KENDRIYA VIDYALAYA SANGATHAN HYDERABAD REGION

STUDY MATERIAL

CLASS - 10

SUBJECT - MATHEMATICS

SESSION: 2023-24

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CHAPTER – 1: REAL NUMBERS
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CHAPTER – 2 POLYNOMIALS
Ms. G Sita, KV Tirumalgiri

CHAPTER – 3 PAIR OF LINEAR EQUATIONS IN TWO VARIABLES
Sri K James, KV No.-1 Golconda

CHAPTER – 4 QUADRATIC EQUATIONS
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CHAPTER – 5 ARITHMETIC PROGRESSION
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CHAPTER – 6 TRIANGLES
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Sri K James, KV No.-1 Golconda

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Mr. T Vijay Kumar Sharma, KV Kanchanbagh

CHAPTER – 10 CIRCLES
Mr. Kumar Swamy, KV Gachibowli

CHAPTER – 11 CONSTRUCTIONS
--**DELETED**--

CHAPTER – 12 AREA RELATED TO CIRCLES
Mr. J Anjaiah, KV No.-1 CRPF

CHAPTER – 13 SURFACE AREAS AND VOLUMES
            Mr. J Anjaiah, KV No.-1 CRPF

CHAPTER – 14 STATISTICS
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CHAPTER – 15 PROBABILITY
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CHAPTER-1: REAL NUMBERS

CONCEPT BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. Number 6 is -------------- (   )
(**a**) a natural number   (**b**) a whole number   (**c**) a rational number   (**d**) all above

Answer: (**d**)

Explanation: 6 is natural number as well as whole number and generally rational numbers will be in the form of $\frac{p}{q}$, the number 6 can also written as $\frac{6}{1}$.

Q2. The prime factors for 1729 is ------------------- (   )
(**a**) 13 x 9 x 17   (**b**) 7 x 13 x 19   (**c**) 7 x 23 x 9   (**d**) 9 x 19 x 13

Answer: (**b**)

Explanation: we can see 9 which is composite number in a, c and d which not prime

Q3. HCF of 26 and 91 is:
(**a**) 15   (**b**) 13   (**c**) 19   (**d**) 11

Answer: (**b**) 13

Explanation: The prime factorisation of 26 and 91 is;
26 = 2 x 1391 = 7 x 13Hence, HCF (26, 91) = 13

Q4. Which of the following is not irrational?
(**a**) $(3 + \sqrt{7})$ (**b**) $(3 - \sqrt{7})$ (**c**) $(3 + \sqrt{7})(3 - \sqrt{7})$ (**d**) $3\sqrt{7}$

Answer: (**c**) $(3 + \sqrt{7})(3 - \sqrt{7})$

Explanation: If we solve, $(3 + \sqrt{7})(3 - \sqrt{7})$, we get;
$(3 + \sqrt{7})(3 - \sqrt{7}) = 3^2 - (\sqrt{7})^2 = 9 - 7 = 2$ [By $a^2 - b^2 = (a - b)(a + b)$]

Q5. The addition of a rational number and an irrational number is equal to:
(**a**) rational number   (**b**) Irrational number
(**c**) Both   (**d**) None of the above

Answer: (**b**) Irrational number

Explanation: The addition of a rational number and an irrational number is equal to irrational number.

Q6. The multiplication of two irrational numbers is:
(**a**) irrational number   (**b**) rational number
(**c**) Maybe rational or irrational   (**d**) None

Answer: (c) Maybe rational or irrational

Explanation: The multiplication of two irrational numbers is maybe rational or irrational.

Q7. If set A = {1, 2, 3, 4, 5,…} is given, then it represents:
(a) Whole numbers   (b) Rational Numbers
(c) Natural numbers   (d) Complex numbers

Answer: (c) Natural numbers

Explanation: If set A = {1, 2, 3, 4, 5,…} is given, then it represents natural numbers.

Q8. If p and q are integers and is represented in the form of p/q, then it is a:
(a) Whole number   (b) Rational number   (c) Natural number   (d) Even number

Answer: (b) Rational number

Explanation: If p and q are integers and is represented in the form of p/q, then it is a rational number.

Q9. The largest number that divides 70 and 125, which leaves the remainders 5 and 8, is:
(a) 65   (b) 15   (c) 13   (d) 25

Answer: (c) 13

Explanation: 70 – 5 = 65 and 125 – 8 = 117HCF (65, 117) is the largest number that divides 70 and 125 and leaves remainder 5 and 8   HCF (65, 117) = 13

Q10. The least number that is divisible by all the numbers from 1 to 5 is:
(a) 70   (b) 60   (c) 80   (d) 90

Answer: (b) 60

Explanation: The least number will be LCM of 1, 2, 3, 4, 5.
Hence, LCM (1, 2, 3, 4, 5) = 2 x 2 x 3 x 5 = 60

Q11. The sum or difference of two irrational numbers is always
(a) rational   (b) irrational   (c) rational or irrational   (d) not determined

Answer: (b) irrational

Q12. The least number that is divisible by all the numbers from 1 to 10? (   )
(a) 10   (b) 100   (c) 504   (d) 2520

Answer: (d)

Explanation: Required no. is LCM OF (1, 2, 3, 4, 5, 6, 7, 8, 9, 10) = (1 x 2 x 2 x 2 x 2 x 3 x 3 x 5 x 7) = 2520

Q13. $\frac{1}{\sqrt{2}}$ is a/an:

    (a) a fraction   **(b)** rational number   **(c)** irrational number   **(d)** none

    Answer: (c)

    Explanation: On rationalization $\frac{1}{\sqrt{2}}$ x $\frac{\sqrt{2}}{\sqrt{2}}$ becomes $\frac{1}{2}$ x $\sqrt{2}$ irrational only

Q14. The HCF of 231 and 396 is

    (a) 32   **(b)** 21   **(c)** 13   **(d)** 33

    Answer: (d) 33

Q15. $\frac{\sqrt{3}}{\sqrt{27}}$ is a /an ----------------------------- ( )

    (a) Irrational number   **(b)** Rational number   **(c)** fraction   **(d)** none

    Answer: (b)

    Explanation: $\frac{\sqrt{3}}{\sqrt{27}}$ can be written as $\frac{\sqrt{3}}{\sqrt{3}X\sqrt{9}}$ after cancel root 3 it will become $\frac{1}{3}$

Q16. The prime factorisation of 96 is

    (a) $2^5 \times 3$ **(b)** 2^6 **(c)** $2^4 \times 3$ **(d)** $2^4 \times 32$

    Answer: (a) $2^5 \times 3$

    Explanation: Prime factors of $96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^5 \times 3$

Q17. If two positive integers p and q expressed as $p = ab^2$ and $q = a^3b$: where a and b are prime numbers then LCM (p, q) ………………….. ( )

    (a) ab   **(b)** a^2b^2 **(c)** a^3b^2 **(d)** a^3b^3

    Answer: (c)

    Explanation: p = a x b x b   q = a x a x a x b

                 LCM of p, q = a x a x a x b x b = a^3 x b^2

Q18. For any two positive integers a and b, HCF (a, **b)** $\times$ LCM (a, **b)** =

    (a) 1   **(b)** $(a \times b)/2$ **(c)** a/b   **(d)** $a \times b$

    Answer: (d) $a \times b$

    Explanation: For any two positive integers a and b, HCF (a, **b)** $\times$ LCM (a, **b)** $= a \times b$.

Q19. If two numbers are 10 and 15 then what is the product of LCM X HCF?

    a) 150   **b)** 10   **c)** 15   **d)** 25

    Ans: 150

    Explanation: Product of given two numbers is the product of their LCM and HCF

Case Based Questions

CASE STUDY 1:

Q20. Three friends Virat, Rohit, and Sachin used to ride their bicycles around their Society's park every day in the evening. The shape of the society's park is a Rectangle.

One day, they decide to play a game. All three have a ringing bell on their bicycle. They ring the bell at an interval of 9, 12, 15 minutes respectively means after every 9 mins. Virat rings the bell, after every 12 mins. Rohit rings the bell and after every 15 mins, Sachin rings the bell.

(a) If they start ringing together a time, after what time will they next ring together?
(i) 150 minutes **(ii)** 3 minutes   **(iii)** 180 minutes   **(iv)** 100 minutes

(b) If only Sachin and Virat play this game, then after what time will they next ring together?
(i) 15 minutes   **(ii)** 9 minutes   **(iii)** 30 minutes   **(iv)** 45 minute

(c) If only Rohit and Sachin play this game, then after what time will they next ring together?
(i) 6 minutes   **(ii)** 60 minutes   **(iii)** 45 minutes   **(iv)** 80 minutes

(d) If one more friend, Rishab also join them from the beginning. Now Virat, Rohit, Sachin and Rishab ring at an interval of 9,12, 15 and 20 minutes then after what time will they next ring together.
(i) 180 minutes **(ii)** 60 minutes   **(iii)** 45 minutes   **(iv)** 100 minutes

(e) If only Rohit and Rishab play this game, then after what time will they next ring together?
(i) 6 minutes   **(ii)** 60 minutes   **(iii)** 40 minutes   **(iv)** 180 minutes

CASE STUDY – 2

Q21. Diwali is the biggest festival in India. People give gifts to their loved ones and wish them **"Happy Diwali"**. People give different types of gifts to their loved ones but most of them prefer to give sweets in gifts. Therefore, all sweet shops remain very busy on the Diwali festival in India.

One shopkeeper **A** prepares 396 GulabJamuns and 342 Ras-Gullas. He packs them in combination. Each container consists of either GulabJamuns or Ras-Gullas but has an equal number of pieces.

(a) Find the number of pieces, Shopkeeper **A** should put in each box so that number of boxes is the least.
(i) 12   **(ii)** 18   **(iii)** 20   **(iv)** 25

(b) There is another sweets shopkeeper **B** beside shopkeeper **A**. Shopkeeper **B** prepares 350 GulabJamuns and 400 Ras-Gullas. His packing follows the same rules as of shopkeeper **A**. Find the number of pieces shopkeeper **B** should put in each box so that number of boxes is the least.
(i) 20   **(ii)** 18   **(iii)** 50   **(iv)** 5

(c) The ratio of the number of boxes required by shopkeeper **A** to shopkeeper **B**, is:
(i) 9:25   **(ii)** 3:5   **(iii)** 1:1   **(iv)** 5:1

(d) If there is another shopkeeper **C** who makes 500 GulabJamuns and 400 Ras-Gullas, then the ratio of Number of boxes required by Shopkeep **A**, **B**, and **C** is: (i.e **A: B: C**)
(i) 3:5:10   **(ii)** 3:4:5   **(iii)** 9:25:50   **(iv)** 1:3:50

(e) The ratio of the Number of boxes required by Shopkeeper **A** and **C** is (i.e **A: C**):
(i) 3:25   **(ii)** 1:2   **(iii)** 9:50   **(iv)** 2:25

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ANSWER KEY

CASE Study 1: -	**(a) (iii)**	**(b) (iv)**	**(c) (ii)**	**(d) (i)**	**(e) (ii)**
CASE Study 2: -	**(a) (ii)**	**(b) (iii)**	**(c) (i)**	**(d) (iii)**	**(e) (iii)**

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Assertion and Reasoning Question

Direction: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R).
Mark the correct choice as:
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q22. Assertion (A): The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.
Reason (R): If a and b are two positive integers, then H.C.F. $\times$ L.C.M. = $a \times b$.

Answer: (d) Assetion (A) is false but Reason (R) is true.

Explanation: Since HCF $\times$ LCM = $a \times b$
$\Rightarrow 3072 = 16 \times 162$
$\Rightarrow 3072 \neq 2592$

Q23. Assertion (A): (7 x 13 x 11) +11 and (7 x 6 x 5 x 4 x 3 x 2 x 1) + 1 have exactly composite numbers
Reason (R): (3 x 12 x 101) + 4 is not composite number

Answer: (c)

Explanation: (7 x 13 x 11) + 11 = 11(7 x 13 + 1) = 11 x (91 + 1) = 11 x 92 = 11 x 2 x 2 x 23 = more than two prime factors = a composite number
(7 x 6 x 5 x 4 x 3 x 2 x 1) + 3 = 3(7 x 6 x 5 x 4 x 2 x 1 + 1) = 3 x 1681 = 3 x 41 x 41 = more than two prime factors = a composite number
Thus reason is not correct.
Assertion is correct but reason is incorrect.

Q24. Assertion (A): 2 is an example of a rational number.
Q25. Reason (R): The square roots of all positive integers are irrational numbers.
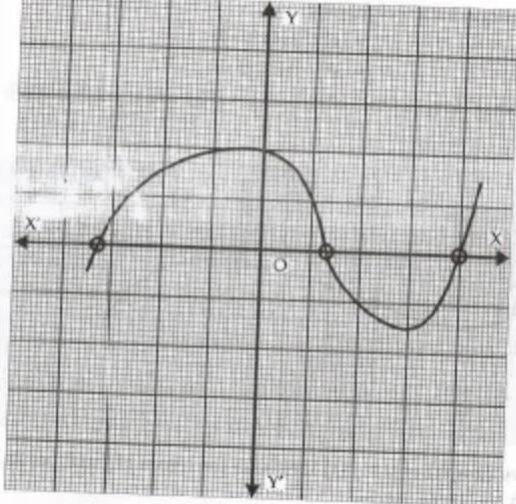
Answer: (c)

Explanation: Here, reason is false. As $\sqrt{16} = \pm 4$, which is not an irrational number.
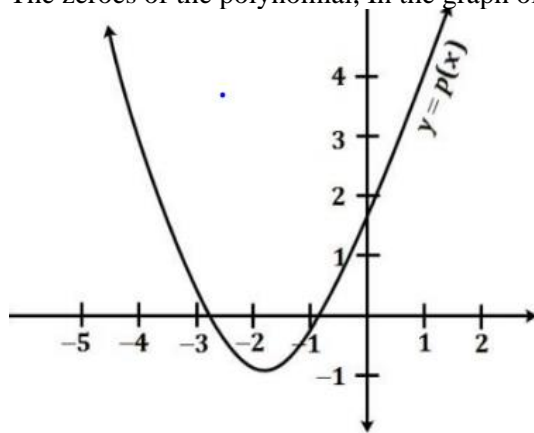
CHAPTER-2: POLYNOMIALS

COMPETENCY BASED QUESTIONS

Multiple Choice Questions (MCQ)

Q1. The number of zeroes of the polynomial, In the graph of polynomial are

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

Q2. The zeroes of the polynomial, In the graph of polynomial are

     (a) 1, 3   **(b)** -1, -3   **(c)** -1, 3   **(d)** 1, -3

Q3. If one zero of the polynomial $2x^2 + px - 10$ is -2 then the value of p is
     (a) 1   **(b)** -1   **(c)** 9   **(d)** -9

Q4. Write a quadratic polynomial, sum of whose zeroes is 2√3 and their product is 5 is
     (a) $x^2 + 2\sqrt{3}x + 5$ **(b)** $x^2 - 2\sqrt{3}x - 5$
     (c) $x^2 + 2\sqrt{3}x - 5$ **(d)** $x^2 - 2\sqrt{3}x + 5$

Q5. A quadratic polynomial whose zeroes are 2±√3 is
     (a) $x^2 - 4x - 1$ **(b)** $x^2 - 4x + 1$ **(c)** $x^2 + 4x - 1$ **(d)** $x^2 - x + 4$

Q6. The condition that zeroes of polynomial $p(x) = ax^2 + bx + c$ are reciprocal of each other
     (a) a = b   **(b)** a = c   **(c)** a = -b   **(d)** a = -c

Q7. The quadratic polynomial whose zeroes are 1 and –3 are
   (a) $X^2 + 2x - 3$ (b) $X^2 + 2x + 3$ (c) $X^2 - 2x - 3$ (d) $X^2 - 3x - 2$

Q8. If the zeroes of the quadratic polynomial $x^2 + (a + 1) x + b$ are 2 and –3, then
   (a) $a = -7, b = -1$ (b) $a = 5, b = -1$ (c) $a = 2, b = -6$ (d) $a = 0, b = -6$

Q9. If one of the zeroes of a quadratic polynomial $x^2 + px + q$ is the negative of other then
   (a) p = 0, q = 0   (b) p = 0, q > 0   (c) p = 0, q < 0   (d) p > 0, q > 0

Q10. if the sum of zeroes of the polynomial $kx^2 + 2kx + 3$ is equal to their product, then the value of k is
   (a) $\frac{2}{3}$ (b) $\frac{-2}{3}$ (c) $\frac{3}{2}$ (d) $\frac{-3}{2}$

Q11. If one of the zeroes of the polynomial $3x^2 + 2x + k$ is reciprocal of other, then value of k is
   (a) 1   (b) 2   (c) 3   (d) 4

Q12. What number should be added to $x^2 - 5x + 2$ so that 3 is the zero of the polynomial
   (a) 2   (b) -2   (c) 4   (d) -4

Q13. The product of zeroes of the polynomial $x^2 - 5x + k$ is 6. Then its zeroes are
   (a) 1, 6   (b) 2, 3   (c) 1, -6   (d) -2, -3

Q14. If α and β are zeroes of the polynomial $3x^2 - 5x - 2$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is
   (a) $\frac{2}{5}$ (b) $\frac{-2}{5}$ (c) $\frac{5}{2}$ (d) $\frac{-5}{2}$

Assertion and Reasoning Question

Directions: In the following questions, a statement of Assertion (A) is followed by a statement of reason (R).
Mark the correct choice as:
(a) Both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q15. Assertion (A): The graph y=f(x) is shown in figure, for the polynomial f(x). The number of zeroes of f(x) is 3.
   Reason (R): The number of zeroes of the polynomial f(x) is the number of points of which f(x) cuts or touches the x-axis.
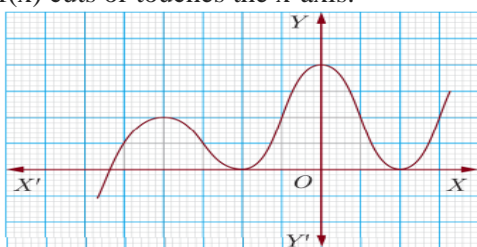
Q16. Assertion (A): The graph of a polynomial intersect x-axis at 3 points and y-axis at 1 points, the polynomial has 3 zeroes.
Reason (R): The number of zeroes that a polynomial p(x) can have is the number of times polynomial intersect x and y axis.

Q17. Assertion (A): $x^2+7x+12$ has two zeroes.
Reason (R): A quadratic polynomial can have at the most two zeroes.

**Q18. Assertion (A):** If the sum of the zeroes of the quadratic polynomial $x^2-2kx+8$ is 2 then value of k is -1.
Reason (R): Sum of zeroes of a quadratic polynomial ax^2+bx+c is -b/a.

