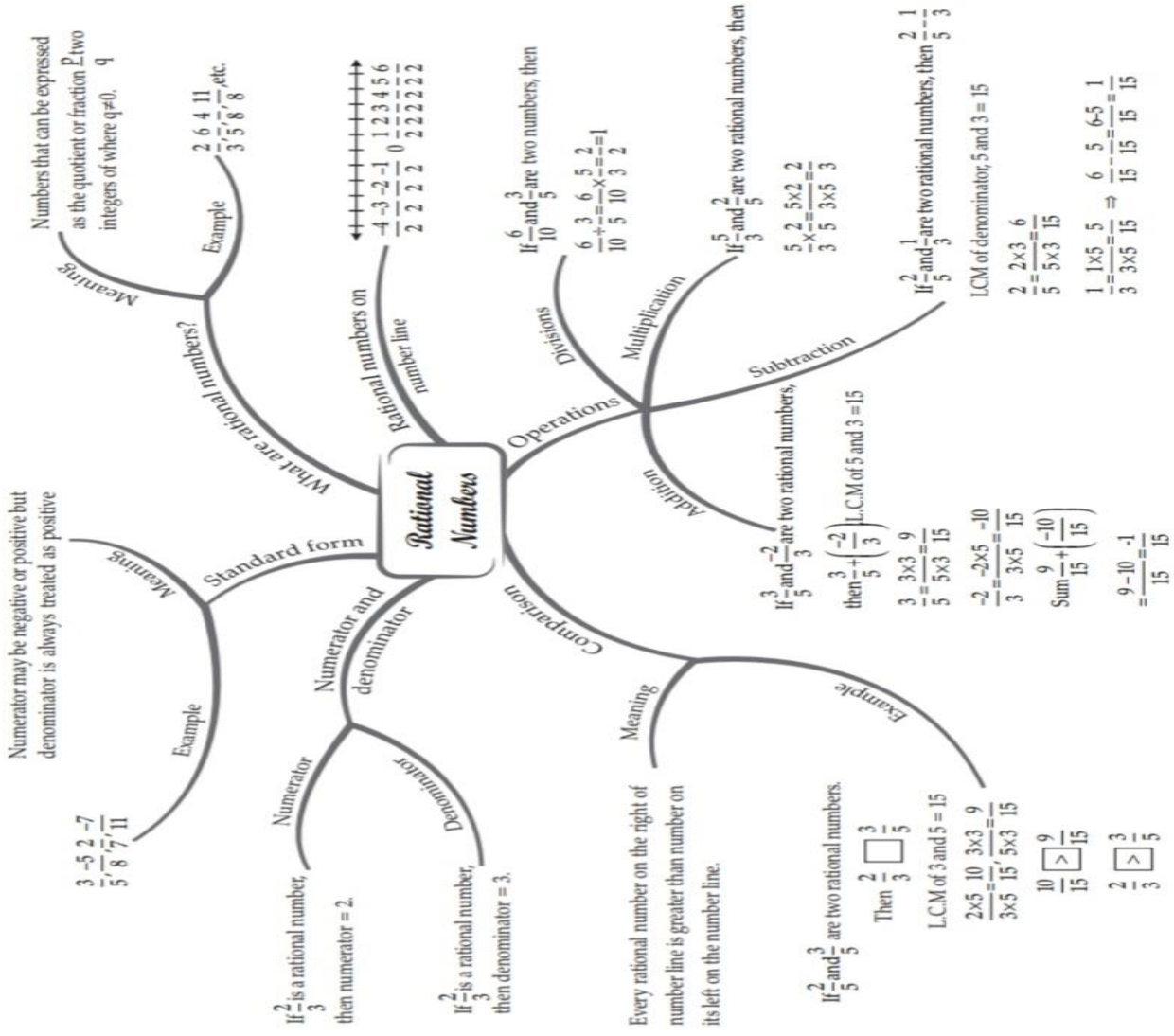
$$\text{The Product of Two Rational Numbers} = \frac{\text{Product of Numerators}}{\text{Product of Denominators}}$$

4. Division
a. Reciprocal
Reciprocal is the multiplier of the given rational number which gives the product of 1. Reciprocal of a/b is b/a

Product of Reciprocal: If we multiply the reciprocal of the rational number with that rational number then the product will always be 1.

b. Division of a Rational Number with another Rational Number:
To divide a rational number with another rational number we have to multiply the reciprocal of the rational number with the other rational number.

MIND MAP



OBJECTIVE TYPE QUESTIONS

1. A rational number pq is said to be in the lowest form if p and q have no _____
2. The rational number $\frac{17}{19}$ lies to the _____ of zero on the number line.
3. If $\frac{p}{q}$ is a rational number, then q can't be _____
4. Two rational numbers with different numerators are equal, if their numerators are in the same _____ as their denominators.
5. Multiplicative inverse of $\frac{7}{9}$ is _____.
6. Two rational numbers are equal if they have the same _____ form.
7. A rational number $\frac{p}{q}$ is negative if p & q are of _____ sign.
8. If the product of two non-zero rational number is 1, then they are _____ of each other.
9. Between any two distinct rational numbers there are _____ rational numbers.
10. Additive inverse of $\frac{2}{3}$ is _____.

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. common factor	2. Right	3. 0	4. Ratio	5. $\frac{9}{7}$
6. Simple	7. Opposite	8. Reciprocal	9. Infinite	10. $\frac{-2}{3}$

MULTIPLE CHOICE QUESTIONS

(1) The denominator of the rational number $\frac{5}{-3}$ is

(a) 5 (b) -3 (c) 3 (d) 8

(2) If $\frac{3}{4} = \frac{?}{12}$, then? =

(a) 3 (b) 6 (c) 9 (d) 12

(3) Which of the following is a negative rational number?

(a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{-4}{-5}$ (d) $\frac{2}{-3}$

(4) Which of the following is a positive rational number?

(a) $\frac{-1}{2}$ (b) $\frac{2}{-3}$ (c) $\frac{-3}{-4}$ (d) -5

(5) The rational number $\frac{12}{40}$ in standard form is

(a) $\frac{3}{10}$ (b) $\frac{6}{10}$ (c) $\frac{3}{20}$ (d) $\frac{6}{20}$

(6) The rational number −21/28 in standard form is

(a) $\frac{-3}{4}$ (b) $\frac{3}{4}$ (c) $\frac{3}{7}$ (d) $\frac{-3}{7}$

(7) Which of the following is correct?

(a) $\frac{1}{-2} > \frac{-1}{3}$ (b) $\frac{1}{-2} < \frac{-1}{3}$ (c) $\frac{1}{-2} = \frac{-1}{3}$ (d) None of these

(8) The reciprocal of $\frac{-2}{5}$ is:

(a) $\frac{-5}{2}$ (b) $\frac{5}{2}$ (c) $\frac{2}{5}$ (d) $\frac{-2}{5}$

(9) The sum $\frac{-3}{4}$ and 0 =

(a) $\frac{3}{4}$ (b) $\frac{-3}{4}$ (c) 1 (d) 0

(10) $\frac{-6}{5} \times 1 =$

(a) $\frac{-6}{5}$ (b) $\frac{6}{5}$ (c) $\frac{-5}{6}$ (d) $\frac{5}{6}$

ANSWERS OF MCQ

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

VERY SHORT ANSWER TYPE QUESTIONS

(1) If $\frac{x}{6} = \frac{-35}{42}$, then find the value of x.

Solution: x = $\frac{-35}{42}$ x 6

x=-5

(2) How many rational numbers are there between two rational numbers ?

Solution: Uncountable

(3) Which is greater $\frac{3}{4}$ or $\frac{7}{8}$?

Solution: $\frac{7}{8}$

(4) Find $\frac{3}{13} + \frac{5}{65}$

Solution: $\frac{4}{13}$

(5) In the standard form of rational numbers, find the common factor of numerator and denominator?

Solution: 1

(6) Find the standard form of $\frac{-48}{60}$.

Solution: $\frac{-4}{5}$

(7) Find the difference between $\frac{5}{7}$ and $\frac{3}{8}$.

Solution: $\frac{19}{56}$

(8) What is the multiplicative inverse of $\frac{-21}{26}$?

Solution: $\frac{-26}{21}$

(9) Write $\frac{-165}{210}$ in simplest form.

Solution: $\frac{-11}{14}$

(10) What is the product of $\frac{-3}{5}$ and $\frac{4}{7}$.

Solution: $\frac{-12}{35}$

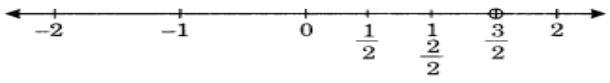
SHORT ANSWER TYPE QUESTIONS

1. Represent the following on number line.

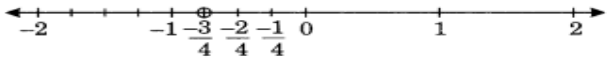
   $(i)\frac{3}{2}$ (ii) $\frac{-3}{4}$

Solution:

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



$(ii)\ -\frac{3}{4}$



2. Find the sum of

   (i) $\frac{5}{4} + \frac{(-11)}{4}$ (ii) $\frac{5}{3} + \frac{3}{5}$

Solution: (i) $\frac{5}{4} + \frac{(-11)}{4}$

$= \frac{5}{4} - \frac{11}{4}$ $= \frac{(5-11)}{4}$ $= \frac{-6}{4}$ $= \frac{-3}{2}$

(ii) $\frac{5}{3} + \frac{3}{5}$

Taking L.C.M of 3 and 5 , we get 15

$\frac{5}{3}+\frac{3}{5}=\frac{5\times5}{3\times5}+\frac{3\times3}{5\times3}=\frac{25}{15}+\frac{9}{15}=\frac{(25+9)}{15}=\frac{34}{15}$

3. The difference of two rational numbers is $\frac{9}{5}$. If one of the number is 3, find the other number.

Solution: Let the other number **=x**

According to the question,

$x-3=\frac{9}{5}$

or $x=\frac{9}{5}+3=\frac{9}{5}+\frac{3}{1}=\frac{9+15}{5}==\frac{24}{5}$

∴ the other number is 24/5

4. Out of $\frac{2}{3}$ and $\frac{5}{9}$, which is greater and by how much?

Solution: First we have to compare the fractions: $\frac{2}{3}$ and $\frac{5}{9}$

$\frac{2}{3},\frac{5}{9}$

By cross multiplication, we have:

2 × 9 = 18 and 5 × 3 = 15

However, 18 > 15

$\therefore \frac{2}{3}>\frac{5}{9}$

So, $\frac{2}{3}$ is greater than $\frac{5}{9}$.

Now, $\frac{2}{3}-\frac{5}{9}$

$=\frac{6-5}{9}$ [∵ LCM of 3 and 9 = 9]

$=\frac{1}{9}$

Hence, $\frac{2}{3}$ is $\frac{1}{9}$ part more than $\frac{5}{9}$.

5. If the product of two rational numbers is $\frac{-9}{16}$ and one of them is $\frac{-4}{15}$, find the other number.

Solution: Let the required rational number be x.

$$\therefore\ x\times\left(\frac{-4}{15}\right)=-\frac{9}{16}$$

$$\Rightarrow\quad x=-\frac{9}{16}\div\left(-\frac{4}{15}\right)=-\frac{9}{16}\times\frac{15}{-4}$$

$$\left[\text{Reciprocal of } -\frac{4}{15}=\frac{15}{-4}\right]$$

$$=\frac{-9\times15}{-16\times4}=\frac{135}{64}=2\frac{7}{64}$$

$$\text{Hence, the required rational number} = 2\frac{7}{64}.$$

6. Arrange $\frac{-3}{5},\frac{-2}{5},\frac{-1}{5}$ in ascending order.

Solution: Given, rational numbers are $\frac{-3}{5},\frac{-2}{5},\frac{-1}{5}$

The above rational numbers are like rational numbers.

As, −3<−2<−1

Thus, the ascending order is $\frac{-3}{5}<\frac{-2}{5}<\frac{-1}{5}$

7. Divide the sum of $-2\frac{15}{17}$ and $3\frac{5}{34}$ by their difference.

Solution: First convert these mixed fractions into improper fraction.

=> $-2\frac{15}{17}=-\frac{49}{17}$ and $3\frac{5}{34}=\frac{107}{34}$

Then take the L.C.M. of denominators to make them same.

L.C.M. of 17 and 34=2×17=34

⇨ $-\frac{49}{17}\times\frac{2}{2}=\frac{-98}{17}$ and $\frac{107}{34}\times\frac{1}{1}=\frac{107}{34}$

Now add them:

$\frac{(-98+107)}{34}=\frac{9}{34}$

Subtract them:

$\frac{(-98-107)}{34}=\frac{-205}{34}$

Now divide the answers we get after adding and subtracting them: -

$\frac{9}{34}\div\frac{-205}{34}$

Take reciprocal of $\frac{-205}{34}$

=>$\frac{9}{34}\times$ (reciprocal of $\frac{-205}{34}$)

=> $\frac{9}{34}\times\frac{34}{-205}=-\frac{9}{205}$

8. Insert five rational numbers between:

(*i*) $\frac{-2}{3}$ and -1 (*ii*) $-\frac{1}{2}$ and $\frac{-3}{2}$

Solution:

(*i*) $\frac{-2}{3}$ and $-1 \Rightarrow \frac{-2}{3}$ and $\frac{-1}{1}$

LCM of 3 and 1 = 3

$\therefore \frac{-2\times1}{3\times1}=\frac{-2}{3}$ and $\frac{-1\times3}{1\times3}=\frac{-3}{3}$

We know that there is no integer between -2 and -3.

$\therefore$ Multiplying and dividing by 5 + 1 = 6 to each of the rational numbers, we have

$\frac{-2\times6}{3\times6}=\frac{-12}{18}$ and $\frac{-3\times6}{3\times6}=\frac{-18}{18}$

Here, integers between -12 and -18 are -13, -14, -15, -16 and -17.

$\therefore$ The required rational numbers are

$\frac{-13}{18}, \frac{-14}{18}, \frac{-15}{18}, \frac{-16}{18}$ and $\frac{-17}{18}$

i.e., $\frac{-13}{18}, \frac{-7}{9}, \frac{-5}{6}, \frac{-8}{9}, \frac{-17}{18}$

(*ii*) $-\frac{1}{2}$ and $\frac{-3}{2}$

Since, the denominator are same and there is only one integer between -1 and -3.

$\therefore$ Multiplying and dividing by 5 + 1 = 6 to each of the rational numbers, we have

$\frac{-1\times6}{2\times6}=\frac{-6}{12}$ and $\frac{-3\times6}{2\times6}=\frac{-18}{12}$

Here, the integers between -6 and -18 are -7, -8, -9, -10, -11

$\therefore$ The required rational numbers are

$\frac{-7}{12}, \frac{-8}{12}, \frac{-9}{12}, \frac{-10}{12}, \frac{-11}{12}$

i.e., $\frac{-7}{12}, \frac{-2}{3}, \frac{-3}{4}, \frac{-5}{6}, \frac{-11}{12}$

9. Evaluate the following:

$$\frac{-12}{-5}+\frac{7}{-3}+\frac{-5}{14}+\frac{22}{7}$$

Solution:

$$\frac{-12}{-5}+\frac{7}{-3}+\frac{-5}{14}+\frac{22}{7}$$

$$=\frac{12}{5}-\frac{7}{3}-\frac{5}{14}+\frac{22}{7}$$

[LCM of 5, 3, 14, 7 = 210]

$$\therefore \quad \frac{12}{5}=\frac{12\times 42}{5\times 42}=\frac{504}{210}$$

$$\frac{-7}{3}=\frac{-7\times 70}{3\times 70}=\frac{-490}{210}$$

$$\frac{-5}{14}=\frac{-5\times 15}{14\times 15}=\frac{-75}{210}$$

$$\frac{22}{7}=\frac{22\times 30}{7\times 30}=\frac{660}{210}$$

So, $\frac{12}{5}-\frac{7}{3}+\frac{-5}{14}+\frac{22}{7}$

$$=\frac{504}{210}-\frac{490}{210}-\frac{75}{210}+\frac{660}{210}$$

$$=\frac{504-490-75+660}{210}$$

$$=\frac{1164-565}{210}$$

$$=\frac{599}{210}=2\frac{179}{210}$$

10. Simplify:

$21.5 \div 5 - \frac{1}{5}$ of $(20.5 - 5.5) + 0.5 \times 8.5$

Solution: Using BODMAS rule, we have

$21.5 \div 5 - \frac{1}{5}$ of $(20.5 - 5.5) + 0.5 \times 8.5$

$= 21.5 \div 5 - \frac{1}{5}$ of $15 + 0.5 \times 8.5$

$= 21.5 \times \frac{1}{5} - \frac{1}{5} \times 15 + 0.5 \times 8.5$

$= 4.3 - 3 + 4.25$

$= 4.3 + 4.25 - 3$

$= 8.55 - 3$

$= 5.55$

LONG ANSWER TYPE QUESTIONS

1. During a festival sale, the cost of an object is Rs 870 on which 20% is off. The same object is available at other shops for Rs 975 with a discount of $6\frac{2}{3}$ %. Which is a better deal and by how much?

Solution: The cost of the object = Rs 870

Discount = 20% of Rs 870 = $\frac{20}{100} \times 870$ = Rs 174

Selling price = Rs 870 – Rs 174 = Rs 696

The same object is available at other shop = Rs 975

$$\text{Discount} = 6\frac{2}{3}\% \text{ of } ₹\ 975$$

$$= \frac{\cancel{20}}{\cancel{3}} \times \frac{1}{\cancel{100}_{\cancel{5}}} \times \cancel{975}^{\cancel{195}^{65}} = ₹\ 65$$

Selling price = Rs 975 – Rs 65 = Rs 910
Since Rs 910 > Rs 696
Difference = Rs 910 - Rs 696 = Rs 214
So, the cost of an object is Rs 870 on which 20% is off is a better deal by Rs 214.

2. Select those rational numbers which can be written as a rational number with numerator 6: (1/22), (2/3), (3/4), (4/-5), (5/6), (-6/7), (-7/8)

Solution: (1/22), (2/3), (3/4) and (-6/7)

3. In each of the following, find an equivalent form of the rational number having a common denominator:
(i) (3/4) and (5/12) (ii) (2/3), (7/6) and (11/12) (iii) (5/7), (3/8), (9/14) and (20/21) Solution:

Solution: (i) Equivalent forms with same denominators are (9/12) and (5/12)
(ii) Equivalent forms are (8/12), (14/12) and (11/12) having same denominators
(iii) Forms are (120/168), (63/168), (108/168) and (160/168) having same denominators

4. Express each of the following rational numbers to the lowest form:

(i) $\frac{132}{-428}$ (ii) $\frac{-32}{-56}$

Solution: (i) $\frac{132}{-428}$

Find HCF OF (132, 428) = 4

Divide numerator and denominator by 4 we get $\frac{33}{-107}$

(ii) $\frac{-32}{-56}$

Find HCF of 32 and 56

HCF (32,56) =8

Divide numerator and denominator by 8 we get

We get $\frac{4}{7}$.

(5) Rohit donated $\frac{1}{5}$ of his monthly income to an NGO working for the education of old women, $\frac{1}{4}$ of his salary spent on food, $\frac{1}{3}$ on rent and $\frac{1}{15}$ on other expenses. If he is left with Rs 9000, find his monthly income. What values are being promoted?

Solution:

Let salary = ₹ 1

$$\text{Then donation to NGO} = \frac{1}{5} \text{ of } ₹1 = ₹\frac{1}{5}$$

$$\text{Spent on food} = \frac{1}{4} \text{ of } ₹1 = ₹\frac{1}{4}$$

$$\text{On rent} = \frac{1}{3} \text{ of } ₹1 = ₹\frac{1}{3}$$

$$\text{and other expenses} = \frac{1}{15}$$

$$\therefore \text{ Remaining income} = 1 - \left[\frac{1}{5} + \frac{1}{4} + \frac{1}{3} + \frac{1}{15}\right]$$

$$= \frac{60 - (12 + 15 + 20 + 4)}{60}$$

$$= \frac{60 - 51}{60} = \frac{9}{60}$$

6. From a rope 15 m long, $4\frac{1}{3}$ m is cut off and $\frac{3}{5}$ of the remaining is cut off again. Find the length of the remaining part of the rope.

Solution:

Length of a rope = 15 m

$$\text{Length of piece cut off} = 4\frac{1}{3} = \frac{13}{3}\text{ m}$$

$$\text{Remaining length of rope} = 15 - \frac{13}{3}$$

$$= \frac{45-13}{3} = \frac{32}{3}\text{ m}$$

$$\therefore \text{ Again length of rope cut off} = \frac{3}{5} \text{ of } \frac{32}{3}$$

$$= \frac{32}{5}\text{ m}$$

$$\therefore \text{ Remaining length of rope} = \frac{32}{3} - \frac{32}{5}$$

$$= \frac{160-96}{15} = \frac{64}{15} = 4\frac{4}{15}\text{ m}$$

7. Rohit takes $4\frac{4}{5}$ minutes to make complete round of a circular park. How much time will he take to make 15 rounds?

Solution: Time taken by Rohit to complete one round of the circular park = $4\frac{4}{5}$ min $= \frac{24}{5}$ min

$\therefore$ Time taken to complete 15 rounds $= (15 \times \frac{24}{5})$ min

= (3 × 24) min

= 72 min

= 1 h 12 min [$\because$ 1 hr = 60 min]

Hence, Rohit will take 1 h 12 min to make 15 complete rounds of the circular park.

8. Perimeter of a rectangle is 2m less than $\frac{2}{5}$ of the perimeter of a square, if the perimeter of the square is 40m, find the length and breadth of the rectangle given that the breadth is $\frac{1}{3}$ of the length.

Solution:

Perimeter of a square = 40 m

Perimeter of rectangle = $\frac{2}{5}$ of 40 − 2 = 16 − 2 = 14 m

Perimeter of rectangle = 2(Length + Breadth)

$$\therefore \text{ Length + Breadth} = \frac{\text{Perimeter}}{2} = \frac{14}{2} = 7\text{ m}$$

$$\text{If length is 1, then breadth} = \frac{1}{3}$$

$$l + b = 1 + \frac{1}{3} = \frac{4}{3}$$

$$\text{Now divide 7 m in the ratio of } 1 : \frac{1}{3} \Rightarrow 3 : 1$$

$$\therefore \text{ Length} = \frac{7}{3+1} \times 3 = \frac{7\times 3}{4} = \frac{21}{4} = 5\frac{1}{4}\text{ m}$$

$$\text{and breadth } \frac{7}{3+1} \times 1 = \frac{7}{4} \times 1 = \frac{7}{4} = 1\frac{3}{4}\text{ m}$$

9. Which of the following rational numbers is greater?

(i) $\frac{3}{4}, \frac{1}{2}$ (ii) $\frac{-3}{2}, \frac{-3}{4}$

Solution:

(i) We have $\frac{3}{4}, \frac{1}{2}$

LCM of 4 and 2 = 4

$\therefore \quad \frac{3}{4} = \frac{3 \times 1}{4 \times 1} = \frac{3}{4}$

$\frac{1}{2} = \frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$

Since $\frac{3}{4} > \frac{2}{4}$

$\therefore \quad \frac{3}{4} > \frac{1}{2}$

(ii) We have $\frac{-3}{2}, \frac{-3}{4}$

LCM of 2 and 4 = 4

$\therefore \quad \frac{-3}{2} = \frac{-3 \times 2}{2 \times 2} = \frac{-6}{4}$

$\frac{-3}{4} = \frac{-3 \times 1}{4 \times 1} = \frac{-3}{4}$

Since $\frac{-3}{4} > \frac{-6}{4}$

$\therefore \quad \frac{-3}{4} > \frac{-3}{2}$

10. Subtract the sum of −5/6 and -8/5 from the sum 8/3 and -32/5.

Solution:

Sum of $\frac{-5}{6}$ and $-1\frac{3}{5}$

$\Rightarrow \quad \frac{-5}{6} + \left(-1\frac{3}{5}\right) = \frac{-5}{6} - \frac{8}{5}$

$= \frac{-5 \times 5}{6 \times 5} - \frac{8 \times 6}{5 \times 6}$

[LCM of 6 and 5 = 30]

$= \frac{-25}{30} - \frac{48}{30}$

$= \frac{-25 - 48}{30} = \frac{-73}{30}$

Sum of $2\frac{2}{3}$ and $-6\frac{2}{5}$

$\Rightarrow \quad 2\frac{2}{3} + \left(-6\frac{2}{5}\right) = \frac{8}{3} - \frac{32}{5}$

$= \frac{8 \times 5}{3 \times 5} - \frac{32 \times 3}{5 \times 3}$ [LCM of 3 and 5 = 15]

$= \frac{40}{15} - \frac{96}{15} = \frac{40 - 96}{15} = \frac{-56}{15}$

$\therefore$ Required difference is $\left(\frac{-56}{15}\right) - \left(\frac{-73}{30}\right)$

$\frac{-56}{15} + \frac{73}{30} = \frac{73}{30} - \frac{56}{15} = \frac{73 \times 1}{30 \times 1} - \frac{56 \times 2}{15 \times 2}$

$= \frac{73}{30} - \frac{112}{30} = \frac{73 - 112}{30} = \frac{-39^{13}}{30_{10}} = \frac{-13}{10}$

CCT BASED QUESTIONS

QUESTION

"Teacher, why I can't get full credit for this question?"
"Your answer is correct, but you didn't use the correct method, so I am going to give you half credit."
Actually what Tom did was simply cancel the two "6" that appear in the question as shown:

$\frac{ab}{bc} = \frac{a}{c}$

$\frac{16}{64} = \frac{1\ 6}{6\ 4} = \frac{1}{4}$

Although Tom had gotten the correct answer, his method was wrong since 16 and 64 are 10+6 and 60+4 but not 1x6 and 6x4. Therefore, the "6" cannot be cancelled as shown in this method. But sometimes Tom's method is lucky and computes the correct solution.

1. For which of these fractions will Tom's method give a correct answer?

$a) \frac{12}{24}$ $b) \frac{14}{42}$ $c) \frac{13}{39}$ $d) \frac{19}{95}$

2. The standard form of $\frac{-48}{60}$ is?

$a) \frac{48}{60}$ $b) \frac{-60}{48}$ $c) \frac{-4}{5}$ $d) \frac{-4}{-5}$

3. Which of the following is equivalent to $\frac{4}{5}$?

$a) \frac{5}{4}$ $b) \frac{16}{25}$ $c) \frac{16}{20}$ $d) \frac{15}{25}$

4. Which is greater number in the following:

$a) \frac{-1}{2}$ $b)$ 0 $c) \frac{1}{2}$ $d)$ – 2

5. If $\frac{-5}{7} = \frac{x}{28}$, the value of x is :

$a)$ – 20 (b) 20 $c)$ – 30 $d)$ 30

ANSWERS OF CCT BASED QUESTIONS

(1) d (2) c (3) c (4) c (5) a

PRACTICE QUESTIONS FOR SELF ASSESSMENT

OBJECTIVE TYPE QUESTIONS

1. The reciprocal of _____ does not exist.
2. The standard form of $\frac{18}{-24}$ is_____.
3. On a number line, $\frac{3}{-4}$ is to the _____of zero (0).
4. $\frac{-27}{45}$ and $\frac{-3}{5}$ represent the _____ rational numners.
5. In the standard form of a rational number, the common factor of numerator and denominator is always _____.

MULTIPLE CHOICE QUESTIONS

(1) Reciprocal of 1 is
(a) 1 (b) 0 (c) -1 (d) not defined
(2) How many rational numbers are between 2 and 4
(a) one (b) two (c) zero (d) uncountable
(3) The product of $\frac{2}{9}$ and $\frac{27}{8}$ is ……..
(a) $\frac{4}{3}$ (b) $\frac{3}{4}$ (c) 3 (d) 4
(4) Which of the following cannot be a rational number?
(a) $\frac{0}{5}$ (b) $\frac{0}{-5}$ (c) $\frac{5}{0}$ (d) -1

(5) If $\frac{p}{q}$ and $\frac{r}{s}$ are equivalent fraction, then we have

(a) p + s = q + r (b) p ÷ s = q ÷ s (c) pq = rs (d) ps = rq

VERY SHORT ANSWER TYPE QUESTIONS

(1) A rational number is defined as a number that can be expressed in the form $\frac{p}{q}$, where p and q are integers and q =0. Is the statement true?

(2) Write down any four negative rational numbers.

(3) Find the additive inverse of $\frac{4}{5}$.

(4) Write the given rational numbers in ascending order: $\frac{-3}{4}, \frac{-5}{4}, \frac{-9}{4}$.

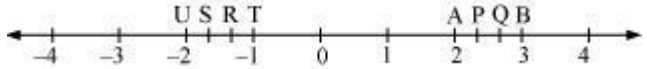
(5) Write the four rational numbers between -2 and 10.

SHORT ANSWER TYPE QUESTIONS

1. Write four more rational numbers in each of the following patterns:

(i) $\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20}, \ldots$ (ii) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \ldots$

2. The points P, Q, R, S, T, U, A and B on the number line are such that, TR = RS = SU and AP = PQ = QB. Name the rational numbers represented by P, Q, R and S.



3. Which of the following pairs represent the same rational number?

(i) $\frac{-7}{21}$ and $\frac{3}{9}$ (ii) $\frac{-16}{20}$ and $\frac{20}{-25}$ (iii) $\frac{-2}{-3}$ and $\frac{2}{3}$

4. Fill in the boxes with the correct symbol out of >, <, and =

(i) $\frac{-5}{7} \square \frac{2}{3}$ (ii) $\frac{-4}{5} \square \frac{-5}{7}$

5. Find the value of:

(i) $\frac{-1}{8} \div \frac{3}{4}$ (ii) $\frac{-7}{12} \div \left(\frac{-2}{13}\right)$ (iii) $\frac{3}{13} \div \left(\frac{-4}{65}\right)$

LONG ANSWER TYPE QUESTIONS

1. Reduce each of the following rational numbers in its lowest form

(i) $\frac{-60}{72}$ (ii) $\frac{-32}{56}$

2. Are the rational numbers $\frac{-8}{28}$ and $\frac{32}{-12}$ equivalent? Give reason.

3. If $\frac{-5}{7} = \frac{x}{28}$ find the value of x

4. Simplify:

(i) $\frac{13}{11} \times \frac{-14}{5} + \frac{13}{11} \times \frac{-7}{5} + \frac{-13}{11} \times \frac{34}{5}$

(ii) $\frac{6}{5} \times \frac{3}{7} - \frac{1}{5} \times \frac{3}{7}$

5. If x = $\frac{1}{10}$ and y = $\frac{-3}{8}$, then evaluate x + y, x-y, xy and x ÷ y.

CCT BASED QUESTIONS

A TIP

A waiter's income consists of his salary and tips made. During one week his tips were $\frac{5}{4}$ of his salary.

1. What fraction of his income came from tips?

$a)\ \frac{5}{8}$ $b)\ \frac{5}{9}$ $c)\ \frac{5}{4}$ $d)\ \frac{4}{9}$

2. Find the odd one out of the following.

$a)\ \frac{4}{3}\times\frac{3}{4}$ $b)\ \frac{-3}{2}\times\frac{-2}{3}$ $c)\ 2\times\frac{1}{2}$ $d)\ \frac{-1}{3}\times\frac{3}{1}$

3. If p = m×t and q = n×t, then $p\ q$ =

$a)\ \frac{n}{m}$ $b)\ \frac{1}{m}$ $c)\ \frac{1}{n}$ $d)\ \frac{m}{n}$

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. Zero 2. $\frac{3}{-4}$ 3. Left 4. Same 5. 1

ANSWERS OF MULTIPLE CHOICE QUESTIONS

(1) a (2) d (3) b (4) c (5) d

ANSWERS OF VERY SHORT ANSWER TYPE QUESTIONS

Solution 1: false

Solution 2: $\frac{-3}{5}$, $\frac{-4}{5}$, -7, $\frac{-14}{3}$ etc.

Solution 3: $\frac{-4}{5}$

Solution 4: $\frac{-9}{4}$, $\frac{-5}{4}$, $\frac{-3}{4}$

Solution 5: -1, 0, 5, 8 (any four between -2 and 10)

ANSWERS OF SHORT ANSWER TYPE QUESTIONS

Solution 1: (i) -15/25, -18/30, -21/35, -24/40 (ii) -4/16, -5/20, -6/24/, -7/28

Solution 2: Each part which is between the two numbers is divided into 3 parts

Therefore, A= $\frac{6}{3}$, P=$\frac{7}{3}$, Q=$\frac{8}{3}$ and B= $\frac{9}{3}$

Similarly T= $\frac{-3}{3}$, R= $\frac{-4}{3}$, S= $\frac{-5}{3}$ and U= $\frac{-6}{3}$

Thus the rational numbers represented by P,Q,R and S are

P=$\frac{7}{3}$, Q=$\frac{8}{3}$, R= $\frac{-4}{3}$, S= $\frac{-5}{3}$

Solution 3: (i) No (ii) Yes (iii) Yes

Solution 4: (i) since a negative number is always smaller than positive -5/7 < 2/3

(ii) Since both are negative,

We ignore the signs $\frac{4}{5}$ and $\frac{5}{7}$, we compare these two numbers. Since denominator in different,

We make it same

Common denominator =L.C.M of 5&7 =5x7=35

4/5=4/5x7/7=28/35 and 5/7=5/7x5/5=25/35

28/35 > 25/35 => $\frac{4}{5}>\frac{5}{7}$

Multiplying by (-1) both sides $\frac{4(-1)}{5}<\frac{5(-1)}{7}$

$\frac{-4}{5}<\frac{-5}{7}$

Solution 5: (i) Simplifying it,

$$\Rightarrow \frac{-1}{8}\times\frac{4}{3}=\frac{-1\times 4}{8\times 3}\Rightarrow \frac{-4}{24}=\frac{-1}{6}$$

(ii)Given

$$\frac{-7}{12}\div\left(\frac{-2}{13}\right)$$

$\frac{-7}{12}$ x $\frac{13}{-2}$ = $\frac{13}{24}$

(iii) Evaluate the given expression.

$==> \frac{3}{13} \div \frac{-4}{65}$

$==> \frac{3}{13} \times -\frac{65}{4}$

$==> -\frac{15}{4}$

ANSWERS OF LONG ANSWER TYPE QUESTIONS

Solution 1: Find HCF of 60 and 72
HCF (60,72) =12
Divide numerator and denominator by 12we get
We get $\frac{-5}{6}$
(ii) $\frac{-32}{56}$
Find HCF of 32 and 56
HCF (32,56) =8
Divide numerator and denominator by 8, we get $\frac{4}{7}$.
Solution 2: Yes
Solution 3 : (-5)(28) = 7x
x = -20

Solution 4 : (i) -13
(ii) 3/7

Solution 5: x + y = -11/40,
x - y = 19/40,
xy = -3/80,
x ÷ y = -4/15

ANSWERS OF CCT BASED QUESTIONS

(1) b (2) d (3) d

Chapter 9, Rational Numbers (October-08 Periods)

e-content, you tube video links

Exercise 9.1 https://youtu.be/OzZW3bARZ_0
Exercise 9.2 https://youtu.be/oGN4pQ02_O0

CHAPTER – 10
PRACTICAL GEOMETRY

KEY NOTES

Construction of Triangles

1. Properties of triangles

(i) The exterior angle of a triangle is equal in measure to the sum of interior opposite angles.
(ii) The total measure of the three angles of a triangle is 180°.
(iii) Sum of the lengths of any two sides of a triangle is greater than the length of the third side.
(iv) In any right-angled triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides.

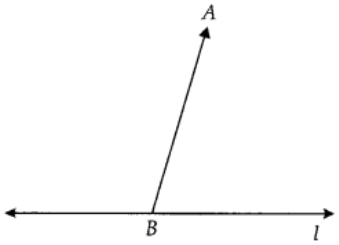
2. Essential measurements for the construction of a triangle

A triangle can be drawn if any one of the following sets of measurements is given:
(i) Three sides: SSS
(ii) Two sides and the angle between them: SAS
(iii) Two angles and the side between them: ASA
(iv) The hypotenuse and a leg in the case of a right-angled triangle: RHS

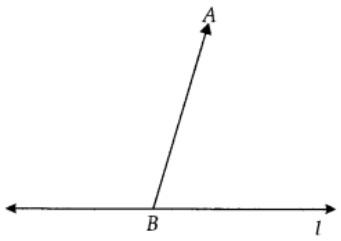
Construction of a line parallels to a given line, through a point not on the line.

Steps of Construction:

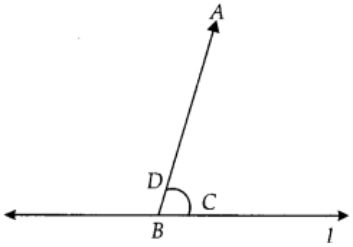
Step 1: Take a line 'l' and a point 'A' outside 'l'



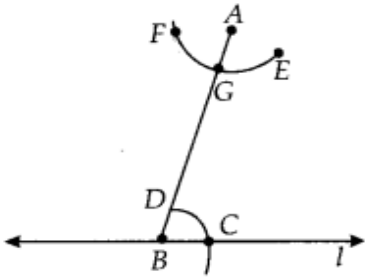
Step 2: Take any Point B on l and join B to A.



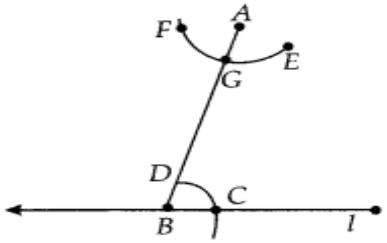
Step 3: With B as centre and a convenient radius, draw an arc cutting l at C and BA at D.



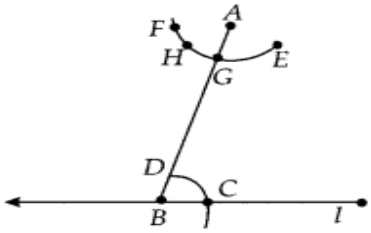
Step 4: Now with A as centre and the same radius as in Step 3 draw an arc EF cutting AB at G.



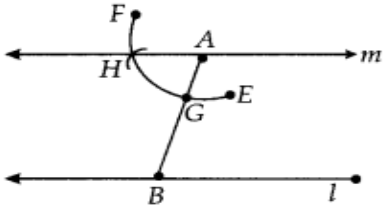
Step 5: Place the pointed tip of the compasses at C and adjust the opening so that the pencil tip at D.



Step 6: With the same opening as in Step 5 and with G as centre, draw an arc cutting the arc EF at H.



Step 7: Now, join AH to draw a line 'm'.



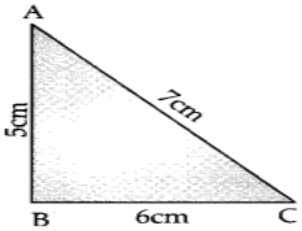
CONSTRUCTION OF A TRIANGLE:

(i) Construction of a triangle when the lengths of its three sides are known (SSS Criterion).

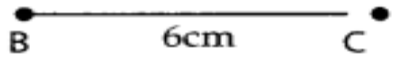
Example: Construct a ΔABC in which AB = 5cm, BC = 6cm and CA = 7cm.

Steps of Construction

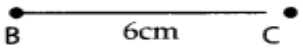
Step 1: First, we draw a rough sketch with a given measure.



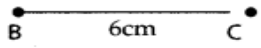
Step 2: Draw a line segment BC of length 6 cm.



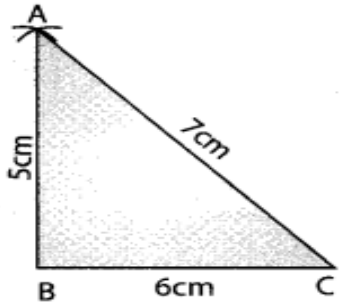
Step 3: From B, point A is at a distance of 5 cm. So with B as centre, draw an arc of radius 5 cm.



Step 4: From C, point A is at a distance of 7 cm. So, with C as centre, draw an arc of radius 7 cm.



Step 5: A has to be on both the arcs drawn. So, it is the point of intersection of arc.
Mark the point of intersection of arcs as A. Join AB and AC. ΔABC is now ready.

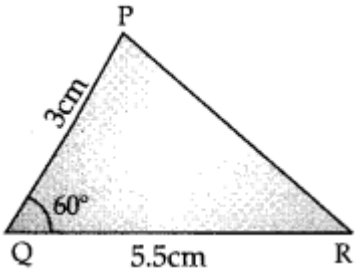


(ii) Constructing a triangle when the lengths of two sides and the measure of the angle between them are known. (SAS Criterion)

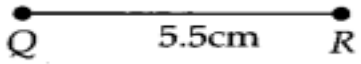
Example: Construct a ΔPQR in which PQ = 3cm, QR = 5.5cm and $\angle Q = 60^0$.

Steps of Construction

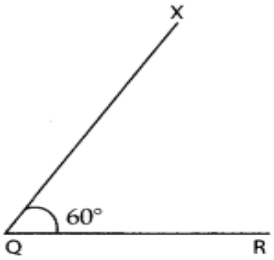
Step 1: First we draw a rough sketch with given measures.



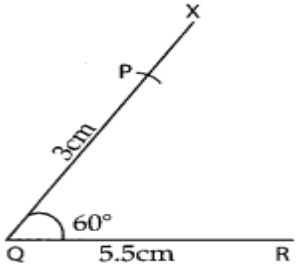
Step 2: Draw a line segment QR of length 5.5 cm.



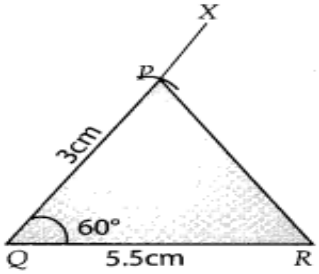
Step 3: At Q, draw QX making 60° with QR.



Step 4: With Q as centre, draw an arc of radius 3 cm. It cuts QX at the point E



Step 5: Join PR. ΔPQR is now obtained.

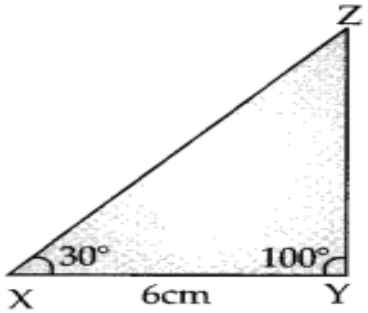


(iii) Constructing a triangle when the measures of two of its angles and the length of the side included between them is given (ASA Criterion)

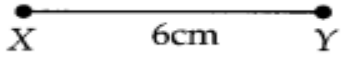
Example: Construct a ΔXYZ in which XY = 6cm, $\angle X = 60^0$ and $\angle Y = 100^0$.

Steps of Construction

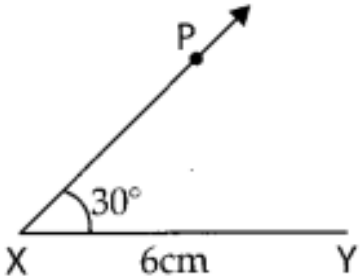
Step 1: Before actual construction, we draw a rough sketch with measures marked on it.



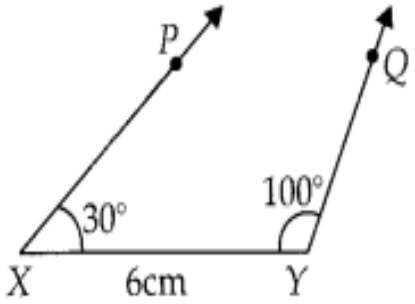
Step 2: Draw XY of length 6 cm.



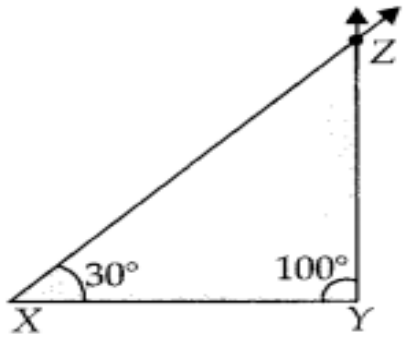
Step 3: At X, draw a ray XP making an angle of 30° with XY. By the given condition Z must be somewhere on the XP.



Step 4: At Y, draw a ray YQ making an angle of 100° with YX. By the given condition, Z must be on the ray YQ also.



Step 5: Z has to lie on both the rays XP and YQ. So, the point of intersection of two rays is Z.



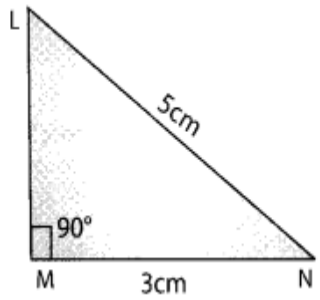
ΔXYZ is now completed.

(iv) Constructing a Right-Angled Triangle when the length of one leg and its hypotenuse are given (RHS Criterion)

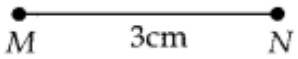
Example: Construct a ΔLMN in which MN = 3cm, ∠M = 90^0 and LN = 5cm.

Steps of Construction

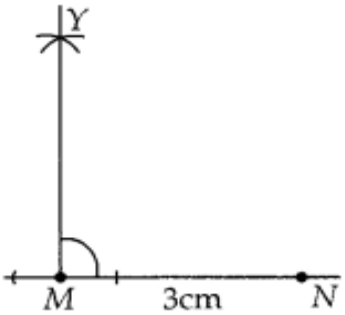
Step 1: Draw a rough sketch and mask the measures. Remember to mark the right angle.



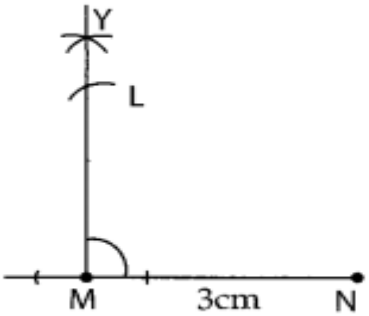
Step 2: Draw MN of length 3 cm.



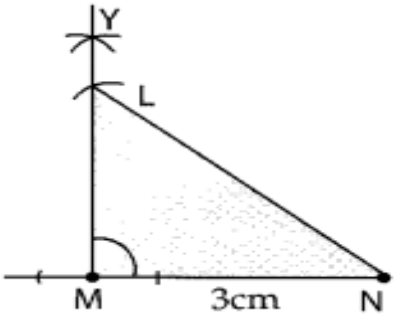
Step 3: At M, draw MX ⊥ MN.



Step 4: With N as centre, draw an arc of radius 5 cm.



Step 5: L has to be on the perpendicular line MX as well as on the arc drawn with centre N. Therefore, L is the meeting point of these two ΔLMN is now obtained.



ΔLMN is now completed.

Practical Geometry

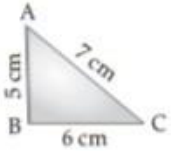
What is practical geometry?

It is a geometry done practically i.e. using compass, protactor, etc. It usually consists of constructions of polygon figures such as triangle etc.

Construction of triangles

With three sides (S.S.S. Criterion)

Rough Sketch :

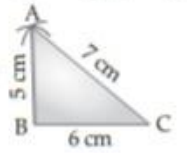


Step-1:

Step-2: Draw an arc of 5 cm

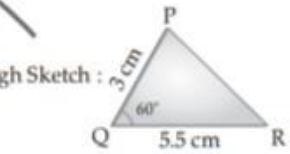
Step-3: Draw an arc of 7 cm which cuts previous arc

Step-4: Join the lines



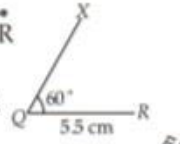
With two sides and angle between them (S.A.S. Criterion)

Rough Sketch :



Step-1:

Step-2:



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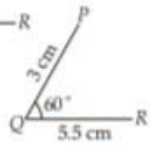

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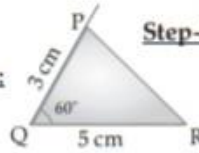
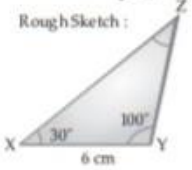


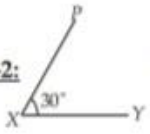
With two angles and the sides between them (A.S.A Criterion)

Rough Sketch :

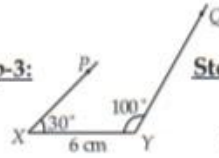


Step-1:

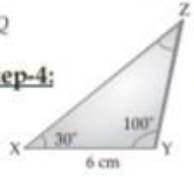
Step-2:



Step-3:

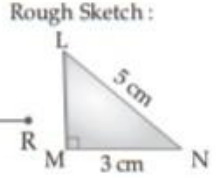


Step-4:

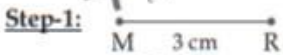


With a hypotenuse and a leg in right angled Triangle (R.H.S Criterion)

Rough Sketch :

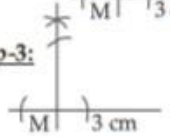


Step-1:

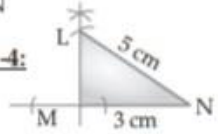


Step-2:

Step-3:



Step-4:

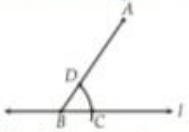


Construction of a line parallel to given line through a point not on the line

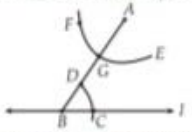
Step1:-Take a line 'l' and a point 'A' outside 'l'.

Step2:-Take any point B on l and join B to A.

Step3:-With B as a centre and a convenient radius, draw an arc cutting l at C and AB at D.

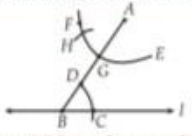


Step4:-Now with A as a centre and a convenient radius, draw an arc EF cutting AB at G.

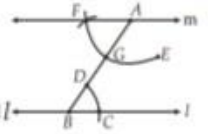


Step5:-Place the compass tip at C and pencil tip at D.

Step6:-With G as centre, draw an arc cutting the arc EF at H.



Step7:-Now join AH to draw a line '*m*'.



Therefore, $m \parallel l$

OBJECTIVE TYPE QUESTIONS

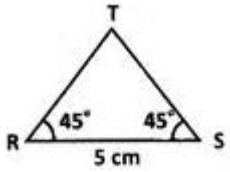
1. A triangle can be drawn if the _____ and a leg in the case of a right-angled triangle are known.
2. We can draw _____ line (s) parallel to a given line.
3. The number of line (s) that can be drawn parallel to a given line through a given point not on the line is ____.
4. A triangle can be drawn only when the sum of any two sides of the triangle is _____than third side.
5. Construction of a triangle is not possible if three _____ of a triangle are given.
6. The sum of angles of a triangle is _____ right angles.
7. A triangle can be drawn if _____ sides and one angle given.
8. If the lengths of two legs of right triangle are given, we can construct the triangle. (True / False)
9. A unique triangle can be constructed if two angles & the length of any side are given. (True / False)
10. We can construct a triangle DEF such that EF = 7.2 cm, $\angle E = 110°$ and $\angle F = 80^0$. (True / False)

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1.	Hypotenuse	2. Infinite	3. 1	4. Greater	5. Angles
6.	2	7. 2	8. True	9. True	10. False

MULTIPLE CHOICE QUESTIONS

Question 1. In ΔRST, R = 5 cm, and $\angle SRT = 45°$ and $\angle RST = 45°$. Which criterion can be used to construct ΔRST?
(a) ASA criterion (b) SAS criterion
(c) SSS criterion (d) RHS criterion
Answer: (a) ASA criterion
Hint:



Clearly, from the figure two angles and the included side are given. So, A.S.A. criterion can be used to construct ΔRST.

Question 2. Identify the criterion of construction of the equilateral triangle LMN given LM = 6 cm.
(a) SAS criterion (b) RHS criterion
(c) ASA criterion (d) SSS criterion
Answer: (d) SSS criterion
Hint: Since ALMN is equilateral the measurement of one side is used for the other two sides of the triangle. Hence ALMN can be constructed by S.S.S. criterion.

Question 3. The idea of equal alternate angles is used to construct which of the following?
(a) A line parallel to a given line (b) A triangle
(c) A square (d) Two triangles
Answer: (a) A line parallel to a given line.

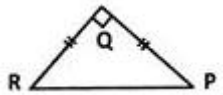
Question 4. Given AB = 3 cm, AC = 5 cm, and $\angle B = 30°$, ΔABC cannot be uniquely constructed, with AC as base, why?
(a) Two sides and included angle are given. (b) The other two angles are not given.
(c) The vertex B cannot be uniquely located. (d) The vertex A coincides with the vertex C
Answer: (c) The vertex B cannot be uniquely located

Question 5. A line p and a point X not on it are given. Which of the following is used to draw a line parallel to p through X?

(a) Equal corresponding angles. (b) Congruent triangles.
(c) Angle sum property of triangles (d) Pythagoras' theorem.
Answer: (a) Equal corresponding angles.
Hint: Corresponding angles of parallel lines are equal.

Question 6. Δ PQR is such that ∠P = ∠Q = ∠R = 60° which of the following is true?
(a) Δ PQR is equilateral. (b) Δ PQR is acute angled.
(c) Both [a] and [b] (d) Neither [a] nor [b]
Answer: (c) Both [a] and [b]
Hint: In ΔPQR since all the angles are acute, it is acute angled. Also since all the angles are equal, it is equilateral.

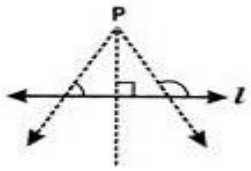
Question 7. Which vertex of ΔABC is right angled if AB = 8 cm, AC = 6 cm,and BC= 10 cm,?
(a) ∠C (b) ∠A (c) ∠B (d) A or C
Answer: (b) ∠A
Hint: From the given measurements, BC is the hypotenuse. The angle opposite to BC is ∠A which is a right angle.
Question 8. An isosceles triangle is constructed as shown in the figure.



Which of the given statements is incorrect?
(a) PR is the hypotenuse of ΔPQR (b) ΔPQR is an equilateral triangle.
(c) ΔPQR is a right angled triangle (d) If right angled ΔPQR has its equal angles measuring 45° each.
Answer: (b) ΔPQR is an equilateral triangle.

Question 9. ΔPQR is constructed with all its angles measuring 60° each. Which of the following is correct?
(a) ΔPQR is an equilateral triangle (b) ΔPQR is isosceles triangle
(c) ΔPQR is a scalene triangle (d) ΔPQR is a right angled triangle
Answer: (a) ΔPQR is an equilateral triangle.

Question 10. How many perpendicular lines can be drawn to a line from a point not on it?
(a) 1 (b) 2 (c) 0 (d) Infinite
Answer: (a) 1
Hint:



As can be seen from the given figure, one and only one perpendicular line can be drawn to a given line from a point not on it.

VERY SHORT ANSWER TYPE QUESTIONS

Q.1) △ PQR is a triangle right-angled at P. If PQ = 3 cm and PR = 4 cm, find QR.
Answer: 5 cm
Q.2) Which is the longest side in the triangle PQR right angled at P?
Answer: QR
Q.3) Which is the longest side in the triangle ABC right angled at B?
Answer: AC
Q.4) Which is the longest side of a right triangle?
Answer: Hypotenuse
Q.5) A triangle can be drawn if _____ sides given.
Answer: 3

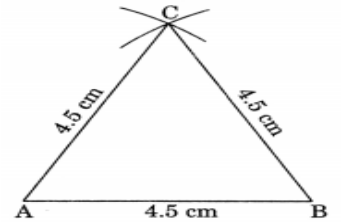
Q.6) A triangle can be drawn if two sides and _____ angle given.
Answer: 1
Q.7) A triangle can be drawn if _____ sides and one angle given.
Answer: 2
.8) A triangle can be drawn if two angles and _____ side given.
Answer: 1
Q.9) A triangle can be drawn if ____ angles and one side given.
Answer: 2
Q.10) A triangle can be drawn if the _____ and a leg in the case of a right-angled triangle.
Answer: hypotenuse

SHORT ANSWER TYPE QUESTIONS

Question 1. State whether the triangle is possible to construct if
(a) In ΔABC, m∠A = 80°, m∠B = 60°, AB = 5
(b) In ΔPQR, PQ = 5 cm, QR = 3 cm, PR = 8.8 cm
Solution:
(a) m∠A = 80°, m∠B = 60°
m∠A + m∠B = 80° + 60° = 140° < 180°
So, ΔABC can be possible to construct.

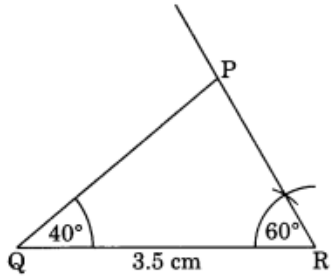
(b) PQ = 5 cm, QR = 3 cm, PR = 8.8 cm
PQ + QR = 5 cm + 3 cm = 8 cm < 8.8 cm
or PQ + QR < PR
So, the ΔPQR can not be constructed.

Question 2. Draw an equilateral triangle whose each side is 4.5 cm.



Solution: Steps of construction:
(i) Draw AB = 4.5 cm.
(ii) Draw two arcs with centres A and B and same radius of 4.5 cm to meet each other at C.
(iii) Join CA and CB.
(iv) ΔCAB is the required triangle.

Question 3. Draw a ΔPQR, in which QR = 3.5 cm, m∠Q = 40°, m∠R = 60°.



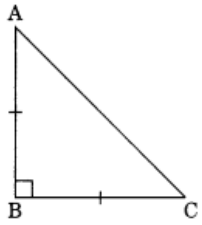
Solution: Steps of construction:
(i) Draw QR = 3.5 cm.
(ii) Draw ∠Q = 40°, ∠R = 60° which meet each other at P.
(iii) ΔPQR is the required triangle.

Question 4. There are four options, out of which one is correct. Choose the correct one:
(i) A triangle can be constructed with the given measurement.

(a) 1.5 cm, 3.5 cm, 4.5 cm (b) 6.5 cm, 7.5 cm, 15 cm
(c) 3.2 cm, 2.3 cm, 5.5 cm (d) 2 cm, 3 cm, 6 cm
Solution: Option (a) is possible to construct. Since, 1.5 cm + 3.5 cm > 4.5 cm

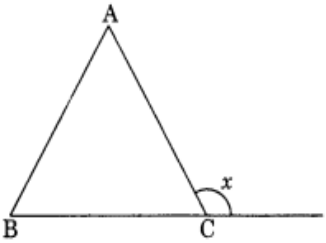
(ii) (a) m∠P = 40°, m∠Q = 60°, AQ = 4 cm
(b) m∠B = 90°, m∠C = 120° , AC = 6.5 cm
(c) m∠L = 150°, m∠N = 70°, MN = 3.5 cm
(d) m∠P = 105°, m∠Q = 80°, PQ = 3 cm
Solution: Option (a) is correct. Since, m∠P + m∠Q = 40° + 60° = 100° < 180°

Question 5. What will be the other angles of a right-angled isosceles triangle?



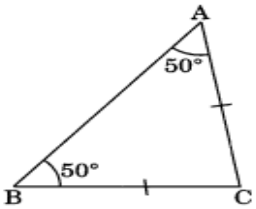
Solution: In right angled isosceles triangle ABC, ∠B = 90°
∠A + ∠C = 180° – 90° = 90°
But ∠A = ∠B
∠A = ∠C = 902 = 45°
Hence the required angles are ∠A = ∠C = 45°.

Question 6. What is the measure of an exterior angle of an equilateral triangle?



Solution: We know that the measure of each interior angle = 60°
Exterior angle = 180° – 60° = 120°

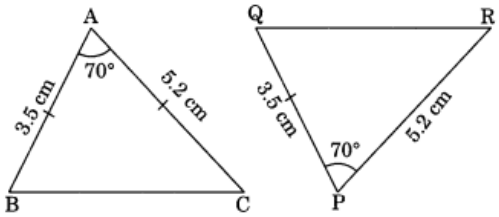
Question 7. In ΔABC, ∠A = ∠B = 50°. Name the pair of sides which are equal.



Solution: ∠A = ∠B = 50°
AC = BC [∵ Sides opposite to equal angles are equal]
Hence, the required sides are AC and BC.

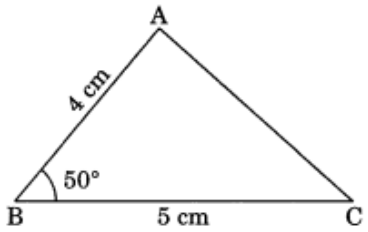
Question 8. If one of the other angles of a right-angled triangle is obtuse, whether the triangle is possible to construct.
Solution: We know that the angles other than right angle of a right-angled triangle are acute angles.
So, such a triangle is not possible to construct.

Question 9. State whether the given pair of triangles are congruent.



Solution: Here, AB = PQ = 3.5 cm
AC = PR = 5.2 cm
∠BAC = ∠QPR = 70°
ΔABC ≅ ΔPQR [By SAS rule]

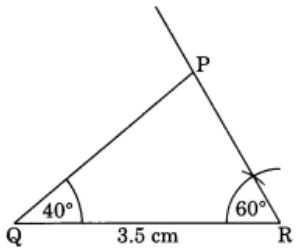
Question 10. Draw a ΔABC in which BC = 5 cm, AB = 4 cm and m∠B = 50°.



Solution:Steps of construction:
(i) Draw BC = 5 cm.
(ii) Draw ∠B = 50° and cut AB = 4 cm.
(iii) Join AC.
(iv) ΔABC is the required triangle.