Case Based Questions

Attempt any four sub parts of each question.
Each sub part carries 1 mark

Q19. Sarita tied a rope to two branches of a tree in form of a jhula as shown in the figure to form a mathematical shape.
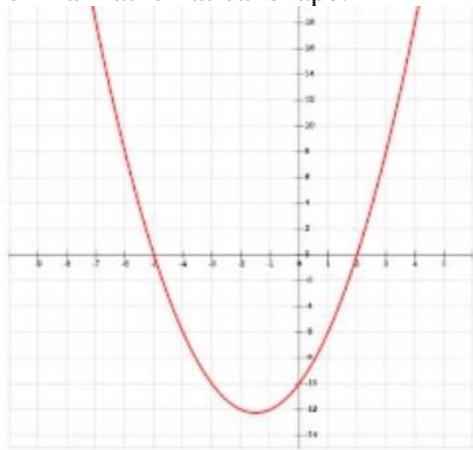
(i) What is the shape of the jhula
(a) Linear   **(b)** Spiral   **(c)** parabola   **(d)** ellipse

(ii) How many zeroes are there for the polynomial
(a) 1   **(b)** 2   **(c)** 3   **(d)** 4

(iii) What will be the expression of the polynomial
(a) $x^2 +3x – 10$ **(b)** $x^2 +3x + 10$ **(c)** $x^2 - 3x – 10$ **(d)** $x^2 - 3x + 10$

(iv) What is the value of polynomial at $x = 2$
(a) 3   **(b)** 2   **(c)** 1   **(d)** 0

(v) A quadratic polynomial whose zeroes are 3 and -5 is
(a) $x^2 +2x + 15$ **(b)** $x^2 +2x – 15$ **(c)** $x^2 -2x – 15$ **(d)** $x^2 -2x + 15$

Q20. Basketball and soccer are played with a spherical ball. Even though an athlete dribbles the ball in both sports, a basketball player uses his hands and a soccer player uses his feet. Usually, soccer is played outdoors on a large field and basketball is played indoor on a court made out of wood. The projectile (path trace**d)** of soccer ball and basketball are in the form of parabola representing quadratic polynomial.
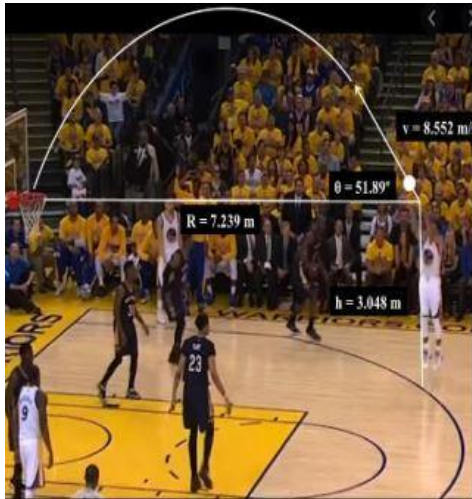
(i) The shape of the path traced shown is
a) Spiral   **b)** Ellipse   **c)** Linear   **d)** Parabola

(ii). The graph of parabola opens upwards, if _____
a) $a = 0$ **b)** $a < 0$ **c)** $a > 0$ **d)** $a \geq 0$

(iii) Observe the following graph and answer
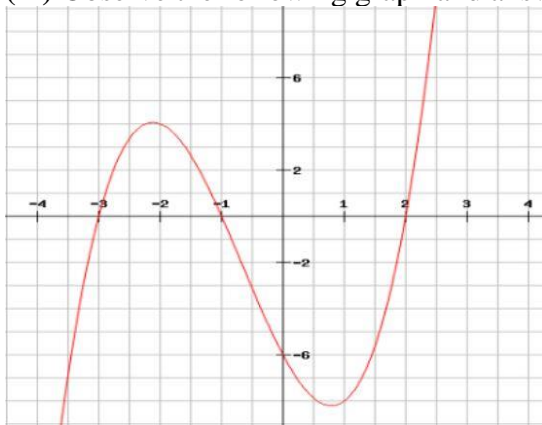
In the above graph, how many zeroes are there for the polynomial?
a) 0   **b)** 1   **c)** 2   **d)** 3

(iv) The three zeroes in the above shown graph are
a) 2, 3, -1   **b)** -2, 3, 1   **c)** -3, -1, 2   **d)** -2, -3, -1

(v) Find the zeroes of the polynomial $x^2 + x - 20$ are
(a) 4, 5   **(b)** -4, 5   **(c)** -4, -5   **(d)** 4, -5

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ANSWER KEY
1. c   2. b   3. b   4. d   5. b   6. b   7. a   8. d   9. c   10. d   11. c
12. c   13. b   14. d   15. a   16. c   17. a   18. d   19. **(i) (c) (ii) (b) (iii) (a) (iv)** d
(v) (b)   20. **(i)** d **(ii)** c **(iii)** d **(iv)** c **(v)** d
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CHAPTER-3: PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

CONCEPT BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. Write the number of solutions of the following pair of linear equations.
x + 3y -5 = 0
2x + 6y = 10
(a) 1   (b) 2   (c) 3   (d) Infinite

Q2. A pair of Linear equations which has a unique solution x = 2 and y = -3 is
(a) 2x + y = 1 and 2x – 3y = -5   (b) 2x + 5y = -11 and 4x + 10 y = -22
(c) x – 2y = 1 and 3x + 2y = 0   (d) x – 4y -14 = 0 and 5x – y – 13 = 0

Q3. The pair of Linear equations x + 2y + 5 = 0 and -3x -6y + 1 = 0 has
(a) a unique solution   (b) exactly two solutions
(c) Infinitely many solutions   (d) no solution

Q4. For which value of "p" does the pair of equations, 4x + py + 8 = 0 and 2x + 2y + 2 = 0 has unique solution?
(a) 1   (b) -1   (c) 2   (d) all of these

Q5. When a boy travels equal distance at a speed of x km/hr and y km/hr. His average speed is 4 km/hr. But when he travels at these speed for equal time, his average speed is 4.5 km/hr. The difference of the two speeds is
(a) 2 km/hr   (b) 3 km/hr   (c) 4 km/hr   (d) 5 km/hr

Q6. Graphically the pair of Linear equations 6x – 3y + 10 = 0 and 2x –y + 9 = 0, represents two lines which are
(a) intersecting exactly at one point   (b) intersecting exactly at two points
(c) coincident   (d) parallel

Q7. If x = a, y = b is the solution of the equations and x – y = 2 and x + y = 4, then the value of a and b respectively
(a) 3 and 5   (b) 5 and 3   (c) 3 and 1   (d) 1 and 3

Q8. If the lines given by 3x + 2ky = 2 and 2x + 5y + 1 = 0 are parallel then the value of k is
(a) $\frac{-5}{4}$ (b) $\frac{2}{5}$ (c) $\frac{3}{2}$ (d) $\frac{15}{4}$

Q9. For what value of k, do the equations 6x – 2y = -16 and 12x – 2ky + 32 = 0 represent coincident lines?
(a) $\frac{1}{2}$ (b) $\frac{-1}{2}$ (c) 2   (d) -2

Q10. The sum of the digits of a two digit number is 9. If 27 is added to it the digits of the number gets reversed. The number is
(a) 25   (b) 36   (c) 63   (d) 72

Q11. How many solutions does the pair of Linear equations y= 0 and y = -6 has
    (a) one solution   **(b)** two solutions
   **(c)** Infinitely many solutions   **(d)** no solution

Q12. A pair of Linear equations is inconsistent, how many solutions does it has
    (a) one solution   **(b)** two solutions   **(c)** Infinitely many   **(d)** no solution

Case Based Questions

Case Study 1:

Case study: - Mr. Mohan arranged a lunch party for some of his friends. The expenses of the lunch are partly constant and partly proportional to the number of guests. The expenses amount to ₹ 650 for 7 guests and ₹ 970 for 11 guests.
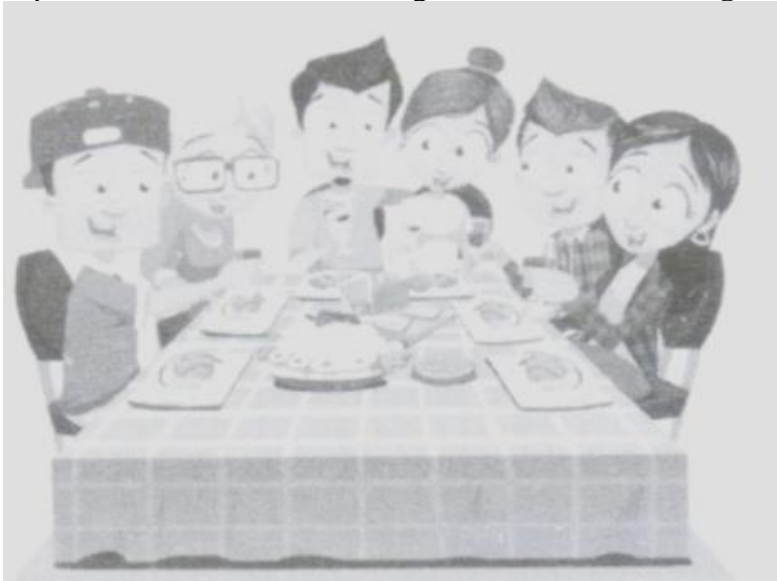
Denote the constant expenses by ₹ x and proportional expense per person by ₹ y.

Now answer the following questions.

Q13. The following represent both the situations algebraically.
    (a) x + 7y = 650, x + 11y = 970   **(b)** x - 7y = 650, x - 11y = 970
    (c) x + 11y = 650, x + 7y = 970   **(d)** 11 x + 7y = 650, 11x - 11y = 970

Q14. Proportional expense for each person is
    (a) ₹ 50   **(b)** ₹ 80   **(c)** ₹ 90   **(d)** ₹ 100

Q15. The fixed (or constant) expense for the party is
    (a) ₹ 50   **(b)** ₹ 80   **(c)** ₹ 90   **(d)** ₹ 100

Q16. If there would be 15 guests at the lunch party, then what amount Mr. Mohan has to pay?
    (a) ₹ 1500   **(b)** ₹ 1300   **(c)** ₹ 1200   **(d)** ₹ 1290

Q17. The system of linear equations representing both the situations will have
    (a) a unique solution   **(b)** Infinitely many solutions
    (c) no solution   **(d)** None of these

Q18. For what value of k, will the equations, $x + 2y + (11 - k) = 0$ and $2x + ky + (10 + k) = 0$ represent the coincident lines

(a) k = 12   (b) k = 4   (c) k = 36   (d) k = 2

Assertion and Reasoning Question

In the following questions, a statement of Assertion (A) is followed by a statement of reason (R).

Mark the correct choice as: -

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Q19. Assertion (A): -The graph of the Linear equations $3x + 2y = 12$ and $5x - 2y = 4$ gives a pair of intersecting lines.

Reason (R): -The graph of the Linear equations $a_1x + b_1 y + c_1 = 0$ and $a_2x + b_2 y + c_2 = 0$ gives a pair of intersecting lines, If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Q20. Assertion (A): - If pair of lines are coincident, then we say that pair of lines is consistent and it has a unique solution.

Reason (R): - If the pair of lines are parallel then the pair has no solution and is called inconsistent pair of equations.

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Q21. Assertion (A): -The Linear equations $x - 2y - 3 = 0$ and $3x + 4y -20 = 0$ have exactly one solution.

Reason (R): - The Linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ have unique solution.

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Q22. Assertion (A): - The graphical representation of the Linear equations $x + 2y = 3$ and $2x + 4y + 7 = 0$ gives a pair of coincident lines.

Reason (R): - The graph of the Linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ gives a pair of intersecting lines If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q23. Assertion (A): - The value of k for which the system of linear equations $3x + ky = 0$ and $2x - y + 14 = 0$ has a unique solution is $k \neq \frac{-3}{20}$

Reason (R): - The graph of the Linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ gives a pair of intersecting lines If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

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ANSWER KEY

1.D	2.B	3.D	4.D	5.B	6.A	7.C	8.D	9.C	10.C	11.D	12.D
13.A	14.B	15.C	16.D	17.A	18.B	19.A	20.D	21.C	22.D	23.A	

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CHAPTER-4: QUADRATIC EQUATIONS

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. If one root of equation $4x^2-2x+k-4=0$ is reciprocal of the other. The value of k is:
(a) -8   (b) 8   (c) -4   (d) 4

Q2. The sum of the roots of the quadratic equation $3x^2 - 9x + 5 = 0$ is
(a) 3   (b) 6   (c) -3   (d) 2

Q3. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$, then
(a) p = 3   (b) p = 5   (c) p = 7   (d) p = 1

Q4. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, the value of q is
(a) $\frac{49}{4}$ (b) $\frac{4}{49}$ (c) 49   (d) 4

Q5. The roots of the equation $2x^2-3x-5=0$ are
(a) $1, \frac{5}{2}$ (b) $-1, \frac{5}{2}$ (c) $1, -\frac{5}{2}$ (d) $-1, -\frac{5}{2}$

Q6. If α and β are roots of the quadratic equation $x^2+2x-3=0$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ is
(a) $\frac{1}{3}$ (b) $\frac{-1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{-2}{3}$

Q7. If the equation $x^2+2x+k=0$ has real and distinct roots, then value of k is
(a) k<1   (b) k>1   (c) k≤1   (d) k≥1

Q8. The values of k for which the quadratic equation $kx(x - 2) + 6 = 0$ has equal roots
(a) 0   (b) 3   (c) 6   (d) -6

Q9. The nature of the roots of the quadratic equation $2x^2 -4x +3=0$ are
(a) real and equal   (b) real and distinct   (c) no real roots   (d) none of these

Q10. The value of the discriminant of the quadratic equation $3\sqrt{3}x^2+10x+\sqrt{3}=0$ is
(a) 36   (b) 64   (c) 81   (d) 100

Q11. The value of p, for which one root of the quadratic equation $px^2 -14x+8=0$ is 6 times the other is
(a) 1   (b) 2   (c) 3   (d) 4

Q12. A natural number, when increased by 6, equals 160 times its reciprocal. Then the number is.
(a) 10   (b) 8   (c) 6   (d) 16

Q13. The product of two successive integral multiples of 5 is 300. Then the numbers are:

(a) 25, 30   (b) 10, 15   (c) 30, 35   (d) 15, 20

Q14. The positive root of $\sqrt{(3x^2+6)} = 9$ is
(a) 3   (b) 5   (c) 7   (d) 9

Assertion and Reasoning Question

Directions: In the following questions, a statement of Assertion (**A**) is followed by a statement of reason (R).
Mark the correct choice as:
(a) Both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q15. Assertion (A): $(2x – 1)^2 – 4x^2 + 5 = 0$ is not a quadratic equation.
Reason (R): An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, where a, b, c $\in$ R is called a quadratic equation.

Q16. Assertion (A): The discriminant of the quadratic equation $2x^2 – 4x + 3 = 0$, is -8 and hence the nature of its roots is no real roots.
Reason (R): If $b^2-4ac<0$ the nature of roots is no real roots.

Q17. Assertion (A): $4x^2 – 12x + 9 = 0$ has repeated roots.
Reason (R): The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if discriminant D>0

Q18. Assertion (A): The roots of the equation $7x^2 + x +1 = 0$ are real and distinct
Reason (R): If $b^2-4ac >0$ then roots are real and distinct.

Case Based Questions

Attempt any four sub parts of each question.
Each sub part carries 1 mark

Q19. The speed of a motor boat in still water is 20 km/hr. For covering the distance of 15 km the boat took 1 hour more for upstream than downstream.

(i) Let speed of the stream be x km/hr. then speed of the motorboat in downstream will be
(a) 20 km/hr   **(b)** $(20 + x)$ km/hr   **(c)** $(20 – x)$ km/hr   **(d)** $(x-20)$ km/hr

(ii) Which is the correct quadratic equation for the speed of the stream?
(a) $x^2 + 30x − 200 = 0$ **(b)** $x^2 + 20x − 400 = 0$
(c) $x^2 + 30x − 400 = 0$ **(d)** $x^2 − 20x − 400 = 0$

(iii) What is the speed of stream?
(a) 20 km/hour   **(b)** 10 km/hour   **(c)** 15 km/hour   **(d)** 5 km/hour

(iv) How much time boat took in downstream?
(a) 90 minutes   **(b)** 15 minutes   **(c)** 30 minutes   **(d)** 45 minutes

(v) What is the distance travelled by the boat in 3 hours upstream?
(a) 20 km   **(b)** 25 km   **(c)** 30 km   **(d)** 45 km

Q20. Raj and Ravi are very close friends. Raj's parents have a Maruti Alto. Ravi 's parents have a Toyota. Both the families decided to go for a picnic to Mysore palace in karnataka by their own car. Raj's car travels x km/h, while Ravi's car travels 5km/h more than Raj's car. Raj'scar took 4 hours more than Ravi's car in covering 400 km.

(i) What will be the distance covered by Ravi's car in two hours?
(a) $2 (x + 5)$ km   **(b)** $(x – 5)$ km   **(c)** $2 (x + 10)$ km   **(d)** $(2x + 5)$ km

(ii) Which of the following quadratic equation describe the speed of Raj's car?
(a) $x^2 − 5x − 500 = 0$ **(b)** $x^2 + 4x − 400 = 0$
(c) $x^2 + 5x − 500 = 0$ **(d)** $x^2 − 4x + 400 = 0$

(iii) What is the speed of Raj's car?
(a) 20 km/h   **(b)** 15 km/h   **(c)** 25 km/h   **(d)** 10 km/h

(iv) How much time Ravi took to travel 400 km?
(a) 20 h   **(b)** 40 h   **(c)** 25 h   **(d)** 16 h

(v) How much time took Raj to travel 400 km?
(a) 15 h   **(b)** 20 h   **(c)** 12 h   **(d)** 8 h

****

ANSWER KEY
1. b   2. a   3. c   4. a   5. b   6. c   7. a   8. c   9. c   10. b   11. c   12. a
13. d   14. b   15. b   16. a   17. c   18. d   19.**(i) (b) (ii)** c **(iii) (b) (iv) (c) (v) (c)**
20. **(i)** a **(ii)** c **(iii)** a **(iv)** d **(v)** b
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CHAPTER-5: ARITHMETIC PROGRESSION

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. In an Arithmetic Progression, if a = 28, d = -4, n = 7, then a_n is:
(a) 4   (b) 5   (c) 3   (d) 7

Answer: (a) 4

Explanation: For an AP,
$a_n = a+(n-1)d$, $= 28+(7-1)(-4)$, $= 28+6(-4)$, $= 28-24$, $a_n=4$

Q2. If a = 10 and d = 10, then first four terms will be:
(a) 10, 30, 50, 60   (b) 10, 20, 30, 40
(c) 10, 15, 20, 25   (d) 10, 18, 20, 30

Answer: (b) 10, 20, 30, 40

Explanation: a = 10, d = 10
$a_1 = a = 10$, $a_2 = a_1+d = 10+10 = 20$, $a_3 = a_2+d = 20+10 = 30$, $a_4 = a_3+d = 30+10 = 40$

Q3. The first term and common difference for the A.P. 3, 1, -1, -3 is:
(a) 1 and 3   (b) -1 and 3   (c) 3 and -2   (d) 2 and 3

Answer: (c) 3 and -2

Explanation: a = 3,
d = Second term – First term,
$\Rightarrow 1 – 3 = -2 \Rightarrow d = -2$

Q4. 30th term of the A.P: 10, 7, 4, …, is
(a) 97   (b) 77   (c) -77   (d) -87

Answer: (c) -77

Explanation: A.P. = 10, 7, 4, …First term, a = 10, $d = a_2 − a_1 = 7−10 = −3$
$a_n = a +(n−1)d$;
$a_{30} = 10+(30−1)(−3)$
$a_{30} = 10+(29)(−3)$
$a_{30} = 10−87 = −77$

Q5. 11th term of the A.P. -3, -1/2, 2 …. Is
(a) 28   (b) 22   (c) -38   (d) -48

Answer: (b) 22

Explanation: A.P. = -3, -1/2, 2 …

First term a = – 3, Common difference,
d = $a_2 - a_1$ = (-1/2) -(-3)
⇒ (-1/2) + 3 = 5/2,
a_n = a+(n−1)d,
a_{11} = -3+(11-1)(5/2),
a_{11} = -3+(10)(5/2)
a_{11} = -3+25, a_{11} = 22

Q6. The missing terms in AP: __, 13, __, 3 are:
(a) 11 and 9   **(b)** 17 and 9   **(c)** 18 and 8   **(d)** 18 and 9

Answer: (**c**)

Explanation: a_2 = 13 and a_4 = 3,
a_n = a+(n−1) d, a_2 = a +(2-1)d
13 = a+d ……………… (i),
a_4 = a+(4-1)d, 3 = a+3d ………….. (ii)

Subtracting equation (i) from (ii), we get, – 10 = 2d, d = – 5
Now put value of d in equation 1, 13 = a+(-5), a = 18 (first term),
a_3 = 18+(3-1)(-5)
= 18+2(-5) = 18-10 = 8 (third term).