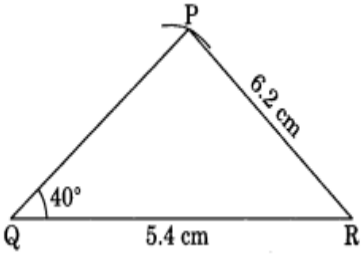
LONG ANSWER TYPE QUESTIONS

Question 1. Draw a ΔPQR, in which QR = 3.5 cm, m∠Q = 40°, m∠R = 60°.
Solution:



Steps of construction:
(i) Draw QR = 3.5 cm.
(ii) Draw ∠Q = 40°, ∠R = 60° which meet each other at P.
(iii) ΔPQR is the required triangle.

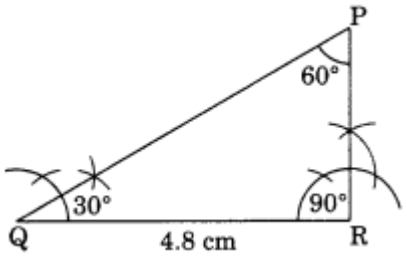
Question 2. Draw ΔPQR in which QR = 5.4 cm, ∠Q = 40° and PR = 6.2 cm.
Solution:



Steps of construction:
(i) Draw QR = 5.4 cm.
(ii) Draw ∠Q = 40°.
(iii) Take R as the centre and with radius 6.2 cm, draw an arc to meet the former angle line at P.

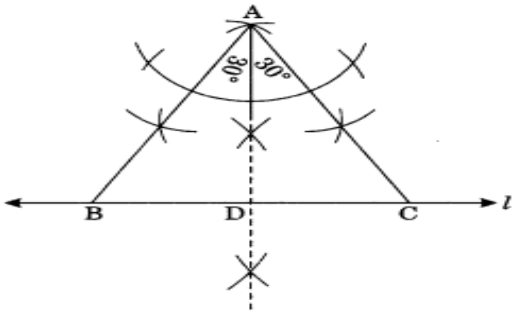
(iv) Join PR.
(v) ΔPQR is the required triangle.

Question 3. Construct a ΔPQR in which m∠P = 60° and m∠Q = 30°, QR = 4.8 cm.
Solution:
m∠Q = 30°, m∠P = 60°
m∠Q + m∠P + m∠R = 180° (Angle sum property of triangle)
30° + 60° + m∠R = 180°
90° + m∠R = 180°
m∠R = 180° – 90°
m∠R = 90°



Steps of construction:
(i) Draw QR = 4.8 cm. (ii) Draw ∠Q = 30°.
(iii) Draw ∠R = 90° which meets the former angle line at P.
(iv) ∠P = 180° – (30° + 90°) = 60°
(v) ΔPQR is the required triangle.

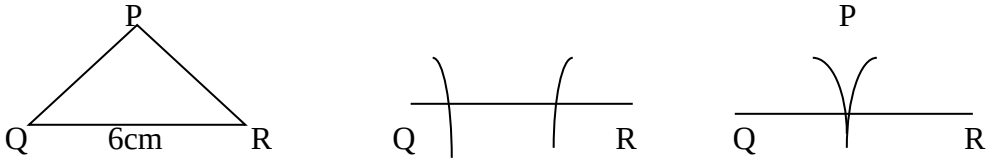
Question 4. Construct an equilateral triangle whose altitude is 4.5 cm.
Solution: Construct an equilateral triangle whose altitude is 4.5 cm.



Solution:
Steps of construction:
(i) Draw any line l and take a point D on it.
(ii) Construct a perpendicular to l at D and cut AD = 4.5 cm.
(iii) Draw the angle of 30° at on either side of AD to meet the line l at B and C.
(iv) ΔABC is the required equilateral triangle.

CASE STUDY BASED QUESTIONS

Question 1. A student attempted to draw a triangle whose rough diagram is given here. He drew QR first. Then with Q and R as center, he drew two arcs of 2cm,but he could not get point P.Then he repeated the process by taking another distance of 3cm and he got the point P on QR but could not succeed to draw the triangle .



(i) Can such a triangle exist? What property of triangle in connection to this problem, the student is not using?
Answer i) Yes, triangle exist.
'The sum of any two sides of a triangle is always greater than the third side.'

(ii)Is it possible to construct a triangle with sides equal to 4cm,5cm and 7cm?
Answer ii) True

PRACTICE QUESTIONS FOR SELF ASSESSMENT

OBJECTIVE TYPE QUESTIONS

1. A triangle in which all three sides are of equal lengths is called ____
2. The sum of the three angles of a triangle is _____.
3. ____ angles and the ____ side is enough to construct a triangle.
4. For construction of any triangle, we need any three elements. (True / False)
5. A triangle with sides 6cm, 4cm and 10cm can't be constructed. (True / False)

MULTIPLE CHOICE QUESTIONS

Question 1. Identify the false statement.
(a) A triangle with three equal sides is called an equilateral triangle.
(b) A triangle with a right angle is called a right angled triangle.
(c) A triangle with two equal sides is called a scalene triangle.
(d) A right angled triangle has two acute angles and a right angle.

Question 2. ΔPQR is constructed such that PQ = 5 cm, PR = 5 cm and $\angle RPQ = 50°$. Identify the type of triangle constructed.
(a) An isosceles triangle (b) An acute angled triangle
(c) An obtuse angled triangle (d) Both [a] and [b]

Question 3. Which of the following is NOT constructed using a ruler and a set square?
(a) A perpendicular to a line from a point not on it.
(b) A perpendicular bisector of a line segment.
(c) A perpendicular to a line at a point on the line.
(d) A line parallel to a given line through a given point.

Question 4. Study the steps of construction given.
Step 1: Draw a ray OA.
Step 2: With O as centre and any convenient radius draw an arc MN to cut OA at M.
Step 3: With M as centre and the same radius draw an arc to cut MN at P.
Step 5: Draw OQ and produce it to D. An angle AOD is constructed.
What is the measure of $\angle AOD$?
(a) 60° (b) 30° (c) 120° (d) 45°

Question 5. In ΔXYZ, x, y and z denote the three sides. Which of the following is incorrect'?
(a) $x - y > z$ (b) $x + z > y$ (c) $x - y < z$ (d) $x + y > z$

VERY SHORT ANSWER TYPE QUESTIONS

Question 1. A triangle can be drawn if the hypotenuse and a _____ in the case of a right-angled triangle.
Question 2. A triangle in which all three sides are of equal lengths is called _____.
Question 3. Write the side opposite to the vertex B of triangle ABC.
Question 4. A triangle in which two altitudes of the triangle are two of its sides is _____.
Question 5. A _____ is a simple closed curve made of three line segments.

SHORT ANSWER TYPE QUESTIONS

Question 1. Draw ΔPQR in which QR = 5.4 cm, ∠Q = 40° and PR = 6.2 cm.
Question 2. Construct a ΔPQR in which m∠P = 60° and m∠Q = 30°, QR = 4.8 cm.
Question 3. Construct a ΔABC such that AB = 6.5 cm, AC = 5 cm and the altitude AP to BC is 4 cm.

LONG ANSWER TYPE QUESTIONS

Question 1. Construct an equilateral triangle whose altitude is 4.5 cm.
Question 2. Draw an isosceles right-angled triangle whose hypotenuse is 5.8 cm.
Question 3. Construct a ΔABC such that AB = 6.5 cm, AC = 5 cm and the altitude AP to BC is 4cm.

CASE STUDY BASED QUESTIONS

A man put a ladder 17m long against the wall of a house just reached the height of 15m from the ground.

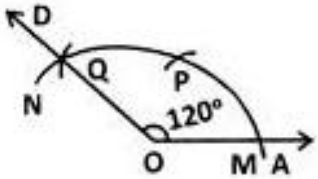
(i) Which type of triangle is so formed?
(ii) How far is the lower end of the ladder from the wall?
(iii) If he slides the lower end of the ladder from the wall 2m then what about the height of the wall?

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. Equilateral	2. 180^0	3. Two, included	4. False	5. False

ANSWERS OF MULTIPLE CHOICE QUESTIONS

Answer 1: (c) A triangle with two equal sides is called a scalene triangle.
Answer 2: (d) Both [a] and [b]
Answer 3: (b) A perpendicular bisector of a line segment.
Answer 4: (c) 120°
Hint: The given steps of construction are to construct an angle of 120°.



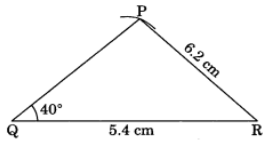
Answer 5: (a) x – y > z
Hint: The difference of two sides of a triangle is less than its third side.

ANSWERS OF VERY SHORT ANSWER TYPE QUESTIONS

Answer 1**:** leg
Answer 2: Equilateral
Answer 3: AC
Answer 4: right-angled triangle
Answer 5**:** triangle

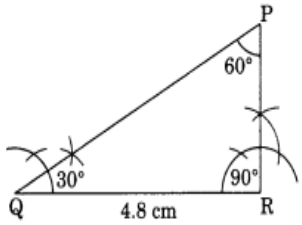
ANSWERS OF SHORT ANSWER TYPE QUESTIONS

Solution 1:



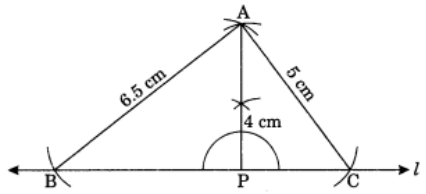
Steps of construction:
(i) Draw QR = 5.4 cm.
(ii) Draw ∠Q = 40°.
(iii) Take R as the centre and with radius 6.2 cm, draw an arc to meet the former angle line at P.
(iv) Join PR.
(v) ΔPQR is the required triangle.

Solution 2:



m∠Q = 30°, m∠P = 60°
m∠Q + m∠P + m∠R = 180° (Angle sum property of triangle)
30° + 60° + m∠R = 180°
90° + m ∠R = 180°
m ∠R = 180° – 90°
m ∠R = 90°
Steps of construction:
(i) Draw QR = 4.8 cm.
(ii) Draw ∠Q = 30°.
(iii) Draw ∠R = 90° which meets the former angle line at P.
(iv) ∠P = 180° – (30° + 90°) = 60°
(v) ΔPQR is the required triangle.

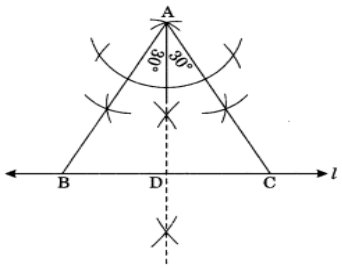
Solution 3:



Steps of construction:
(i) Draw a line l and take any point P on it.
(ii) Construct a perpendicular to l at P.
(iii) Cut AP = 4 cm.
(iv) Draw two arcs with centre A and radii 6.5 cm and 5 cm to cut the line l at B and C respectively.
(v) Join AB and AC.
(vi) ΔABC is the required triangle.

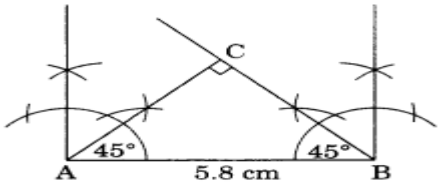
ANSWERS OF LONG ANSWER TYPE QUESTIONS

Solution 1:



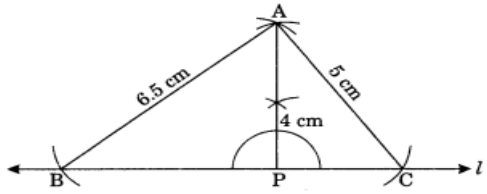
Steps of construction:
(i) Draw any line l and take a point D on it.
(ii) Construct a perpendicular to l at D and cut AD = 4.5 cm.
(iii) Draw the angle of 30° at on either side of AD to meet the line l at B and C.
(iv) ΔABC is the required equilateral triangle.

Solution 2: Right angled triangle is an isosceles triangle
Each of its acute angles = 90°/2 = 45°



Steps of construction:
(i) Draw AB = 5.8 cm.
(ii) Construct ∠A = 45° and ∠B = 45° to meet each other at C.
(iii) ∠C = 180° – (45° + 45°) = 90°
(iv) ΔACB is the required isosceles right angle triangle.

Solution 3:



Steps of construction:
(i) Draw a line l and take any point P on it.
(ii) Construct a perpendicular to l at P.
(iii) Cut AP = 4 cm.
(iv) Draw two arcs with centre A and radii 6.5 cm and 5 cm to cut the line l at B and C respectively.
(v) Join AB and AC.
(vi) ΔABC is the required triangle.

ANSWERS OF CASE STUDY BASED QUESTIONS

Answer i) Right angled triangle. Answer ii) 8m Answer iii) Height will decrease.

Chapter 10, Practical Geometry (November-08 Periods)

e-content, you tube video links

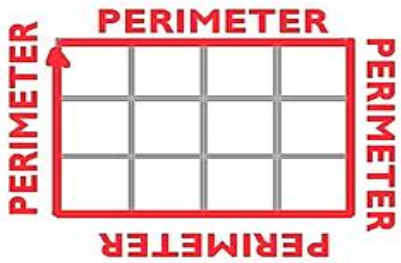
Exercise 10.1 https://youtu.be/Hw2hsGqBNjU
Exercise 10.2 https://youtu.be/MNIXrDB2S0o
Exercise 10.3 https://youtu.be/cv1PRKa1iks
Exercise 10.4 https://youtu.be/Dn7gP6qC6v8
Exercise 10.5 https://youtu.be/j5DTdXw7WpM

CHAPTER –11
PERIMETER AND AREA

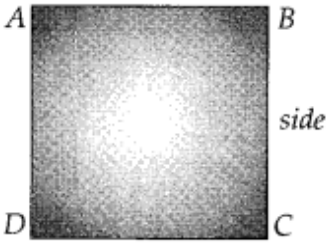
KEY POINTS

Perimeter is the distance around a closed figure.

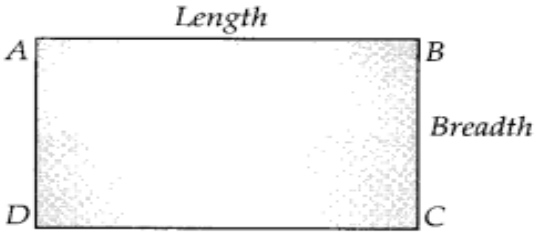
Area is the measure of the part of plane or region enclosed by the closed figure.



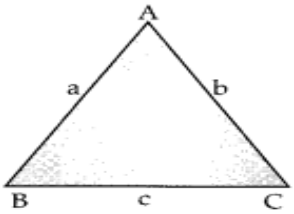
Perimeter of square = 4 × side



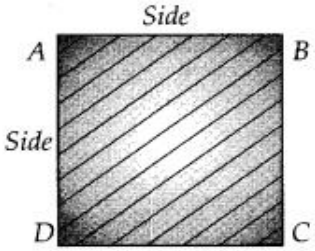
Perimeter of Rectangle = 2 × (length + breadth) = 2 × (l + b)



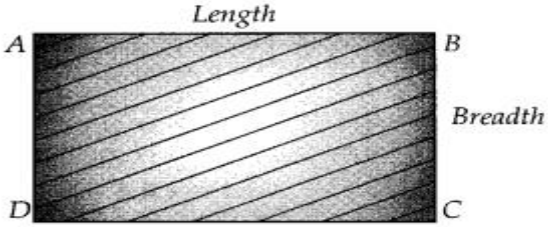
Perimeter of triangle = sum of all sides of triangle = a + b + c



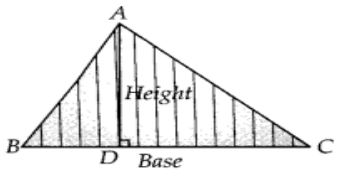
Area of square = side × side = $(side)^2$



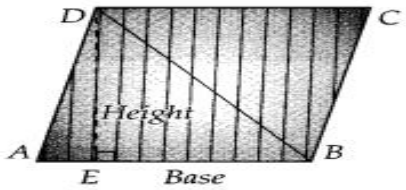
Area of Rectangle = Length × Breadth = l × b



Area of Triangle = $\frac{1}{2}$ × Base × Height (Altitude)



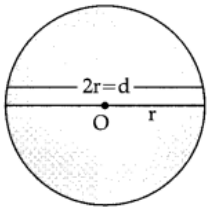
Area of a parallelogram = Base × Height



The distance around a circular region is known as its **circumference.**

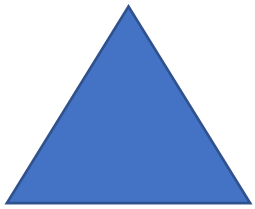
The ratio of circumference and diameter of a circle is a constant is denoted by **π (pi).**

Circumference of a circle = πd = π(2r) = 2πr.
where 'd' is diameter and 'r' is the radius and $\pi = \frac{22}{7}$ or 3.14 (approximately).



Area of a circle = πr^2, where r is the radius of the circle and $\pi = \frac{22}{7}$ or 3.14 (approximately).

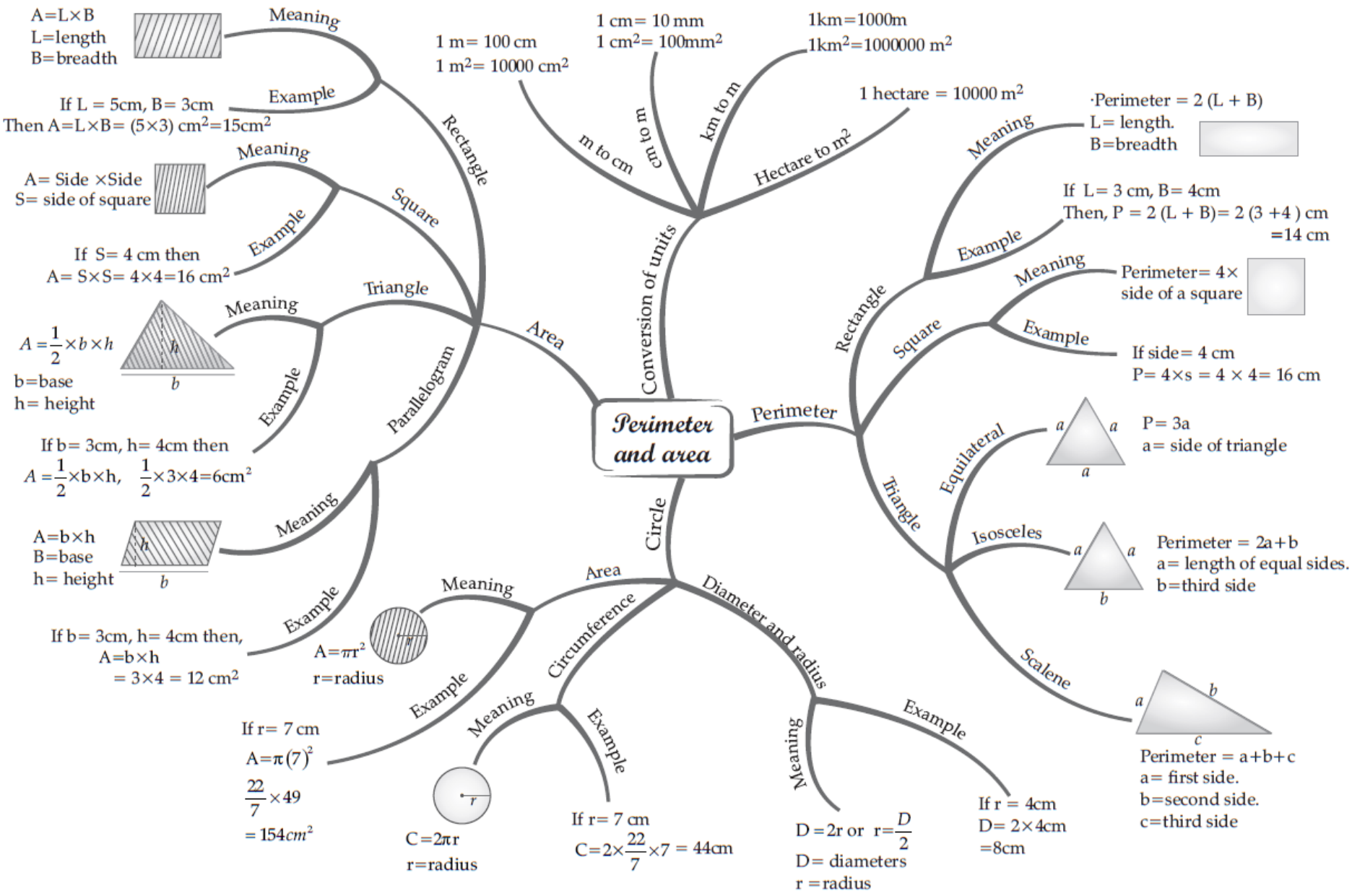
Area of equilateral triangle = $\frac{\sqrt{3}}{4} \times (\text{side})^2$



Conversion of Units:

Length	Area
1 cm = 10 mm	$1\ cm^2 = 10\ mm \times 10\ mm = 100\ mm^2$
1 m = 100 cm	$1\ m^2 = 1\ m \times 1\ m$
1 km = 1000 m	$= 100\ cm \times 100\ cm$
	$= 10000\ cm^2$
	$1\ km^2 = 1\ km \times 1\ km$
	$= 1000\ m \times 1000\ m$
	$= 1000000\ m^2$
	1 hectare = 100 m × 100 m
	$= 10{,}000\ m^2$

APPLICATIONS :
You must have observed that quite often, in gardens or parks, some space is left all around in the form of path or in between as cross paths.
A framed picture has some space left all around it. We need to find the areas of such pathways or borders when we want to find the cost of making them.
We will learn to find these areas also using above formulae.


Perimeter and area
Area
Rectangle
Meaning
A=L×B
L=length
B=breadth
Example
If L = 5cm, B= 3cm
Then A=L×B= (5×3) cm²=15cm²
Square
Meaning
A= Side ×Side
S= side of square
Example
If S= 4 cm then
A= S×S= 4×4=16 cm²
Triangle
Meaning
A = 1/2 ×b×h
b=base
h= height
Example
If b= 3cm, h= 4cm then
A = 1/2 ×b×h, 1/2 ×3×4=6cm²
Parallelogram
Meaning
A=b×h
B=base
h= height
Example
If b= 3cm, h= 4cm then,
A=b×h
= 3×4 = 12 cm²
Conversion of units
1 m= 100 cm
1 m²= 10000 cm²
m to cm
1 cm= 10 mm
1 cm²= 100mm²
cm to m
1km=1000m
1km²=1000000 m²
km to m
1 hectare = 10000 m²
Hectare to m²
Perimeter
Rectangle
Meaning
·Perimeter = 2 (L + B)
L= length.
B=breadth
Example
If L= 3 cm, B= 4cm
Then, P = 2 (L + B)= 2 (3 +4) cm
=14 cm
Square
Meaning
Perimeter= 4×
side of a square
Example
If side= 4 cm
P= 4×s = 4 × 4= 16 cm
Triangle
Equilateral
P= 3a
a= side of triangle
Isosceles
Perimeter = 2a+b
a= length of equal sides.
b=third side
Scalene
Perimeter = a+b+c
a= first side.
b=second side.
c=third side
Circle
Area
Meaning
A=πr²
r=radius
Example
If r= 7 cm
A=π(7)²
22/7 ×49
= 154cm²
Circumference
Meaning
C=2πr
r=radius
Example
If r= 7 cm
C=2×22/7×7 = 44cm
Diameter and radius
Meaning
D =2r or r=D/2
D= diameters
r =radius
Example
If r = 4cm
D= 2×4cm
=8cm

OBJECTIVE TYPES QUESTIONS

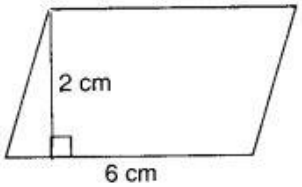
1. If the side of a square is 13 cm, then its area is …… cm².
2. If the side of an equilateral triangle is 5 cm. Its perimeter is …… cm.
3. The area of a triangle is 330 cm². If its altitude is 11 cm, then its base = …….. cm.
4. The base and the corresponding height of a triangle are 5 cm and 4.2 cm respectively. Its area is …… cm².
5. The radius of a semicircle is 7 cm. The area of the semicircle is …….
6. The base and the corresponding height of a triangle are 5 cm and 4.2 cm respectively. Its area is …… cm².
7. If the side of a square is 10 cm, then its area is ……. cm².
8. The perimeter of a square is numerically equal to its area. The side of the square is ……. cm.
9. The perimeter of a rectangle is 50 cm. If its length is 15 cm, then its breadth is …… cm.
10. If the perimeter of an equilateral triangle is 3 cm. Its area is …….. cm².

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. 169 cm²	2. 15 cm	3. 60 cm	4. 10.5 cm²	5. 77 cm²
6. 10.5 cm²	7. 100 cm²	8. 4 cm	9. 10 cm	10. $\frac{\sqrt{3}}{4}$ cm²

MULTIPLE CHOICE QUESTIONS (MCQ)

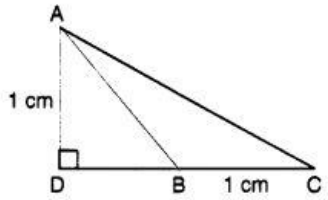
1. The area of a square plot is 1600 m^2. The side of the plot is
   (a) 40 m (b) 80 m (c) 120 m (d) 160 m
2. The perimeter of a rectangle is 30 m. Its length is 10 m. Its breadth is
   (a) 15 m (b) 10 m (c) 5 m (d) 3 m
3. The perimeter of a square is 48 cm. Its area is
   (a) 144 cm^2 (b) 12 cm^2 (c) 48 cm^2 (d) 100 cm^2
4. The area of a rectangular room is 150 m^2. If its breadth is 10 m, then find its length.
   (a) 25 m (b) 15 m (c) 50 m (d) 55 m
5. A rectangular wire of length 40 cm and breadth 20 cm is bent in the shape of a square. The side of the square is
   (a) 10 cm (b) 20 cm (c) 30 cm (d) 40 cm
6. The area of a parallelogram of base 5 cm and height 3.2 cm is
   (a) 8 cm^2 (b) 12 cm^2 (c) 20 cm^2 (d) 16 cm^2
7. Find the area of the following parallelogram:



   (a) 12 cm^2 (b) 6 cm^2 (c) 24 cm^2 (d) 8 cm^2
8. If the area of a parallelogram is 16 cm^2 and base is 8 cm, find the height.

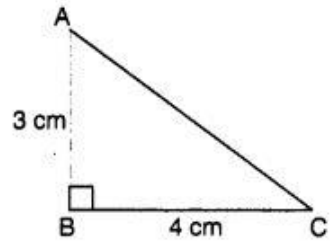
(a) 1 cm (b) 2 cm *-(c) 3 cm (d) 4 cm

9. Find the area of ΔABC



(a) 1 cm^2 (b) 2 cm^2 (c) 4 cm^2 (d) ½ cm^2

10. Find the area of ΔABC



(a) 3 cm^2 (b) 4 cm^2 (c) 6 cm^2 (d) 12 cm^2

ANSWERS OF MCQ

1. (a) 40 m 2. (c) 5 m 3. (a) 144 cm^2 4. (b) 15 m 5. (c) 30 cm
6. (d) 16 cm^2 7. (a) 12 cm^2 8. (b) 2 cm 9. (d) ½ cm^2 10. (c) 6 cm^2

VERY SHORT ANSWER (VSA) TYPE QUESTIONS

Question 1. The side of a square is 2.5 cm. Find its perimeter and area.
Solution: Side of the square = 2.5 cm
Perimeter = 4 × Side = 4 × 2.5 = 10 cm
Area = $(side)^2 = (4)^2 = 16\ cm^2$

Question 2. If the perimeter of a square is 24 cm. Find its area.
Solution: Perimeter of the square = 24 cm
Side of the square = 244 cm = 6 cm
Area of the square = $(Side)^2 = (6)^2\ cm^2 = 36\ cm^2$

Question 3. Find the area of a square park whose perimeter is 360 m.
Solution: Area of a square = Side x Side
Perimeter = 360 m (given)
One side of the square = 360/4 = 90 m.
Therefore, Area = 90 x 90 = 8100 square meter.

Question 4. If the length and breadth of a rectangle are 36 cm and 24 cm respectively. Find
(i) Perimeter (ii) Area of the rectangle.
Solution: Length = 36 cm, Breadth = 24 cm
(i) Perimeter = 2(l + b) = 2(36 + 24) = 2 × 60 = 120 cm
(ii) Area of the rectangle = l × b = 36 cm × 24 cm = 864 cm^2

Question 5. The perimeter of a rectangular field is 240 m. If its length is 90 m, find:
(i) it's breadth (ii) it's area.
Solution: (i) Perimeter of the rectangular field = 240 m
2(l + b) = 240 m
l + b = 120 m
90 m + b = 120 m

b = 120 m – 90 m = 30 m
So, the breadth = 30 m.

(ii) Area of the rectangular field = l × b = 90 m × 30 m = 2700 m^2
So, the required area = 2700 m^2

Question 6. Find the breadth of a rectangular plot of land, if its area is 330 square meters and the length is 11 m. Also find its perimeter.
Solution: Area = 330 square m (given)
Length, l = 11m
Area of a rectangle = l × b
330 = 11 × b
b = 330/11 = 30 m
Perimeter = 2 × (l + b) = 2 × (11 + 30) = 2 × 41= 82 m

Question 7. The length and breadth of a rectangular field are equal to 600 m and 400 m respectively. Find the cost of the grass to be planted in it at the rate of Rs. 2.50 per m^2.
Solution: Length = 600 m, Breadth = 400 m
Area of the field = l × b = 600 m × 400 m = 240000 m^2
Cost of planting the grass = Rs. 2.50 × 240000 = Rs. 6,00,000
Hence, the required cost = Rs. 6,00,000.

Question 8. Find the height if the area of the parallelogram is 36 square cm and the base is 9 cm.

Solution:
Area of a parallelogram = 36 square cm.
Base, b = 9 cm
Area = Base × Height
36 = 9 × height
Height = 36/9 = 4 cm

Question 9. What is the circumference of a circle of diameter 14 cm?
Solution: Circumference of a circle = πd
Here d = 14 cm
Therefore, C = $\frac{22}{7}$ × 14 = 44 cm

Question 10. The perimeter of a circle is 176 cm, find its radius.
Solution: The perimeter of the circle = 176 cm

$$2\pi r = 176$$
$$2 \times \frac{22}{7} \times r = 176$$
$$\therefore r = \frac{176 \times 7}{2 \times 22} = 4 \times 7 = 28 \text{ cm}$$

SHORT ANSWER (SA) TYPE QUESTIONS

Question 1. The length and the breadth of a rectangular piece of land are 500 m and 300 m respectively. Find:
(i) its area
(ii) the cost of the land, if 1 m^2 of the land costs Rs. 10,000
Solution: Given: l = 500 m, b = 300 m
(i) Area = l × b = 500 m × 300 m = 150000 m^2
(ii) Cost of land = Rs. 10,000 × 150000 = Rs. 15,00,000,000

Question 2. A wire of length 176 cm is first bent into a square and then into a circle. Which one will have more area?
Solution: Length of the wire = 176 cm
Side of the square = 176 ÷ 4 cm = 44 cm
Area of the square = $(\text{Side})^2 = (44)^2\ \text{cm}^2 = 1936\ \text{cm}^2$
Circumference of the circle = 176 cm

$$2\pi r = 176\ \text{cm}$$

$$2 \times \frac{22}{7} \times r = 176\ \text{cm}$$

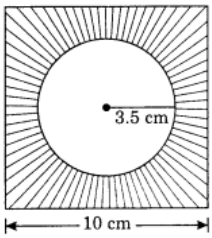
$$r = \frac{176 \times 7}{2 \times 22} = 28\ \text{cm}$$

$\therefore$ Area of the circle $= \pi r^2$

$$= \frac{22}{7} \times 28 \times 28 = 2464\ \text{cm}^2$$

Since $2464\ \text{cm}^2 > 1936\ \text{cm}^2$
Hence, the circle will have more area.