Q7. Which term of the A.P. 3, 8, 13, 18, … is 78?
(a) 12th **(b)** 13th **(c)** 15th **(d)** 16th

Answer: (**d**) 16th

Explanation: Given, 3, 8, 13, 18, … is the AP.
First term, a = 3
Common difference, d = $a_2 - a_1$ = 8 − 3 = 5
Let the nth term of given A.P. be 78.
Now as we know, a_n = a+(n−1)d, 78 = 3+(n −1)5, 75 = (n−1)5, (n−1) = 15, n = 16

Q8. The 21st term of AP whose first two terms are -3 and 4 is:
(a) 17   **(b)** 137   **(c)** 143   **(d)** -143

Answer: (**b**) 137

Explanation: First term = -3 and second term = 4,
a = -3, d = 4-a = 4-(-3) = 7,
a_{21}=a+(21-1)d,
=-3+(20)7
=-3+140
=137

Q9. If 17th term of an A.P. exceeds its 10th term by 7. The common difference is:
(a) 1   **(b)** 2   **(c)** 3   **(d)** 4

Answer: (**a**) 1

Explanation: Nth term in AP is: a_n = a+(n-1)d,

$a_{17} = a + (17-1)d$
$a_{17} = a + 16d,$
In the same way, $a10 = a+9d,$
Given, $a17 - a10 = 7,$
Therefore, $(a+16d) - (a+9d) = 7,\ 7d = 7,\ d = 1$

Q10. The number of multiples of 4 between 10 and 250 is:
   (a) 50   **(b)** 40   **(c)** 60   **(d)** 30

   Answer: (c) 60

   Explanation: The multiples of 4 after 10 are:12, 16, 20, 24, …
   So here, a = 12 and d = 4

   Now, 250/4 gives remainder 2.

   Hence, 250 – 2 = 248 is divisible by 2.12, 16, 20, 24, …, 248
   So, nth term, $a_n = 248$

   As we know, $a_n = a+(n-1)d$
   $248 = 12+(n-1)\times4$
   $236/4 = n-1$
   $59 = n-1$
   $n = 60$

Q11. 20th term from the last term of the A.P. 3, 8, 13, …, 253 is:
   (a) 147   **(b)** 151   **(c)** 154   **(d)** 158

   Answer: (d) 158

   Explanation: Given, A.P. is 3, 8, 13, …, 253
   Common difference, d= 5.

   In reverse order,253, 248, 243, …, 13, 8, 5
   So, a = 253, d = 248 − 253 = −5, n = 20
   By nth term formula, $a_{20} = a+(20-1)d$, $a_{20} = 253+(19)(-5)$, $a_{20} = 253-95$, $a_{20} = 158$

Q12. The sum of the first five multiples of 3 is:
   (a) 45   **(b)** 55   **(c)** 65   **(d)** 75

   Answer: (a) 45

   Explanation: The first five multiples of 3 is 3, 6, 9, 12 and 15
   a=3 and d=3, n=5
   Sum, $S_n = n/2[2a + (n-1)d]$
   $S_5 = 5/2[2(3) + (5-1)3]$
   $=5/2[6+12] = 5/2[18]$
   $=5 \times 9 = 45$

Q13. The 10th term of the AP: 5, 8, 11, 14, … is
   (a) 32   **(b)** 35   **(c)** 38   **(d)** 185

Answer: (a) 32

Explanation: Given AP: 5, 8, 11, 14
$a = 5$, $d = 8 - 5 = 3$

$a_n = a + (n - 1)d$

Now, 10th term $= a_{10} = a + (10 - 1)d$
$= 5 + 9(3)$
$= 5 + 27$
$= 32$

Q14. In an AP, if $d = -4$, $n = 7$, $a_n = 4$, then a is
   (a) 6   **(b)** 7   **(c)** 20   **(d)** 28

Answer: (d) 28

Solution: Given, $d = -4$, $n = 7$, $a_n = 4$,
We know that, $a_n = a + (n - 1)d$,
$4 = a + (7 - 1)(-4)$,
$4 = a + 6(-4)$,
$4 = a - 24$
$\Rightarrow a = 4 + 24 = 28$

Q15. The list of numbers $-10, -6, -2, 2,\ldots$ is
   (a) an AP with $d = -16$ **(b)** an AP with $d = 4$
   (c) an AP with $d = -4$ **(d)** none

Answer: (b) an AP with $d = 4$

Explanation: $-10, -6, -2, 2,\ldots,$
Let $a_1 = -10$, $a_2 = -6$, $a_3 = -3$, $a_4 = 2$,
$a_2 - a_1 = -6 - (-10) = 4$
$a_3 - a_2 = -2 - (-6) = 4$
$a_4 - a_3 = 2 - (-2) = 4$

Q16. If the 2nd term of an AP is 13 and the 5th term is 25, then its 7th term is
   (a) 30   **(b)** 33   **(c)** 37   **(d)** 38

Answer: (b) 33

Explanation: Given $a_2 = 13$, $a + d = 13$, $a = 13 - d\ldots.$(i)
$a_5 = 25$, $a + 4d = 25\ldots.$(ii)

Substituting **(i)** in (ii),
$13 - d + 4d = 25$, $3d = 12$, $d = 4$

So, $a = 13 - 4 = 9$,
$a_7 = a + 6d = 9 + 6(4) = 9 + 24 = 33$

Q17. Which term of the AP: 21, 42, 63, 84,… is 210?
   (a) 9th   **(b)** 10th **(c)** 11th **(d)** 12th

Answer: (b) 10th

Explanation: Given AP:21, 42, 63, 84,…
$a = 21$, $d = 42 – 21 = 21$, $a_n = 210$
$a + (n – 1)d = 210$
$21 + (n – 1)(21) = 210$
$21 + 21n – 21 = 210$
$21n = 210$
$n = 10$

Q18. What is the common difference of an AP in which $a_{18} – a_{14} = 32$?
(a) 8   **(b)** -8   **(c)** -4   **(d)** 4

Answer: (a) 8

Explanation: -Given, $a_{18} – a_{14} = 32$,
We know that, $a_n = a + (n – 1)d$
So, $a + 17d – (a + 13d) = 32$,
$17d – 13d = 32$, $4d = 32$, $d = 8$

Q19. The famous mathematician associated with finding the sum of the first 100 natural numbers is
(a) Pythagoras   **(b)** Newton   **(c)** Gauss   **(d)** Euclid

Answer: (c) Gauss

Explanation: -The famous mathematician associated with finding the sum of the first 100 natural numbers is Gauss.

Q20. The sum of first 16 terms of the AP: 10, 6, 2,… is
(a) –320   **(b)** 320   **(c)** –352   **(d)** –400

Answer: (a) -320

Explanation: -Given AP: 10, 6, 2,…
Here, $a = 10$, $d = -4$,
Sum of first n terms $= S_n = (n/2)[2a + (n – 1)d]$
The sum of first 16 terms $= S_{16} = (16/2)[2(10) + (16 – 1)(-4)]$
$= 8[20 + 15(-4)]$
$= 8(20 – 60)$
$= 8(-40) = -320$

Assertion and Reasoning Question

Directions:
(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) If Assertion is correct but Reason is incorrect.
(d) If Assertion is incorrect but Reason is correct.

Q21. Assertion: Let the positive numbers a, b, c be in A.P., then 1/bc, 1/ac, 1/ab are also in A.P.
Reason: If each term of an A.P. is divided by abc, then the resulting sequence is also in A.P.

Answer: (**a**)

Q22. Assertion (A): If S_n is the sum of the first n terms of an A.P., then its nth term an is given by $a_n = S_n - S_{n-1}$
Reason (R): The 10th term of the A.P. 5, 8, 11, 14, ………………. is 35.

Answer (**c**)

Q23. Assertion (A): The sum of the series with the nth term, $t_n = (9 - 5n)$ is (465), when no. of terms n = 15.
Reason (R): Given series is in A.P. and sum of n terms of an A.P. is

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

Answer (**d**)

Case Based Questions

CASE STUDY 1:
Q24. India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.

Based on the above information, answer the following questions:
1. Find the production during first year.
2. Find the production during 8th year.
3. Find the production during first 3 years.
4. In which year, the production is Rs 29,200.
5. Find the difference of the production during 7th year and 4th year.

Answer:
1. Rs 5000
2. Production during 8th year is (a+7**d)** = 5000 + 2(2200) = 20400
3. Production during first 3 year = 5000 + 7200 + 9400 = 21600
4. N = 12
5. Difference = 18200 - 11600 = 6600

CASE STUDY 2:
Q25. Your friend Veer wants to participate in a 200m race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to do in 31 seconds.

1. Which of the following terms are in AP for the given situation
a) 51,53,55….   **b)** 51, 49, 47….   **c)** -51, -53, -55….   **d)** 51, 55, 59…

Answer: b) 51, 49, 47….

2. What is the minimum number of days he needs to practice till his goal is achieved
a) 10   **b)** 12   **c)** 11   **d)** 9

Answer: c) 11

3. Which of the following term is not in the AP of the above given situation
a) 41   **b)** 30   **c)** 37   **d)** 39

Answer: b) 30

4. If nth term of an AP is given by $a_n = 2n + 3$ then common difference of an AP is
a) 2   **b)** 3   **c)** 5   **d)** 1

Answer: a) 2

5. The value of x, for which $2x$, $x+ 10$, $3x + 2$ are three consecutive terms of an AP
a) 6   **b)** -6   **c)** 18   **d)** -18

Answer: a) 6

CHAPTER-6: TRIANGLES

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. If in triangle ABC and DEF, *AB/ED = BC/DF,* then they will be similar when
(a) ∠B = ∠E   (b) ∠A = ∠D   (c) ∠B = ∠D   (d) ∠A = ∠F

Q2. In ΔABC, DE ∥ BC and AD = 4 cm, AB = 9cm. AC = 13.5 cm, then the value of EC is
(a) 6 cm   (b) 7.5 cm   (c) 9 cm   (d) none of these

Q3. In the below figure, DE ∥ BC then the value of AD is
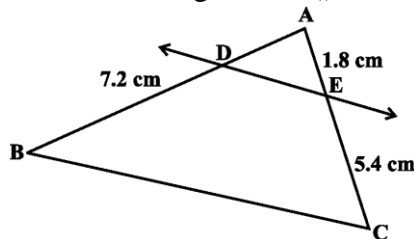
(a) 2 cm   (b) 2.4 cm   (c) 3 cm   (d) none of the above

Q4. D and E are points on the sides AB and AC respectively of a ΔABC such that DE ∥ BC. Find the value of x when AD = x cm, DB = (x − 2) cm, AE = (x + 2) cm and EC = (x − 1) cm.
(a) 2 cm   (b) 3 cm   (c) 4 cm   (d) none of the above

Q5. D and E are points on the sides AB and AC respectively of a ΔABC such that DE ∥ BC. Find the value of x when AD = 4 cm, DB = (x − 4) cm, AE = 8 cm and EC = (3x − 19) cm.
(a) 12 cm   (b) 13 cm   (c) 14 cm   (d) none of the above

Q6. D and E are points on the sides AB and AC respectively of a ΔABC such that DE ∥ BC. Find the value of x when AD = (7x − 4) cm, AE = (5x − 2) cm, DB = (3x + 4) cm and EC = 3x cm.
(a) 4 cm   (b) $\frac{1}{3}$ cm   (c) both (a) and (b)   (d) none of the above

Q7. In the below figure, ABCD is a trapezium in which CD ∥ AB and its diagonals intersect at O. If AO = (2x + 1) cm, OC = (5x − 7) cm, DO = (7x − 5) cm and OB = (7x + 1) cm, find the value of x.
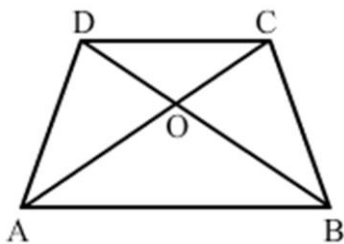
(a) 2 cm   (b) 3 cm   (c) 4 cm   (d) none of the above

Q8. ΔABC is such that AB = 3 cm, BC = 2 cm and CA = 2.5 cm. If ΔDEF ∼ ΔABC and FE = 4 cm, then find the perimeter of ΔDEF.
(a) 12 cm   (b) 13 cm   (c) 14 cm   (d) 15 cm

Q9. A street light bulb is fixed on a pole 6 m above the level of the street. If a woman of height 1.5 m casts a shadow of 3 m, find how far she is away from the base of the pole.
(a) 12 cm   (b) 10 cm   (c) 9 cm   (d) 11 cm

Q10. A 15 metres high tower casts a shadow 24 meters long at a certain time and at the same lime, a telephone pole casts a shadow 16 meters long. Find the height of the telephone pole.
(a) 12 cm   (b) 10 cm   (c) 9 cm   (d) 11 cm

Q11. ABCD is a trapezium in which AB II DC and P and Q are points on AD and BC, respectively such that PQ ∥ DC. If PD = 18 cm, BQ = 35 cm and QC = 15 cm, find AD.
(a) 20 cm   (b) 40 cm   (c) 60 cm   (d) 80 cm

Q12. If ΔABC ∼ ΔDEF, AB = 4 cm, DE = 6 cm. EF = 9 cm and FD =12 cm, find the perimeter of ΔABC.
(a) 12 cm   (b) 14 cm   (c) 16 cm   (d) 18 cm

Q13. In the below figure, if ∠ADE = ∠B, AD = 3.8 cm, AE = 3.6 cm, BE = 2.1 cm and BC = 4.2 cm, find DE.
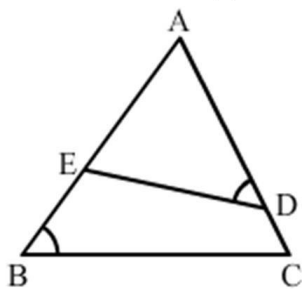
(a) 2 cm   (b) 2.5 cm   (c) 2.8 cm   (d) 3 cm

Q14. The perimeters of two similar triangles ABC and PQR are 32 cm and 24 cm respectively. If PQ = 12 cm. find AB.
(a) 12 cm   (b) 14 cm   (c) 16 cm   (d) 18 cm

Q15. In the given figure, ∠CAB = 90°, AD ⊥ BC, AC = 75 cm, AB = 1 m and BC = 1.25 m, find AD.
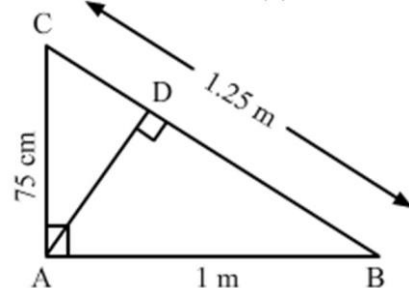
(a) 20 cm   (b) 40 cm   (c) 60 cm   (d) 80 cm

Q16. A vertical stick of length 7.5 m casts a shadow 5 m long on the ground and at the same time a tower casts a shadow 24 m long. Find the height of the tower.
(a) 20 m   (b) 40 m   (c) 60 m   (d) none of these

Q17. ΔABC ~ ΔDEF and the perimeters of ΔABC and ΔDEF are 30 cm and 18 cm respectively. If BC = 9 cm, then EF = ?
(a) 6.3 cm   (b) 5.4 cm   (c) 7.2 cm   (d) 4.5 cm

Q18. A vertical pole 6 m long casts a shadow of length 3.6 m on the ground. What is the height of a tower which casts a shadow of length 18 m at the same time?
(a) 10.8 m   (b) 28.8 m   (c) 32.4 m   (d) 30 m

Q19. The shadow of a 5-m-long stick is 2 m long. At the same time the length of the shadow of a 12.5 m high tree (in m) is
(a) 3.0   (b) 3.5   (c) 4.5   (d) 5.0

Q20. If ΔABC and ΔDEF are similar triangles such that ∠A = 57° and ∠E = 83°. Find ∠C.
(a) 33º   (b) 30º   (c) 40º   (d) 83º

Q21. Two poles of height a and b (b > **a**) are c metres apart. The height h (in metres) of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is
(a) ab   (b) ab + 2ab   (c) $\frac{ab}{a+b}$ (d) None of these

Q22. If in two triangles ABC and PQR, *AB/QR = BC/PR = CA/PQ*, then
(a) ΔPQR ~ ΔCAB   (b) ΔPQR ~ ΔABC   (c) ΔCBA ~ ΔPQR   (d) ΔBCA ~ΔPQR

Q23. In ΔABC, DE ∥ AB. If AB = a, DE = x, BE = b and EC = c. Express x in terms of a, b and c.
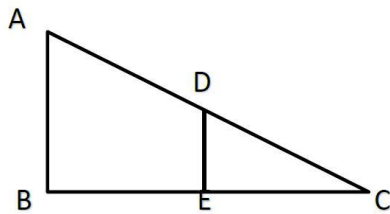
(a) $\frac{ac}{b}$ (b) $\frac{ac}{b+c}$ (c) $\frac{ab}{c}$ (d) $\frac{ab}{b+c}$

Q24. In the given figure, M is mid-point of side CD of a parallelogram ABCD. The line BM is drawn intersecting AC at L and AD produced at E. Then EL =
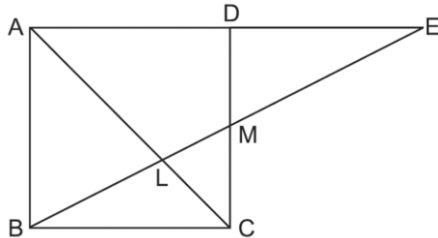
(a) BL   (b) ½ BL   (c) 2BL   (d) None of these

Q25. Right angled triangles BAC and BDC are right angled at A and D and they are on same side of BC. If AC and BD intersect at P, then AP × PC equals
(a) PB × DP   (b) BD × DP   (c) AP × DP   (d) None of these

ASSERTION AND REASONING TYPE QUESTIONS

DIRECTION: In the following questions 26 to 30, a statement of Assertion (**A**) is followed by a statement of reason (R).
Mark the correct choice as:
(**a**) Both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(**b**) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(**c**) Assertion (A) is true but reason (R) is false.
(**d**) Assertion (A) is false but reason (R) is true.

Q26. Assertion (A): D and E are points on the sides AB and AC respectively of a ∆ABC such that DE ‖ BC then the value of x is 4, when AD = x cm, DB = (x – 2) cm, AE = (x + 2) cm and EC = (x – 1) cm.
Reason (R): If a line is parallel to one side of a triangle then it divides the other two sides in the same ratio.

Q27. Assertion (A): D and E are points on the sides AB and AC respectively of a ∆ABC such that AB = 10.8cm, AD = 6.3cm, AC = 9.6cm and EC = 4cm then DE is parallel to BC.
Reason (R): If a line is parallel to one side of a triangle then it divides the other two sides in the same ratio.

Q28. Assertion (A): If a line intersects sides AB and AC of a ∆ ABC at D and E respectively and is parallel to BC, then $AD/AB = AE/AC$.
Reason (R): If a line is parallel to one side of a triangle then it divides the other two sides in the same ratio.