Question 3. In the given figure, find the area of the shaded portion.



Solution: Area of the square = $(\text{Side})^2 = 10\ \text{cm} \times 10\ \text{cm} = 100\ \text{cm}^2$
Area of the circle = πr^2

$$= \frac{22}{7} \times 3.5 \times 3.5$$

$$= \frac{77}{2}\ \text{cm}^2$$

$$= 38.5\ \text{cm}^2$$

Area of the shaded portion = $100\ \text{cm}^2 - 38.5\ \text{cm}^2 = 61.5\ \text{cm}^2$

Question 4. The area of a square park is same as of a rectangular park. If the side of the square park is 60 m and the length of the rectangular park is 90 m, find the breadth of the rectangular park.
Solution: Given: Side of the square park = 60 m

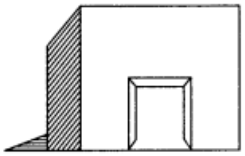
Length of the rectangular park = 90 m

Area of the rectangular park = Area of the square park
90 m × b = 60 m × 60 m
⇒ b=60m×60m/90m
⇒ b = 40m
Hence, the required breadth = 40 m.

Question 5. A door of length 2m and breadth 1m is fitted in a wall. The length of the wall is 4.5 m and the breadth is 3.6m. Find the cost of white washing the wall, if the rate of white washing the wall is Rs. 20 per m^2.

Solution: Given: Length of wall = 4.5 m
Breadth of the wall = 3.6 m
Length of the door = 2 m
Breadth of the door = 1 m

Area of the wall = l × b = 4.5 m × 3.6 m = 16.20 m^2



Area of the door = l × b = 2 m × 1 m = 2 m^2

∴ Area of the wall to be white washed = Area of the wall – Area of the door

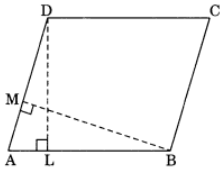
= 16.20 m^2 – 2 m^2= 14.20 m^2

Cost of white washing

= Rs.14.20 × 20 = Rs. 284.00

Hence, the required area = 14.20 m^2 and the required cost = Rs. 284

Question 6. DL and BM are the heights on sides AB and AD respectively of parallelogram ABCD. If the area of the parallelogram is 1470 cm^2, AB = 35 cm and AD = 49 cm, find the length of BM and DL.



Solution: Area of the parallelogram ABCD = AB × DL

⇒ 1470 cm^2 = 35 cm × DL

⇒ $\frac{1470}{35}$ = DL

∴ DL = 42 cm

Area of the parallelogram ABCD = AD × BM

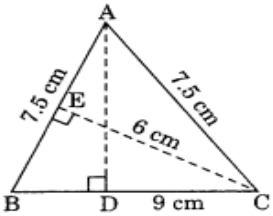
1470 cm^2 = 49 cm × BM

⇒ BM = $\frac{1470}{49}$ = 30 cm

∴ BM = 30 cm

Hence, BM = 30 cm and DL = 42 cm

Question 7. ΔABC is isosceles with AB = AC = 7.5 cm and BC = 9 cm. The height AD from A to BC, is 6 cm. Find the area of ΔABC. What will be the height from C to AB i.e., CE?



Solution: Area of ΔABC = 12 × base × height

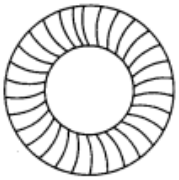
$= \frac{1}{2} \times 9 \text{ cm} \times 6 \text{ cm} = 27 \text{ cm}^2$

$\text{Area of } \Delta ABC = \frac{1}{2} \times AB \times CE$

$27 \text{ cm}^2 = \frac{1}{2} \times 7.5 \text{ cm} \times CE$

$\therefore \quad CE = \frac{27 \times 2}{7.5} \text{ cm} = \frac{36}{5} \text{ cm} = 7.2 \text{ cm}$

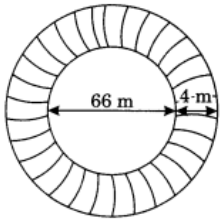
Question 8. A gardener wants to fence a circular garden of diameter 21 m. Find the length of the rope he needs to purchase, if he makes 2 rounds offence. Also find the cost of the rope, if it costs Rs. 4 per metre. (Take π =22/7)



Solution: Diameter of the circular garden = 21 m
∴ Radius = 21/2 m
∴ Circumference = $2\pi r = 2\times22/7\times21/2 = 66$ m
Length of rope needed for 2 rounds $= 2 \times 66$ m $= 132$ m
Cost of the rope = Rs.4×132 = Rs. 528

Question 9. From a circular sheet of radius 4 cm, a circle of radius 3 cm is removed. Find the area of the remaining sheet. (Take $\pi = 3.14$)
Solution: Radius of the circular sheet = 4 cm
∴ Area = $\pi r^2 = \pi \times 4 \times 4 = 16\pi$ cm^2
Radius of the circle to be removed = 3 cm
∴ Area of sheet removed = $\pi r^2 = 9\pi$ cm^2
Area of the remaining sheet = $(16\pi - 9\pi)$ cm^2 = 7π cm^2 = 7×3.14 cm^2 = 21.98 cm^2
Hence, the required area = 21.98 cm^2.

Question 10. A circular flower bed is surrounded by a path 4 m wide. The diameter of the flower bed is 66 m. What is the area of this path? (Take $\pi = 3.14$)



Solution: Diameter of the flower bed = 66 m .
∴ Radius = 662 = 33 m
Let $r_1 = 33$ m
Width of the path = 4 m
Radius of the flower bed included path = 33 m + 4 m = 37m
Let $r_2 = 37$m
Area of the circular path = $\pi(r_2^2 - r_1^2)$
$= 3.14\ (37^2 - 33^2)$
$= 3.14 \times (37 + 33)\ (37 - 33)$ $\quad [a^2 - b^2 = (a + b)\ (a-b)]$
$= 3.14 \times 70 \times 4 = 879.20$ m^2
Hence, the required area = 879.20 m^2

LONG ANSWER (LA) TYPE QUESTIONS

Question 1. A wire is in the shape of a rectangle. Its length is 40 cm and breadth is 22 cm. If the same wire is rebent in the shape of a square, what will be the measure of each side. Also find which shape encloses more area?
Solution: Given: Length = 40 cm, Breadth = 22 cm
Perimeter of the rectangle = Length of the wire
$= 2(l + b) = 2(40$ cm $+ 22$ cm$)$
$= 2 \times 62$ cm $= 124$ cm
Now, the wire is rebent into a square.
Perimeter = 124 cm
⇒ $4 \times$ side = 124

∴ side = 124 ÷ 4 = 31 cm
So, the measure of each side = 31 cm
Area of rectangular shape = l × b = 40 cm x 22 cm = 880 cm^2

Area of square shape = $(Side)^2 = (31)^2 = 961\ cm^2$
Since 961 cm^2 > 880 cm^2
Hence, the square encloses more area.

Question 2. Shazli took a wire of length 44 cm and bent it into the shape of a circle. Find the radius of that circle. Also find its area. If the same wire is bent into the shape of a square, what will be the length of each of its sides? Which figure encloses more area, the circle or the square? (Take π =22/7)
Solution: Length of the wire to be bent into a circle = 44 cm

$2\pi r = 44$

$$2 \times \frac{22}{7} \times r = 44$$

$$\therefore \quad r = \frac{44 \times 7}{2 \times 22} = 7 \text{ cm}$$

$$\text{Area of such circle} = \pi r^2$$

$$= \frac{22}{7} \times 7 \times 7$$

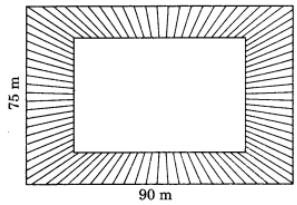
$$= 154 \text{ cm}^2$$

Now, the length of the wire is bent into a square.
Here perimeter of square = length of wire
Length of each side of the square
= Perimeter =44/4=11cm
Area of the square = $(Side)^2 = (11)^2 = 121\ cm^2$
Since, 154 cm^2 >121 cm^2
Thus, the circle encloses more area.

Question 3. From a circular card sheet of radius 14 cm, two circles of radius 3.5 cm and a rectangle of length 3 cm and breadth 1 cm are removed, (as shown in the given figure below). Find the area of the remaining sheet. (Take π = 22/7)

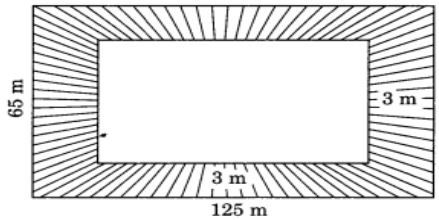
Solution: Radius of the circular sheet = 14 cm
∴ Area = πr^2 = 22/7 × 14 × 14 cm^2 = 616 cm^2
Area of 2 small circles = 2 × πr^2 = 2 × 22/7 × 3.5 × 3.5 cm^2= 77.0 cm^2
Area of the rectangle = l × b = 3 × 1 cm^2 = 3 cm^2
Area of the remaining sheet after removing the 2 circles and 1 rectangle = 616 cm^2 – (77 + 3) cm^2
= 616 cm^2 – 80 cm^2 = 536 cm^2

Question 4. A garden is 90 m long and 75 m broad. A path 5 m wide is to be built outside and around it. Find the area of the path. Also find the area of the garden in hectare.
Solution:



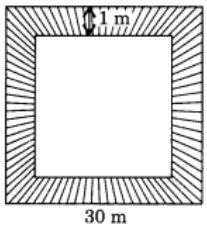
Given: Length = 90 m
Breadth = 75 m
Area of the garden = l × b = 90 m × 75 m = 6750 m^2
Length of the garden including path = 90m + 5m + 5m = 100 m
Breadth of the garden including path = 75m + 5m + 5m = 85m
Area of the garden including path = l × b = 100 m × 85 m = 8500 m^2
Area of the path = 8500 m^2 – 6750 m^2 = 1750 m^2
Hence, required area of path = 1750 m^2 and area of the garden = 6750 m^2 = 0.675 ha

Question 5. A 3 m wide path runs outside and around a rectangular park of length 125 m and breadth 65 m. Find the area of the path.
Solution: Length of the park = 125 m
Breadth of the park = 65 m
Area of the park = l × b = 125 m × 65 m = 8125 m^2



Length of the park including path = 125 m + 3m + 3m = 131 m
Breadth of the park including path = 65m + 3m + 3m = 71m
Area of the park including path = 131 m × 71 m = 9301 m^2
∴ Area of the path = 9301 m^2 – 8125 m^2 = 1176 m^2
Hence, the required area = 1176 m^2.

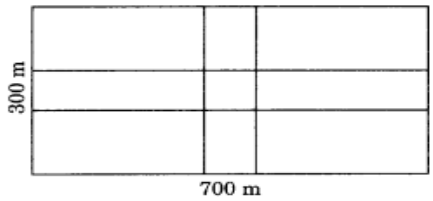
Question 6. A path 1 m wide is built along the border and inside a square garden of side 30 m. Find:
(i) the area of the path.
(ii) the cost of planting grass in the remaining portion of the garden at the rate of Rs. 40 per m^2.
Solution:



Area of the square garden = $(Side)^2$ = 30 m × 30 m = 900 m^2
Length of the garden excluding the path = 30 m – 2 × 1 m = 28 m
∴ Area of the garden excluding the path = 28 m × 28 m = 784 m^2
(i) Area of the path = 900 m^2 – 784 m^2 = 116 m^2
(ii) Cost of the planting the remaining portion at the rate of Rs. 40 per m^2 = Rs. 40 × 784 = Rs. 31,360

Question 7. Two cross roads, each of width 10 m, cut a right angles through the centre of a rectangular park of length 700 m and breadth 300 m and parallel to its sides. Find the area of the roads. Also find the area of the park excluding cross roads. Give the answer in hectares.

Solution:



Length of the road parallel to the length of the park = 700 m

Width of the road = 10 m

∴ Area of the road = l × b = 700 m × 10 m = 7000 m^2

Length of the road parallel to the breadth of the park = 300 m

Width of the road = 10 m Area of this road = l × b = 300 m × 10 = 3000 m^2

Area of the both roads = 7000 m^2 + 3000 m^2 – Area of the common portion

= 10,000 m^2 – 10 m × 10 m

= 10,000 m^2 – 100 m^2

= 9900 m^2 = 0.99 ha

Area of the park = l × b = 700 m × 300 m = 210000 m^2

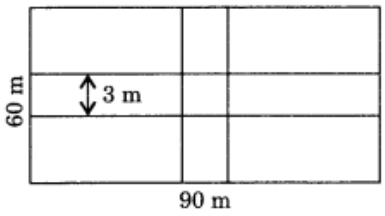
Area of the park excluding the roads = 210000 m^2 – 9900 m^2 = 200100 m^2 = 20.01 ha

Question 8. Through a rectangular field of length 90 m and breadth 60 m, two roads are constructed which are parallel to the sides and cut each other at right angles through the centre of the fields. If the width of each road is 3 m, find

(i) the area covered by the roads.

(ii) the cost of constructing the roads at of the rate of Rs. 110 per m^2.

Solution:



Length of the road along the length of the field = 90 m

Breadth = 3 m

∴ Area of this road = l × b = 90 m × 3 m = 270 m^2

Similarly, the area of the road parallel to the breadth of the field = l × b

= 60 m × 3 m = 180 m^2

Area of the common portion = 3m × 3m = 9m^2

(i) Area of the two roads = 270 m^2 + 180 m^2 – 9 m^2 = 450 m^2 – 9 m^2 = 441 m^2

(ii) Cost of constructing the roads = Rs. 110 × 441 = Rs. 48,510

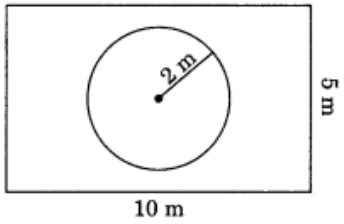
Question 9. The given figure represents a rectangular lawn with a circular flower bed in the middle. Find:

(i) the area of the whole land.

(ii) the area of the flower bed.

(iii) the area of the lawn excluding the area of the flower bed.

(iv) the circumference of the flower bed.



Solution:

(i) Length of the lawn = 10 m

Breadth of the lawn = 5 m

Area of the lawn = l × b = 10 m × 5 m = 50 m^2

(ii) Area of the circular flower bed = πr^2 =22/7×2×2=887m^2=12.57m^2

(iii) Area of the lawn excluding the area of the flower bed

$$= 50\ m^2 - \frac{88}{7}\ m^2$$

$$= \frac{350 - 88}{7}\ m^2 = \frac{262}{7}\ m^2 = 37.43\ m^2$$

(*iv*) Circumference of the flower bed = $2\pi r$

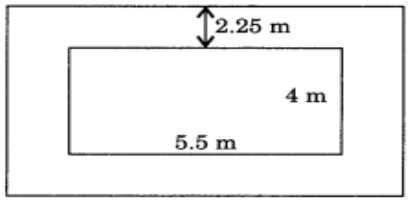
$$= 2 \times \frac{22}{7} \times 2 = \frac{88}{7}\ m^2 = 12.57\ m^2$$

Question 10. A verandah of width 2.25 m is constructed all along outside a room which is 5.5 m long and 4 m wide. Find:

(i) the area of the verandah.

(ii) the cost of cementing the floor of the verandah at the rate of Rs. 200 per m^2.

Solution:



Length of the room = 5.5 m

Breadth of the room = 4 m

∴ Area of the room = l × b = 5.5 m × 4 m = 22 m^2

Width of the verandah = 2.25 m

Length of the room including verandah = 5.5 m + 2 × 2.25 m = 10 m

Breadth of the room including verandah = 4 m + 2 × 2.25 m = 8.50 m^2

Area of the room including verandah = l × b = 10 m × 8.50 m = 85 m^2

(i) Area of the verandah = 85 m^2 – 22 m^2 = 63 m^2

(ii) Cost of cementing the floor of the verandah = Rs. 200 ×63 = Rs. 12600

CREATIVE AND CRITICAL THINKING (CCT)

KITTY'S TILING PROBLEM

Kitty is a floor tile maker. He used to make rectangular or square type of tiles. He prefers to make tiles of regular shapes so that floorings can be made with these tiles alone without gap by joining them corner to corner.

(i) How many rectangular tiles of size 30cm × 15cm is required to for rectangular hall of size 3.6m × 3m.

(ii) How many tiles will be joined at corners of the floor.

(iii) If he uses equi-triangular tiles how many of them join at one corner of the floor.

(iv) What will be the size of largest square tile that can be used for the floorings without cutting any tile for

rectangular hall of size 24m × 15 m?

SOLUTIONS OF CCT TYPE QUESTIONS

KITTY'S TILING PROBLEM

(i)24 Tiles (ii)4 (iii)3 (iv)3m × 3m

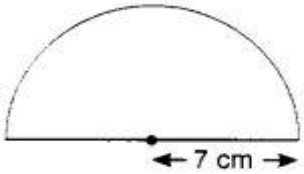
PRACTICE QUESTIONS FOR SELF ASSESSMENT

OBJECTIVE TYPE QUESTIONS

1. 1 hectare = ……. m².
2. The diameter of a circle is 14 cm. Its area is ……. cm².
3. The diameter of a circle is 2 cm. Its area is ……. cm².
4. If radius of a circle is 1 cm, then the circumference of its semi-circle is …… cm.
5. The area of a semi-circle, whose radius 2 cm is ……. cm².

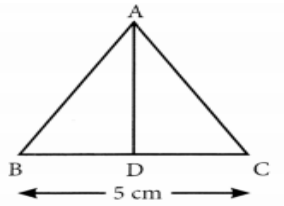
MULTIPLE CHOICE QUESTIONS

1. The radius of a circle is 7 cm. Its circumference is
   (a) 22 cm (b) 44 cm (c) 11 cm (d) 66cm
2. The diameter of a circle is 7 cm. Find its area
   (a) 154 cm^2 (b) 38.5 cm^2 (c) 22 cm^2 (d) 11 cm^2
3. One hectare is …….
   (a) 1000 m (b) 10000 m (c) 1000 m² (d) 10000 m²
4. The perimeter of the following figure is



   (a) 27 cm (b) 28 cm (c) 36 cm (d) 40 cm

5. Find AD in the following figure, if area of ΔABC is 6 cm².

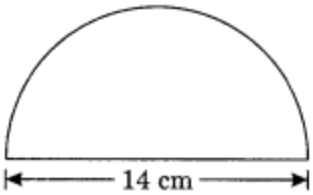


   (a) 3 cm (b) 4 cm (c) 5 cm (d) 2.4 cm

VERY SHORT ANSWER TYPE QUESTIONS

Question 1. The radius of a circle is 3.5 cm, find its circumference and area.
Question 2. Area of a circle is 154 cm^2, find its circumference.

Question 3. Find the perimeter of the figure given below.



Question 4. Find the area of the triangle whose base is 14 cm and height is 20 cm.
Question 5. Find the altitude of a triangle whose base is 12 cm, and area is 672 square cm.

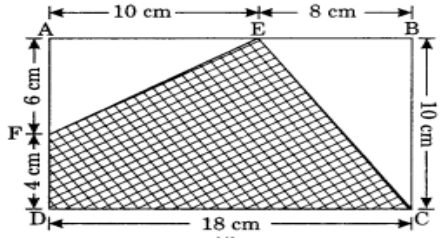
SHORT ANSWER TYPE QUESTIONS

Question 1. A rectangle park is 45 m long and 30 m wide. A path 2.5 m wide is constructed outside the park. Find the area of the path.

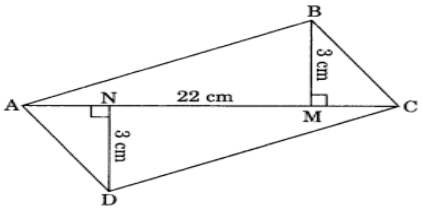
Question 2. A picture is painted on a cardboard 8 cm long and 5 cm wide such that there is a margin of 1.5 cm along each of its sides. Find the total area of the margin.

Question 3. How many times a wheel of radius 28 cm must rotate to cover a distance of 352 m?
(Take $\pi = 22/7$)

Question 4. In the following figure, find the area of the shaded portion.

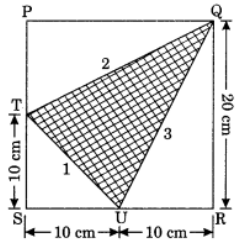


Question 5. Find the area of the quadrilateral ABCD. Here, AC = 22 cm, BM = 3 cm, DN = 3 cm, and BM ⊥ AC, DN ⊥ AC.

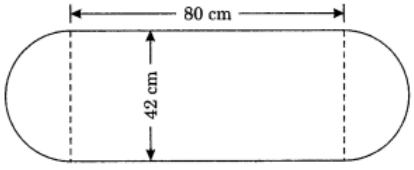


LONG ANSWER TYPE QUESTIONS

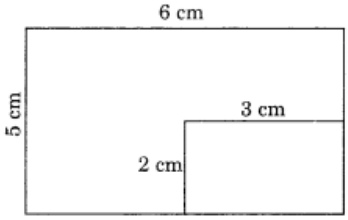
Question 1. In the following figure, find the area of the shaded portion.



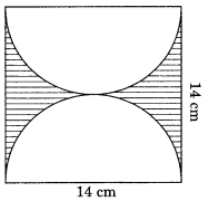
Question 2. In the given figure, calculate:
(a) the area of the whole figure.
(b) the total length of the boundary of the field.



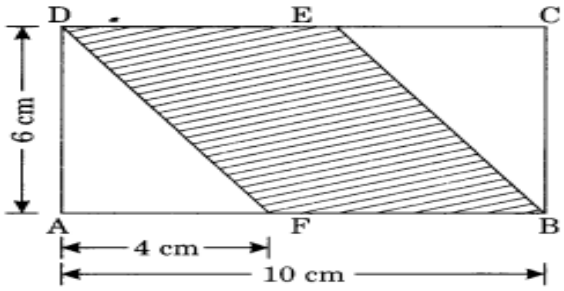
Question 3. A rectangular piece of dimension 3 cm × 2 cm was cut from a rectangular sheet of paper of dimensions 6 cm × 5 cm. Find the ratio of the areas of the two rectangles. (NCERT Exemplar)



Question 4. Find the area of the shaded portion in the figure given below.



Question 5. Find the area of a parallelogram-shaped shaded region. Also, find the area of each triangle. What is the ratio of the area of shaded portion to the remaining area of the rectangle?



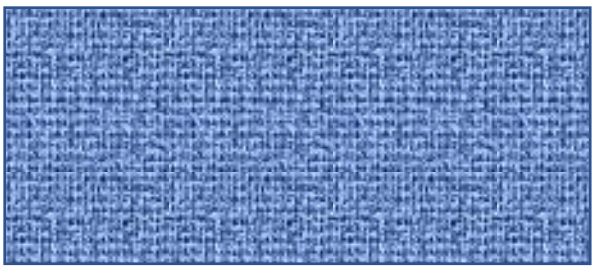
CREATIVE AND CRITICAL THINKING (CCT)

THEME - RECTANGLE AND SQUARE

We have a floor and a carpet of the dimensions as given below.

FLOOR

CARPET



(i)What are the shapes of floor and carpet?
(ii)Find the perimeters of floor and carpet.
(iii)Whose area is greater floor or carpet?
(iv)How much area of floor can be covered with this carpet?

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. 10000 m² 2. 154 cm² 3. $\frac{22}{7}$ cm² 4. $\frac{36}{7}$ cm 5. $\frac{44}{7}$ cm²

ANSWERS OF MULTIPLE CHOICE QUESTIONS

1. (b) 44 cm 2. (b) 38.5 cm^2 3. (d) 10000 m^2 4. (c) 36 cm 5. (d) 2.4 cm

ANSWERS OF VERY SHORT ANSWER TYPE QUESTIONS

Solution 1: Radius = 3.5 cm
Circumference = $2\pi r$

$$= 2 \times \frac{22}{7} \times 3.5 = 22 \text{ cm}$$

$$\text{Area} = \pi r^2$$

$$= \frac{22}{7} \times 3.5 \times 3.5$$

$$= \frac{77}{2} = 38.5 \text{ cm}^2$$

Solution 2: Area of the circle = 154 cm^2

$$\pi r^2 = 154$$

$$\frac{22}{7} \times r^2 = 154$$

$$r^2 = 154 \times \frac{7}{22}$$

$$r^2 = 7 \times 7$$

$$r^2 = (7)^2$$

$$r^2 = (7)^2$$

$$\Rightarrow \quad r = 7 \text{ cm}$$

$$\text{Circumference of the circle} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 7 = 44 \text{ cm}$$

Solution 3: Perimeter of the given figure = Circumference of the semicircle + diameter

$$= \pi r + 2r$$

$$= \frac{22}{7} \times 7 + 2 \times 7$$

$$= 22 + 14$$

$$= 36 \text{ cm}$$

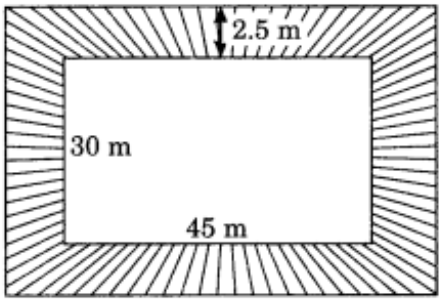
Hence, the required perimeter = 36 cm.

Solution 4: Area of a triangle = ½ × b × h
Given, base = 14 cm & height = 20 cm
Area = ½ × 14 × 20 = 140 square cm.

Solution 5: Given, base = 12 cm
Area = 672 square cm (given)
Area = ½ × Base × Altitude
672 = ½ ×12 × Altitude
Altitude = 672 × 2 / 12 = 112 cm

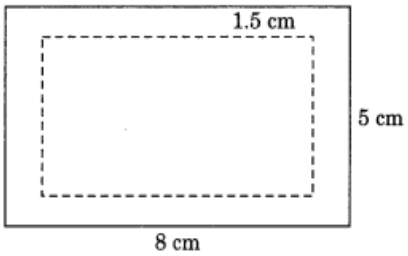
ANSWERS OF SHORT ANSWER TYPE QUESTIONS

Solution 1:



Length of the rectangular park = 45 m
Breadth of the park = 30 m
Area of the park = l × 6 = 45m × 30m = 1350 m^2
Length of the park including the path = 45 m + 2 × 2.5 m = 50 m
Breadth of the park including the path = 30 m + 2 × 2.5 m = 30m + 5m = 35m
Area of the park including the path = 50 m × 35 m = 1750 m^2
Area of the path = 1750 m^2 – 1350 m^2 = 400 m^2
Hence, the required area = 400 m^2.

Solution 2:



Length = 8 cm, breadth = 5 cm
Area of the cardboard = l × b = 8 cm × 5 cm = 40 cm^2
Width of the margin = 1.5 cm
Length of the inner cardboard = 8 cm – 1.5 × 2 cm = 8 cm – 3 cm = 5 cm
Breadth of the inner cardboard = 5 cm – 1.5 × 2 cm = 5 cm – 3 cm = 2 cm
Area of the inner rectangle = l × b = 5 cm × 2 cm = 10 cm^2
Area of the margin = 40 cm^2 – 10 cm^2 = 30 cm^2
Hence, the required area = 30 cm^2.

Solution 3: Radius of the wheel = 28 cm
Circumference = $2\pi r$ = 2 × 227 × 28 = 176 cm
Distance to be covered = 352 m or 352 × 100 = 35200 m
Number of rotation made by the wheel to cover the given distance = 35200/176 = 200
Hence, the required number of rotations = 200.

Solution 4: (Area of the rectangle = l × b
= 18 cm × (6 cm + 4 cm)
= 18 cm × 10 cm = 180 cm^2
Area of right triangle =12×b×h=12×6×10=30cm^2
Area of right ΔBCE = 12 × b × h
= 12 × 8 × 10 =40 cm^2
Area of the two right triangles = 30 cm^2 + 40 cm^2 = 70 cm^2
Area of the shaded portion = 180 cm^2 – 70 cm^2 = 110 cm^2

Solution 5:

$$\text{Area of } \Delta ABC = \frac{1}{2} \times b \times h = \frac{1}{2} \times 22 \times 3 = 33 \text{ cm}^2$$

$$\text{Area of } \Delta ADC = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 22 \times 3 = 33 \text{ cm}^2$$

Area of the quadrilateral ABCD = Area of ΔABC + Area of ΔADC

= 33 cm^2 + 33 cm^2 = 66 cm^2

Hence, the required area = 66 cm^2.

ANSWERS OF LONG ANSWER TYPE QUESTIONS

Solution 1:

(i) Area of the rectangle = l × b

= 18 cm × (6 cm + 4 cm)

= 18 cm × 10 cm = 180 cm^2

Area of right triangle = $\frac{1}{2}$×b×h=$\frac{1}{2}$×6×10=30cm^2

Area of right ΔBCE = $\frac{1}{2}$ × b × h

= $\frac{1}{2}$ × 8 × 10 =40 cm^2

Area of the two right triangles = 30 cm^2 + 40 cm^2 = 70 cm^2

Area of the shaded portion = 180 cm^2 – 70 cm^2 = 110 cm^2

(ii) Area of the square PQRS = $(Side)^2$ = $(20)^2$ = 400 cm^2

$$\text{Area of triangle (1)} = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 10 \times 10 = 50 \text{ cm}^2$$

$$\text{Area of triangle (2)} = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 10 \times 20 = 100 \text{ cm}^2$$

$$\text{Area of triangle (3)} = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 10 \times 20 = 100 \text{ cm}^2$$

Area of the three triangles = 50 cm^2 + 100 cm^2 + 100 cm^2 = 250 cm^2

Area of the shaded portion = 400 cm^2 – 250 cm^2 = 150 cm^2

Solution 2:

Area of the rectangular portions = l × b = 80 cm × 42 cm = 3360 cm^2

Area of two semicircles = 2 × $\frac{1}{2}$ πr^2 = πr^2

= 22/7 × 21 × 21

= 22 × 3 × 21

= 1386 cm^2

Total area = 3360 cm^2 + 1386 cm^2 = 4746 cm^2

Total length of the boundary of field = (2 × 80 + πr + πr) cm

= (160 + 22/7 × 21 + 22/7 × 21)

= (160 + 132) cm

= 292 cm

Hence, the required (i) area = 4746 cm^2 and (ii) length of boundary = 292 cm.

Solution 3: Length of the rectangular piece = 6 cm

Breadth = 5 cm

Area of the sheet = l × b = 6 cm × 5 cm = 30 cm^2

Area of the smaller rectangular piece = 3 cm × 2 cm = 6 cm^2
Ratio of areas of two rectangles = 30 cm^2 : 6 cm^2 = 5 : 1

Solution 4: Area of the rectangle = l × b = 14 cm × 14 cm = 196 cm^2
Radius of the semicircle = 142 = 7 cm
Area of two equal semicircle = $2 \times \frac{1}{2} \pi r^2 = \pi r^2$ = 22/7 × 7 × 7 = 154 cm^2
Area of the shaded portion = 196 cm^2 – 154 cm^2 = 42 cm^2

Solution 5: Here, AB = 10 cm
AF = 4 cm
FB = 10 cm – 4 cm = 6 cm
Area of the parallelogram = Base × Height = FB × AD = 6 cm × 6 cm = 36 cm^2
Hence, the required area of shaded region = 36 cm^2.
Area $\Delta DEF = \frac{1}{2} \times b \times h = \frac{1}{2} \times AF \times AD = \frac{1}{2} \times 4 \times 6 = 12$ cm^2
Area $\Delta BEC = \frac{1}{2} \times b \times h = \frac{1}{2} \times GC \times BC = 12 \times 4 \times 6 = 12$ cm^2
Area of Rectangle ABCD = l × b = 10 cm × 6 cm = 60 cm^2
Remaining area of Rectangle = 60 cm^2 – 36 cm^2 = 24 cm^2
Required Ratio = 36 : 24 = 3 : 2

ANSWERS OF CCT TYPE QUESTIONS

RECTANGLE AND SQUARE

(i)Floor: Square shaped, Carpet: Rectangular shape
(ii)Perimeter of Floor: 48 units. Perimeter of Carpet: 52 units
(iii)Area of Floor: 144 sq. units. Area of carpet: 144 sq. units. Areas of both are equal.
(iv)Whole area of floor can be covered with this carpet.

Chapter 11, Perimeter and Area (November-14 Periods)

e-content, you tube video links

Exercise 11.1 https://youtu.be/AEPz0pbW-fA
Exercise 11.2 https://youtu.be/vtWYo_d7y0w
Part-I of Exercise 11.3 https://youtu.be/dgscDk-AaHc
Part-II of Exercise 11.3 https://youtu.be/Mu0PxtlukQU
Part-I of Exercise 11.4 https://youtu.be/po6Okifk9tQ
Part-II of Exercise 11.4 https://youtu.be/jmv3W7HqvQc

CHAPTER – 12

ALGEBRAIC EXPRESSION)

KEY POINTS

Algebraic Expressions: An Algebraic Expression is the combination of constant and variables. We use the operations like addition, subtraction etc to form an algebraic expression.

Variable: A variable does not have a fixed value .it can be varied. It is represented by letters like a, y, p m etc.

Constant: A constant has a fixed value. Any number without a variable is a constant.

Example: 2x + 7

Here we got this expression by multiplying 2 and x and then add 7 to it.

In the above expression, the variable is x and the constant is 7.

Terms of an Expression

Terms

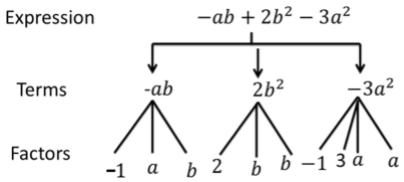
To form an expression we use constant and variables and separate them using the operations like addition, subtraction etc. these parts of expressions which we separate using operations are called **Terms**.

$$4x - y + 7$$

In the above expression, there are three terms, 4x, - y and 7.

Factors of a Term

Every term is the product of its factors. As in the above expression, the term 4x is the product of 4 and x. So 4 and x are the factors of that term.We can understand it by using a tree diagram.



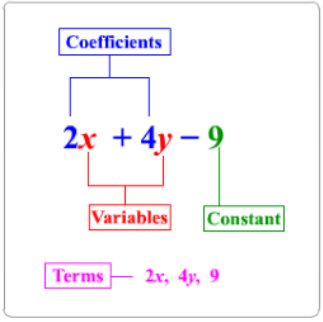
Coefficients

As you can see above that some of the factors are numerical and some are algebraic i.e. contains variable. The numerical factor of the term is called the numerical coefficient of the term.

In the above expression,

-1 is the coefficient of ab , 2 is the coefficient of b^2 , -3 is the coefficient of a^2.

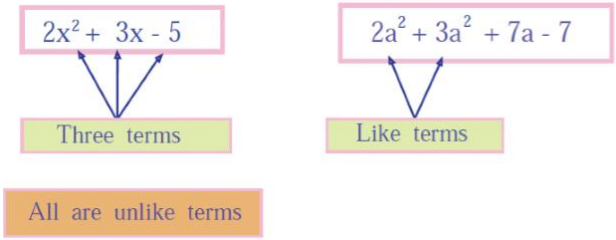
Parts of an Expression



Like and Unlike Terms

Like Terms are the terms which have same algebraic factors. They must have the same variable with the same exponent.

Unlike Terms are the terms which have different algebraic factors.



$2x^2 + 3x – 5$ does not contain any term with same variable.

$2a^2 + 3a^2 + 7a – 7$ contains two terms with same variable i.e. $2a^2$ and $3a^2$.so these are like terms.

Monomials, Binomials, Trinomials and Polynomials

Expressions	Meaning	Example
Monomial	Any expression which has only one term.	$5x^2$, 7y, 3ab
Binomial	Any expression which has two, unlike terms.	$5x^2 + 2y$, 2ab – 3b
Trinomial	Any expression which has three, unlike terms.	$5x^2 + 2y + 9xy$, x + y – 3
Polynomial	Any expression which has one or more terms with the variable having non-negative integers as an exponent is a polynomial.	$5x^2 + 2y + 9xy + 4$ and all the above expressions are also polynomial.

Remark: All the expressions like monomial, binomial and trinomial are also a polynomial.

Addition and Subtraction of Algebraic Expression

1. Addition of Like Terms: If we have to add like terms then we can simply add their numerical coefficients and the result will also be a like term.

Example: Add 2x and 5x.

Solution: 2x + 5x

= (2 × x) + (5 × x)

= (2 + 5) × x (using distributive law)

=7 × x = 7x

2. Subtraction of Like Terms: If we have to subtract like terms then we can simply subtract their numerical coefficients and the result will also be a like term.

Example: Subtract 3p from 11p.

Solution: 11p – 3p = (11-3) p = 8p

Simplify the expression: $12p^2 – 9p + 5p – 4p^2 – 7p + 10$

Solution: First we have to rearrange the terms.

$12p^2 – 4p^2 + 5p – 9p – 7p + 10$

$= (12 – 4) p^2 + (5 – 9 – 7) p + 10$

$= 8p^2 + (– 4 – 7) p + 10$

$= 8p^2 + (–11) p + 10 = 8p^2 – 11p + 10$

Finding the Value of an Expression

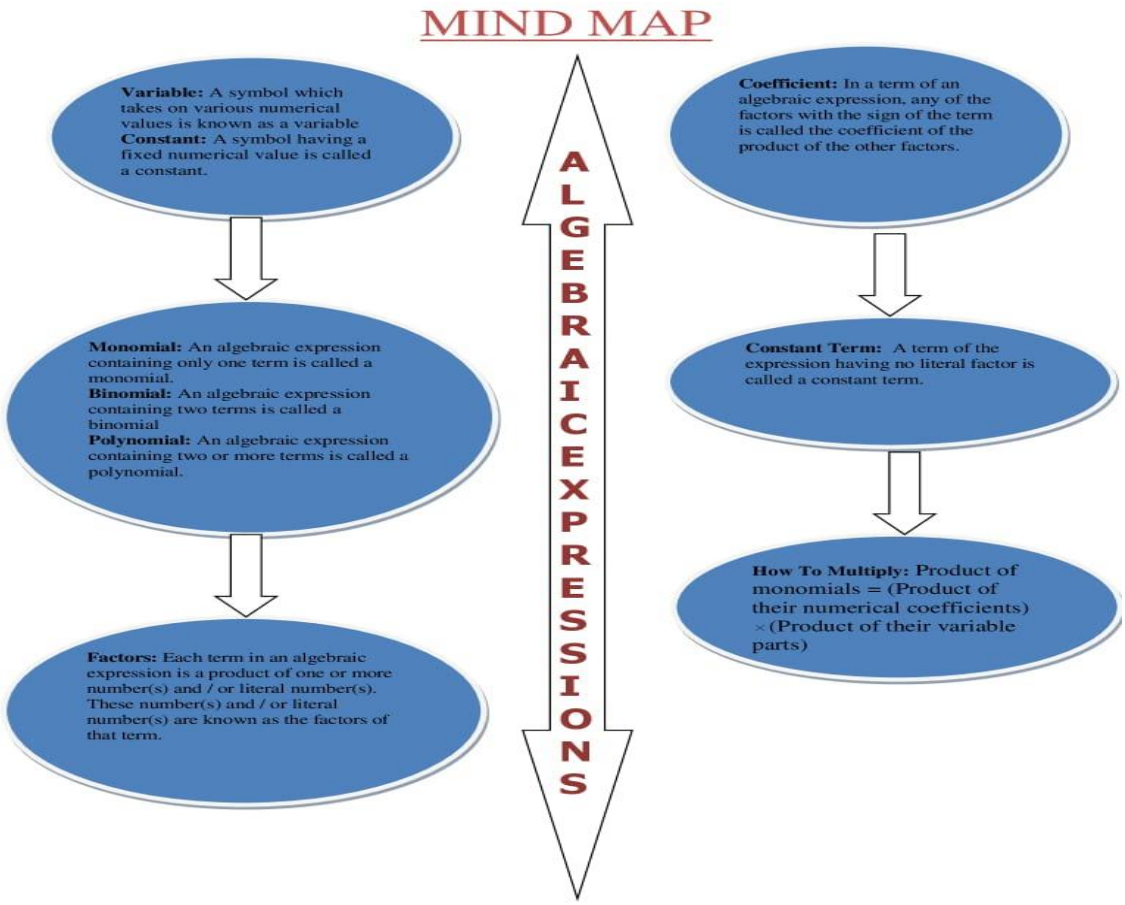
If we know the value of the variable in the expression then we can easily find the numerical value of the given expression.

Example: Find the value of the expression 2x + 7 if x = 3.

Solution: We have to put the value of x = 3.

$2x + 7 = 2(3) + 7 = 6 + 7 = 13 = 25$

MIND MAP OF THE CHAPTER



OBJECTIVE TYPE QUESTIONS OF THE CHAPTER

1. How many terms are there in the expression $2x^2y$?
(a) 1 (b) 2 (c) 3 (d) 4

2. Factor of $-5x^2y^2z$ are:
(a) $-5 \times x \times y \times z$ (b) $-5 \times x^2 \times y \times z$ (c) $-5 \times x \times x \times y \times y \times z$ (d) $-5 \times x \times y \times z^2$

3. How many terms are there in the expression $1.2ab - 2.4b + 3.6a$?
(a) 1 (b) 2 (c) 3 (d) 4

4. How many terms are there in the expression $-2p^3 - 3p^2 + 4p + 7$?
(a) 1 (b) 2 (c) 3 (d) 4

5. What is the coefficient of x in the expression $4x + 3y$?
(a) 1 (b) 2 (c) 3 (d) 4

6. What is the coefficient of y^2 in the expression $4 - xy^2$?
(a) 4 (b) x (c) –x (d) None of these

7. What is the coefficient of x in the expression $ax^3 + bx^2 + d$?
(a) a (b) b (c) d (d) 0

8. The number of scarfs of length half metre that can be made from y metres of cloth is:
(a) 2y (b) y/2 (c) y + 2 (d) y + 1/2

9. Which of the following pairs of terms is a pair of like terms?
(a) 7p, 8q (b) 10pq, -7qp (c) $12q^2 p^2$, $-5p^2$ (d) 2405p, 78qp

10. Which of the following pairs of terms is a pair of unlike terms?
(a) $-p^2q^2$, $12q^2p^2$ (b) 41, 100 (c) qp^2, $13p^2q$ (d) $-4yx^2$, $-4xy^2$

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. (a) 1 2. (b) 2 3. (c) 3 4. (d) 4
5. (d) 4 6. (c) -x 7. (d) 0 8. (a) 2y
9. (b) 10pq, -7qp 10. (d) $-4yx^2$, $-4xy^2$

MULTIPLE CHOICE QUESTIONS (MCQ)

1. What is the coefficient of x in the expression 2 – x + y?
(a) 2 (b) 1 (c) -1 (d) None of these

2. What is the coefficient of y^2 in the expression $3y^2 + 4x$?
(a) 1 (b) 2 (c) 3 (d) 4

3. Which of the following pairs of terms is a pair of like terms?
(a) 3x, 2xy (b) $-xy^2$, $-2xy^2$ (c) $-6x^2$, $20x^2y$ (d) $8x^2$, 7y

4. Add a + b – 1, b – a + 1, 1 – 26
(a) 1 (b) -1 (c) 2 (d) -2

5. Subtract y^2 from $-5y^2$
(a) $-6y^2$ (b) $6y^2$ (c) y^2 (d) $-5y^2$

6. What should be subtracted from $x^2 + y^2 - 2xy$ to get $x^2 + y^2$?
(a) 2xy (b) -2xy (c) xy (d) – xy

7. Find the value of the expression 4x – 3 for x = 1
(a) 4 (b) -3 (c) 3 (d) 1

8. Find the value of the expression $a^2 - 2ab + b^2$ for a = 1, b = 1
(a) 1 (b) 0 (c) -1 (d) 2

9. Find the value of the expression 3x + 5 (x – 2) for x = 2
(a) 2 (b) 4 (c) 5 (d) 6

10. Find the value of the expression $z^3 - 2(z - 10)$ for z = 10
(a) 10 (b) 100 (c) 1000 (d) 10000

ANSWERS OF MULTIPLE CHOICE QUESTIONS(MCQ)

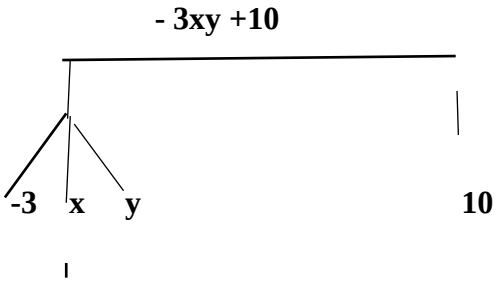
1. (c) -1 2. (c) 3 3. (b) $-xy^2$, $-2xy^2$
4. (a) 1, Hint: Sum =(1 -1)a +(1 + 1 -2)b -1 + 1 + 1 = 1 5. (a) $-6y^2$, Hint: $-5y^2 - y^2 = -6y^2$
6. (b) -2xy, Hint: $x^2 + y^2 - 2xy - (x^2 + y^2) = -2xy$ 7. (d) 1, Hint: 4(1) - 3 = 1
8. (b) 0, Hint: $(1)^2-2(1)(1) + (1)^2 = 0$ 9. (d) 6, Hint: 3(2) + 5(2-2) = 6
10. (c) 1000, Hint: $(10)^3 - 2(10 - 10) = 1000$

VERY SHORT ANSWER (VSA) TYPE QUESTIONS

1. Identify in the given expressions, terms which are not constants. Give their numerical coefficients.
(i) 5x – 3 (ii) $11 - 2y^2$
Solution: (i) 5x, 5 is the coefficient of x
(ii) $-2y^2$, -2 is the coefficient of y^2

2. Group the like terms together from the following expressions:
$-8x^2y$, 3x, 4y, x , $2x^2y$, -y
Solution: Like terms are: 3x,x
4y, -y
$-8x^2y$,$2x^2y$

3. Draw the tree diagram for the given expressions: -3xy + 10
Solution: The terms in the expression are -3xy and 10
-3xy = -3 × x × y



4. Find the numerical coefficient of each of the terms:
x^3y^2z, $-3xy^2z^3$, $5x^3y^2z$, $-7x^2y^2z^3$

Solution: 1 is the numerical coefficient of x^3y^2z,
-3 is the numerical coefficient of $-3xy^2z^3$
5 is the numerical coefficient of $5x^3y^2z$
-7 is the numerical coefficient of $-7x^2y^2z^3$

5. Find the value of following polynomials at m = 1, n = -1 and p = 2
(i) $m^3 + n^3 + p^3$
(ii) mn + np + pm
Solution: (i) $(1)^3 + (-1)^3 + (2)^3 = 1 - 1 + 8 = 8$
(ii) $mn + np + pm = 1 \times -1 \times 2 = -2$

6. Add:
(i) $3x^2y$, $-5x^2y$, $-x^2y$
(ii) a + b – 3, b + 2a – 1
Solution: (i) $3x^2y - 5x^2y - -x^2y = 3x^2y - 6x^2y = -3x^2y$
(ii) a + b – 3 + b + 2a – 1 = 3a +2b -4

7. Subtract $3x^2 – x$ from $5x – x^2$.
Solution: $5x – x^2 - (3x^2 – x) = 6x – 4x^2$

8. Simplify combining the like terms:
(i) a – (a – b) – b – (b – a)
(ii) $x^2 – 3x + y^2 – x – 2y^2$
Solution: (i) a – (a – b) – b – (b – a) =a -a + b -b = 0
(ii) $x^2 – 3x + y^2 – x – 2y^2 = x^2 – 4x - y^2$

9. Subtract 24xy – 10y – 18x from 30xy + 12y – 14x
Solution: 30xy + 12y – 14x - (24xy – 10y – 18x)
= 30xy -24xy + 12y + 10y – 14x + 18x
= 6xy + 22y + 4x

10. Give the sum of $2x^2 + 3xy – 5$ and $7 + 2xy – x^2$.
Solution: $2x^2 + 3xy – 5 + 7 + 2xy – x^2 = x^2 + 5xy + 2$

SHORT ANSWER (SA) TYPE QUESTIONS

1. Add : (i) 3x- y + 11 and - y - 11 (ii) $4 + 3x$ and $5 - 4x + 2x^2$
Solution: (i) 3x- y + 11 + (- y - 11) = 3x- 2y
(ii) $4 + 3x + 5 - 4x + 2x^2 = 9 - x + 2x^2$

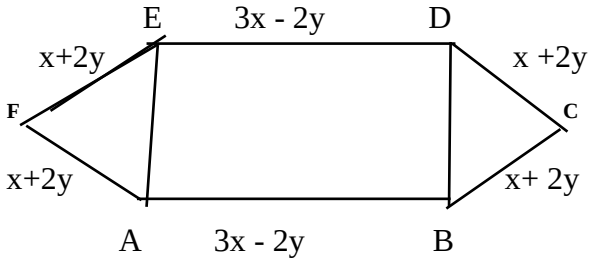
2. If $P = 2x^2 – 5x + 2$, $Q = 5x^2 + 6x – 3$ and $R = 3x^2 – x – 1$. Find the value of 2P – Q + 3R.
Solution: $2P – Q + 3R = 2(2x^2 – 5x + 2) - (5x^2 + 6x – 3) + 3 (3x^2 – x – 1)$
$= 4x^2 – 10x + 4 - 5x^2 - 6x + 3 + 9x^2 –3x –3$

$= 8x^2 - 19x + 4$

3. If A = -(2x + 3), B = -3(x – 2) and C = -2x + 7. Find the value of k if (A + B + C) = k.
Solution: (A + B + C) = k
-2x - 3 -3x + 6 -2x + 7 = k

-7x + 10 = k

4. Find the perimeter of the given figure ABCDEF.



Solution: 2(3x - 2y) +4(x +2y) = 6x - 2y + 4x +8y = 10x + 6y

5. Subtract:
(i) $-x^2 + 10x - 5$ from $3x^2 - 2x - 2$
(ii) $5a^2 - 7ab + 5b^2$ from $3ab - 2a^2 - 2b^2$
Solution: (i) $3x^2 - 2x - 2 - (-x^2 + 10x - 5) = 4x^2 - 12x + 3$
(ii) $3ab - 2a^2 - 2b^2 - (5a^2 - 7ab + 5b^2) = 10\,ab - 7a^2 - 7b^2$

6. What should be added to $x^2 + xy + y^2$ to obtain $2x^2 + 3xy$?
Solution: $2x^2 + 3xy - (x^2 + xy + y^2) = x^2 + 2xy - y^2$

7. What should be subtracted from 2a+ 8b + 10 to get -3a + 7b + 16?
Solution: 2a+ 8b + 10 - (-3a + 7b + 16) = 5a + b - 6

8. If m = 2, find the value of:
(i) m - 2 (ii) 9 - 5m
Solution: (i) m - 2 = 2 - 2 = 0
(ii) 9- 5m = 9 - 5× 2 = 9 - 10 = -1

9. What should be taken away from $3x^2 - 4y^2 + 5xy + 20$ to obtain $-x^2 - y^2 + 6xy + 20$?
Solution: $3x^2 - 4y^2 + 5xy + 20 - (-x^2 - y^2 + 6xy + 20) = 4x^2 - 3y^2 - xy$

10. Subtract :
(i) $-5x^2y$ from $-9x^2y$ (ii) 8yz from -4yz
Solution: (i) $-9x^2y - (-5x^2y) = -4x^2y$
(ii) -4yz - (8yz) = -12yz

LONG ANSWER (LA) TYPE QUESTIONS

1. The lengths of the sides of a triangle are $4x^2 - 3x + 7$, -x2 + 2x - 9 and $5x^2 - 4x + 8$. Find the perimeter of the triangle.
Solution: $4x^2 - 3x + 7 + (-x^2 + 2x - 9) + 5x^2 - 4x + 8 = 8x^2 + x + 6$

2. What is to be added to $4x^3 - 6x^2 + 5x - 3$ to get $x^3 + x^2 - x + 1$?
Solution: $x^3 + x^2 - x + 1 - (4x^3 - 6x^2 + 5x - 3) = -3x^3 + 7x^2 - 6x + 4$

3. Subtract 2x + y - z from the sum of 9x - 7y + 8z and -8x + 9y - 7z.
Solution: 9x - 7y + 8z -8x + 9y - 7z = x + 2y - z -(2x + y - z) = - x + y

4. If a = 3x - 5, b = 4y + 7 and c = 3x + 4y +2, prove that a+ b - c = 0.
Solution: a+ b - c = 3x - 5 + 4y + 7 - (3x + 4y + 2) = 0

5. The sum of two expressions is $4x^3 - 6x^2 + 4x - 1$. if one of them is $2x^3 - 3x^2 + 2x$, find the other.
Solution: $4x^3 - 6x^2 + 4x - 1 - (2x^3 - 3x^2 + 2x) = 2x^3 + 9x^2 + 2x - 1$

6. From the sum of $2y^2 + 3z$, $-y^2 - yz - z^2$ and $yz + z^2$, subtract the sum of $3y^2 - z^2$ and $-y^2 + yz + z^2$.
Solution: $2y^2 + 3z - y^2 - yz - z^2 = y^2 + 3z - yz - z^2 + yz + z^2 = y^2 + 3z$
and $3y^2 - z^2 - y^2 + yz + z^2 = 2y^2 + yz$

Now $y^2 + 3z - (2y^2 + yz) = -y^2 - yz + 3z$

7. When a = 0, b = -1,find the value of the given expressions:
(i) 2a + 2b (ii) $2a^2 + b^2 + 1$ (iii) $2a^2b + 2ab^2 + ab$
Solution: (i) $2a + 2b = 2\times0 + 2 \times -1 = 0 - 1 = -1$
(ii) $2a^2 + b^2 + 1 = 2 \times 0^2 + (-1)^2 + 1 = 0 + 1 + 1 = 2$
(iii) $2a^2b + 2ab^2 + ab = 2 \times 0^2 \times -1 + 2 \times 0 \times (-1)^2 + 0 \times -1 = 0 + 0 + 0 = 0$

8. Simplify these expressions and find their values if x = 3,a = -1, b = -2.
(i) 3x -5 -x + 9 (ii) 3a + 5 -8a + 1 (iii) 2 - 8x + 4x + 4.
Solution: (i) $3x - 5 - x + 9 = 2x + 4 = 2 \times 3 + 4 = 10$
(ii) $3a + 5 - 8a + 1 = -5a + 6 = -5 \times -1 + 6 = 5 + 6 = 11$
(iii) $2 - 8x + 4x + 4 = -4x + 6 = -4 \times 3 + 6 = -6$

9. (i) if z = 10, find the value of $z^3 - 3(z - 10)$
(ii) If p = -10, find the value of $p^2 - 2p - 100$.
Solution: (i) $z^3 - 3(z - 10) = 10^3 - 3(10 - 10) = 1000 - 3 \times 0 = 1000$
(ii) $p^2 - 2p - 100 = -10^2 - 2\times - 10 - 100 = 100 + 20 - 100 = 20$

10. Simplify the following expression and find its value when a = 5 and b = -3.
$2(a^2 + ab) + 3 - ab$
Solution: $2(a^2 + ab) + 3 - ab = 2(5^2 + 5\times-3) + 3 - 5\times-3 = 2 \times 10 + 3 + 15 = 38$

CCT PRACTICE QUESTIONS

Theme- 1

ZELLER'S RULE: FIND THE DAY FOR GIVEN DATE QUICKLY

With this technique named after its founder Zeller, you can solve any 'Dates and Calendars' problems. Zeller's Rule can be used to find the day on any particular date in the calendar in the history.
All you have to know is the formula given below and how to use it. Zeller's Rule Formula

$$\mathbf{F = K + [(13xM - 1)/5] + D + [D/4] + [C/4] - 2C}$$

where,

1) K = Date. So, for 27/06/2019, we take K=27

In Zellers rule, months start from March.
2) M = Month number
Remember that month Starts from March in this formula. So
March = 1, April = 2, May = 3 June = 4 July =5, August = 6, September = 7, October = 8, November = 9, December = 10, January = 11, February = 12
So, for 27/06/2019, M=4

3) D = Last two digits of the year
So, in our example of 27/06/2019, the value of D is 19.

4) C = The first two digits of century
So, in our example of 27/06/2019, the value of C is20. Let us now calculate the day for 27/06/2019 with the formula above.

Remember that the values of K, M, D and C are 27, 04, 19 and 20 respectively.

The formula is:

F = K + [(13xM – 1)/5] + D + [D/4] + [C/4] – 2C

Replacing the values in the formula, we get
F = 27 + [{(13 x 4)- 1}/5] + 19 + 19/4 + 20/4 – (2 x 20) □ Therefore,
F = 27 + 51/5 + 19 + 19/4 + 20/4 – 40
which gives F = 27 + 10.2 + 19 + 4.75 + 5 – 40
[We have to consider only the integral value and ignore the value after decimal. So, the equation changes a bit as shown below. We have just removed value after
decimal]
F = 27 + 10 + 19 + 4 + 5 – 40
Therefore, F = 25

Now that you have a numerical value for the day, divide the number by 7. We need the remainder only.

For example, in this case, the remainder is 4. Now, match the remainder with the chart below:
0 = Sunday, 1 = Monday , 2 = Tuesday, 3 = Wednesday
4 = Thursday, 5 = Friday , 6 =Saturday

Here, 4 represents Thursday. So by Zeller's rule, 27th of June, 2019 is on a Thursday.

Question 1: By using the above Zeller's formula, Find the day for 15/08/1947.
F = K + [(13xM – 1)/5] + D + [D/4] + [C/4] – 2C.

Question 2: By using the above Zeller's formula, Find the day for 26/01/1950.

SOLUTION OF CCT PRACTICE QUESTIONS

(Theme- 1) ZELLER'S RULE: FIND THE DAY FOR GIVEN DATE QUICKLY

Solution 1. F = K + [(13xM – 1)/5] + D + [D/4] + [C/4] – 2C
For 15/08/1947

K= 15 , M = 08, D = 47 and C = 19

F = 15 + [(13 ×8 -1)/5] +47 + [47/4] + [19/4] - 2 × 19

= 15 + 103/5 + 47 + 11.75 + 4.75 - 38

= 15 + 20.6 + 47 + 11.75 + 4.75 - 38

Now, we have to consider only integer value ignoring the decimal value

= 15 + 20 + 47 + 11 + 4 -38

= 97-38 = 59

Now 59 is divided by 7 , we get 3 as remainder

3 is WEDNESDAY as per given rule.

Solution 2. F = K + [(13xM – 1)/5] + D + [D/4] + [C/4] – 2C
For 26/01/1950
K = 26 , M = 01 D= 50 and C = 19

$F = 26 + [(13 \times 1 - 1)/5] + 50 + [50/4] + [19/4] - 2 \times 19$

$= 26 + [12/5] + 50 + 12.5 + 4.75 - 38$

$= 26 + 2.4 + 50 + 12.5 + 4.75 - 38 = 26 + 2 + 50 + 12 + 4 - 38 = 94 - 38 = 56$

56 is divided by 7, we get 0 as remainder.

Therefor day is SUNDAY.

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PRACTICE QUESTIONS FOR SELF ASSESSMENT

OBJECTIVE TYPE QUESTIONS

1. Add $4x^2y, -3x^2y, -7xy^2, 7xy^2$
   (a) x^2y (b) xy^2 (c) xy (d) $-x^2y$
2. Simplify : $p + (p - q) + q + (q - p)$
   (a) p (b) q (c) p + q (d) p – q
3. Simplify : $z^2 + 11z^2 - 5z - 11z^2 + 5z$
   (a) z^2 (b) $-z^2$ (c) 5z (d) -5z
4. Subtract – xy from xy
   (a) xy (b) 2xy (c) 3xy (d) 4xy
5. What should be added to $x^2 + y^2$ to get $x^2 + y^2 + 2xy$?
   (a) xy (b) 2xy (c) 4xy (d) -2xy

MULTIPLE CHOICE QUESTIONS

1. Find the value of the expression $a^3 + b^3 + c^3 - 3abc$ for a = 2, b = 3, c = 4
   (a) 3 (b) 6 (c) 9 (d) 27
2. If the value of the expression $x^2 - 5x + k$ for x = 0 is 5, then the value of k is
   (a) 2 (b) 3 (c) 4 (d) 5
3. Number of terms in the expression $3x^2y - 2y^2z - z^2x + 5$:
   (a) 2 (b)3 (c)4 (d)5
4. The subtraction of 5 times of y from x is :
   (a) 5x – y (b) y - 5x (c) x- 5y (d) 5y - x
5. Identify the binomial out the following:
   (a) $3xy^2 + 5y - x^2y$ (b) $x^2y - 5y - x^2y$ (c) xy + yz + zx (d)$3xy^2 + 5y - x$

VERY SHORT ANSWER TYPE QUESTIONS

1. Subtract $3x^2 - 5y - 2$ from $5y - 3x^2 + xy$ and find the value of the result if x = 2, y = -1.
2. Subtract 24xy – 10y – 18x from 30xy + 12y – 14x.
3. Find the sum of $-3x^3y^2 + 2x^2y^3$ and $-3x^2y^3 - 5y^4$.
4. What should be subtracted from $2x^3 - 3x^2y + 2xy^2 + 3y^2$ to get $x^3 - 2x^2y + 3xy^2 + 4y^2$?
5. To what expression must $99x^3 - 33x^2 - 13x - 41$ be added to make the sum zero?