Q29. Assertion (A): In the given figures, ∆ABC ~ ∆GIH.
**Reason (R):** If the corresponding sides of two triangles are proportional, then they are similar.
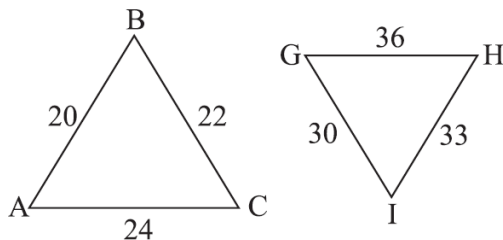
Q30. Assertion (A): D and E are points on the sides AB and AC respectively of a ∆ABC such that DE ‖ BC then the value of x is 11, when AD = 4cm, DB = (x – 4) cm, AE = 8cm and EC = (3x – 19) cm.
Reason (R): If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

Case Based Questions

Q31. Rahul is studying in X Standard. He is making a kite to fly it on a Sunday. Few questions came to his mind while making the kite. Give answers to his questions by looking at the figure.
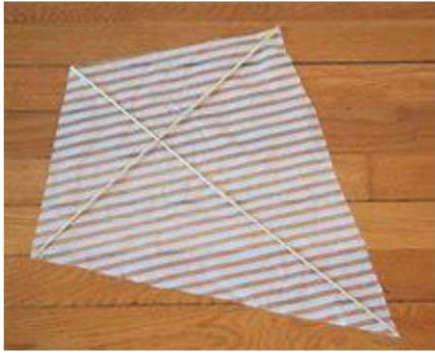
(i) Rahul tied the sticks at what angles to each other?
(a) 30°　　　　**(b)** 60°　　　　**(c)** 90°　　　　**(d)** 70°

(ii) Which is the correct similarity criteria applicable for smaller triangles at the upper part of this kite?
(a) RHS　　　　**(b)** SAS　　　　**(c)** SSA　　　　**(d)** AAS

(iii) Sides of two similar triangles are in the ratio 4:9. Corresponding medians of these triangles are in the ratio,
(a) 2:3　　　　**(b)** 4:9　　　　**(c)** 81:16　　　　**(d)** 16:81

(iv) In a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle. This theorem is called as,
(a) Pythagoras theorem　　　　　　　　**(b)** Thales theorem
(c) Converse of Thales theorem　　　　　　**(d)** Converse of Pythagoras theorem

(v) What is the area of the kite, formed by two perpendicular sticks of length 6 cm and 8 cm?
(a) 48 cm^2　　　　**(b)** 14 cm^2　　　　**(c)** 24 cm^2　　　　**(d)** 96 cm^2

Q32. Points A and B are on the opposite edges of a pond as shown in below figure. To find the distance between the two points, Ram makes a right-angled triangle using rope connecting B with another point C at a distance of 12 m, connecting C to point D at a distance of 40 m from point C and then connecting D to the point A which is at a distance of 30 m from D such that $\angle ADC = 90^0$.
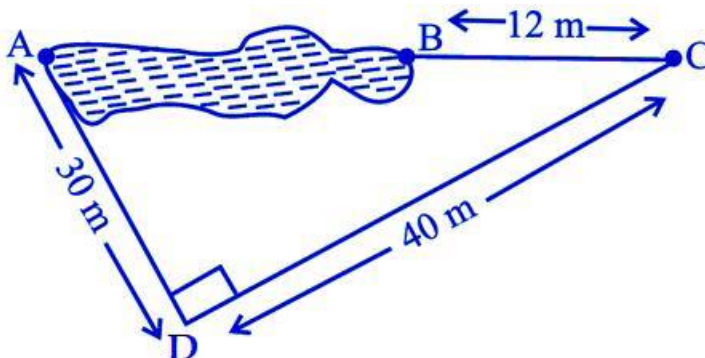

(i) Which property of geometry will be used to find the distance AC?
(a) Similarity of Triangles　　　　**(b)** Thales Theorem
(c) Pythagoras Theorem　　　　　**(d)** Quadratic Equation

(ii) What is the distance AC?
(a) 50 m　　　　**(b)** 12 m　　　　**(c)** 100 m　　　　**(d)** 70 m

(iii) Which is the following does not form a Pythagoras triplet?
(a) (7, 24, 25)   **(b)** (15, 8, 17)   **(c)** (5, 12, 13)   **(d)** (21, 20, 28)

(iv) Find the length AB.
(a) 12 m   **(b)** 38 m   **(c)** 50 m   **(d)** none of these

(v) Find the length of the rope used.
(a) 120 m   **(b)** 70 m   **(c)** 82 m   **(d)** none of these

Q33. On one day, a poor girl of height 90 cm is looking for a lamp-post for completing her homework as in her area power is not there and she finds the same at some distance away from her home. After completing the homework, she is walking away from the base of a lamp-post at a speed of 1.2 m/s. The lamp is 3.6 m above the ground (see below figure).
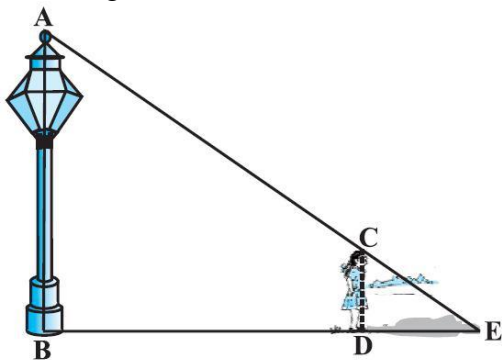
(i) Find her distance from the base of the lamp post.
(a) 1.2 m   **(b)** 3.6 m   **(c)** 4.8 m   **(d)** none of these

(ii) Find the correct similarity criteria applicable for triangles ABE and CDE.
(a) AA   **(b)** SAS   **(c)** SSS   **(d)** AAS

(iii) Find the length of her shadow after 4 seconds.
(a) 1.2 m   **(b)** 3.6 m   **(c)** 4.8 m   **(d)** none of these

(iv) Areas of two similar triangles are in the ratio 9:16. Find the ratio of Corresponding sides of these triangles.
(a) 9:16   **(b)** 3:4   **(c)** 81:256   **(d)** 18:32

(v) Find the ratio AC:CE.
(a) 1: 3   **(b)** 3 : 1   **(c)** 1 : 4   **(d)** 4 : 1

Q34. Anjali places a mirror on level ground to determine the height of a tree (see the diagram). She stands at a certain distance so that she can see the top of the tree reflected from the mirror. Anjali's eye level is 2 m above the ground. The distance of Anjali and the tree from the mirror are 1.4 m and 2.8 m respectively.
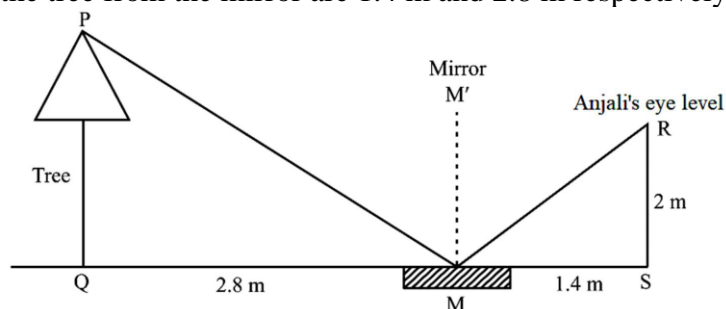
(i) What are the two Δs formed in the above diagram, which are used to calculate the height of the tree?
(a) Δs QMM' and PQM   **(b)** Δs PQM and RSM
(c) Δs RM'M and MRS   **(d)** Δs PM'M and RM'M

(ii) State the criterion of similarity, that will be used in the above found triangles.
(a) RHS   **(b)** SSS   **(c)** SAS   **(d)** AA

(iii) What is the height of the tree?
(a) 4 m   **(b)** 5 cm   **(c)** 6 m   **(d)** 7 cm

(iv) If we want to calculate the distance of the mirror from the top of the tree, then which property will be used?
(a) Thales theorem   **(b)** Converse of Thales theorem
(c) Pythagoras theorem   **(d)** Converse of Pythagoras theorem

(v) What is the distance between Rashmi and Gulmohar tree?
(a) 3.2 m   **(b)** 5.2 m   **(c)** 4.2 m   **(d)** 2.2 m

Q35. In one of the residential colony of city, there is a triangular park ABC available. The Resident Welfare Association of the colony wishes to divide this park into two parts of equal areas. One for planting trees and raising a lawn and the other for providing place for children park for playing activities. One of the members Ram suggested to draw a line segment XY || BC for the same.
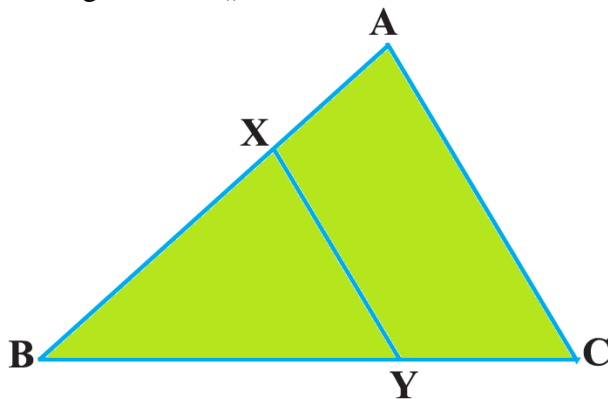
(i) Which is the correct similarity criteria is used for above triangles ABC and XBY?
(a) SSS   **(b)** AAA   **(c)** RHS   **(d)** ASA

(ii) What is the ratio of areas of ΔABC : Δ XBY?
(a) 1 : 2   **(b)** 2 : 1   **(c)** 1 : 4   **(d)** 1 : √2

(iii) If ∠BXY = 60°, then ∠BAC is:
(a) 80°   **(b)** 60°   **(c)** 140°   **(d)** 100°

(iv) If the ratio of areas of ΔBXY : Δ ABC is 1 : 2, then XB : AB is:
(a) 1 : 2   **(b)** 1 : 4   **(c)** 2 : 4   **(d)** 1 : √2

(v) If the area of Δ AXY is 128 m^2, then what will be area of Δ CXY.
(a) 128 m^2 **(b)** 248 m^2 **(c)** 256 m^2 **(d)** 48 m^2

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ANSWER KEY

1. (c) ∠B = ∠D **2. (b)** 7.5 cm **3. (b)** 2.4 cm **4. (c)** 4 cm

5. (d) none of the above **6. (c)** both **(a)** and **(b)** **7. (a)** 2 cm **8. (d)** 15 cm

9. (c) 9 cm **10. (b)** 10 cm **11. (c)** 60 cm **12. (d)** 18 cm

13. (c) 2.8 cm **14. (c)** 16 cm **15. (c)** 60 cm

16. (d) none of these **17. (b)** 5.4 cm **18. (d)** 30 m **19. (d)** 5.0

20. (c) 40º **21. (c)** $\frac{ac}{a+b}$ **22. (a)** ΔPQR ~ ΔCAB

23. (b) $\frac{ac}{b+c}$ **24. (c)** 2BL **25. (a)** PB × DP

26. (a) Both Assertion (**A**) and Reason (R) are true and reason (R) is the correct explanation of

assertion (**A**)

27. (b) Both Assertion (**A**) and Reason (R) are true but reason (R) is not the correct explanation

of assertion (**A**)

28. (a) Both Assertion (**A**) and Reason (R) are true and reason (R) is the correct explanation of

assertion (**A**)

29. (a) Both Assertion (**A**) and Reason (R) are true and reason (R) is the correct explanation of

assertion (**A**)

30. (b) Both Assertion (**A**) and Reason (R) are true but reason (R) is not the correct explanation

of assertion (**A**)

31. (i) (c) 90° **(ii) (b)** SAS **(iii) (b)** 4:9 **(iv) (d)** Converse of Pythagoras theorem **(v) (c)** 24 cm^2

32. (i) (c) Pythagoras Theorem **(ii) (a)** 50 m **(iii) (d)** (21, 20, 28) **(iv) (b)** 38 m **(v) (c)** 82 m

33. (i) (c) 4.8 m **(ii) (a)** AA **(iii) (d)** none of these **(iv) (b)** 3:4 **(v) (b)** 3 : 1

34. (i) (b) Δs PQM and RSM **(ii) (d)** AA **(iii) (a)** 4 m **(iv) (c)** Pythagoras theorem **(v) (c)** 4.2 m

35. (i) (b) AAA **(ii) (b)** 2 : 1 **(iii) (b)** 60° **(iv) (d)** 1 : √2 **(v) (a)** 128 m^2
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CHAPTER-7: CO-ORDINATE GEOMETRY

CONCEPT BASED QUESTIONS
### Multiple Choice Questions (MCQ)

Q1. The ratio in which the line $2x + y - 4 = 0$ divides the line segment joining the points A (2, -2) and B (3, 7) is
(a) 2:9   (b) 1:9   (c) 1:2   (d) 2:3

Q2. If the mid-point of the line segment joining the points A (3, 4) and B (a, 4) is P (x, y) passes through $x + y - 20 = 0$, then find the value of a.
a) 0   (b) 1   (c) 40   (d) 29

Q3. The point on Y-axis which is equidistant from the points (5, -2) and (-3, 2) is
(a) 1   (b) -1   (c) 2   (d) – 2

Q4. The distance of the point S (3, 4) from origin is
a) 5   (b) 4   (c) 3   (d) 1

Q5. The ratio in which the point joining X (6, 5) and Y (4, -3) is divided by the line $y = 2$
(a) 2:1   (b) 3:5   (c) 1:5   (d) 2:3

Q6. The radius of the circle whose end points of diameter are (24, 1) and (2, 23) is
(a) $2\sqrt{11}$ (b) $11\sqrt{2}$ (c) $33\sqrt{2}$ (d) $22\sqrt{2}$

Q7. The co-ordinates of the point A, where AB is the diameter of the circle whose center is (2, 3) and B (1, 4) are
(a) (- 2, 3)   (b) (3, -10)   (c) (-10, 3)   (d) (3, 2)

Q8. The distance between A (-5, 7) and B(1, 3) is
(a) $\sqrt{25}$ (b) $\sqrt{57}$ (c) $\sqrt{13}$ (d) $\sqrt{52}$

Q9. The co-ordinates of a point on the X-axis are of
(a) (x, 0)   (b) (0, x)   (c) (0, 0)   (d) None of these

Q10. The relation between x and y such that the point (x, y) is equidistant from the point (1, 5) and (-2, 3) is
(a) $x - y = 7$ (b) $6x + 4y = 13$ (c) $2x + y = 13$ (d) $x - 2y = 7$

Case Based Questions

Case Study 1:

Case: - Malini and Vahini are friends living at the same streets in Hyderabad. Vahini's house is at the intersection of one street with another street on which there is a Park. They both study in the same school and that is not far from Vahini's house. Suppose the school

is situated at the point 'O', i.e. the origin, Malini's house is at A, Vahini's house is at B and the park is at C.
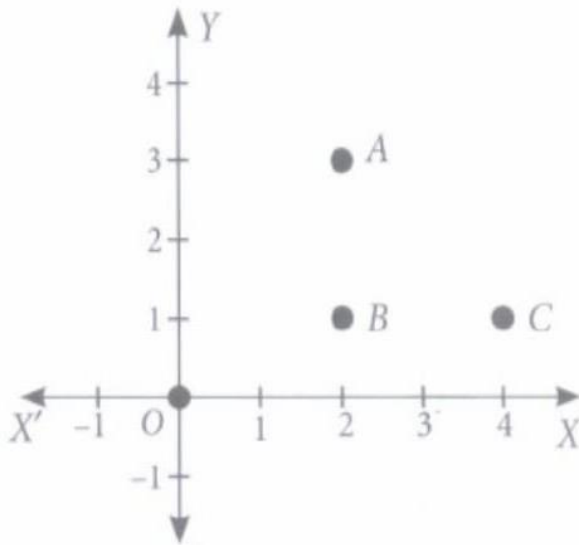
Based on the above given information, answer the following questions.

Q11. How far is Malini's house is from Vahini's house?

    a) 2 units   **(b)** 3 units   **(c)** 4 units   **(d)** 5 units

Q12. How far is park from Vahini's house?

    a) 5 units   **(b)** 4 units   **(c)** 3 units   **(d)** 2 units

Q13. How far is park from Malini's house?

    a) 2 units   **(b)** 3 units   **(c)** 4 units   **(d)** None of these

Q14. Which of the following is true?

    (a) ABC   form a scalene triangle   **(b)** ABC   form an isosceles triangle
    (c) ABC   form an equilateral triangle   **(d)** None of these

Q15. How far is Malini's house from school than Vahini's house?

    (a) $\sqrt{5}$ units   **(b)** $\sqrt{13}$ units   **(c)** $\sqrt{13}$ - $\sqrt{5}$ units   **(d)** $\sqrt{13}$ + $\sqrt{5}$ units

Assertion and Reasoning Question

In the following questions, a statement of Assertion (A) is followed by a statement of reason (R).
Mark the correct choice as: -
(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q16. Assertion (A): - Mid-point of a line segment divides the line in the ratio 1:1
    Reason (R): - The distance between the points (a, b) and (c, d) is given by
$\sqrt{(c-a)^2 + (d-b)^2}$

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q17. Assertion (A): - The co-ordinates of the points which divide the line segment joining A (2, 8) and B (-3, -7) into three equal parts are $(\frac{-4}{3}, \frac{-22}{3})$.

Reason (R): - The points which divide AB in the ratio 1:3 and 3:1 are called points to trisection of AB.

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q18. Assertion (A): - The co-ordinate of a point A on Y-axis is 5 and B has coordinates (-3, 1)
then the length AB is 5 units.
Reason (R): - The point A (2, 7) lies on the perpendicular bisector of line segment joining the points P (6, 5) and Q (0, -4).

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q19. Assertion (A): - The co-ordinates of the point which divide the join of A (-3, 5) and B (2, 3) in the ratio 5:2 is $(\frac{4}{7}, \frac{25}{7})$

Reason (R): - The co-ordinates of the point S (x, y) which divides the line segment joining the points P (x_1, y_1) and Q (x_2, y_2) in the ratio m_1:m_2 is $(\frac{m1x2 + m2x1}{m1 + m2}, \frac{m1y2 + m2y1}{m1 + m2})$.

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q20. Assertion (A): -The point (0, 2) lies on Y-axis
Reason (R): -The X-coordinate of the point on Y-axis is zero.