SHORT ANSWER TYPE QUESTIONS

1. Find the value of the following expression, when x= -1
   (i) 2x -7 (ii) -x + 2
2. If p = -2 , find the value of:
   (i) 4p+ 7 (ii) $-3p^2 + 4p + 7$
3. Subtract :
   (i) $5x^2 - 3x^3 + x - 6$ from $x^3 - 4 + 3x^2$
   (ii) -(x + y+ z) from x + y + z.
4. Verify $a^2 + b^2 = c^2$ for a = 6, b = 8 and c= 10.
5. If x = 6,y = -2 and z = 1,find the value of 3x - 4y + z.

LONG ANSWER TYPE QUESTIONS

1. If $A = 3x^2 - 4x + 1$, $B = 5x^2 + 3x - 8$ and $C = 4x^2 - 7x + 3$, the find:
   (i) $(A + B) - C$ (ii) $B + C - A$
2. Evaluate the following algebraic expressions for $x = -1$, $y = -2$, $z = 3$.
   $5x^2y + 7xy^2 + 3xyz$ (ii) $x^3 + y^3 + z^3 - 3xyz$
3. What must be added to $(-4x^3 + 7x^2 - 3x + 4)$ to get zero?
4. The sum of two expressions is $x^2 - y^2 + 3y - 5$.if one of them is $2y^2 + 2x^2 - 10$, find the other.
5. The length of a rectangle is 6 m less than three times its breadth. Find the dimensions of the rectangle, if the perimeter is 148m.

CCT PRACTICE QUESTIONS

Theme – MEDALS TALLY (Medals tally in South Asian Games)

UPDATED: December 10, 2019 19:26 IST The South Asian Games (SAF Games, SAG, or SA games, and formerly known as South Asian Federation Games) are a biennial multi-sport event held among the athletes from South Asia. The governing body of these games is South Asia Olympic Council (SAOC), was formed in 1983. Last event: 1-10 December 2019 Kathmandu, ...
First event: September 1984 Kathmandu, Nepal
Abbreviation: SAG Occur every: 2 years

Motto: Peace, Prosperity and Progress

South Asian Games Medals Tally 2019 India concluded the South Asian Games with their highest medal tally in the history of the tournament. Indian contingent was able to win 312 medals, which includes 174 gold, 93 silver, and 45 bronze medals. India had claimed 309 medals in the 2016 edition of the South Asian Games. Next it will be conducted in 2022 in Lahore, Pakistan.

COUNTRY	GOLD	SILVER	BRONZE	TOTAL MEDALS
INDIA	174	93	45	312
NEPAL	51	60	95	206
SRILANKA	40	83	128	251
PAKISTAN	31	41	59	131
BANGLADESH	19	32	87	138
MALDIVES	1	0	4	5
BHUTAN	0	7	13	20

Question 1. If the range of number of gold medals is A ,the median of number of silver medals is B and the mean of number of bronze medals is C .Find the value of A – B + C.

Question 2. Identify one of the countries whose total number of medals is a prime number.

ANSWERS OF OBJECTIVE TYPE QUESTIONS

1. (a) x^2y 2. (c) $p + q$ 3. (b) $-z^2$ 4.(b) $2xy$ 5. (b) $2xy$

ANSWERS OF MULTIPLE CHOICE QUESTIONS

1. (d)27, Hint: $(2)^3 + (3)^3 + (4)^3 - 3(2)(3)(4) = 8 + 27 + 64 - 72 = 27$
2. (d) 5, Hint: $(0)^2 - 5(0) + k = 5$ 3.(c) 4
4. (c) $x - 5y$ 5.(d) $3xy^2 + 5y - xy^2$

ANSWERS OF VERY SHORT ANSWER TYPE QUESTIONS

Solution 1: $5y – 3x^2 + xy - (3x^2 – 5y – 2) = 10y + xy + 2 = 10 \times -1 + (-1) \times 2 + 2 = -10$

Solution 2: $30xy + 12y – 14x - (24xy – 10y – 18x) = 6xy + 22y + 4x$

Solution 3: $-3x^3y^2 + 2x^2y^3 + -3x^2y^3 – 5y^4 = -3x^3y^2 - x^2y^3 – 5y^4$.

Solution 4: $2x^3 – 3x^2y + 2xy^2 + 3y^2 - (x^3 – 2x^2y + 3xy^2 + 4y^2) = x^3 – x^2y - xy^2 - y^2$

Solution 5: $99x^3 – 33x^2 – 13x – 41 - (99x^3 – 33x^2 – 13x – 41) = - 99x^3 + 33x^2 + 13x +$

ANSWERS OF SHORT ANSWER TYPE QUESTIONS

Solution 1: (i) $2x -7 = 2\times -1 = -2$

(ii) $-x + 2 = -(-1) + 2 = 3$

Solution 2: (i) $4p+ 7 = 4 \times -2 + 7 = -1$

(ii) $-3p^2 + 4p + 7 = -3 \times(-1)^2 + 4 \times -1 + 7 = 0$

Solution 3: (i) $x^3 - 4 + 3x^2 - (5x^2 - 3x^3 + x - 6) = 4x^3 -2x^2- x - 2$

(ii)$x + y + z + x + y + z = 2x +2 y +2 z.$

Solution 4: $a^2 + b^2 = c^2$

$6^2 + 8^2 = 10^2$

$36 + 64 = 100$

Solution 5: $3x - 4y + z$ for $x = 6, y = -2$ and $z = 1$

$3 \times 6 - 4\times -2 +1 = 18 + 8 + 1 = 27$

ANSWERS OF LONG ANSWER TYPE QUESTIONS

Solution 1: (i) $(A + B) - C = (3x^2 - 4x + 1 +5x^2 + 3x - 8) - (4x^2 - 7x + 3)$

$= 8x^2 - x - 7 - 4x^2 + 7x - 3 = 4x^2 + 6x - 10$

(ii) $B + C - A = 5x^2 + 3x - 8 + 4x^2 - 7x + 3 - (3x^2 - 4x + 1)$

$= 9x^2 - 4x - 5 - 3x^2 + 4x - 1 = 6x^2 - 6$

Solution 2: (i) $5x^2y + 7xy^2 + 3xyz = 5(-1)^2 \times -2 + 7(-1)\times (-2)^2 + 3(-1)\times (-2)\times (3)$

$= - 10 - 28 + 18 = - 20.$

(ii) $x^3 + y^3 + z^3 -3xyz = (-1)^3 + (-2)^3 + (3)^3 -3 \times - 1 \times -2 \times 3$

$= -1 -8 + 27 - 18 = - 27 + 27 = 0$

Solution 3: $-4x^3 + 7x^2 - 3x + 4 + (4x^3 - 7x^2 + 3x - 4) = 0$

Solution 4: $x^2 - y^2 + 3y -5 - (2y^2 + 2x^2 -10) = x^2 - y^2 + 3y -5 - 2y^2 - 2x^2 +10$

$= -x^2 - 3y^2 + 3y +5$

Solution 5: Let breadth of the rectangle be ‘b’ m, then its length (3b- 6) m.

Now perimeter of rectangle $2(l+b) = 2(b+3b- 6) = 2(4b - 6) =148$

$(4b - 6) = 74$

$4b = 80$

$b = 20m$

$l = 54m$

SOLUTION OF CCT PRACTICE QUESTIONS

Solution 1. A – B + C. where A = 174 -0 = 174, B = 316/7 = 45.14 and C = 431/7 = 61.57

174 - 45.14 + 61.57 = 235.57 - 45.14 = 190.43

Solution 2. 251,131 and 5 are Prime numbers. Therefore, Shri Lanka, Pakistan and Maldives

Chapter 12, Algebraic Expressions (December-12 Periods)

e-content, you tube video links

Part-I of Exercise 12.1 https://youtu.be/2J76KVsoLUE
Part-II of Exercise 12.1 https://youtu.be/2XMBdWtQwIc
Exercise 12.2 https://youtu.be/qj0ZBfdpi9I
Exercise 12.3 https://youtu.be/OBV-Z3hAFWY
Exercise 12.4 https://youtu.be/6aJ2gq0Yy1I

Chapter 13

Exponents and Powers

Key Points

• Exponents: Exponents are used to express large numbers in shorter form to make them easy to read, understand, compare and operate upon.

• Expressing Large Numbers in the Standard Form: Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such a form of a number is called its standard form or scientific motion.

• Very large numbers are difficult to read, understand, compare and operate upon.
To make all these easier, we use exponents, converting many of the large numbers in a shorter form.
Numbers in exponential form obey certain laws, which are:
for any non-zero rational number a and a positive integer n

a^n= a×a×a×a…. n times

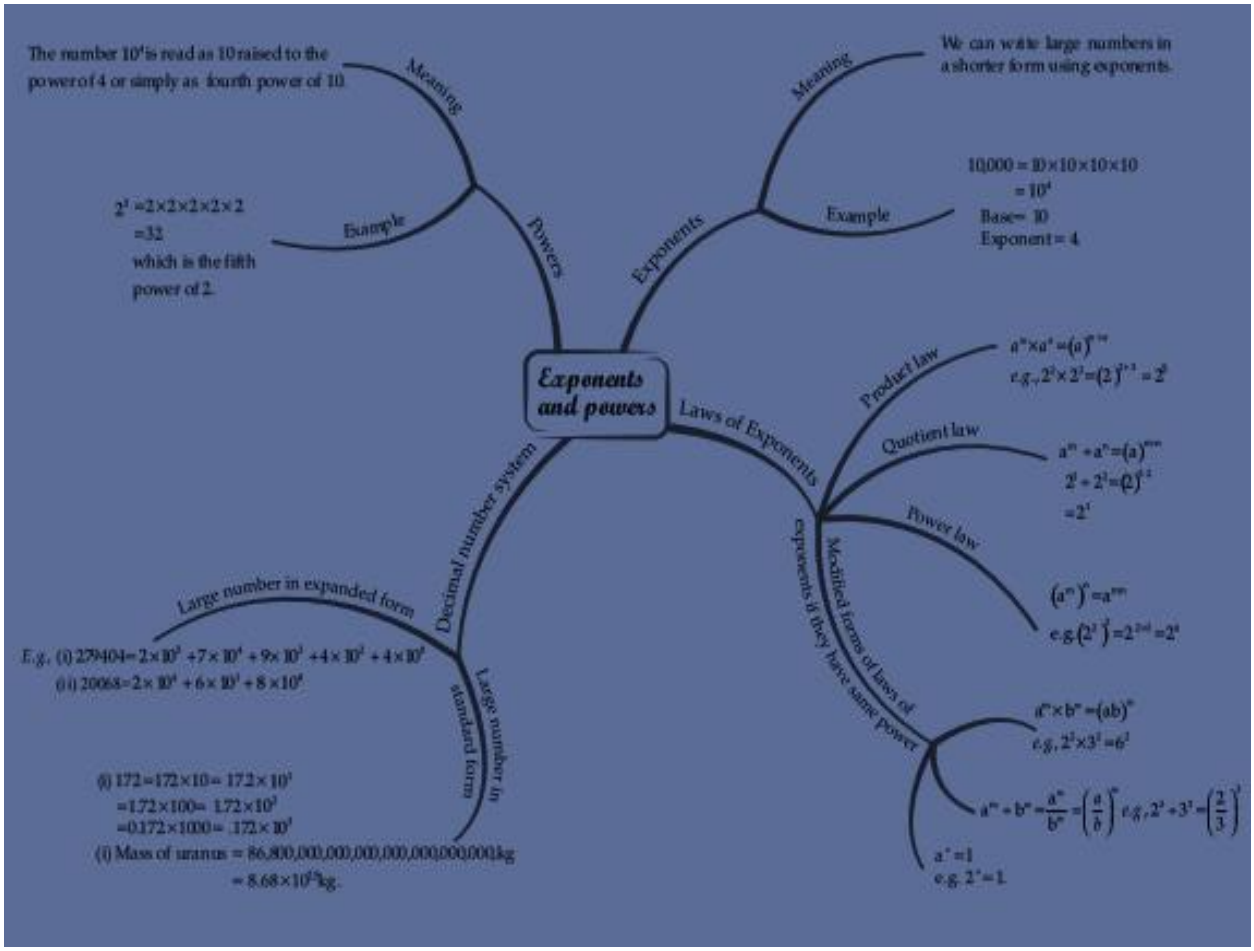
where a is called base and n is the exponent or index or power.

Aslo $a^{-n} = 1/a$ and $a^0 = 1$

(i) $a^m \times a^n = a^{m+n}$ (ii) $a^m \div a^n = a^{m-n}$ (iii)$(a^m)^n = a^{mn}$ (iv) $a^m \times b^m = (ab)^m$

(v) $a^m \div b^m = (a/b)^m$

Mind Map



Objective Type Questions

Q 1 The value of $3^3 \times 3^4$ is_____

Q 2 $1^0 \times 2^0 \times 3^0$ =_____

Q 3 $3^5 > 5^3$ True/ False

Q 4 $(-1)^{\text{even number}}$ =_____

Q 5 $(-10)^3$ = _____

Q 6 $t \times t$ =

Q 7 $7^2 \times 2^2$ = _____

Q 8 $p^3 \times p^2$ _____

Q 9 $2^7 \div 2^4$_____

Q 10 Exponential form of $(-4)^{100} \times (-4)^{20}$ is _____

Q 11 $(7^{50})^2$=

Q 12 $a^2 \times t^2$=

Q 13 Exponential form of $(-4m)^3$ =

Q 14 $3^0 = (1000)^0$ True/False

Q 15 $5900 = 5.9 \times 10^4$ True/False

Solutions

Q1. 3^7 Q2. 1 Q3. True Q4. 1 Q5. – 1000 Q6. t^2 Q7. $(7x2)^2$

Q8. p^5 Q9. 2^3 Q10. $(-4)^{120}$ Q11. 7^{100} Q12. $(at)^2$ Q13. -4^3m^3 Q14. True

Q 15 False

Multiple Choice Questions

Q 1 The exponential form of 10000 is

(a) 10^3 (b) 10^4 (c) 10^5 (d) none of these

Q 2 The exponential form of 81 is

(a) 3^4 (b) 3^3 (c) 3^2 (d) none of these

Q 3 The exponential form of 125 is

(a) 5^4 (b) 5^3 (c) 5^2 (d) none of these

Q 4.The value of $(-2)^3$ is

(a) 8 (b) -8 (c) 16 (d) -16

Q 5 0×10^4 =

(a) 0 (b) 10^4 (c) 1 (d) none of these

Q 6 If $(-3)^4 \times (-3)^6 = (-3)^?$, then ? =

(a) 4 (b) 10 (c) 6 (d) 12

Q 7 $10^6 \div 10^5$ =

(a) 10^1 (b) 10^5 (c) 10^6 (d) None of these

Q 8 $a^m \times a^n$ =

(a) a^{m+n} (b) a^{m-n} (c) a^{mn} (d) $a^{m/n}$

Q 9 $(2^2)^3$ =

(a) 2^2 (b) 2^3 (c) 2^1 (d) 2^6

Q 10 If a is any non-zero integer, then a^0 =

(a) a (b) 0 (c) 1 (d) none of these

Answers of MCQ,s

Q1 b Q2 a Q3 b Q4 b Q5 a Q6 b Q7 a Q8 a Q9 d Q10 c

Very Short Answer Questions

Q1 Express 343 as a product of powers of their prime factors:

Q2 Using laws of exponents, simplify and write the answer in exponential form $a^3 \times a^2$

Q3 Express 256 as power 2.

Q4 Simplify: $a^5 \times 3^2 \times a^7$

Q5 Find $49^4 \times 7^3$

Q6 Evaluate $(-1)^{28} + (1)^{28}$

Q7 Write the base and exponent of each of $(3)^7$

Q8 Express 1000 as a product of powers of prime factors

Q9 Simplify $3^7 \div 3^4$

Q10 Simplify $(3^2)^2$

Solutions of Very Short Answer Questions

Q1 $7x7x7=7^3$ Q2 $a^3 \times a^2 = a^{3+2} = a^5$ $[a^m \times a^n = a^{m+n}]$ Q3 2^8 Q4 $9\ a^{12}$ Q5 $7^{2x4} x 7^3 = 7^{11}$ Q6 2 Q7 Base 3, Exponent 7 Q8 $1000 = 2^3 \times 5^3$ Q9 $3^7 \div 3^4 = 3^{7-4} = 3^3$ Q10 $(3^2)^2 = 3^4$

Short Answer Questions

Q1 Express 16000 as a product of powers of prime factors.

Q2 Find the value of $(-5)^4$?

Q3 Express $a \times a \times a \times c \times c \times c \times c \times d$ in exponential form.

Q4 Simplify $(-3)^2 \times (-5)^2$.

Q5 Find the value of $5^6 \div 5^2$

Q6 Express $(2 \times 3)^5$ in the exponential form

Q7 Expand: $(\frac{3}{5})^4$

Q8 Simplify and write the answer in the exponential form $(6^2 \times 6^4) \div 6^3$

Q9 Simplify $2^3 \times a^3 \times 5a^4$

Q10 $(a^5 \div a^3) \times a^8$

Answers of Short Answer Questions

Q1 $16{,}000 = 16 \times 1000 = (2 \times 2 \times 2 \times 2) \times 1000 = 24 \times 10^3$ (as $16 = 2 \times 2 \times 2 \times 2$) $= (2 \times 2 \times 2 \times 2) \times (2 \times 2 \times 2 \times 5 \times 5 \times 5) = 2^4 \times 2^3 \times 5^3$

(Since $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$) $= (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2) \times (5 \times 5 \times 5)$ or, $16{,}000 = 2^7 \times 5^3$

Q2 $(-5)^4 = (-5) \times (-5) \times (-5) \times (-5) = 25 \times 25 = 625$

Q3 $a \times a \times a \times c \times c \times c \times c \times d = a^3 c^4 d$

Q4 $(-3)^2 \times (-5)^2 = (-2) \times (-2) \times (-2) \times (-10) \times (-10) \times (-10) = (-8) \times (-1000) = 8000$

Q5 $5^4 = 5^{6-2}$

Q6 $(2 \times 3) \times (2 \times 3) \times (2 \times 3) \times (2 \times 3) \times (2 \times 3) = (2 \times 2 \times 2 \times 2 \times 2) \times (3 \times 3 \times 3 \times 3 \times 3) = 2^5 \times 3^5$

Q7 $(\frac{3 \times 3 \times 3 \times 3}{3 \times 3 \times 3 \times 3}) = (\frac{81}{625})$

Q8 $(6^2 \times 6^4) \div 6^3 = 6^{2+4-3} = 6^3$

Q9 $2^3 \times a^3 \times 5 \times a^4$

$= 2^3 \times 5 \times a^3 \times a^4$

$= 8 \times 5 \times a^{3+4}$

$= 40\, a^7$

Q10 $(a^5 \div a^3) \times a^8 = a^{10}$

Long Answers Questions

Q1 Find the value of p if $(\frac{4}{7})^9 \div (\frac{4}{7})^3 = (\frac{4}{7})^{2p-1}$

Q2 If $x = (\frac{3}{4})^2$, find (i) x^2 (ii) x^3

Q3 simplify $\frac{5 \times 4^8 \times 3^4}{8^2 \times 25}$

Q4 simplify $\frac{12^4 \times 9^3 \times 4}{6^3 \times 8^2 \times 27}$

Q5 Simplify $\frac{(2^5)^2 \times 7^3}{8^3 \times 7}$

Q6 A light year is the distance that light can travel in one year.

1 light year= 9,460,000,000,000 km.

(a) Express one light year in scientific notation.

(b) The average distance between Earth and Sun is 1.496 x 10^8 km. Express the distance in normal form.

(c) Is the distance between Earth and the Sun greater than, less than or equal to one light year?

Find the difference between the distance between Earth & the Sun and one light year.

Q7 The mass of the earth is 5,976,000,000,000,000,000,000,000 Kg and the radius of the earth is 6.37 x 10^6m. Moon is the natural satellite of earth which revolves around the sun due to the strong gravitational force of the earth. The mass of the moon is 7.36 x 10^{22}Kg. The radius of the moon is 1.74 x 10^6m. The distance between the earth and moon is 3.84 x 10^5km.

i). Write the mass of earth in standard form?

ii). Express the distance between earth and moon in m and find its square. Write your answer in standard form?

Q8 Viruses range in size from 0.02 to 0.25 micron.Bacteria are giants when compared to viruses.

The smallest bacteria are about 0.4 micron. 1 micron= 10^{-6}metre that is one millionth part of metre.

i) What is the size of the smallest bacteria ?

ii) Express 0.4 micron in terms of metres in standard form?

Q9 Simplify $\frac{3^4 \times 12^3 \times 36}{2^5 \times 6^3}$

Q10 Simplify $\left(\frac{6\times10}{2^2\times5^3}\right)^2 \times \frac{25}{27}$

Solutions of Long Answers Questions

Q1 $(\frac{4}{7})^{9} \div (\frac{4}{7})^{3} = (\frac{4}{7})^{2p-1}$

$(\frac{4}{7})^{9-3} = (\frac{4}{7})^{2p-1}$

2p-1=6

2p=7

p= 7/2

Q2 (i) x^2 = 81/256

(ii) x^3= 729/4096

Q3 81/20

$$\frac{12^4 \times 9^3 \times 4}{6^3 \times 8^2 \times 27} = \frac{(2^2\times3)^4\times(3^2)^3\times2^2}{(2\times3)^3\times(2^3)^2\times3^3}$$

$$= \frac{(2^2)^4 \quad (3)^4 \quad 3^{2\times3} \quad 2^2}{2^3 \quad 3^3 \quad 2^{2\times3} \quad 3^3} = \frac{2^8 \quad 2^2 \quad 3^4 \quad 3^6}{2^3 \quad 2^6 \quad 3^3 \quad 3^3}$$

$$= \frac{2^{8\ 2}\times3^{4\ 6}}{2^{3\ 6}\times3^{3\ 3}} = \frac{2^{10}\times3^{10}}{2^9\times3^6}$$

$$= 2^{10-9}\times3^{10-6} = 2^1\times3^4$$

$$= 2\times81 = 162$$

Q4

Q5 98

Q6 a) 9.46 x 10^{12} km b) 149600000 Km c) Less

Q7 i) 5.976 × 10^{24}Kg ii) 3.84 × 10^5× 10^3 = 3.84 × 10^8m

(3.84 × 10^8)^2= 1.47456× 10^{16}m^2

Q8 i) 0.04x10^1 micron ii) 4x10^{-7}metres

Q9 729 Q10 1/75

CCT

CELLS OF BLOOD

When a person gets infected or becomes sick, Doctor advises him for a blood test. Pathologists find the number of cells per cubic millimeter of blood. His blood report shows the following values -

Red blood cells count (RBC). --. 4.45 x 10^6 per mm^3

White blood cells count (WBC) --. 8.9 x 10^3per mm^3

(Leucocytes)

Platelets count --. 3.02 x 10^5 per mm^3

Hemoglobin --. 12.8 GM%

Question (1)- The ratio between RBCs and WBCs is

(a) 500 : 1 (b) 1 : 500 (c) 550 : 1 (d) 1 : 100

Question (2) - What is the total number of RBCs and Platelets?

Question (3) - in the sample, which are more WBCs or Platelets?

Description of Answer Key and Credits:

Q No	Answer	Credits
1	(a)	For right answer full credit, otherwise no credit
2	4.752 x 10^6 per mm^3	For right answer full credit, otherwise no credit
3	Platelets are more.	

PRACTICE QUESTIONS FOR SELF ASSESSMENT

Practice of **Multiple Choice Questions**

Q 1 Which of the following is true?

(a) $2^0 = (100)^0$ (b) $10^2 \times 10^8 = 10^{16}$ (c) $2^2 \times 3^3 = 65$ (d) $2^3 > 3^2$

Q 2 $(ab)^m$ =

(a) $a^m b^m$ (b) $a^m b$ (c) ab^m (d) ab

Q 3 333 in standard form is

(a) 3.33×10^2 (b) 3.33×10^3 (c) 3.33×10^1 (d) 3.33×10^4

Q 4 100000000000 in standard form is

(a) 1×10^8 (b) 1×10^9 (c) 1×10^{10} (d) 1×10^{11}

Q 5 $b \times b \times b \times b \times b =$

(a) b^5 (b) b^4 (c) b^6 (d) b^3

Practice of Very Short Answer Questions

Q1 Find $3^0 + 4^0 + 5^0$

Q2 Write 333 in standard form?

Q3 Find $(-4)^3$

Q4 Compare the following numbers:

2.7×10^{12}; 1.5×10^8

Q5 Find the number from each of the following expanded forms:

$8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$

Practice of Short Answer Questions

Q1 Express 108×192 as a product of prime factors only in exponential form:

Q2 Express 768 as a product of prime factors only in exponential form:

Q3 Expand by expressing powers of 10 in the exponential form: 20068

Q4 . Find the number from the following expanded form:

$3 \times 10^4 + 7 \times 10^2 + 5 \times 10^0$

Q5 Express the number appearing in the following statements in standard form.

The distance between Earth and Moon is 384,000,000 m.

Practice of Long Answers Questions

Q1 Find m so that $\left(\frac{2}{9}\right)^3 \times \left(\frac{2}{9}\right)^6 = \left(\frac{2}{9}\right)^{2m-1}$

Q2 Simplify $\frac{125\times5^2\times a^7}{10^3\times a^4}$

Q3 Find the value of $\frac{10^{22}+10^{20}}{10^{20}}$.

Q4 If $2^{1998} - 2^{1997} - 2^{1996} + 2^{1995} = K.2^{1995}$ Find the value of K

Q5 Find x so that $\left(\frac{5}{3}\right)^5\times\left(\frac{5}{3}\right)^{11}=\left(\frac{5}{3}\right)^{8x}$

Answers of Practice of Multiple Choice Questions

Q1 a Q2 a Q3 a Q4 d Q5 a

Solutions of Practice of Very Short Answer Questions

Q1 3 Q2 3.33×10^2 Q3 $(-4)\times(-4)\times(-4) = -64$ Q4 $2.7\times10^{12} > 1.5\times10^8$ Q5 6045

Solutions of Practice of Short Answer Questions

Q1 $(2\times2\times3\times3\times3)\times(2\times2\times2\times2\times2\times2\times3)$

$= (2^2\times3^3)\times(2^6\times3)$

$= 2^{6+2}\times3^{3+1} == 2^8\times3^4$

Q2 768

$= 2\times2\times2\times2\times2\times2\times2\times2\times3$

$= 2^8\times3$

Q3 20068

$= 2\times10^4 + 0\times10^3 + 0\times10^2 + 6\times10^1 + 8\times10^0$

Q4 30705

Q5 3.84×10^8 m

Solutions of **Practice of Long Answers Questions**

Q1 m = 5 Q2 $25\ a^3/8$ Q3 101 Q4 K =3

Q5

Given $\left(\frac{5}{3}\right)^5\times\left(\frac{5}{3}\right)^{11}=\left(\frac{5}{3}\right)^{8x}$

So, $\frac{5^5}{3^5}\times\frac{5^{11}}{3^{11}}=\left(\frac{5}{3}\right)^{8x}$ $\left\{\text{Using } \left(\frac{a}{b}\right)^m=\frac{a^m}{b^m}\right\}$

or $\frac{5^5\times5^{11}}{3^5\times3^{11}}=\left(\frac{5}{3}\right)^{8x}$

or $\frac{(5)^{16}}{(3)^{16}}=\left(\frac{5}{3}\right)^{8x}$ $\{\text{Using } a^m\times a^n=(a)^{m+n}\}$

or $\left(\frac{5}{3}\right)^{16}=\left(\frac{5}{3}\right)^{8x}$

or $16 = 8x$

Thus, $8x = 16$

Therefore, $x = 2$

Practice of CCT

GROWTH OF BACTERIA

The number of bacteria in a certain box doubles every hour. There were 5 bacteria present in the box originally and the box is fully filled with bacteria in 30 hours.

Question (1) - How many bacteria will be present at the end of the 4th hour?

Question (2) -In how many hours will the box be filled half with bacteria?

Question (3)-Find the difference in the number of bacteria at the end of 10 hours and 11 hours.

Question (4) - The $\frac{1}{4}h$ part of box will be filled with bacteria in

a) 7.5 hours b) 15 hours c) 28 hours d) 4 hours

Description of Answer Key and Credits:

Q No	Answer	Credits
1	$5^4 = 625$	For right answer full credit, otherwise no credit
2	29 hours	For right answer full credit, otherwise no credit
3	$4(5^{10})$	For right answer full credit, otherwise no credit
4	28 hours	For right answer full credit, otherwise no credit

e-content

Chapter 13, Exponents and Powers (December-12 Periods)
Exercise 13.1 https://youtu.be/i4RZZyX6PLc
Exercise 13.2 https://youtu.be/PEXHM2HLT90
Exercise 13.3 https://youtu.be/QU1PgGiCHlM

Chapter 14

Symmetry

Key Points To Remember

1. A figure has line symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

2. Regular polygons have equal sides and equal angles. They have multiple (i.e., more than one) lines of symmetry.

3. Each regular polygon has as many lines of symmetry as it has sides.

Regular pentagon	Regular hexagon	Regular Polygon	Square	Equilateral triangle
Number of lines of symmetry	6	5	4	3

4. Mirror reflection leads to symmetry, under which the left-right orientation have to be taken care of.

5. Rotation turns an object about a fixed point.

This fixed point is the centre of rotation.

The angle by which the object rotates is the angle of rotation.

A half-turn means rotation by 180° ; a quarter-turn means rotation by 90°. Rotation may be clockwise or anticlockwise.

6. If, after a rotation, an object looks exactly the same, we say that it has a rotational symmetry.

7. In a complete turn (of 360°), the number of times an object looks exactly the same is

called the order of rotational symmetry. The order of symmetry of a square, for

example, is 4 while, for an equilateral triangle, it is 3.