(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

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ANSWER KEY
1.A   2.D   3.D   4.A   5.B   6.C   7.D   8.D   9.A   10.B   11.A   12.D
13.D   14.B   15.C   16.A   17.C   18.C   19.A   20.A
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CHAPTER-8: INTRODUCTION TO TRIGONOMETRY

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. If $2\sin 2\theta = \sqrt{3}$ $then$ $\theta =$ --------
   a) 45^0 **b)** 90^0 **c)** 60^0 **d)** 30^0

Q2. In a triangle $ABC, \angle C = 90^0$ and $\angle B = 45^0$, state which of the following is true?
   a) Perpendicular = Hypotenuse   **b)** Base = Hypotenuse
   c) Base = Hypotenuse + perpendicular   **d)** Base =Perpendicular

Q3. If Sin A = $\frac{1}{2}$, then the value of Cot A is_____
   a) $\sqrt{3}$ **b)** $\frac{\sqrt{3}}{2}$ **c)** $\frac{1}{\sqrt{3}}$ **d)** 1

Q4. Find the value of $\sin^2 30^O + 4\cot^2 45^o - \sec^2 60^o$
   a) ½   **b)** ¼   **c)** 1   **d)** 0

Q5. $\frac{1-\tan^2\theta}{1+\tan^2\theta} =$ _____
   a) $\sin 2\theta$ **b)** $\tan 2\theta$ **c)** $\cos 2\theta$ **d)** $\cot 2\theta$

Q6. The value of $(1 + \tan^2 A)(1-SinA)(1 + SinA) =$_____
   a) $\sqrt{2}$ **b)** 1   **c)** 2   **d)** 0

Q7. $(\text{Sec }\theta + \text{Cos }\theta)(\text{Sec }\theta - \text{Cos }\theta) =$ _____
   a) $\tan^2\theta + \cos^2\theta$ **b)** $\tan^2\theta - \cos^2\theta$ **c)** $\tan^2\theta + \sin^2\theta$ **d)** $\tan^2\theta - \sin^2\theta$

Q8. $(\text{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta)$ is equal to
   a) 1   **b)** 0   **c)** -1   **d)** none of these

Q9. In a ΔABC, if $sin (A+B) = sin C$ then the value of $\angle C$ is
   a) 45^0 **b)** 90^0 **c)** 60^0 **d)** 30^0

Q10. The value of $\text{cosec}^4 A - 2\text{cosec}^2 A + 1$ is
   a) $\tan^4 A$ **b)** $\sec^4 A$ **c)** $\text{cosec}^4 A$ **d)** $\cot^4 A$

Q11. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then $a^2 + b^2 =$ -----------
   a) $m^2 - n^2$ **b)** $m^2 + n^2$ **c)** $n^2 - m^2$ **d)** $m^2 n^2$

Q12. If $\sin A + \sin^2 A = 1$, then the value of the expression $(\cos^2 A + \cos^4 A)$ is
   a) 1/2   **b)** 1   **c)** 3   **d)** 2

Q13. $8\cot^2 A - 8\text{cosec}^2 A$ is equal to _____
   a) -8 **b)** 8   **c)** 1   **d)** 0

Q14. $\sqrt{(1 - cos^2\theta)sec^2\theta}$ =_____
  a) $\tan\theta$ **b)** $\cot\theta$ **c)** $\sin\theta$ **d)** $\cos\theta$

Q15. $Sec^4A - sec^2A$ is equal to _____
  a) $\tan^2A - \tan^4A$ **b)** $\tan^4A - \tan^2A$ **c)** $\tan^2A + \tan^4A$ **d)** none of these

Q16. If Sin 5A = 1 the Cos5A = _____
  a) 1   **b)** 0   **c)** undefined   **d)** none of these

Q17. If secA + tanA = p then the value of secA - tan A
  a) p   **b)** 1/p   **c)** p^2 **d)** -p

Assertion and Reasoning Question

In the following questions, a statement of Assertion (**A**) is followed by a statement of reason (R).
Mark the correct choice as: -
(**a**) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(**b**) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(**c**) Assertion (A) is true but reason (R) is false.
(**d**) Assertion (A) is false but reason (R) is true.

Q18. Assertion (A): In $\triangle ABC$, if $\angle B = 90^O$, then $\sin(A + C) = 1$

    Reason (R): Angle sum property of Δ, $90^O + \angle A + \angle C = 180^O \Rightarrow \angle A + \angle C = 90^O$

    (**a**) Both A and R are true and R is the correct explanation of A.
    (**b**) Both A and R are true but R is not the correct explanation of A.
    (**c**) A is true but R is false.
    (**d**) A is false but R is true

Q19. Assertion (A): If $\sin\theta = \cos\theta$ then $\tan\theta = 1$
    Reason (R): We know that $\tan\theta = \frac{sin\theta}{cos\theta}$, so $\tan\theta = 1$, as $\sin\theta = \cos\theta$

    (**a**) Both A and R are true and R is the correct explanation of A.
    (**b**) Both A and R are true but R is not the correct explanation of A.
    (**c**) A is true but R is false.
    (**d**) A is false but R is true

Q20. Assertion (A): $\sin\theta \times \text{cosec}\theta = \cot\theta$
    Reason (R): $\sin\theta$ is reciprocal of $\text{cosec}\theta$

    (**a**) Both A and R are true and R is the correct explanation of A.
    (**b**) Both A and R are true but R is not the correct explanation of A.
    (**c**) A is true but R is false.
    (**d**) A is false but R is true

Q21. Assertion (A): $\sin^2\theta = 1 - \cos^2\theta$ for any value of θ.
    Reason (R): Value of $\sin\theta$ is always more than 1.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true

Q22. Assertion (A): $\sec^2\theta - \tan\theta = \csc^2\theta - \cot^2\theta$
Reason (R): As $1 + \tan^2\theta = \sec^2\theta$ and $1 + \cot^2\theta = \csc^2\theta$

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true

Case Based Questions

Q23. Golf is a game played in an open field where the golfer plays his golf   ball into a hole by using different types of clubs (golf instruments). In golf, a golfer plays a number of holes in a given order.18 holes played in an order controlled by the golf course design, normally makeup a game.

On your approach shotto the ninth green, the Global Positioning System (GPS) your cart is equipped with tells you the pin is 120 meter away.
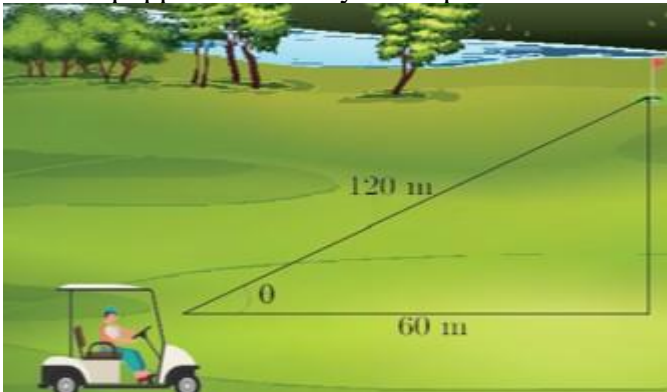
i) The distance plate states the straight line distance to the hole is 60 metre. Relative to a straight line between the plate and the hole, at what acute angle should you hit the shot?
ii) What is the value of the tangent of the above angle?
iii) What is the length of the side opposite to the angle θ in the given picture?
iv)What is the value of tangent of angle A?

Q24. Akshat studies in VIVEKANADA HIGH SCHOOL, Vasant Kunj, Delhi. During summer vacation he went to his native place in a village. His grand father took him to the bank of a nearby river. Akshat was very happy to see the pollution free environment near the river. He was standing on the bank of the river He thought to measure the width of the

river. He found that the angle of elevation of the top of a tree standing on the opposite bank was 60°When he moved 30m away from the river the angle of elevation reduced to 30$^{\text{O}}$


i) What is the height of the tree?

ii) What is the width of the river?

iii) After moving howmuchdistanceawayfromtherivertheangleofelevationbecomes45$^{\text{O}}$.

iv) If the width of the river were 40m then what would be the height of the selected?

Q25. An electrician has to repair an electric fault on the pole of height of 8m. He needs to reach a point 2m below the top of the pole to undertake the repair work.
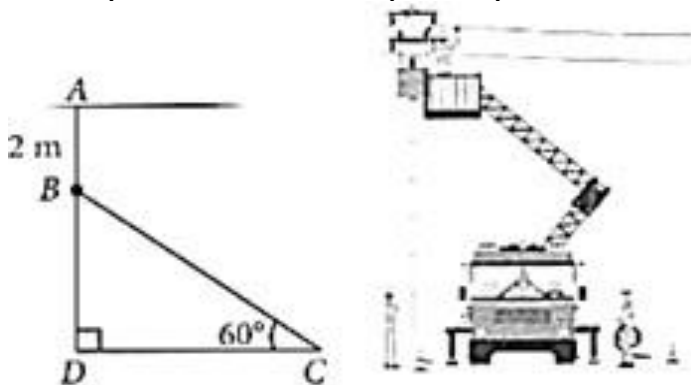
i) Length of BD is:
a) 4 m   **b)** 4 m   **c)** 10 m   **d)** 6 m

ii) What should be the length of ladder, so that it makes an angle of 60° with the ground?
a) 5√3 m   **b)** 2√3 m   **c)** 3√3 m   **d)** 4√3 m

iii) The distance between the foot of ladder and pole is:
a) 4√3 m   **b)** 6√3 m   **c)** 3√3 m   **d)** 2√3 m

iv) What will be the measure of ∠BCD when BD and CD are equal?
a) 60°   **b)**75°   **c)** 30°   **d)** 45°

v) Find the measure of ∠DBC.
a) 30°   **b)** 15°   **c)** 60°   **d)** 45°

Q26.
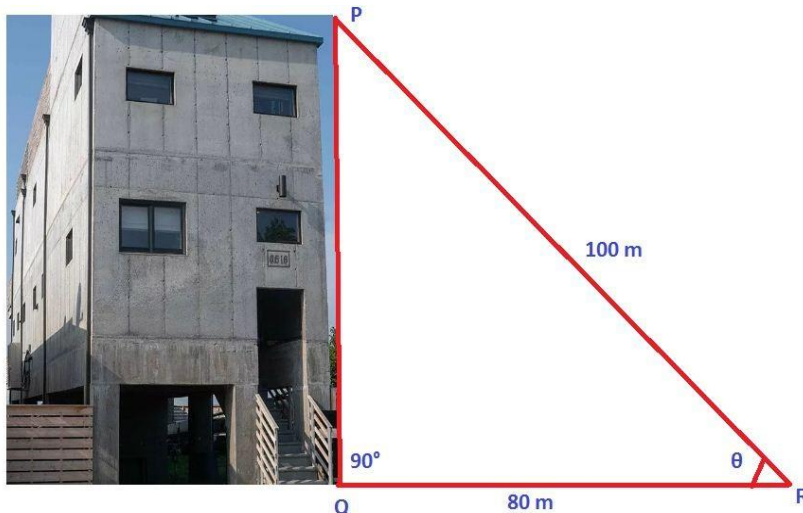
Dinesh is residing in a multi-story house at Karol bagh, Delhi. He is studying in class X. Deepak is the neighbour of Dinesh who is his classmate too. Dinesh wants to measure the height of his house building using trigonometrical functions. PQ is the outer wall of the house. Dinesh is standing at point R which is at a distance of 80 m from the house. Deepak standing at point P on the top of the building throws a rope at Dinesh who is standing at point R. The length of the rope PR was measured to be100m. ∠PRQ was taken to be equal to θ.

Now answer the following questions:

i) What is the height of the house building?
a) 100 m　　　**b)** 80 m　　　**c)** 60 m　　　**d)** 150 m

ii) What is the value of *sin(P+R)*?
a) 1/5　　　**b)** 1　　　**c)** 3/5　　　**d)** 7/5

iii. What should the inclination of the rope if the height of the building is equal to base? Will the length of the rope be same? Explain

3 MARKS QUESTIONS: -

Q27. ABC is a right triangle, right angled at C. If A = 30^0 and AB = 40 units, find the remaining two sides and ∠B

Q28. If *sinA + cosecA = 2*, then find the value of $sin^2A + cosec^2A$.

Q29. If cosA + sinA = $\sqrt{2} \, cosA,$ then find the value of cosA – sinA.

Q30. Prove that $sec^4\theta - sec^2\theta = tan^4\theta + tan^2\theta.$

Q31. In a ΔABC right angled at B, ∠A = ∠C. find the values of
　　i) sinAcosC + cosAsinC
　　ii) sinAsinB + cosAcosB

Q32. Find acute angles A and B, if sin(A + 2**B)** = $\frac{\sqrt{3}}{2}$ and cos(A+ 4**B)** = 0, A>B

Q33. Find an acute angle θ, when $\frac{cos\theta - sin\theta}{cos\theta + sin\theta\theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$

Q34. Simplify: $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$
(Hint: use $a^3 + b^3$ and $a^2 + b^2$ identities)

Q35. If mCosA = n then find the value of tan A.

Q36. Prove that $1 + \dfrac{\cot^2 A}{cosecA+1} = cosecA$

4 MARKS QUESTIONS: -

Q37. If $\sec\theta + \tan\theta = p$, then prove that $\dfrac{p^2-1}{p^2+1} = sin\theta$.

Q38. Prove that $\dfrac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \dfrac{1+sin\theta}{cos\theta}$.

Q39. If $2\sin\theta + 3cos\theta = 2$, then find the value of $3sin\theta - 2cos\theta$.

Q40. If $x = a\sec\theta + b\tan\theta$ and $y = a\tan\theta + b\sec\theta$, then prove that $x^2 - y^2 = a^2 - b^2$.

CHAPTER-9: APPLICATION OF TRIGONOMETRY

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. The angle of elevation of the top of a tower from a point on the ground, which is 20m away from the foot of the tower is 60^0. Find the height of the tower.
(a) $10\sqrt{3}$ m   (b) $30\sqrt{3}$ m   (c) $20\sqrt{3}$ m   (d) none of these

Q2. The height of a tower is 10m. What is the length of its shadow when Sun's altitude is 45^0?
(a) 10 m   (b) 30 m   (c) 20 m   (d) none of these

Q3. The angle of elevation of a ladder leaning against a wall is 60^0 and the foot of the ladder is 9.5 m away from the wall. Find the length of the ladder.
(a) 10 m   (b) 19 m   (c) 20 m   (d) none of these

Q4. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}$: 1, what is the angle of elevation of the Sun?
(a) 30^0 (b) 60^0 (c) 45^0 (d) none of these

Q5. What is the angle of elevation of the Sun when the length of the shadow of a vertical pole is equal to its height?
(a) 30^0 (b) 60^0 (c) 45^0 (d) none of these

Q6. If the angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary, find the height of the tower.
(a) 10 m   (b) 6 m   (c) 8 m   (d) none of these

Q7. The ratio of the length of a rod and its shadow is $1:\sqrt{3}$. The angle of elevation of the sun is
(a) 30^0 (b) 60^0 (c) 45^0 (d) none of these

Q8. A tower is $100\sqrt{3}$ m high. Find the angle of elevation if its top from a point 100 m away from its foot.
(a) 30^0 (b) 60^0 (c) 45^0 (d) none of these

Q9. The string of a kite is 100m long and it makes an angle of 60^0 with the horizontal. Find the height of the kite, assuming that there is no slack in the string.
(a) $100\sqrt{3}$ m   (b) $\dfrac{200}{\sqrt{3}}$ m   (c) $50\sqrt{3}$ m   (d) $\dfrac{100}{\sqrt{3}}$ m

Q10. A circus artist is climbing a 20m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole if the angle made by the rope with the ground level is 30^0.

(a) 10 m   **(b)** 30 m   **(c)** 20 m   **(d)** none of these

Q11. A vertical pole stands on the level ground. From a point on the ground 25m away from the foot of the pole, the angle of elevation of its top is found to be 60^0. Find the height of the pole.

(a) $25\sqrt{3}$ m   **(b)** $\dfrac{25}{\sqrt{3}}$ m   **(c)** $50\sqrt{3}$ m   **(d)** none of these

Q12. The tops of two poles of height 20m and 14m are connected by a wire. If the wire makes an angle of 30^0 with horizontal, then the length of the wire is

(a) 12 m   **(b)** 10 m   **(c)** 8 m   **(d)** 6 m

Q13. If the angles of elevation of a tower from two points distant a and b (a > **b)** from its foot and in the same straight line from it are 30^0 and 60^0, then the height of the tower is

**(a)** $\sqrt{a+b}$ m   **(b)** $\sqrt{a-b}$ m   **(c)** $\sqrt{ab}$ m   **(d)** $\sqrt{\dfrac{a}{b}}$ m

Q14. The angle of elevation of the top of a tree from a point A on the ground is 60^0. On walking 20 m away from its base, to a point B, the angle of elevation changes to 30^0. Find the height of the tree.

(a) $10\sqrt{3}$ m   **(b)** $30\sqrt{3}$ m   **(c)** $20\sqrt{3}$ m   **(d)** none of these

Case Based Questions

Q15. Sanjay is an electrician in a village. One day power was not there in entire village and villagers called Sanjay to repair the fault. After thorough inspection he found an electric fault in one of the electric pole of height 5 m and he has to repair it. He needs to reach a point 1.3m below the top of the pole to undertake the repair work.
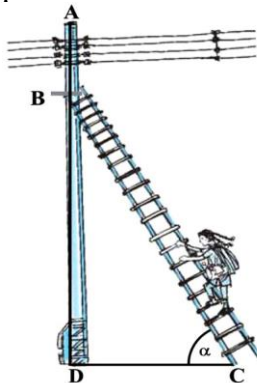
(i) When the ladder is inclined at an angle of α such that 3tan α + 2 = 5 to the horizontal, find the angle α.

(a) 45°   **(b)** 30°   **(c)** 60°   **(d)** none of these

**(ii)** How far from the foot of the pole should he place the foot of the ladder? (Use $\sqrt{3}$ = 1.73)

(a) 2.89 m   **(b)** 2.14 m   **(c)** 3 m   **(d)** none of these

iii) In the above situation if BD = 3 cm and BC = 6 cm. Find α

(a) 45°   **(b)** 30°   **(c)** 60°   **(d)** none of these

Q16. 'Skysails' is that genre of engineering science that uses extensive utilization of wind energy to move a vessel in the sea water. The 'Skysails' technology allows the towing kite to gain a height of anything between 100 metres – 300 metres. The sailing kite is made in such a way that it can be raised to its proper elevation and then brought back with the help of a 'telescopic mast' that enables the kite to be raised properly and effectively. Based on the following figure related to sky sailing, answer the questions:
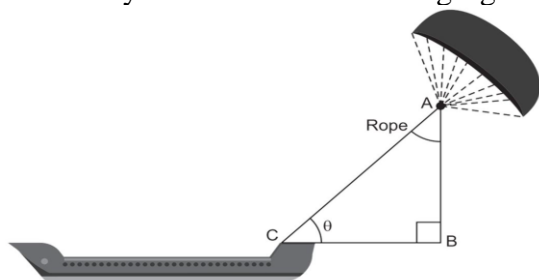
(i) In the given figure, if $3 \tan 2\theta – 3 = 0$, where θ is acute angle, then find the value of θ.
(a) 45°   **(b)** 30°   **(c)** 60°   **(d)** none of these

(ii) What should be the length of the rope of the kite sail in order to pull the ship at the angle (calculated above) and be at a vertical height of 300 m?
(a) 300 m   **(b)** 400 m   **(c)** 500 m   **(d)** 600 m

(iii) What should be the distance BC in order to pull the ship at the angle (calculated above) and be at a vertical height of 300 m?
(a) 300 √3 m   **(b)** 400 √3 m   **(c)** 500 √3 m   **(d)** 600 √3 m

Assertion and Reasoning Question

In the following questions, a statement of Assertion (**A**) is followed by a statement of reason (R).
Mark the correct choice as: -
(a) If both Assertion (A) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q17. Assertion (A): The angle of elevation of an object viewed, is the angle formed by the line of sight with the horizontal when it is above the horizontal level.
Reason (R): The angle of depression. of an object viewed, is the angle formed by the line of sight with the horizontal when it is below the horizontal level.

a) Both assertion and reason are correct and reason is correct explanation for assertion.
b) Both Assertion and Reason are correct but reason is not correct explanation for assertion.
c) Assertion is correct but reason is false.
d) Both Assertion and Reason are false.

Q18. Assertion (A): The line of sight is the line drawn from the eye of an observer to the point in the object viewed by the observer.

Reason (R): Trigonometric ratios are used to find height or length of an object or distance between two distant
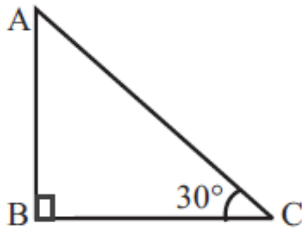
a) Both assertion and reason are correct and reason is correct explanation for assertion.
b) Both Assertion and Reason are correct but reason is not correct explanation for assertion.
c) Assertion is correct but reason is false.
d) Both Assertion and Reason are false.

Q19. Assertion (A): If the length of shadow of a vertical pole is equal to its height, then the angle of elevation of the sun is 45°.
Reason (R): According to Pythagoras theorem, $h^2 = l^2 + b^2$, where h = hypotenuse, l = length and b = base

(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) If Assertion is correct but Reason is incorrect.
(d) If Assertion is incorrect but Reason is correct.

Q20. Assertion (A): In the figure, if BC = 20 m, then height AB is 11.56 m.

Reason (R): tanθ = AB/BC = perpendicular/base, where θ is the angle ∠ACB
(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) If Assertion is correct but Reason is incorrect.
(d) If Assertion is incorrect but Reason is correct.

CHAPTER-10: CIRCLES

## COMPETENCY BASED QUESTIONS

Multiple Choice Questions (MCQ)

Q1. From an external point P, tangents PA and PB are drawn to a circle with centre O. If CD is the tangent to the circle at a point E and PA = 14 cm, find the perimeter of the ΔPCD.
(**a**) 28 cm   (**b**) 27 cm   (**c**) 26 cm   (**d**) 25 cm
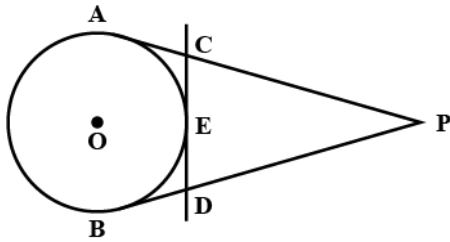
**Q2.** In the below figure, PA and PB are tangents such that PA = 9cm and ∠APB = 60^0. Find the length of the chord AB.
(**a**) 4 cm   (**b**) 7 cm   (**c**) 6 cm   (**d**) 9 cm
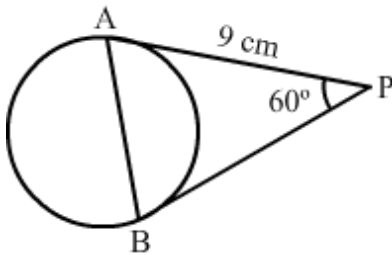
Q3. In the below figure the circle touches all the sides of a quadrilateral ABCD whose three sides are AB = 6 cm, BC = 7 cm, CD = 4 cm. Find AD.
(**a**) 4 cm   (**b**) 3 cm   (**c**) 6 cm   (**d**) 9 cm
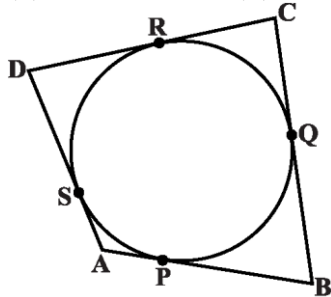
Q4. In the above sided Fig., if TP and TQ are the two tangents to a circle with centre O so that ∠POQ = 110°, then ∠PTQ is equal to
(**a**) 60^0 (**b**) 70^0 (**c**) 80^0 (**d**) 90^0
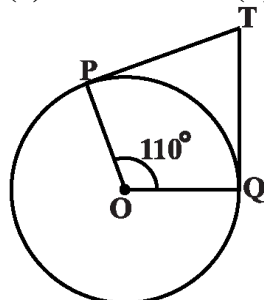
**Q5.** If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then ∠POA is equal to

(a) 60^0 (b) 70^0 (c) 80^0 (d) 50^0

**Q6.** PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T (see below figure). Find the length TP.

(a) $\frac{20}{3}$ cm   (b) $\frac{10}{3}$ cm   (c) $\frac{40}{3}$ cm   (d) none of these
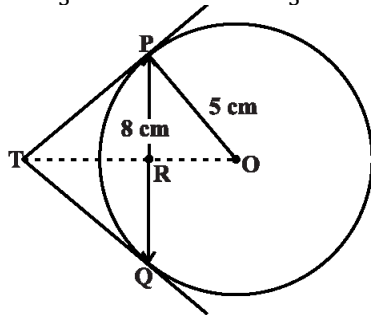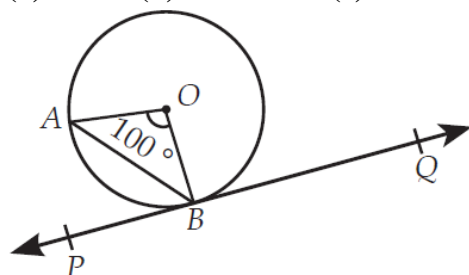

Q7. In the given figure, *O* is the centre of a circle, *PQ* is a chord and *PT* is the tangent at *P*, ∠*POQ* = 70°, then ∠*TPQ* is equal to

(a) 55°   (b) 70°   (c) 45°   (d) 35°
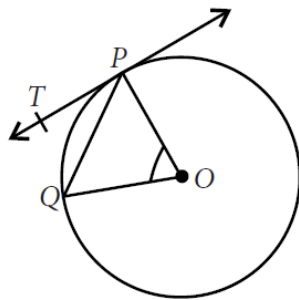
Q8. In the given figure, *PA* and *PB* are tangents to the circle with centre *O*. If ∠*APB* = 60°, then ∠*OAB* is

(a) 30°   (b) 60°   (c) 90°   (d) 15°
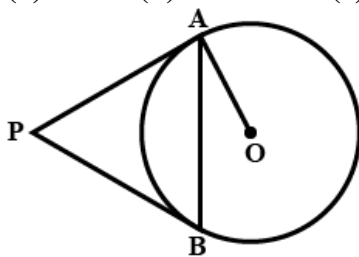
Q9. In figure, *PQ* is tangent to the circle with centre at *O*, at the point *B*. If ∠*AOB* = 100°, then ∠*ABP* is equal to

(a) 50°   (b) 40°   (c) 60°   (d) 80°

Q10. From a point P, two tangents PQ and PR are drawn to a circle with centre at O. T is a point on the major arc QR of the circle. If ∠QPR = 50 , then ∠QTR equals :
(a) 50⁰   (b) 130⁰   (c) 65⁰   (d) 90⁰
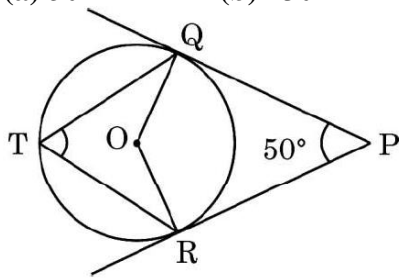
Q11. In the given figure, a circle with centre *O* is inscribed in a quadrilateral *ABCD* such that, it touches the sides *BC, AB, AD* and *CD* at points *P, Q, R* and *S* respectively. If *AB* = 29 cm, *AD* = 23 cm, ∠*B* = 90° and *DS* = 5 cm, then the radius ofthe circle (in cm) is:
(a) 11   (b) 18   (c) 6   (d) 15
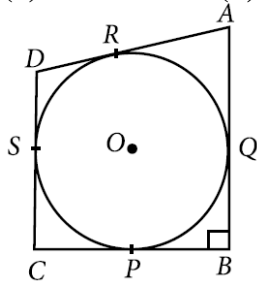
Q12. Two concentric circles of radii 13 cm and 5 cm are given. The length of the chord of the larger circle which touches the smaller circle is
(a) 16 cm   (b) 4 cm   (c) 24 cm   (d) 10 cm

Q13. *ABC* is a right-angled triangle with *BC* = 6 cm and *AB* = 8 cm. A circle with centre *O* and radius *x* cm has been inscribed in D*ABC* as shown in figure. The value of *x* is
(a) 1 cm   (b) 2 cm   (c) 3 cm   (d) 4 cm
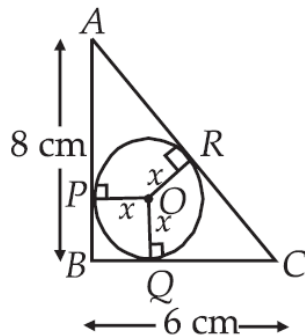
Q14. There are two concentric circles with centre *O* and of diameters 10 cm and 6 cm respectively. *AB,* a chord of outer circle touches the inner circle at *T*. The length of chord *AB* is
(a) 6 cm   (b) 7 cm   (c) 8 cm   (d) 10 cm
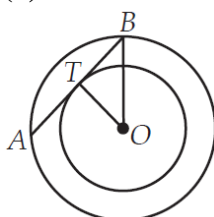
Q15. In the given figure, *QR* is a common tangent to the given circles, touching externally at the point *T*. The tangent at *T* meets *QR* at *P*. If *PT* = 3.8 cm, then the length of *QR* (in cm) is

(a) 3.8   (b) 7.6   (c) 5.7   (d) 1.9
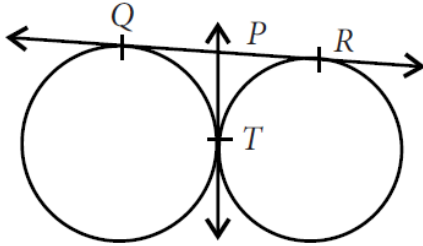
Q16. In the given figure, a quadrilateral *ABCD* is drawn to circumscribe a circle such that its sides *AB*, *BC*, *CD* and *AD* touch the circle at *P*, *Q*, *R* and *S* respectively. If *AB* = *x* cm, *BC* = 7 cm, *CR* = 3 cm and *AS* = 5 cm, find *x*.

(a) 10   (b) 9   (c) 8   (d) 7
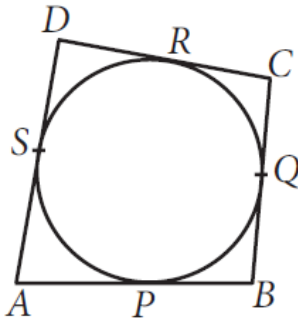
Q17. Two parallel lines touch the circle at points *A* and *B*. If area of the circle is 16p cm2, then *AB* is equal to

(a) 5 cm   (b) 8 cm   (c) 10 cm   (d) 16 cm
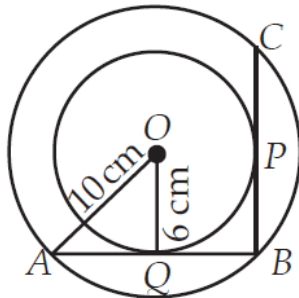
Q18. In the given figure, PQ is tangent to the circle centred at O. If ∠AOB = 95º, then the measure of ∠ABQ will be

(a) 47.5º   (b) 42.5º   (c) 85º   (d) 95º
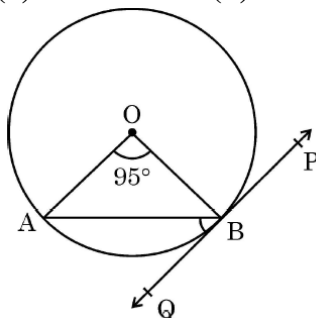
Q19. In the given figure, the quadrilateral PQRS circumscribes a circle. Here PA + CS is equal to:

(**a**) QR   (**b**) PR   (**c**) PS   (**d**) PQ
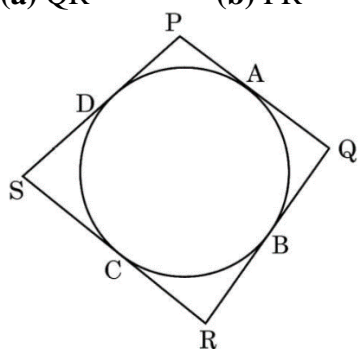
Q20. In the diagram, *PQ* and *QR* are tangents to the circle with centre *O*, at *P* and *R* respectively. Find the value of *x*.

(**a**) 25°   (**b**) 35°   (**c**) 45°   (**d**) 55°
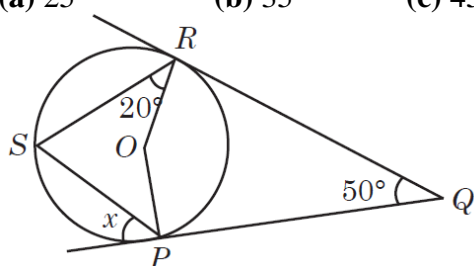
Assertion and Reasoning Question

DIRECTION: In the following questions 26 to 30, a statement of Assertion (**A**) is followed by a statement of reason (R).

Mark the correct choice as:

(**a**) Both Assertion (**A**) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

(**b**) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(**c**)Assertion (A) is true but reason (R) is false.

(**d**) Assertion (A) is false but reason (R) is true.

Q21. Assertion (A): When two tangents are drawn to a circle from an external point, they subtend equal angles at the centre.

Reason (R): A parallelogram circumscribing a circle is a rhombus.

Q22. Assertion (A): PA and PB are two tangents to a circle with centre O such that ∠AOB = 110°, then ∠APB = 90°.

Reason (R): The length of two tangents drawn from an external point are equal.

Q23. Assertion (A): If TP and TQ are the two tangents to a circle with centre O so that ∠POQ = 123°, then ∠PTQ = 57°.

Reason (R): The tangent at any point of a circle is perpendicular to the radius through the point of contact.

Q24. Assertion (A): At a point P of a circle with centre O and radius 12 cm, a tangent PQ of length 16 cm is drawn. Then, OQ = 20 cm.

Reason (R): The tangent at any point of a circle is perpendicular to the radius through the point of contact.

Q25. Assertion (A): The secant of circle is perpendicular to the radius of the circle.
Reason (R): A line that intersects the given circle in two points is called a secant.

Case Based Questions

Q26. Smita always finds it confusing with the concepts of tangent and secant of a circle. But this time she has determined herself to get concepts easier. So, she started listing down the differences between tangent and secant of a circle along with their relation. Here, some points in question form are listed by Smita in her notes.

(i) A line that intersects a circle exactly at two points is called
(a) Secant   **(b)** Tangent   **(c)** Chord   **(d)** Both **(a)** and **(b)**

(ii) Number of tangents that can be drawn on a circle is
(a) 1   **(b)** 0   **(c)** 2   **(d)** Infinite

(iii) Number of tangents that can be drawn to a circle from a point not on it, is
(a) 1   **(b)** 2   **(c)** 0   **(d)** Infinite

(iv) Number of secants that can be drawn to a circle from a point on it is
(a) infinite   **(b)** 1   **(c)** 2   **(d)** 0

(v) A line that touches a circle at only one point is called
(a) Secant   **(b)** Chord   **(c)** Tangent   **(d)** Diameter

Q27. Varun has been selected by his School to design logo for Sports Day T-shirts for students and staff. The logo design is given as in the figure and he is working on the fonts and different colours according to the theme. In the given figure, a circle with centre O is inscribed in a ΔABC, such that it touches the sides AB, BC and CA at points D, E and F respectively. The lengths of sides AB, BC and CA are 12 cm, 8 cm and 10 cm respectively.
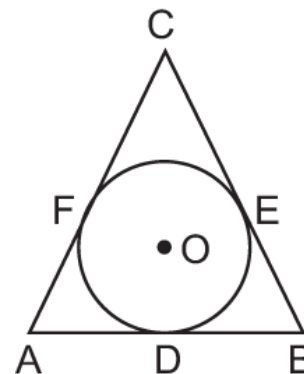
(i) The length of AD is
(a) 7 cm   **(b)** 8 cm   **(c)** 5 cm   **(d)** 9 cm

(ii) The length of BE is
(a) 8 cm   **(b)** 5 cm   **(c)** 2 cm   **(d)** 9 cm

(iii) The length of CF is
(a) 20 cm   **(b)** 5 cm   **(c)** 2 cm   **(d)** 3 cm

(iv) If the radius of the circle is 4 cm, then the area of triangle OAB is
(a) 20 sq cm   **(b)** 36 sq cm   **(c)** 24 sq cm   **(d)** 48 sq cm

(v) The area of triangle ABC is
(a) 50 sq cm   **(b)** 60 sq cm   **(c)** 100 sq cm   **(d)** 90 sq cm

Q28. A Ferris Wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity. After taking a ride in Ferris Wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.
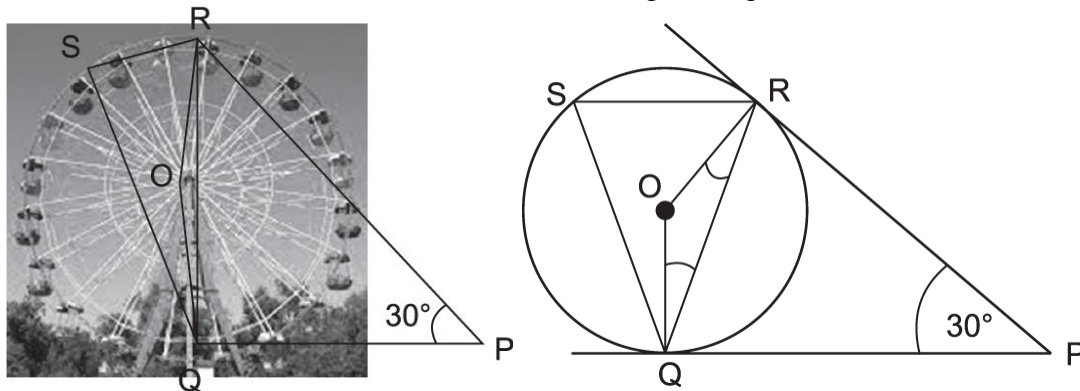
(i) In the given figure, ∠ROQ is
(a) 60°   **(b)** 100°   **(c)** 150°   **(d)** 90°

(ii) ∠RQP equals
(a) 75°   **(b)** 60°   **(c)** 30°   **(d)** 90°

(iii) ∠RSQ equals
(a) 60°   **(b)** 75°   **(c)** 100°   **(d)** 30°

(iv) ∠ORP equals
(a) 90°   **(b)** 75°   **(c)** 100°   **(d)** 60°

(v) If ∠P = 60° and OQ = OR = 5 m, then the length of PQ is
(a) 5 m   **(b)** 12 m   **(c)** 5√3 m   **(d)** None of these

Q29. Circles play an important part in our life. When a circular object is hung on the wall with a cord at nail N, the cords NA and NB work like tangents. Observe the figure, given that ∠ANO = 30° and OA = 5 cm.
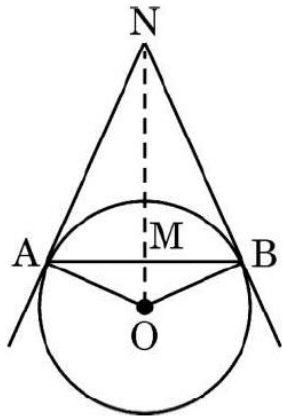
Based on the above, answer the following questions:

(i) Find the distance AN.
(a) 2√3   **(b)** 5√3   **(c)** 4√3   **(d)** 5

(ii) Find the measure of ∠AOB.
(a) 30°   **(b)** 130°   **(c)** 120°   **(d)** 60°

(iii) Find the total length of cords NA, NB and the chord AB.
(a) 12√3   **(b)** 6√3   **(c)** 15√3   **(d)** none of these

(iv) If ∠ANO is 45°, then name the type of quadrilateral OANB.
(a) rectangle   **(b)** rhombus   **(c)** trapezium   **(d)** square

Q30. Aditya is planning to complete his project. He made two circles with centres O and O' of radii 3cm and 5cm respectively. Observe the figure in which the length of tangents PQ is 4 cm and RS is 12cm.
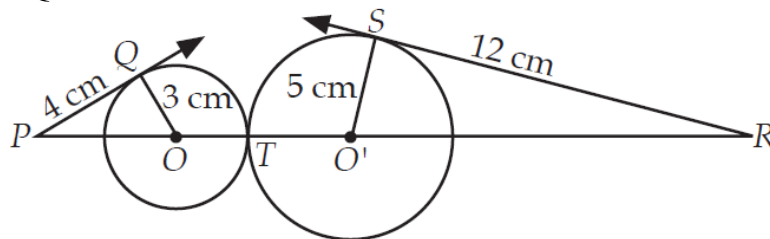
Based on the above, answer the following questions:

(i) Find the length PO.
(a) 10 cm   **(b)** 6 cm   **(c)** 8 cm   **(d)** 5 cm

(ii) Find the length RO'.
(a) 10 cm   **(b)** 12 cm   **(c)** 13 cm   **(d)** 5 cm

(iii) Find the length *PR*.
(a) 20 cm   **(b)** 26 cm   **(c)** 24 cm   **(d)** 28 cm

(iv) Two concentric circles are such that the difference between their radii is 4 cm and the length of the chord of the larger circle which touches the smaller circle is 24 cm. Then the radius of the smaller circle is
(a) 16 cm   **(b)** 20 cm   **(c)** 18 cm   **(d)** None of these

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ANSWER KEY

1. (a) 28 cm   **2. (d)** 9 cm   **3. (b)** 3 cm   **4. (b)** 70^0 **5. (d)** 50^0 **6. (a)** $\dfrac{20}{3}$ cm

7. (d) 35°   **8. (a)** 30°   **9. (a)** 50°   **10. (c)** 65º   **11. (a)** 11   **12. (c)** 24 cm

13. (b) 2 cm   **14. (c)** 8 cm   **15. (b)** 7.6   **16. (b)** 9   **17. (b)** 8 cm   **18. (a)** 47.5º

19. (c) PS   **20. (c)** 45°

21. (b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

22. (d) Assertion (A) is false but reason (R) is true.