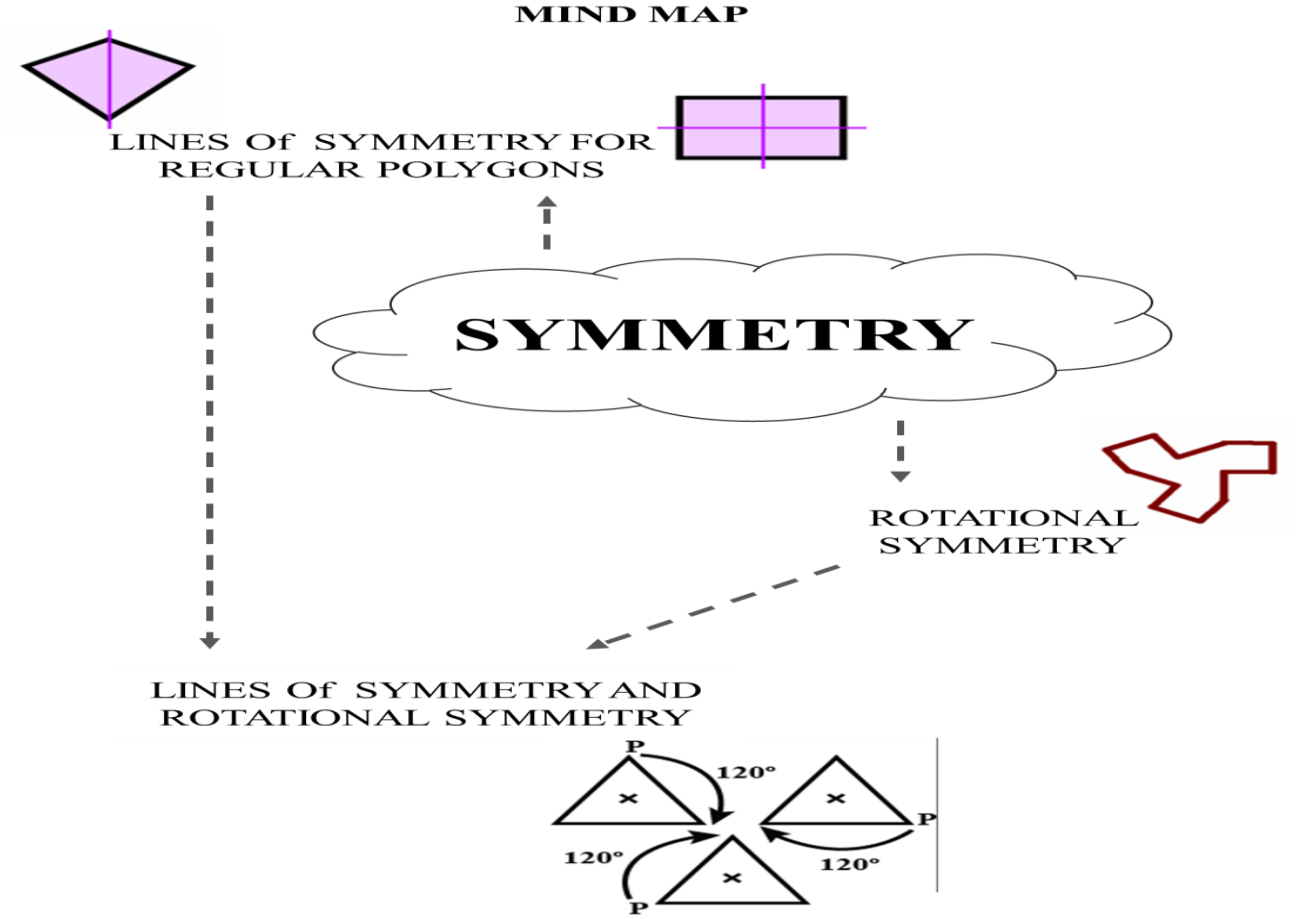
8. Some shapes have only one line of symmetry, like the letter E; some have only rotational

symmetry, like the letter S; and some have both symmetries like the letter H.

The study of symmetry is important because of its frequent use in day-to-day life and

more because of the beautiful designs it can provide us.

MIND MAP



Objective Type of Questions

Fill in the blanks:

(i) A figure has _____ symmetry if there is a line about which the figure may be folded so that the two parts of the figure coincide.
(ii) A regular pentagon has _____ line of symmetry.
(iii) A figure has _____ symmetry if after a rotation through a certain angle. The figure looks exactly the same.
(iv) A _____ triangle has no lines of symmetry
(v) Each regular polygon has as many lines of symmetry as it has _____.
(vi) The concept of line symmetry is closely related to _____ reflection. (vii)The quadrilateral that has four lines of symmetry and order-four rotational symmetry is a _____.
(viii) The angle of rotational symmetry for letter S is _____.
(ix) A line segment is symmetrical about its _____.
(x) Rotation turns an object about a fixed point. The fixed point is called _____.

Fill in the blanks: Answers

(i) Line	(ii) 5	(iii) rotational	(iv)Scalene	(v) number of sides
(vi) mirror	(vii) square	(viii)180°, 360°	(ix) perpendicular bisector	(x) center of rotation

True/False Questions:

(i) When an object rotates, its shape changes.
(ii) If a shape possess rotational symmetry, it will surely have line of symmetry.
(iii) We can not have a rotational symmetry of order more than 1 whose angle of rotation is 23°
(iv) A pentagon which has more than one line of symmetry must be regular.

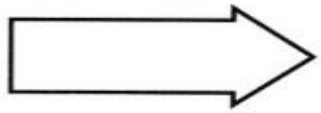
(v) A regular hexagon has six lines of symmetry.

True/False: Answers

(i) False (ii) False (iii) True (iv) True (v) True

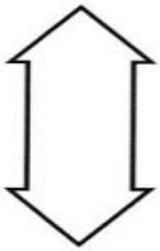
Multiple Choice Questions

2. **The mirror image of 'W', when the mirror is placed vertically:**
   (a) V (b) M (c) S (d) W
3. **How many lines of symmetries are there in an equilateral triangle?**
   (a) 1 (b) 2 (c) 3 (d) 4
4. **How many lines of symmetries are there in a rhombus?**
   (a) 1 (b) 2 (c) 3 (d) 4
5. **How many lines of symmetries are there in regular pentagon?**
   (a) 3 (b) 2 (c) 5 (d) 4
6. **How many lines of symmetries are there in rectangle?**
   (a) 1 (b) 2 (c) 3 (d) 4
7. **Find the number of lines of symmetry of the following figure:**



   (a) 1 (b) 2 (c) 3 (d) 4

8. **Find the number of lines of symmetry of the following figure:**



   (a) 1 (b) 2 (c) 3 (d) 4

9. **Find the number of lines of symmetry in regular hexagon.**
   (a) 2 (b) 4 (c) 6 (d) 5
10. **Letter 'E' of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror reflection) about.**
    (a) a vertical mirror (b) a horizontal mirror (c) both (a) and (b) (d) none of these
11. **Letter 'G' of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror reflection) about.**
    (a) a vertical mirror (b) a horizontal mirror (c) both (a) and (b) (d) none of these

Answers of Multiple Choice Questions

1.(d)W 2. (c)3 3.(b) 2 4(c) 5 5(b) 2 6(a) 1 7(b) 2 8(c) 9. (b) a horizontal mirror 10(d) none of these

Very Short Answer Type Questions

Fill in the Blanks:

1. Rotation turns an object above a fixed point. This fixed point is called ……
2. Order of rotational symmetry of a circle is ……

3. Rhombus is a figure that has ……. lines of symmetry and has a rotational symmetry of order ……
4. The line of symmetry of an isosceles triangle is its …… from the vertex having the equal sides.
5. Each of the letter's H, N, S and Z has a rotational symmetry of order ……

Fill in the Blanks (Answers)

1. centre of rotation 2.infinite 3.two, two 4 median or altitude 5. 2

True and False:

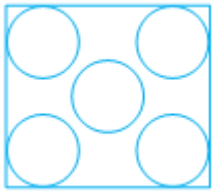
1. A regular pentagon has no lines of symmetry.
2. A scalene triangle has no line of symmetry.
3. Mirror reflection always leads to symmetry.
4. The number of lines of symmetry of a regular polygon is equal to the vertices of the polygon.
5. An angle has two lines of symmetry.

True and False (Answers)

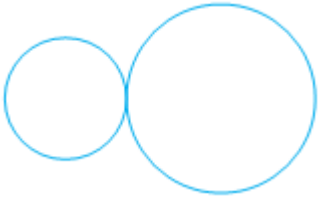
1. False 2.True 3.False 4.True 5.False

Questions and Answers

1. In the word "MATHS" which of the letters shows rotational symmetry of order 2.
2. The angle of rotation for the figure is



3. The number of lines of symmetry in figure is
4. Order of rotational symmetry for the figure is.



5. The order of rotational symmetry in the figure given below is

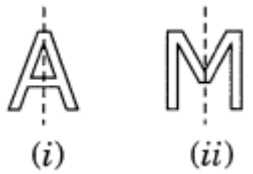
Questions and Answers (Answers)

1. H and S 2.90° 3.Three 4.One 5.Two

Short Answers Type Questions

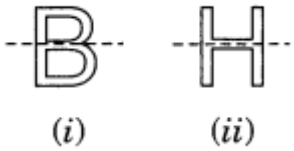
Question 1.
Draw any two English alphabets having an only a vertical line of symmetry.

Solution:



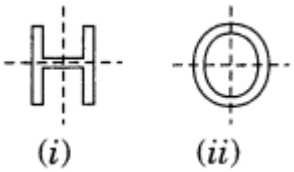
(i) (ii)

Question 2.
Draw any two English alphabets having a horizontal line of symmetry.
Solution:



(i) (ii)

Question 3.
Draw any two English alphabets having both horizontal and vertical line of symmetry.
Solution:

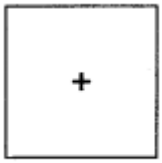


(i) (ii)

Question 4.
Dray any two English alphabets which has no line of symmetry.
Solution:

(i) (ii)

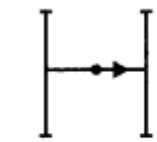
Question 5.
Draw any figure which have the order of rotational symmetry 4.
Solution:



Square

Question 6.
Draw any two figures which have the order of rotational symmetry 2.

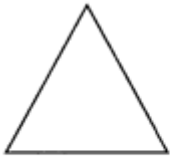
Solution:



English alphabet H

English alphabet S

Question 7.
State the order of rotational symmetry of the following figures.



Equilateral triangle

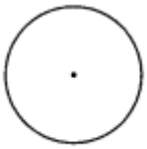
(*i*)

Regular pentagon

(*ii*)

Solution:
(i) Order of equilateral triangle = 3
(ii) Order of regular pentagon = 5.

Question 8.
Draw a figure having an infinite number of lines of symmetry.
Solution:



Circle

A circle has the infinite number of lines of symmetry.

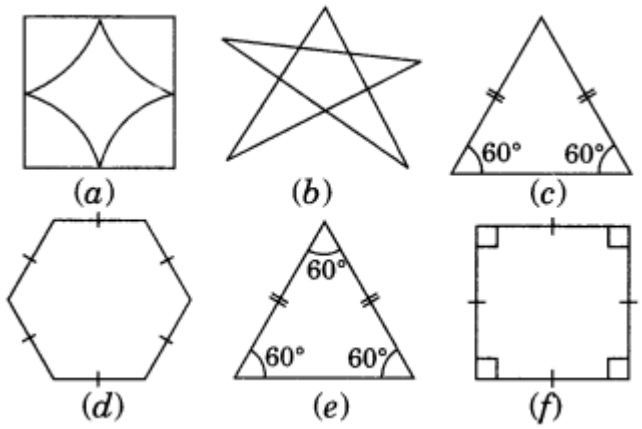
Question 9.
Draw any two figure having no lines of symmetry.
Solution:
English alphabet R and P have no lines of symmetry.

Question 10.
State the English alphabet which has only the horizontal line of symmetry.
Solution:
B, C, D, E, H, I, O, X and K are the English alphabets having an only horizontal line of symmetry.

Long Answers Type Questions

1. After rotation by 60° about a centre, a figure looks exactly the same as its original position. At what other angles will this happen for the figure?
   Sol: After rotating by 60° about a centre, a figure looks exactly the same as its original position. It will also look the same by rotating at an angle of 120°, 180°, 240°, 300°, 360° as these are the multiples of 60°.
2. What other name can you give to the line of symmetry of
   (a) an isosceles triangle (b) a circle
   Solution:
   (a) Median or altitude (b) dimeter

3. Give the order of rotational symmetry of each of the following figures:



Solution:

(a) Order of rotational symmetry = 4 (b) Order of rotational symmetry = 5

(c) Order of rotational symmetry = 3 (d) Order of rotational symmetry = 6

(e) Order of rotational symmetry = 3 (f) Order of rotational symmetry = 4

4. How many lines of symmetry do the following have:

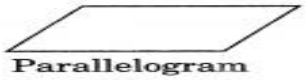
(a) a parallelogram (b) an equilateral triangle (c) a right angle triangle with equal legs

(d) an angle with equal arms (e) a semicircle (f) a rhombus

(g) a square (h) scalene triangle

Solution:

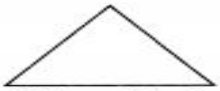
(a)



Parallelogram

No line of symmetry

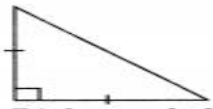
(b)



Equilateral triangle

Number of lines of symmetry = 3

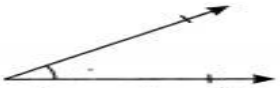
(c)



Right angled isosceles triangle

Number of lines of symmetry = 1

(d)



An angle with equal arm

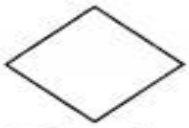
Number of lines of symmetry = 1

(e)

A semicircle

Number of lines of symmetry = 1

(f)



A rhombus

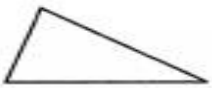
Number of lines of symmetry = 2

(g)

A square

Number of lines of symmetry = 4

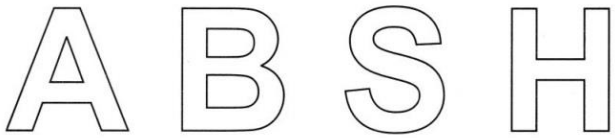
(h)



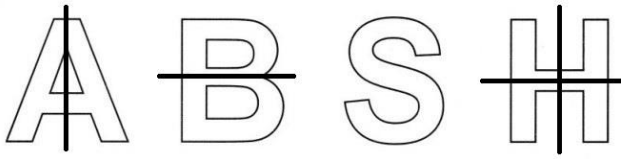
A scalene triangle

Number of lines of symmetry = 0

5. What letters of the English alphabet have reflectional symmetry about
(a) a vertical mirror (b) a horizontal mirror (c) both horizontal and vertical mirrors
Solution:
(a) The letters of English alphabet having reflectional symmetry about a vertical mirror are:
A, H, I, M, O, T, U, V, W, X, Y
(b) Letters of the English alphabets having reflectional symmetry about a horizontal mirror are:
B, C, D, E, H, I, O, X
(c) Letters of the English alphabet having reflectional of symmetry about vertical and horizontal mirror are:
O, X, I, H.
6. Draw all the lines of symmetry for the following letters if they exist.



Solution:

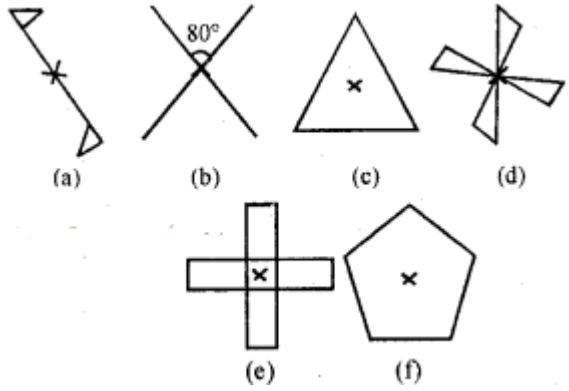


7. By what minimum angle does a regular hexagon rotate so as to coincide with its original position for the first time?
Solution:
The minimum angle by which a regular hexagon rotates so as to coincide with its original position for the first time is 60°.
8. State whether the figure shows rotational symmetry. If yes, then what is the order of rotational symmetry?

Solution:
Yes, four

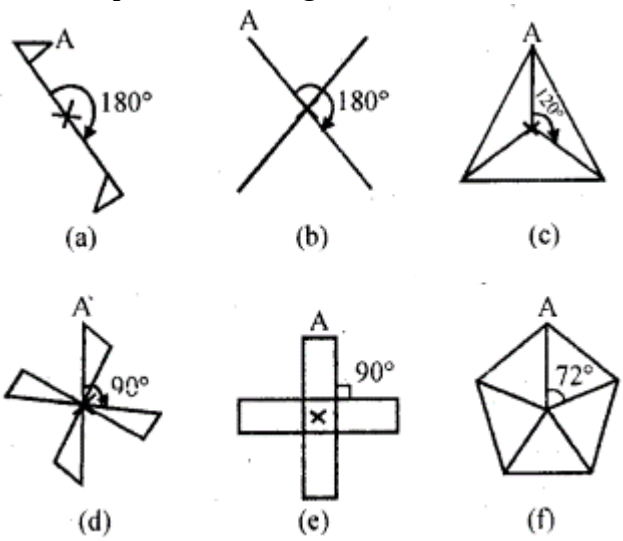
9. Give three examples of such (RBSESolutions.com) shapes which does not have any line symmetry.
Solution:
Example of three shapes which does not have line symmetry are
(i) Scalene triangle (ii) Parallelogram (iii) A non-regular quadrilateral

10. Write the order for following rotational symmetry.



Solution:

Write the point A and angle will be marked as x and rotation will be as follows:



- Figure (a) and (b) It requires two rotation and every rotation will be by 180° which rotates around (x) will come in its original position means order of symmetry will be 2.
- Figure (c) In triangle three rotation is required each rotation will be 120° which rotates around (x) will reach in its original position it has order 3 rotational symmetry.
- Figure (d) and (e) require 4 rotation each rotation will be 90° which rotates around (x) and will acquire its original position. So the order of symmetry will be 4.
- Figure (f) equilateral pentagon which requires S rotation in which each of 72° and after S rotation of 72° It will be in its original position. So order will be 5.

Practice of Multiple Choice Questions

1.) Letter 'I' of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror refection) about.

(a) a vertical mirror (b) a horizontal mirror (c) both (a) and (b) (d) none of these

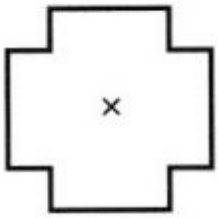
2.) Which of the followings has no line of symmetry:

(a) S (b) A (c) U (d) H

3.) The order of the rotational symmetry of the parallelogram about the centre is:

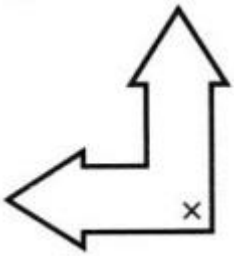
(a) 0 (b) 1 (c) 2 (d) 3

4.) The order of the rotational symmetry of the figure about the point marked 'x'



(a) 1 (b) 2 (c) 3 (d) 4

5.) The order of the rotational symmetry of the above sided right figure about the point marked 'x'



(a) 0 (b) 1 (c) 2 (d) 3

Answers of Practice of Multiple Choice Questions

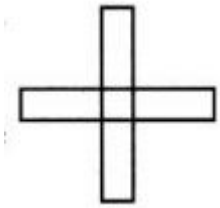
1.(c) both (a) and (b) 2(a) S 3(c) 2 4(d) 4 5(b) 1

Practice of Short Answers Type Questions

Question 1.
Can you give other names for line of symmetry in following shapes
(a) Isosceles triangle (b) A circle
Solution:
Name of other symmetry line
(a) Median in isosceles triangle (b) Diameter of circle

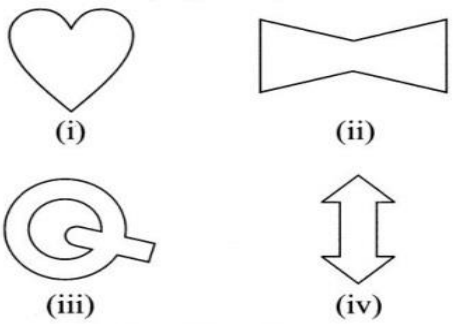
Question 2.
Angle of rotation of a figure is 40°. What is the number of lines of symmetry.
Solution:
Nine

Question 3.
In the given figure:
(a) Find the order of rotational symmetry.
(b) Find the degree measure of the angle of rotation.

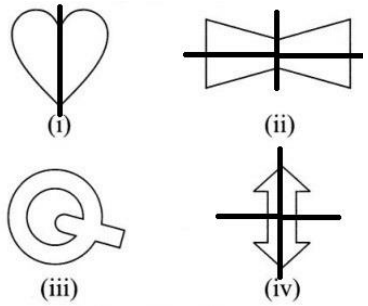


Solution:
(a) Four (b) 90°

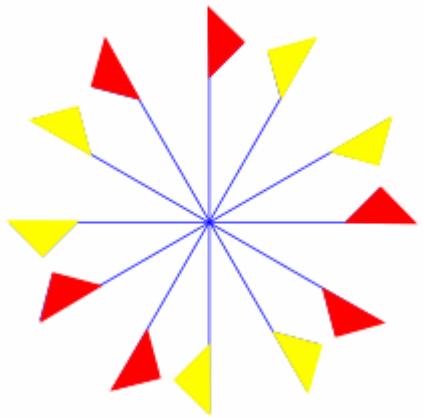
Question 4.
Draw all lines of symmetry for each of the following figures given below:



Solution:



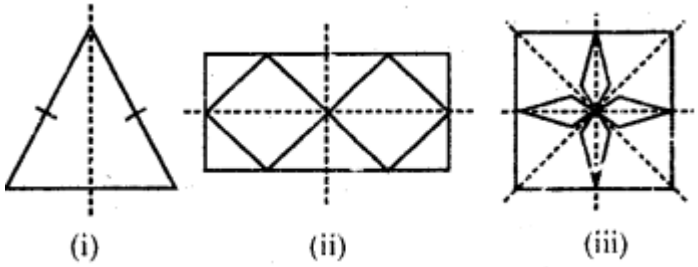
Question 5.
What is the order of rotational symmetry of the above pattern?



Solution:
Three

Practice of Long Answers Type Questions

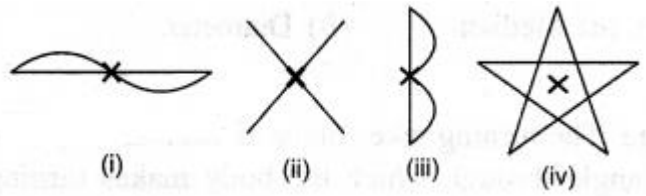
Question 1. Write the number of symmetric axis in the following figures.



Solution:
(i) When triangle is folded in vertical line then it is divided in two parts which are symmetrical. So number of symmetrical axis is one.
(ii) If the given figure is folded on vertical line then it makes two symmetrical figures, The same situation will occur in horizontal axis also. So the number of symmetrical axis is 2.

(iii) In the given figure if it is folded vertical then it shows symmetrical and if is folded horizontally then also it shows symmetry, if it is folded about other dotted lines (diagonally) it also shows symmetry. So number of symmetrical axis is 4.

Question 2. Which of the following shapes have rotational symmetry about the marked point?



Solution:
All the above shapes, i.e. (i), (ii), (iii) and (iv) have rotational symmetry about the marked point (X).

Question 3. Explain Line Symmetry, Reflective Symmetry, And Rotational Symmetry.

Solution:
Line Symmetry- Shapes or patterns that have different types of symmetry, depending on the number of times any shape can be folded in half and still remains similar on both sides. In other words, we can say that the line that divides any figure, shape or any image in similar halves then that figure is said to have line symmetry.

Reflective Symmetry- Reflective symmetry is when a particular shape of pattern is reflected in a line of symmetry. The reflected shape will be similar to the original, the similar size and same distance from the mirror line.

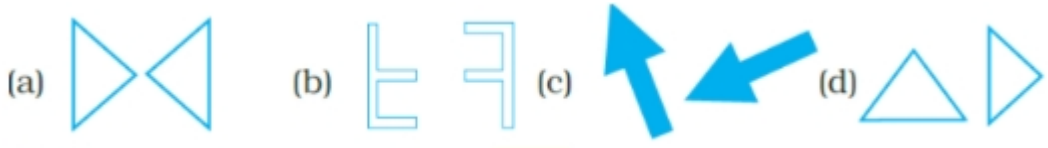
Rotational Symmetry- When any shape or pattern rotates or turns around a central point and remains the same then it is said to have rotational symmetry. For example, if we say that shape has rotational symmetry of order X , this implies that shape can be turned around a central point and still remains the same X times.

Question 4. Can we state that a circle and trapezium have rotational symmetry?

Solution:
A trapezium has one pair of parallel sides. Some trapeziums that include one line of symmetry. Such trapezium is known as isosceles trapezium as they have two sides which are equally as similar to isosceles triangles. A trapezium has rotational symmetry of order 1.

The order of rotational symmetry in terms of a circle refers to the number of times a circle can be adjusted when experimenting with a rotation of 360 degrees. A circle has a rotational symmetry of order that is infinite.

Question 5. Which of the following are reflections of each other?



Solution:
In option (a) we can see that the two figures are identical and reflections of each other as compared to other figures so, option (a) is correct.

Theme 1 **FIDGET SPINNER**

Rashmi was playing with a Fidget spinner. She was wondering that how fidget spinners are made so perfectly and its all three blades are identical. When she was playing, her Father asked her to relate Fidget spinner with any Mathematics topic. She related it with symmetry which is very interesting topic of Mathematics. Rashmi's father asked her to explain the following questions.

i) How many rotational symmetry does it have?
ii) What is the angle of its rotation?

Practice of Theme 2 **BEAUTIFUL DESIGN**

Rahul is very fond of coloring. He uses poster colors for making painting. One day his younger brother Rohan by mistake dropped his colours on a white sheet of paper and to hide his mistake he folded the sheet of paper and kept it in his notebook. Next day on opening it he found a beautiful design(figure).

i) What type of image he mistakenly had made?
ii) How many lines of symmetry does it have ?

Theme 1 Answer (i) 3 Answer (ii) 120 degree

Theme 2 Answer (i) Symmetrical Answer (ii) one line of symmetry

e-content

Chapter 14, Symmetry (January-08 Periods)
Part-I of Exercise 14.1 https://youtu.be/cZFfzfa0-xc
Part-II of Exercise 14.1 https://youtu.be/rscVmcV-4b8
Exercise 14.2 https://youtu.be/CX8YaEavXnk
Exercise 14.3 https://youtu.be/Go4_LF8b7Ss

Chapter 15

VISUALISING SOLID SHAPES

KEY POINTS

Faces, edges and vertices

2-D and 3-D shapes

Nets for building 3-D shapes

Drawing solids on a flat surface

Oblique sketches

Isometric sketches

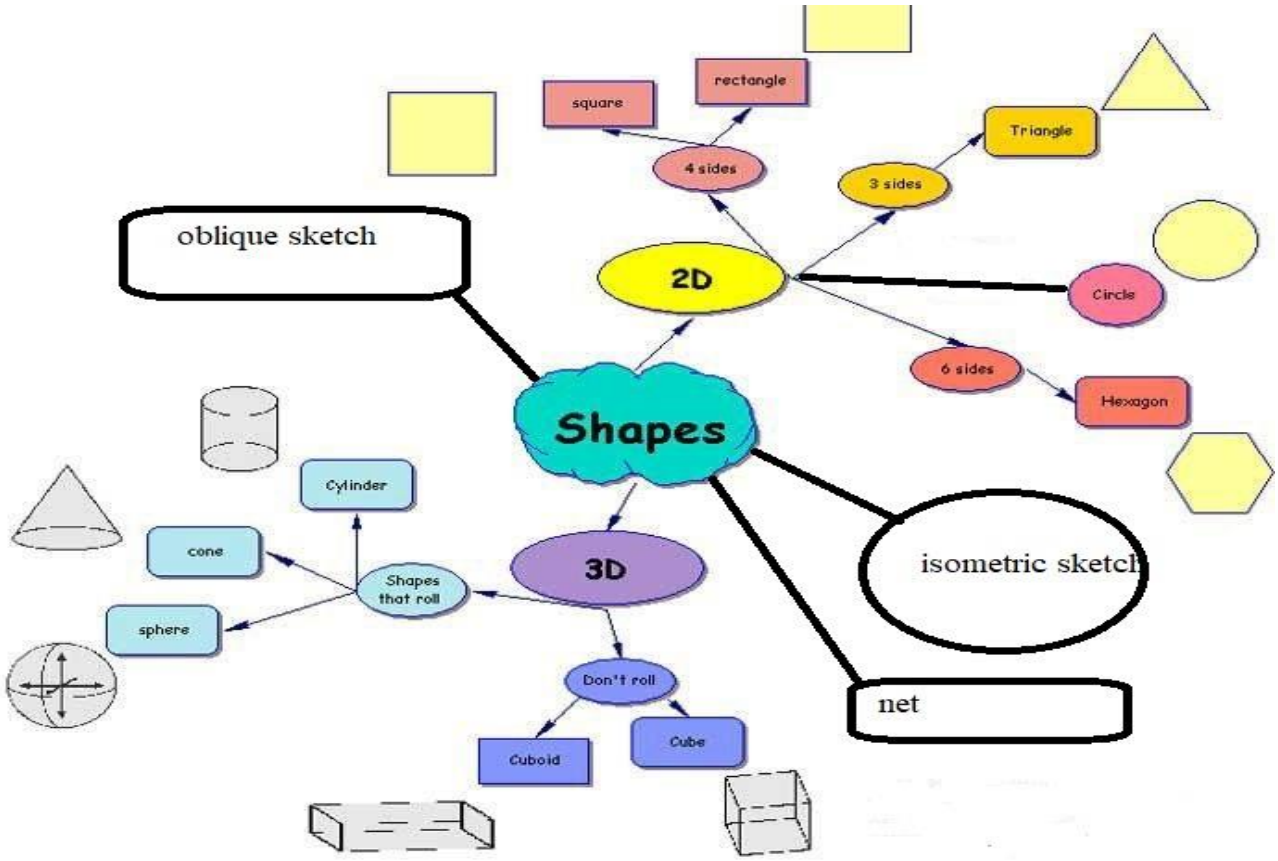
Visualising solid objects

Viewing different sections of a solid (different cuts)

Side view, front view and top view of solids

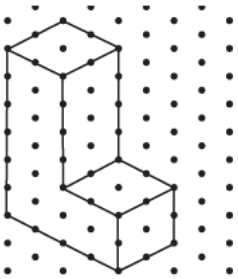
Shadow of solids

MIND MAP

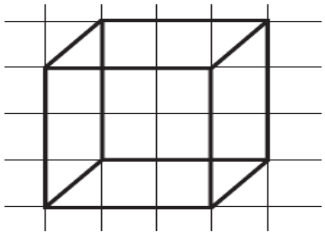


OBJECTIVE TYPE QUESTION

1. The numbering is such that the sum of the dots on the opposite faces of the dice is always 7. the number of dots on the side opposite to 3 dots is 6. (TRUE/FALSE)
2. The type of sketch for the given figure is a/an_____



3. The type of sketch for the given figure is a/an_____



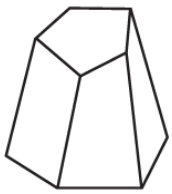
4. Minimum number of faces for a polyhedron are 4. (TRUE/FALSE)
5. A circle is a 3-D figure. (TRUE/FALSE)
6. A cone is a 3-D figure's example. (TRUE/FALSE)
7. A solid that has only one vertex is a _____.
8. A solid that has two opposite identical faces and other faces as parallelograms is a _____.
9. The corners of solid shapes are called its _____.
10. The base of a triangular pyramid is a _____.
11. Each face of a cuboid is a _____.
12. A prism has four bases (TRUE/FALSE)
13. The solid shapes are of two-dimensional. (TRUE/FALSE).
14. All faces of a pyramid are always circle. (TRUE/FALSE).
15. The cube can cast a shadow in the shape of a rectangle. (TRUE/FALSE)

MULTIPLE CHOICE QUESTIONS

1.Number of edges of a cube are

(a) 11 (b)12 (c)13 (d)6

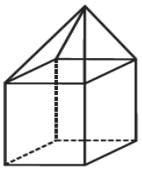
2. Number of vertices for the given figure are



(a)13 (b)11 (c)14 (d)10

3. If two cubes of dimensions 2 cm by 2cm by 2cm are placed side by side, name of resulting solid is
(a) Cube (b)Cuboid (c)Cone (d)Cylinder
4. The top-view of a cone looks like:
(a) A Circle (b) A Square (c) A Rectangle (d) A Triangle
5. The side-view of a cylinder looks like
(a) A Circle (b) A Square (c) A Rectangle (d) A Triangle
6. Cuboid is a rectangular
(a) Pyramid (b) Prism (c) sphere (d) None of these

7. The side-view of a cone appears as:
   (a) Circle (b) Square (c) Rectangle (d) Triangle
8. The number of faces of the solid shape is
   (a) 4 (b) 6 (c)9 (d)10



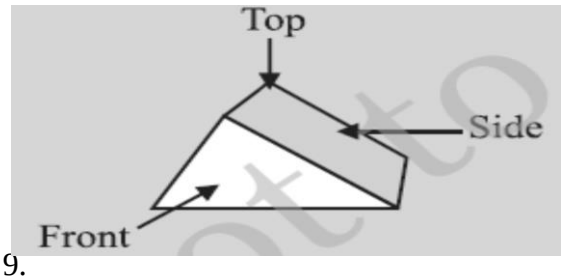
9. The cross-sections do you get when you cut horizontally of a bricks
   (a) A square (b) A rectangle (c) A circle (d) A triangle

10. A bulb is kept burning just right above the following solids. Name the shape of the shadows obtained is

    (a) Circle (b) Cylinder (c) Cone (d) Ball

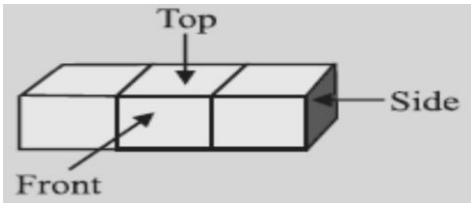
VERY SORT ANSWER TYPE QUESTIONS

1. Write the numbers of edges for a die.
2. Draw a sketch of a cone.
3. Draw a sketch of a pyramid.
4. Write the name of a cross section name if a cut of a ball.
5. Write the name of a vertical cross section name if a cut of a die.
6. Write the Shadow name of the lamp of a cuboid.
7. Write the Shadow name of the lamp of a cone.
8. Draw the top view for the following figure.