23. (a) Both Assertion (**A**) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

24. (a) Both Assertion (**A**) and Reason (R) are true and reason (R) is the correct explanation of assertion (A).

25. (d) Assertion (A) is false but reason (R) is true.

26. (i) (a) Secant   **(ii) (d)** Infinite   **(iii) (b)** 2   **(iv) (a)** Infinite
   (v) (c) Tangent

27. (i) (a) 7 cm   **(ii) (b)** 5 cm   **(iii) (d)** 3 cm   **(iv) (c)** 24 sq cm
   (v) (b) 60 sq cm

28. (i) (c) 150°   **(ii) (a)** 75°   **(iii) (b)** 75°   **(iv) (a)** 90°
   (v) (c) 5√3 m

29. (i) (b) 5√3   **(ii) (c)** 120°   **(iii) (c)** 15√3   **(iv) (d)** square

30. (i) (d) 5 cm   **(ii) (c)** 13 cm   **(iii) (d)** 28 cm   **(iv) (a)** 16 cm

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Chapter-11: CONSTRUCTIONS (DELETED)

CHAPTER-12: AREA RELATED TO CIRCLES

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. If the ratio of the circumferences of two circles is 4: 9, then the ratio of their areas is
    a) 9: 4   **b)** 4: 9   **c)** 2: 3   **d)** 16: 81

Q2. If the sector of a circle of diameter 24 cm subtends an angle of 120^0 at the centre, then the length of the arc of the sector is
    a) 4π cm   **b)** 8π cm   **c)** 10π cm   **d)** 12π cm

Q3. The diameter of a circle whose area is equal to the sum of the areas of the areas of the two circles of radii24 cm and 7 cm is
    a) 31 cm   **b)** 25 cm   **c)** 62 cm   **d)** 50 cm

Q4. The perimeter of a sector of a circle of radius r cm and of central angle θ (in degrees) is
    a) $\frac{\theta}{360}\pi r^2$ **b)** $\frac{\theta}{360}2\pi r + 2r$ **c)** $\frac{\theta}{360}2\pi r$ **d)** $\frac{\theta}{360}2\pi r + \pi r^2$

Q5. The area of the circle that can be inscribed in a square of side 6 cm, is
    a) 9π cm^2 **b)** 14π cm^2 **c)** 12π cm^2 **d)** 18π cm^2

Q6. If the circumference of a circle is 66 cm, then its area is
    a) $\frac{693}{2}$ cm^2 **b)** 693 cm^2 **c)** 1386 cm^2 **d)** $\frac{132}{7}$ cm^2

Q7. If a wire is bent into the shape of a square, then the area of the square is 81 cm^2. When the same wire is bent into a semi-circular shape, then the area of the semi-circle will be
    a) 22 cm^2 **b)** 44 cm^2 **c)** 77 cm^2 **d)** 154 cm^2

Q8. If the area of a circle circumscribing a square of area 64 cm^2 is
    a) 25.5 cm^2 **b)** 50. 28 cm^2 **c)** 75. 48 cm^2 **d)** 100.57 cm^2

Q9. If $\pi = \frac{22}{7}$, the distance (in metres) covered by a wheel of diameter 42 cm, in one revolution, is
    a) 1.1 m   **b)** 1.32 m   **c)** 2.64 m   **d)** 13.86 m

Q10. Find the area of a quadrant of a circle whose circumference is 22 cm.
    a) 9.625 cm^2 **b)** 6.325 cm^2 **c)** 38.5 cm^2 **d)** 77 cm^2

Q11. The circumference of a circle exceeds the diameter by 15 cm, then the radius of the circle is
    a) 5.6 cm   **b)** 4.9 cm   **c)** 4.2 cm   **d)** 3.5 cm

Q12. Two circles touch internally. The sum of their areas is 116π cm^2 and distance between their centres is 6 cm, then the radius of the bigger circle is
a) 15 cm   **b)** 12 cm   **c)** 10 cm   **d)** 8 cm

Q13. A pendulum swings through an angle of 60^0 and describes an arc 17.6 cm in length, then the length of the pendulum is
a) 8.4 cm   **b)** 15.6 cm   **c)** 16.8 cm   **d)** 25.2 cm

Q14. The ratio of the areas of two sectors S_1 with 120^0 and S_2 with 150^0 of the two congruent circles is
a) 3: 4   **b)** 4: 5   **c)** 5: 4   **d)** 6: 5

Q15. If the area of a sector of a circle is $\frac{5}{12}$ of the area of the circle, then the sector angle is
a) 60^0 **b)** 90^0 **c)** 120^0 **d)** 150^0

Q16. A circular park has a path of uniform width around it. The difference between the outer and inner circumferences of the circular park is 132 cm. Its width is
a) 20 cm   **b)** 21 cm   **c)** 22 cm   **d)** 24 cm

Q17. The area of a sector of a circle bounded by an arc of length 5π cm is equal to 20πcm^2, then its radius is
a) 12 cm   **b)** 16 cm   **c)** 8 cm   **d)** 10 cm

Q18. In figure, if $\theta = 90^0$ then the area of the segment is
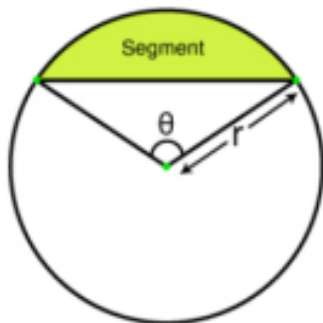
a) $\frac{r^2}{4}(\pi + 2)$ **b)** $\frac{r^2}{4}(\pi - 2)$ **c)** $\frac{r^2}{4}(\pi - 1)$ **d)** $\frac{r^2}{4}(\pi + 1)$

Q19. The minute hand of a clock is 14 cm long. The area swept by it between 10:10 am and 10:25 am is
a) 154 cm^2 **b)** 22 cm^2 **c)** $\frac{308}{3}cm^2$ **d)** $\frac{44}{3}cm^2$

Q20. The ratio of the areas of a circle and an equilateral triangle whose diameter and a side are respectively equal is
a) $\pi: \sqrt{2}$ **b)** $\pi: \sqrt{3}$ **c)** $\sqrt{3}: \pi$ **d)** $\sqrt{2}: \pi$

Assertion and Reasoning Question

The following questions consist of two statements: Assertion(a) and Reason(R). Answer these questions selecting the appropriate option given below:

(a) Both Assertion (**A**) and Reason (**R**) are true and Reason (**R**) is the correct explanation of the Assertion (**A**).

(b) Both Assertion (**A**) and Reason (**R**) are true and Reason (**R**) is not the correct explanation of the Assertion (**A**).

(c) Assertion (**A**) is true but reason(R) is false.

(d) Assertion(**a**) is false but reason(R) is true.

Q21. Assertion (A): A wire is looped in the form of a clock of radius 28 cm. It is bent into a square. Then the area of the square is 1936 cm^2

Reason (R): Angle described by a minute hand in 60 minutes = 360^0.

Q22. Assertion (A): In a circle of radius 6 cm, the angle of a sector 60^0. Then the area of the sector is $18\frac{6}{7}$cm^2.

Reason (R): Area of the circle with radius is πr^2.

Q23. Assertion (A): In an equilateral triangle with each side 10 cm, then altitude of the triangle is $5\sqrt{3}$ cm.

Reason(R): The altitude of an equilateral triangle with side 'a' is $\frac{\sqrt{3}a}{2}$.

Case Based Questions

Case Study-1

Running or Jogging is a very popular form of physical activity. It offers many health benefits. It can help to build strong bones. It improves Cardio Vascular fitness, strengthens muscles, and burns plenty of kilojoules. Although running and jogging both are aerobic exercises but there is a difference between them. Running uses more kilojoules, demand more effort from the lungs, hearts and is faster than jogging.

There is a running track in a school whose left and right ends are semi-circular as shown in the diagram below.
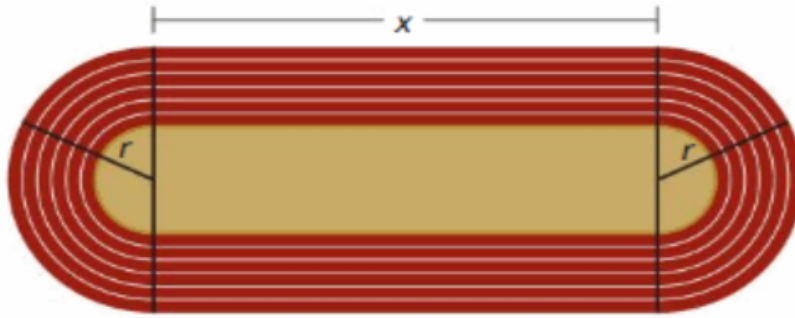
Two friends Arjun and Hasini decide to race on the running track. The distance between the two inner parallel line segments is 80 m and they are each 110m long. The track is 20 m wide.

Based on the above information answer the following questions.

Q24. If Arjun runs on the outer line of the running track, then how much distance Arjun has to cover?

a) $200 + 120\pi$ m **b)** $120 + 120\pi$ m **c)** $220 + 120\pi$ m **d)** $220 + 100\pi$ m

Q25. If Hasini runs on the inner line of the running track, then how much distance Hasini has to cover?

a) $200 + 80\pi$ m **b)** $220 + 60\pi$ m **c)** $120 + 80\pi$ m **d)** $220 + 80\pi$ m

Q26. If Arjun runs at a speed of 10m per/sec on the outer line of the track and Hasini runs at a speed of 8m per/sec on the inner line of the track then who will win the race?

a) Arjun **b)** Hasini
c) Both reach at the same time. **d)** Can not be determined. Data is insufficient.

OR

Q27. If the school administration wants to grow small grass on the track, then how much area do they have to cover?

a) 8.68 km^2 **b)** 5.00 km^2 **c)** 10.68 km^2 **d)** 9.00 km^2

Q28. If the cost of planting grass is Rs. 50 per square meter then what will be the cost of planting grass on running track?

a) 0.1 million rupees **b)** 1 million rupees
c) 0.534 million rupees **d)** 2 million rupees

Case Study-2

Krish has his home located at A and his college located at B. Krish drives his motorobike three days in a week and rides his bicycle in remaining 3 days, to go to his college and back to home. AOB is a sector of a circle with centre O, central angle 60^0 and radius 4.2 km. Path AOB is the route for driving by motorbike and path ACB is for bicycle only.
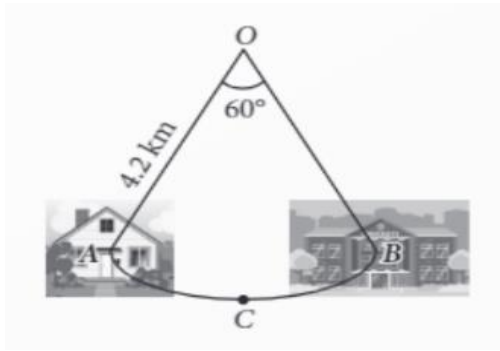
Based on the above information answer the following questions.

Q29. Find the total distance travelled by Krish through motorbike in a week to go to college.
    a) 50.4 km   **b)** 55 km   **c)** 56.4 km   **d)** 58 km

Q30. Find the total distance travelled by Krish through the bicycle in a week to go to college.
    a) 24.4 km   **b)** 26.4 km   **c)** 28 km   **d)** 29.4 km

Q31. Find the area of sector AOB.
    a) 7.88 km^2 **b)** 8.24 km^2 **c)** 9.24 km^2 **d)** 10.14 km^2

Q32. If the angle changed from 60^0 to 90^0, then find the total length of the available paths.
    a) 12 km   **b)** 13 km   **c)** 14 km   **d)** 15 km

****
ANSWER KEY: -
1.D   2.B   3.D   4.B   5.A   6.A   7.C   8.D   9.B   10.A 11.D 12.C
13.C 14.C 15.D 16.B 17.C 18.B 19.A 20.B 21.B 22.B 23.A 24.C
25.D 26.B 27.C 28.C 29.A 30.B 31.C 32.D
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CHAPTER-13: SURFACE AREAS AND VOLUMES

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. The length of the diagonal of a cube is $8\sqrt{3}$ cm. Its total surface area is
  a) 321 cm   **b)** 350 cm^2 **c)** 384 cm^2 **d)** 256 cm^2

Q2. The length of the longest rod that can be placed in a $12\,m \times 9\,m \times 8\,m$ room is
  a) 15 m   **b)** 17 m   **c)** 21 m   **d)** 25 m

Q3. 1 m^3 is equal to how many litres?
  a) 100   **b)** 1000   **c)** 1   **d)** 10

Q4. The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is
  a) 2: 1   **b)** 1: 2   **c)** 1: 3   **d)** 3: 1

Q5. The curved surface area of right circular cone of height 15 cm and base diameter 16 cm is
  a) 60π cm^2 **b)** 120π cm^2 **c)** 136π cm^2 **d)** None of these

Q6. The maximum volume of a cone that can be carved out of a solid hemisphere of radius r is
  a) $3\pi r^2$ **b)** $\frac{\pi r^3}{3}$ **c)** $\frac{\pi r^2}{3}$ **d)** $3\pi r^3$

Q7. The radii of two cylinders are in the ratio 3: 5. If their heights are in the ratio 2: 3, then the ratio of their curved surface areas is
  a) 2:5   **b)** 5:2   **c)** 2:3   **d)** 3:5

Q8. The edge of a cube whose volume is equal to that of a cuboid of dimensions 8 cm x 4 cm x 2 cm is
  a) 8 cm   **b)** 6 cm   **c)** 4 cm   **d)** 2 cm

Q9. A rectangular sheet of paper $40\,cm \times 22\,cm$, is rolled to form a hollow cylinder of height 40 cm. The radius of the cylinder (in cm) is
  a) 3.5 cm   **b)** 7   **c)** $\frac{80}{7}$ **d)** 5

Q10. The total surface area of the given tent is
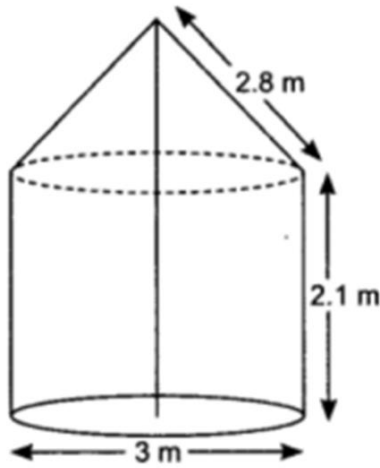
a) 33 cm^2 **b)** 44 cm^2 **c)** 29.7 cm^2 **d)** 26.4 cm^2

Q11. If two solid hemispheres of same base radius $'r'$ joined together along their bases, then the curved surface of this new solid is
a) $4\pi r^2$ **b)** $6\pi r^2$ **c)** $3\pi r^2$ **d)** $8\pi r^2$

Q12. If the volume and the surface area of a solid sphere are numerically equal, then its radius is
a) r = 6 cm   **b)** r = 5 cm   **c)** 4 cm   **d)** 3 cm

Q13. The surface area of a cube is 216 cm^2, its volume is
a) 144 cm^3 **b)** 196 cm^3 **c)** 212 cm^3 **d)** 216 cm^3

Q14. The ratio of the volume of two spheres is 8: 27. If r and R are the radii of spheres respectively, then (R –r): r is
a) 2: 3   **b)** 1: 3   **c)** 1: 2   **d)** 4: 9

Q15. The volume (in cm^3) of the largest right circular cone that can be cut off from a cube of edge 4.2 cm is:
a) 9.7   **b)** 77.6   **c)** 58.2   **d)** 19.4

Q16. The volume of the given solid is __ cm^3
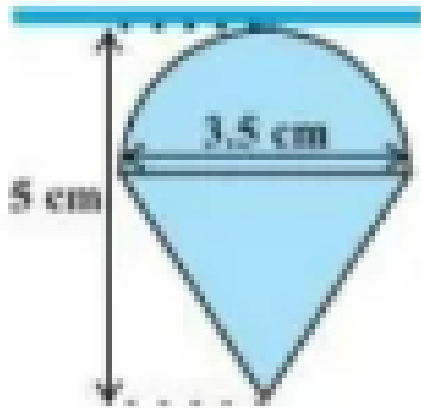
a) $\frac{96.25}{7}$ **b)** $\frac{96.25}{3}$ **c)** $\frac{96.25}{2}$ **d)** $\frac{96.25}{21}$

Q17. Surface area of the given solid is
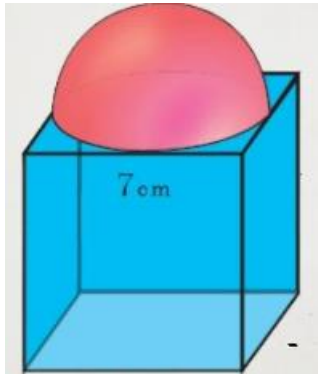
a) 371 cm^2 **b)** 322 cm^2 **c)** 332.5 cm^2 **d)** 332.5 cm^3

Q18. The volume of the given solid is _____ m^3
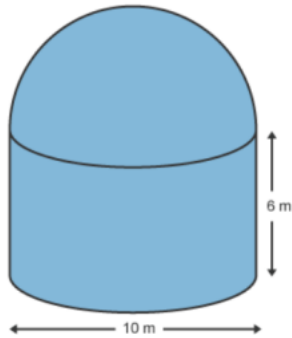
a) $\frac{700}{3}\pi$ **b)** $\frac{110}{3}\pi$ **c)** $\frac{550}{3}\pi$ **d)** 300π

Q19.
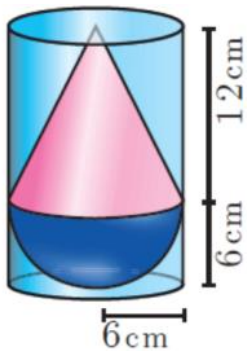
Volume of the water left in the vessel after dropping the solid of same base radius and the same height is _____cm^3.

a) 180π **b)** 270π **c)** 360π **d)** $460\,\pi$

Q20. A solid piece of iron of dimensions $49 \times 33 \times 24$ cm is moulded into a sphere. The radius of the sphere is

a) 21 cm   **b)** 28 cm   **c)** 35 cm   **d)** none of these

Assertion and Reasoning Question

The following questions consist of two statements: Assertion(a) and Reason(R).
Answer these questions selecting the appropriate option given below:
(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (**A**).
(b) Both Assertion (**A**) and Reason (R) are true and Reason (R) is not the correct explanation of the Assertion (**A**).
(c) Assertion (**A**) is true but reason(R) is false.
(d) Assertion(**a**) is false but reason(R) is true.