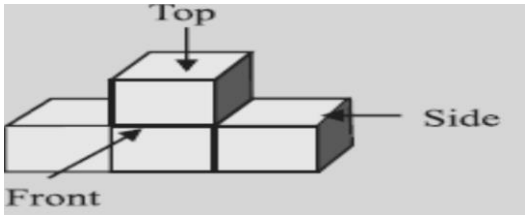


9.

9.Draw the front view for the following figure.



10.Draw the side view for the following figure.



SORT ANSWER TYPE QUESTIONS

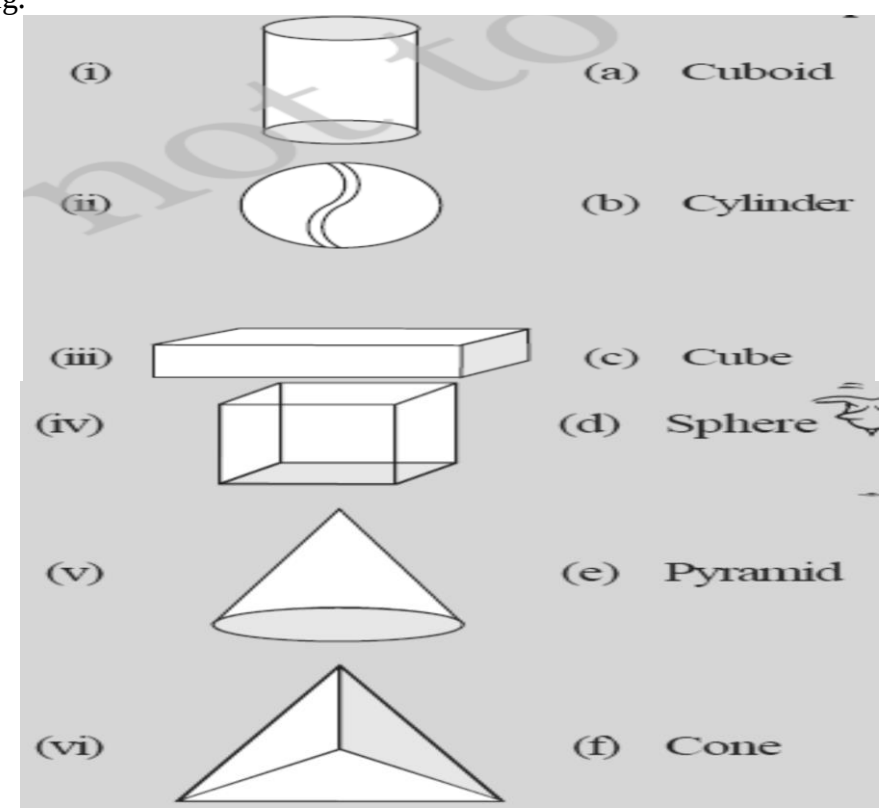
Q1.Draw the net of a cube.

Q2.Draw the net of cylinder.

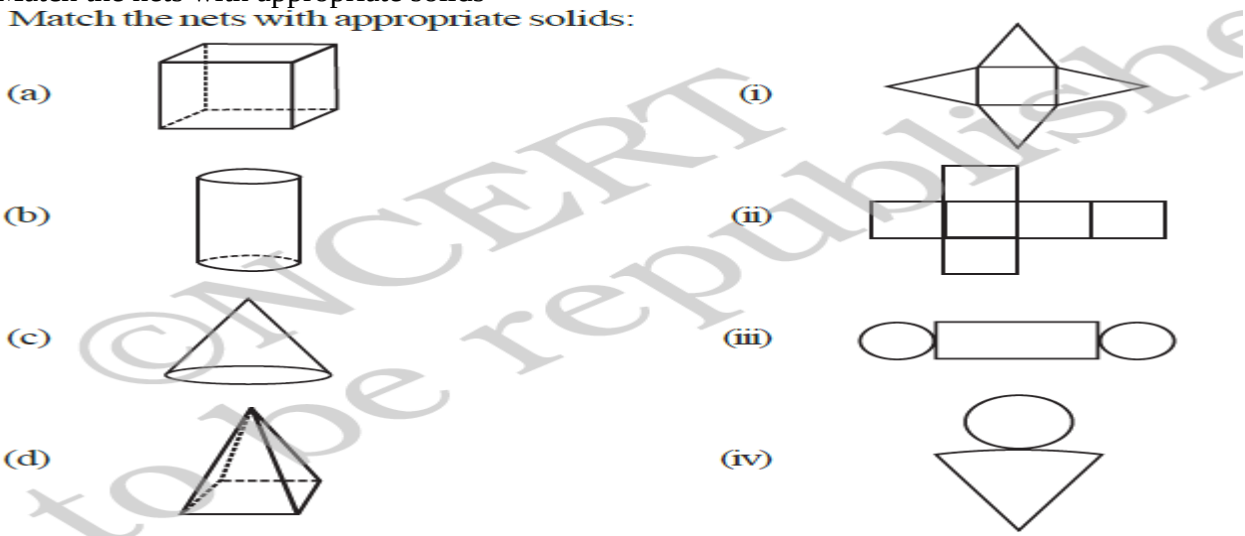
Q3.Draw the net of a cone.

Q4. Draw the net of a pyramid.

Q5.Match the following.



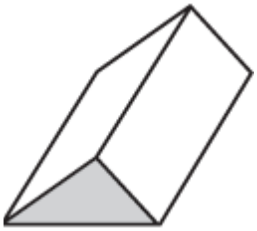
Q6.Match the nets with appropriate solids



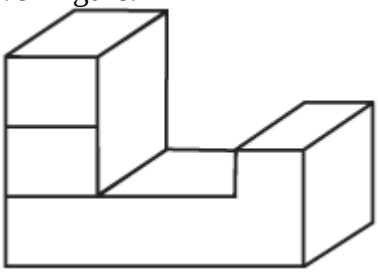
Q7. Draw the top view of a 5 kg weight.

Q8. Write the number of faces for the given solid

Q9. Write the number of faces and vertices for following figure

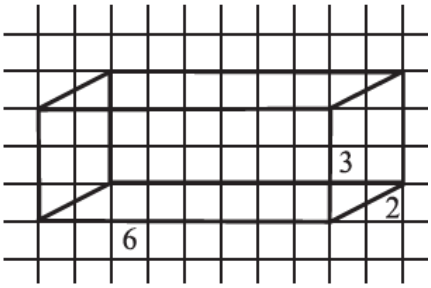


Q10. Draw the front and top view of the given figure.

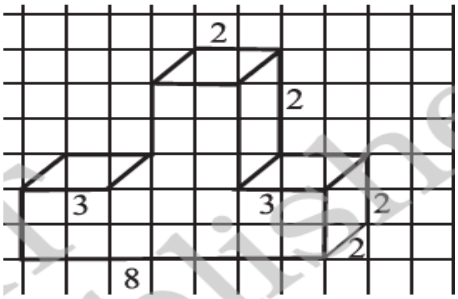


Long Answer Type Questions

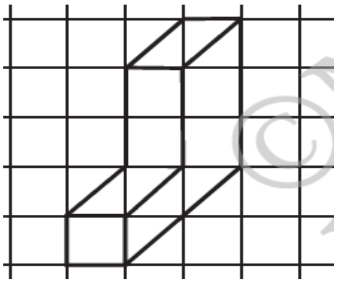
1.Use isometric dot paper and make an isometric sketch for each one of the given shape



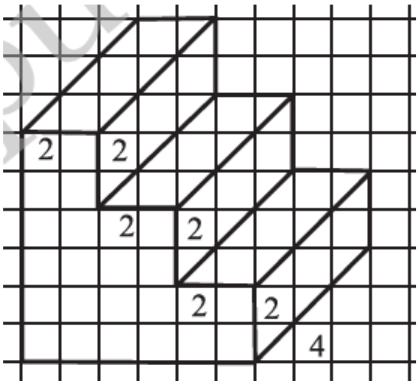
2.Use isometric dot paper and make an isometric sketch for each one of the given shape



3.Use isometric dot paper and make an isometric sketch for each one of the given shape



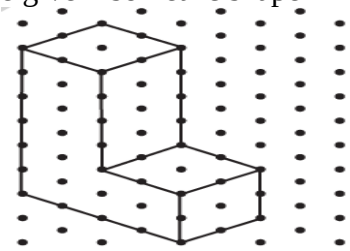
4.Use isometric dot paper and make an isometric sketch for each one of the given shape



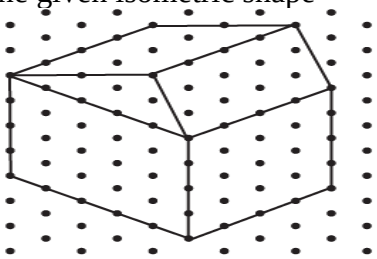
5.The dimensions of a cuboid are 5 cm, 3 cm and 2 cm. Draw three different isometric sketches of this cuboid.

6.Three cubes each with 2 cm edge are placed side by side to form a cuboid. Sketch an oblique or isometric sketch of this cuboid.

7.Make an oblique sketch for each one of the given isometric shape



8.Make an oblique sketch for each one of the given isometric shape



9.Give (i) an oblique sketch and (ii) an isometric sketch for each of the following

"A cuboid of dimensions 5 cm, 3 cm and 2 cm."

10.Write some points on isometric paper.

Practice of VERY SORT ANSWER TYPE QUESTIONS

Q1.Write the Shadow name of the lamp of a cylinder.

Q2.Write the name of a horizontal cross section name if a cut of a cylinder.

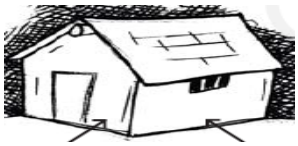
Q3.Write the name of a horizontal cross section name if a cut of a die.

Q4.Write the of solid name if shadow is a square.

Q5.Write the of solid name if shadow is a triangle.

Practice of SORT ANSWER TYPE QUESTIONS

Q1. Draw the front and top view of the given.

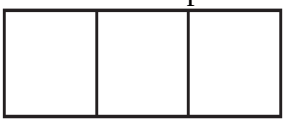


Q2.Write two different between 2-D and 3-D figures.

Q3.Give some examples of 3-D shapes which are present in your home.

Q4.Give some examples of 2-D shapes which are present in your home.

Q5. Here is an incomplete net for making of a cube. Complete it in two different ways.

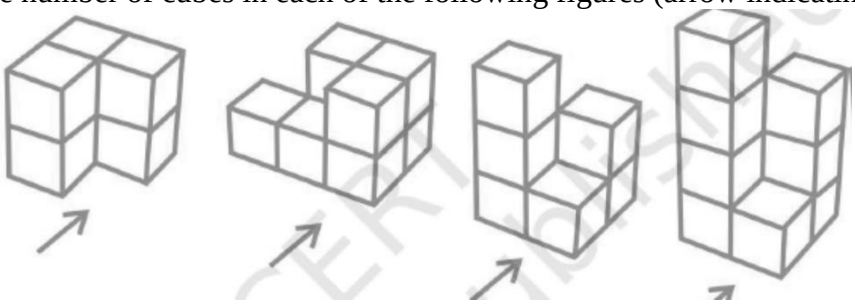


Practice of Long Answer Type Questions

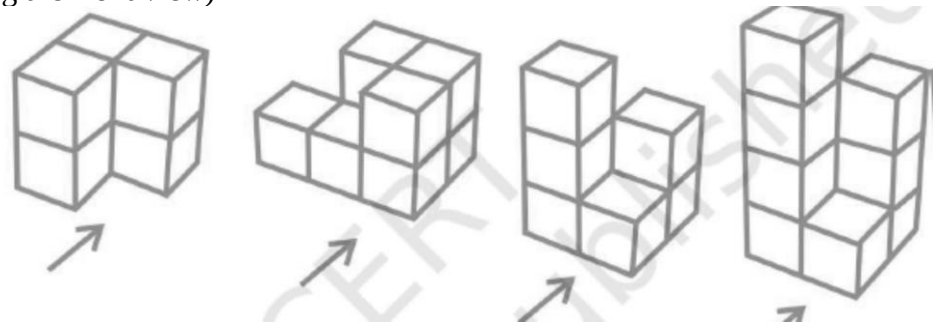
1.Write some points on oblique paper.

2.Write the different isometric paper and oblique paper.

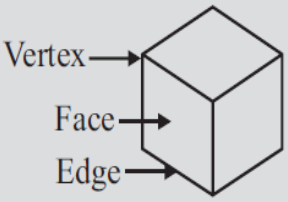
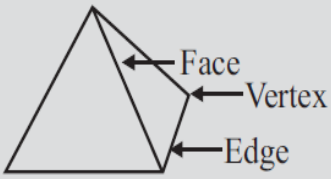
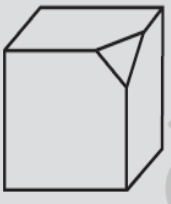
3.Find the number of cubes in each of the following figures (arrow indicating the front view)



4.Find the number of square in each of the following figures in front view , top view and side view (arrow indicating the front view)



5.Complete the following table

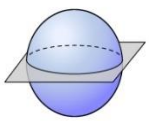
				
Faces **(F)**				
Edges **(E)**				
Vertices **(V)**				

CCT QUESTIONS

3 D TO 2D

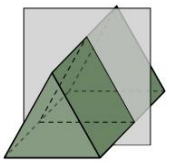
Mike and Harvey wanted to block print geometrical shapes on a plain white tablecloth, but they couldn't find any of the 2D shapes they wanted. Instead, they found many 3D solid shapes lying about. Mike came up with an idea to convert these 3D solids into simple 2D shapes by cutting them open and using their cross section to print the shapes. Help Mike and Harvey figure out what shapes the cross-sections of the 3D solids will form when sliced open as shown in the figures-

Q1. Which best describes the two-dimensional shape created by the cross-section shown?



(a) Oval (b) Circle (c) Ellipse (d)Sphere

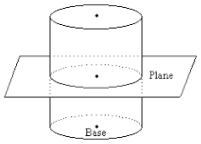
Q2. Which best describes the two-dimensional shape created by the cross-section shown?



(a) Square (b) Triangle (c)Rectangle (d)Trapezoid

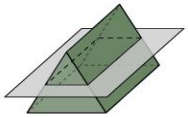
Q3. Which best describes the two-dimensional shape created by the cross-section shown?

(a) Circle
(b) Rectangle
(c) Ellipse
(d) Parallelogram



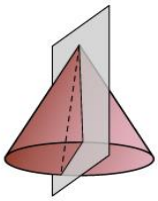
Q4. Which best describes the two-dimensional shape created by the cross-section shown?

(a) Square
(b) Triangle
(c) Trapezoid
(d) Rectangle



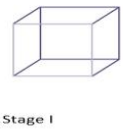
Q5. Which best describes the two-dimensional shape created by the cross-section shown?

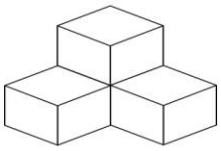
(a) Circle
(b) Ellipse
(c) Triangle
(d) Rectangle

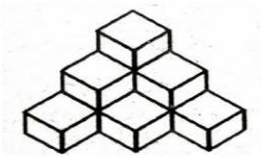


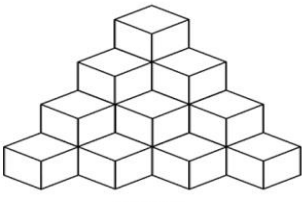
STEP PATTERN

Arman likes to build step pattern using from small identical cubes like the one shown in the following diagram: Arman has lots of small cubes. He uses glue to join cubes together to make other blocks pattern as shown below.


Stage I


Stage II


Stage III


Stage IV

He uses one cube for stage I, four cubes for stage II.

Que 1. How many cubes will he use for stage III?

Que 2. How many cubes will he use for stage IV?

Que 3. How many numbers of squares will be there in top view of this stage II arrangement?

Que 4. Are the numbers of squares in the top view, side view and front view the same?

Yes / No

ANSWER KEY

OBJECTIVE TYPE QUESTION'S ANSWERS

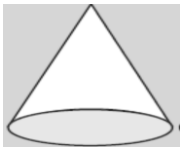
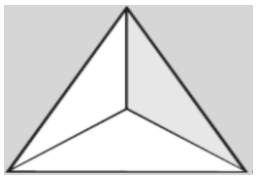
1.False 2. Isometric sketch 3. Oblique sketch 4. True 5. False
6. True 7.Cone 8.Prizm 9.Vertices 10.Triangle

1.Rectangle 2.False 3.False 4.False 5.True

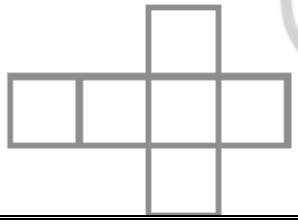
ANWERS of MULTIPLE CHOICE QUESTIONS

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

Answers of VERY SORT ANSWER TYPE QUESTIONS

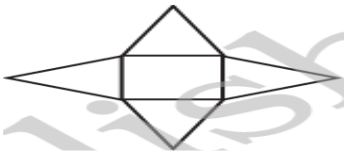
1. Number of edges of a die is 12.
2. Sketch of a cone as--------  -
3. Sketch of a prism as-------- 
4. Cross section cut of a ball is a circle.
5. Vertical cut of a die is a square
6. Shadow of a cuboid is a rectangle.
7. Shadow of a cone is a triangle.
8. Top view of the give figure as 
9. Front view of the given figure as 
10. Side view of the given figure as 

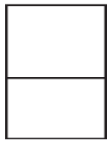
ANSWER of SORT ANSWER TYPE QUESTIONS

1.Net of a cube as 

2.Net of a cylinder as

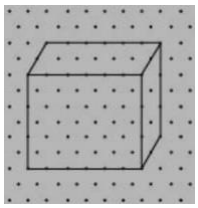
3.Net of a cone as 

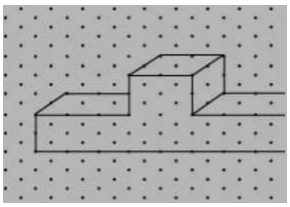
4.Net of a pyramid as 

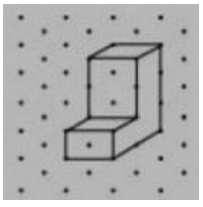
5.Matching as (i)→(b), (ii)→(a), (iii)→(c), (iv)→(f), (v)→(e)
6. Matching as (a)→(ii), (b)→(iii), (c)→(iv), (d)→(i)
7. Top view of 5 kg weight as 

8.Number of faces for given solid is 8.
9.Number of faces are 5 and vertices are 6.
10.Front view and top view of the given solid as 

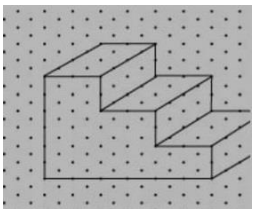
LONG ANSWER TYPE QUESTION'S ANSWER

1).Isometric sketch of the given as 

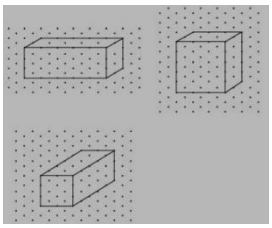
2).Isometric sketch of the given as 

3).Isometric sketch of the given as 

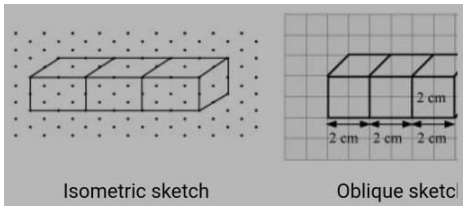
4).Isometric sketch of the given as



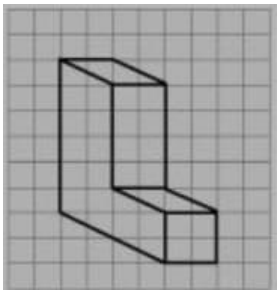
5).Isometric sketches of the given solid



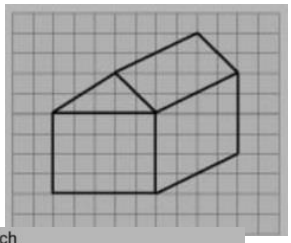
6). Isometric and oblique sketches



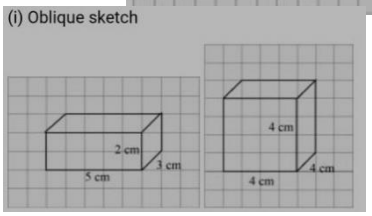
7).Oblique sketch of the given sketch



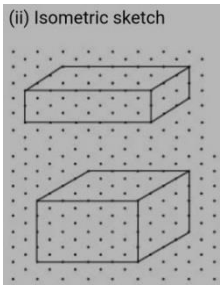
8).Oblique sketch of the given sketch



9).Oblique sketch



10).Isometric sketch



ANWERS of Practice of MULTIPLE CHOICE QUESTIONS

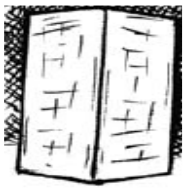
1.c 2.a 3.b 4.b 5.c

Answers of Practice of VERY SORT ANSWER TYPE QUESTIONS

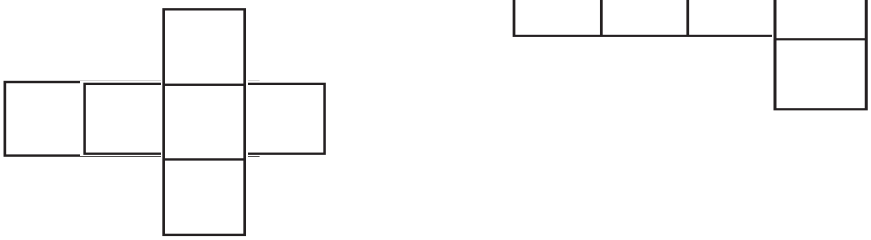
1.Shadow of a cylinder is a rectangle.
2.Horizontal cut of cylinder is a circle.
3.Horizontal cut of a die is a square.
4.If shadow is a square then solid name is a cube.
5.If shadow is a triangle, then solid name is a cone.

ANSWER of Practice of SORT ANSWER TYPE QUESTIONS

1.Front and top views as



2)2-D where two dimensions are measured and in 3-D three dimensions are measured. All plan figures are 2-D figures and all solid figure are 3-D figures.
3)3-D shapes examples gas cylinder, Books, Bed etc.
4)2-D figures examples are photo, cloths etc
5)Net of a cube can be complete as



ANSWER of Practice of LONG ANSWER TYPE QUESTIONS ANSWER

1.)Have you seen an isometric dot sheet? (A sample is given at the end of the book). Such a sheet divides the paper into small equilateral triangles made up of dots or lines. *To draw sketches in which measurements also agree with those of the solid,* we can use isometric dot sheets angle between dots is 60^0.
2.).In an oblique sketch paper, their square boxes each box have in this paper we can represent on 2-D as a 3-D figures but dimensions are not prepositional. On this paper two adjacent sides are cut at right angle.
3.).Have you seen an isometric dot sheet? (A sample is given at the end of the book). Such a sheet divides the paper into small equilateral triangles made up of dots or lines. *To draw sketches in which measurements also agree with those of the solid,* we can use isometric dot sheets angle between dots is 60^0.
4.).In an oblique sketch paper, their square boxes each box have in this paper we can represent on 2-D as a 3-D figures but dimensions are not prepositional. On this paper two adjacent sides are cut at right angle
5.).Number of cubes are used as follows

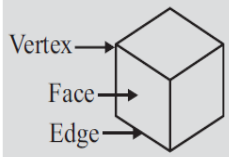
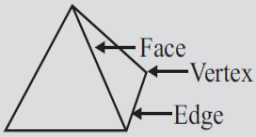
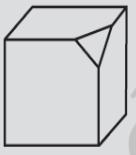
First figure number of cubes used are 6
Second figure number of cubes used are 8
Third figure number of cubes used are 6
Fourth figure number of cubes used are 8

6.).Number of square seem different view as

Figure number	Figure 1	Figure 2	Figure 3	Figure 4

Top view	3	5	3	3
Side view	4	4	5	7

7.).Filled table as

				
Faces **(F)**	6	4	9	7
Edges **(E)**	12	6	16	15
Vertices **(V)**	8	4	9	10

Solutions of CCT

QUESTION 1

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

QUESTION 2

1. Number of cubes are used for stage III are 10.
2. Number of cubes are used for stage III are 20.
3. Number of square in top view of stage II are 3.
4. Yes.

Chapter 15, Visualizing Solid Shapes (February-10 Periods)
Exercise 15.1 https://youtu.be/H8M8vXNiyhk
Exercise 15.2 https://youtu.be/qXxJOqWLAmo
Exercise 15.3 https://youtu.be/oSfBAwrwwSc
Exercise 15.4 https://youtu.be/ncNeDt7chgA

e-Content / Resources Term-2 for the academic year 2021-22

Chapter 9, Rational Numbers (October-08 Periods)

Exercise 9.1 https://youtu.be/OzZW3bARZ_0

Exercise 9.2 https://youtu.be/oGN4pQ02_O0

Chapter 10, Practical Geometry (November-08 Periods)

Exercise 10.1 https://youtu.be/Hw2hsGqBNjU

Exercise 10.2 https://youtu.be/MNIXrDB2S0o

Exercise 10.3 https://youtu.be/cv1PRKa1iks

Exercise 10.4 https://youtu.be/Dn7gP6qC6v8

Exercise 10.5 https://youtu.be/j5DTdXw7WpM

Chapter 11, Perimeter and Area (November-14 Periods)

Exercise 11.1 https://youtu.be/AEPz0pbW-fA

Exercise 11.2 https://youtu.be/vtWYo_d7y0w

Part-I of Exercise 11.3 https://youtu.be/dgscDk-AaHc

Part-II of Exercise 11.3 https://youtu.be/Mu0PxtlukQU

Part-I of Exercise 11.4 https://youtu.be/po6Okifk9tQ

Part-II of Exercise 11.4 https://youtu.be/jmv3W7HqvQc

Chapter 12, Algebraic Expressions (December-12 Periods)

Part-I of Exercise 12.1 https://youtu.be/2J76KVsoLUE

Part-II of Exercise 12.1 https://youtu.be/2XMBdWtQwIc

Exercise 12.2 https://youtu.be/qj0ZBfdpi9I

Exercise 12.3 https://youtu.be/OBV-Z3hAFWY

Exercise 12.4 https://youtu.be/6aJ2gq0Yy1I

Chapter 13, Exponents and Powers (December-12 Periods)

Exercise 13.1 https://youtu.be/i4RZZyX6PLc

Exercise 13.2 https://youtu.be/PEXHM2HLT90

Exercise 13.3 https://youtu.be/QU1PgGiCHlM

Chapter 14, Symmetry (January-08 Periods)

Part-I of Exercise 14.1 https://youtu.be/cZFfzfa0-xc

Part-II of Exercise 14.1 https://youtu.be/rscVmcV-4b8

Exercise 14.2 https://youtu.be/CX8YaEavXnk

Exercise 14.3 https://youtu.be/Go4_LF8b7Ss

Chapter 15, Visualizing Solid Shapes (February-10 Periods)

Exercise 15.1 https://youtu.be/H8M8vXNiyhk

Exercise 15.2 https://youtu.be/qXxJOqWLAmo

Exercise 15.3 https://youtu.be/oSfBAwrwwSc

Exercise 15.4 https://youtu.be/ncNeDt7chgA