Q21. Assertion(A): The curved surface area of a cone of base radius 3 cm and height 4 cm is 15π cm^2.
Reason (R): Volume of a cone $= \pi r^2 h$.

Q22. Assertion (A): If the surface area of a sphere is 616 cm^2. Then its radius is 7 cm.
Reason (R): Surface area of sphere $= 4\pi r^2$.

Case Based Questions

Case Study-1

Tanishque, a 10th standard student makes a project on coronavirus in science for an exhibition in his school. In this project, he picks a sphere that has volume 38808 cm^3 and 11 cylindrical shapes, each of volume 1540 cm^3 with a length of 10 cm
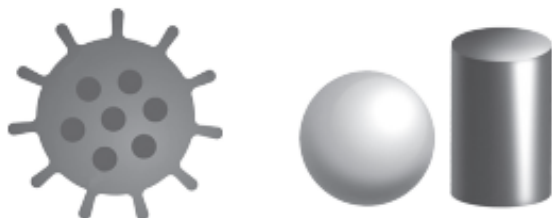
Based on the above information answer the following questions.

Q23. The diameter of the base of the cylinder is
    a) 7 cm   **b)** 14 cm   **c)** 12 cm   **d)** 16 cm

Q24. The diameter of the sphere is
    a) 49 cm   **b)** 28 cm   **c)** 21 cm   **d)** 42 cm

Q25. The total volume of the shape formed is
    a) 85541 cm^3 **b)** 45738 cm^3 **c)** 24625 cm^3 **d)** 55748 cm^3

Q26. The curved surface area of the one cylindrical shape is
    a) 850 cm^2 **b)** 221 cm^2 **c)** 440 cm^2 **d)** 540 cm^2

Q27. The total area covered by cylindrical shapes on the surface of a sphere is
    a) 1694 cm^2 **b)** 1580 cm^2 **c)** 1896 cm^2 **d)** 1470 cm^2

Case Study-2

Sonam and Purva have 18 and 12 coins respectively each of radius 3.5 cm and thickness 0.5 cm. They place their coins one above the other to form solid cylinders.

Based on the above information, answer the following questions.

Q28. Curved surface area of the cylinder made by Sonam is
a) 198 cm^2 **b)** 110 cm^2 **c)** 792 cm^2 **d)** 440 cm^2

Q29. The ratio of curved surface area of the cylinders made by Sonam and Purva is
a) 2: 3   **b)** 3: 2   **c)** 2: 1   **d)** 1: 2

Q30. The volume of the cylinder made by Purva is
a) 198 cm^3 **b)** 132 cm^3 **c)** 346.5 cm^3 **d)** 231 cm^3

Q31. The ratio of the volume of the cylinders made by Sonam and Purva is
a) 1: 2   **b)** 2: 5   **c)** 3: 2   **d)** 4: 3

Q32. When three coins are shifted from Sonam cylinder to Purva's cylinder, then
     a) Volume of two cylinders become equal
     b) Volume of Sonam's cylinder> Volume of Purva's cylinder
     c) Volume of Purva's cylinder> Volume of Sonam's cylinder
     d) None of these.

****
ANSWER KEY: -

1C	2B	3B	4A	5C	6B	7A	8C	9A	10A	11A	12D
13D	14C	15D	16C	17C	18A	19C	20A	21C	22A	23B	24D
25D	26C	27A	28A	29B	30D	31C	32A				

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CHAPTER-14: STATISTICS

"Statistics is the compass that guides us through the vast realm of data,

helping us uncover insights. and make informed choices."

There are three measures of central tendency, mean, median and mode.

Mean: -

The arithmetic mean of a given data is the sum of the values of all the observations divided by the total number of observations. There are two different formulas for calculating the mean for ungrouped data and the mean for grouped data.

Mean of Raw Data or ungrouped data:

Suppose we have n values in a set of data namely as x_1, x_2, x_3......... x_n, then the mean of data is given by using the formula.

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

$$\overline{x} = \frac{x_1 + x_2 + x_3 + \cdots. + x_n}{n}$$

Mean of grouped data:

To calculate mean of grouped data there are three methods.

- Direct method.
- Assumed mean method.
- Step deviation method.

The mean of the grouped data deals with the frequencies of different observations or variables that are grouped together.

If the values of the observations are $x_1 + x_2 + x_3 + x_4 + \cdots.. + x_n$ and their corresponding frequencies are $f_1 + f_2 + f_3 + f_4 + \cdots.. + f_n$ the mean of the data is given by,

$$\overline{x} = \frac{x_1 + x_2 + x_3 + x_4 + \cdots.. + x_n}{f_1 + f_2 + f_3 + f_4 + \cdots.. + f_n}$$

Mean of grouped data by different methods: -

Direct method: $\quad \overline{x} = \frac{\sum f_i x_i}{\sum f_i}$

Assume mean method: $\overline{x} = A + \frac{\sum f_i d_i}{\sum f_i}$ where $d_i = x_i - A$

Where $i = 1,2,3,4,\ldots,$

Median: -

Median of raw data:

The middle most term of the data arranged in ascending or descending order is called the median of the data. After arranging the data in ascending or descending order, the following method is applied:

If number of values or observations in the given data is odd, then the median is given by $\left[\frac{(n+1)}{2}\right]^{th}$ observation.

If the number of values or observations is even, then the median is given by the average of $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ observation.

Cumulative Frequency: The cumulative frequency of a class is the frequency obtained by adding the frequencies of all the classes preceding the give class.

Median for grouped data:

The median for grouped data can be calculated by using the formula,

$$Median = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

Where,

l = lower limits of the median class
n = Sum of the frequencies
cf = cumulative frequency of the preceding class
f = frequency of median class
h = class size.

Steps to find the median of grouped data:
Median of grouped data is in the form of a frequency distribution arranged in ascending order and is continuous. To find the median of any given data is simple since the median is the

middlemost value of the data. Since the data is grouped, it is divided into class intervals. The steps to find the median of grouped data are.

Step 1: Construct the frequency distribution table with class intervals and frequencies.

Step 2: Calculate the cumulative frequency of the data by adding the preceding value of the frequency with the current value.

Step 3: Find the value of N by adding the values in frequency.

Step 4: Find the lower limit of the class interval and the cumulative frequency.

Step 5: Apply the formula for median for grouped data: $Median = l + \left(\dfrac{\frac{n}{2}-cf}{f}\right) \times h$

Mode -

The mode for ungrouped data

The observation which occurs most is called the mode of the data.

The mode of the data 4, 5, 2, 4, 3, 4, 2, 4, 5, 4, 4, 3, 4

As the observation 4 occurs seven times

Mode of the data is = 4

Mode: the mode for the grouped data is given by the formula

$$\text{Mode } = l + \left(\dfrac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

where,

l = Lower limit of the modal class
h = Class size
f_1 = Frequency of the modal class
f_0 = Frequency of the class preceding the modal class
f_2 = Frequency of the class succeeding the modal class

Empirical relation among Mean, Median and Mode

Mean – Mode = 3(Mean - Median)

Mode = 3Median – 2Mean

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. The median and mode of the data given below are: -
Data: 70, 72, 73, 70, 73, 74, 74, 70, 75, 74, 75, 76, 74
a) Median = 70, Mode = 74   **b)** Median = 74, Mode = 74
c) Median = 74, Mode = 70   **d)** Median = 75, Mode = 74

Q2. The mean of the following distribution is 2.5 then the value of y in the distribution is

Variable(x)	1	2	3	4	5
frequency	4	5	y	1	2

a) 2   **b)** 4   **c)** 5   **d)** 6

Q3. The median marks of 120 students were 40. But later on, it was found that the marks of a student who secured 85 were wrongly taken as 58. The correct median is: -
a) 40   **b)** 39   **c)** 50   **d)** 58

Q4. The mean of x, x + 1, x + 3, x + 9 and x + 7 is: -
a) x + 7   **b)** x + 3   **c)** x + 9   **d)** x + 4

Q5. The median of the following observations 22, 24, 33, 37, x + 5, x + 7, 44, 47 51, 58 are arranged in ascending order is 42, then x is: -
a) 30   **b)** 42   **c)** 36   **d)** 40

Q6. If mean and mode of a moderately asymmetrical distribution are 26.74 and 26.77 respectively, then median is: -
a) 26.70   **b)** 26.81   **c)** 26.97   **d)** 26.75

Q7. The mean of 1, 3, 4, 5, 7 and 4 is m. The numbers 3, 2, 2, 4, 3, 3 and p have mean m - 1 and median q. Then, p + q is: -
a) 7   **b)** 6   **c)** 5   **d)** 4

Q8. The sum of deviations is zero when measure from: -
a) Mode   **b)** Arithmetic Mean   **c)** Median   **d)** None of these

Q9. The mean and median of a data are 14 and 15 respectively. Then the value of mode is: -
a) 8.5   **b)** 6   **c)** 12   **d)** 17

Q10. For the following distribution: -

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

The sum of lower limits of the median class and modal class: -
a) 15   **b)** 25   **c)** 30   **d)** 35

Q11. The mean of n terms is $\bar{x}$. If the first term is increased by 1, second term is increased by 2 and so on, then the new mean is: -

a) $\bar{x} + \frac{n+1}{2}$ b) $\bar{x} + \frac{n-1}{2}$ c) $\bar{x} + \frac{n}{2}$ d) $\bar{x} + n$

Assertion and Reasoning Question

Q12. Assertion(A): The runs scored by a batsman in 5 ODIs are 31,97,112, 63, and 12. The Mean is 67.

Reason(R): Mean $= \frac{Total\ sum\ of\ number\ in\ data\ sets}{Total\ number\ in\ data\ sets.}$

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q13. Assertion(A): Frequency is the number of times a particular observation occurs in data.
Reason(R): Data can be grouped into class intervals such that all observations in that range belong to that class.

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (**A**) is false but Reason (R) is true

Q14. Assertion(A): Consider the following frequency.

Class interval	3-6	6-9	9-12	12-15	15-18	18-21
Frequency	2	5	21	23	10	12

The mode of the above data is 12.4
Reason(R): The value of the variable which occurs most often is the mode.

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (**A**) is false but Reason (R) is true

Q15. Assertion (A): Consider the following frequency table:

Class interval	10-15	15-20	20-25	25-30	30-35
Frequency	5	9	12	6	8

The modal class is 10-15.

Reason(R): The class having maximum frequency is called the modal class.

(a) Both Assertion (**A)** and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (**A)** is false but Reason (R) is true

Q16. Assertion(A): if the value of mode and mean is 60 and 66 respectively, the value of median is 64.
Reason(R): 3Median = (Mode + 2 Mean)

(a) Both Assertion (**A)** and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (**A)** is false but Reason (R) is true

Case Based Questions

Case Study 1:

Q17. Indian Premiere League

The Indian Premier League (IPL) is a popular cricket tournament that features some of the best players from around the world. The IPL has various statistics that measure the performance of the players and teams in different aspects of the game. One such statistic is the number of sixes hit by a batsman in an innings. A six is when a batsman hits the ball over the boundary without touching the ground, scoring six runs.

The table below shows the frequency distribution of the number of sixes hit by 50 batsmen in IPL 2023:

Number of sixes	Number of batsmen
0-5	10
5-10	12
10-15	8
15-20	6
20-25	7
25-30	4
30-35	2
35-40	1

(i) What is the mode of the above data?

(a) 8   **(b)** 7   **(c)** 7.6666..   **(d)** 7.066

(ii)Write the formula to determine the median for grouped data?

(a) $\left(\frac{\frac{n}{2}}{f}\right) \times h$ **(b)** $\frac{1}{2} + \left(\frac{\frac{n}{2}-cf}{f}\right) \times h$

(c) $l + \left(\frac{\frac{n}{2}-cf}{f}\right) \times h$ **(d)** $l + \left(\frac{\frac{n}{2}+cf}{f}\right) \times h$

(iii) What is the cumulative frequency of 4th class interval?

(a) 36   **(b)** 38   **(c)** 44   **(d)** 47

(iv) What is the Mean of the data?

(a) 14.8   **(b)** 13   **(c)** 14   **(d)** 13.8

Case Study 2:

Q18. Employees Salary

A company has 100 employees working in different departments such as marketing, sales, production, and administration. The company wants to analyse the salary distribution of

its employees and compare it with the industry average. The following table shows the frequency distribution of the monthly salary (in thousands) of the employees: -

Monthly Salary (in thousands)	Number of Employees
20-30	15
30-40	25
40-50	30
50-60	20
60-70	10

(i) The Mean monthly salary is?
(a) 43 **(b)** 43.5 **(c)** 44 **(d)** 44.5

(ii) The modal monthly salary for the employees will be?
(a) 43 **(b)** 44.33.... **(c)** 43.33.... **(d)** 44

(iii) What is the cumulative frequency of the last data entry?
(a) 100 **(b)** 98 **(c)** 101 **(d)** 99

Case study 3:

Q19. Medical Camp

A medical camp was organized in a college to provide free health check-ups and awareness to the students and staff. The camp was conducted by a team of doctors and nurses from a nearby hospital. The camp offered services such as blood pressure measurement, blood sugar test, eye test, dental check-up, and general consultation. The following table shows the frequency distribution of the blood pressure levels (in mmHg) of 100 students who participated in the camp: -

Blood Pressure Level	Number of Students
90-100	10
100-110	20
110-120	30
120-130	25
130-140	10
140-150	5

The normal blood pressure range for adults is 90/60 mmHg to 120/80 mmHg.

(i) What is the median class?
(a) 110-120   **(b)** 100-110   **(c)** 120-130   **(d)** 90-100

(ii) What is the modal class?
(a) 100-110   **(b)** 120-130   **(c)** 130-140   **(d)** 110-120

(iii) What is the class size of modal class?
(a) 30   **(b)** 5   **(c)** 10   **(d)** 20

(iv) How mode, median and mean are related with each other.
(a) mode = 3median-4mean   **(b)** 2mean = -mode + 3median
(c) Mean = 3median – 2mode   **(d)** None of these.

Case Study 4:

Q20. Evaluation Test

A self-evaluation test is a way of assessing your own performance in the workplace and students by answering questions that reflect on your achievements, challenges, strengths and areas for improvement. A self-evaluation test can help you set goals, identify areas for growth and communicate with your teacher about your expectations and needs.

Marks Obtained	Number of Students
Above 40	36
Above 30	26
Above20	42
Above 10	32
Above 0	24

A self-evaluation test was given to 160 students, Maximum marks were 50. Maximum and Minimum marks were 49 and 4 respectively.

Refer the above frequency distribution table:
(i) Find the range of the marks obtained by the students.
(a) 35   **(b)** 45   **(c)** 25   **(d)** 29

(ii) If A separate section is made for the students scoring less than 20 marks, find the number of students in that section.
(a) 24   **(b)** 30   **(c)** 46   **(d)** 56

(iii) Find the median class of the distribution.
(a) 10-20   **(b)** 20-30   **(c)** 30-40   **(d)** 40-50

(iv) Find the upper limit of the modal class of frequency distribution.
(a) 20   **(b)** 30   **(c)** 40   **(d)** 50

****

Solutions

Q1. **(b)** Arrange the data: 70, 70, 70, 72, 73, 73, 74, 74, 74, 74, 75, 75, 76.
Median = 74 (7th term), Mode = 74 most frequent.

Q2. **(b)** 4

Q3. **(a)** 40 there is no change in the median value as the change of value is occurring on the right side of the median value.

Q4. **d)** x+4
$$= \frac{x+(x+1)+(x+3)+(x+9)+(x+7)}{5}$$

Q5. **(c)**36
$$\frac{(x+5)+(x+7)}{2} = 42$$

Q6. **(d)** 26.75
Mode = 3Median – 2Mean

26.77 = 3 Median-2x26.74

Median = (26.77 +53.48)÷ 3

Q7. **(a)** 7

$$\frac{1+3+4+5+7+4}{6} = m \quad i.e\, m = 4$$

$$\frac{3+2+2+4+3+3+p}{7} = m - 1 \quad i.e\, p = 4$$

Arranging the data we have,2,2,3,3,3,4,4so q= 3

Now, p + q =7

Q8. **(b)** Arithmetic Mean

Q9. (**d**)17

Mode = 3Median – 2Mean

Q10. (**b**)25

Q11. (**a**)

Let $a_1, a_2, a_3, ..., a_n$ be the n terms which have the mean $\overline{X}$

Since each terms are added with 1,2,3,4,….,n

Then, new mean =

$$\frac{a_1+1+a_2+2+a_3+3+\cdots.+a_n+n}{n} = \frac{n\overline{X}+1+2+3+\cdots..+n}{n}$$

$$= \frac{n\overline{X}+\frac{n(n+1)}{n}}{n}$$

$$= \overline{X} + \frac{n+1}{2}$$

Q12. (**d**)   Q13. (**a**)   Q14. (**b**)   Q15. (**d**)   Q16. (**a**)

Q17. **(i) (c)**   **(ii) (c)**   **(iii) (a)**   **(iv) (d)**

Q18. **(i) (b)**   **(ii) (c)**   **(iii) (a)**

Q19. **(i) (a)**   **(ii) (d)**   **(iii) (c)**   **(iv) (b)**

Q20. **(i) (b)**   **(ii) (d)**   **(iii) (b)**   **(iv) (b)**

****

Chapter-15: Probability

"Probability is a measure of uncertainty of various phenomenon.

We can find the probability on the basis of observation and collected data. This is called statistical approach of probability."

Important points of Learning

➢ Let E be an event with 'n' equally likely outcomes and number of outcomes favourable to the happening be 'm'. Then the probability of occurrence of E denoted by P(e) is defined as

$$P(e) = \frac{Number\ of\ favourable\ outcomes\ for\ E}{Total\ number\ of\ outcomes} = \frac{m}{n}$$

➢ $0 \leq P(e) \leq 1$, for all events E.
➢ $P(\bar{E})$ denotes the probability of non-happening of event E.
➢ $P(\bar{E}) = 1 - P(E)$.   E and $\bar{E}$ are complimentary events.
➢ The Probability of a sure event (or a certain event) is 1.
➢ The probability of an impossible event is 0.
➢ An event having only one outcome is called an elementary event (For example, if we toss a coin, then the sample space is S = {Head, Tail}. The event of getting a Head is an elementary event, which can be written as E = {Head}, This event cannot be further sub-divided or broken down into simpler events.)

Sample Space of a coin: -

Head   **Tail**

Sample Space of two coins:

Coin toss	Head (H)	Tail (T)
H	(H, H)	(H, T)
T	(T, H)	(T, T)

Sample space of three coins:

1st toss	2nd toss	3rd toss	Outcome
H	H	H	(H, H, H)
H	H	T	(H, H, T)
H	T	H	(H, T, H)
H	T	T	(H, T, T)
T	H	H	(T, H, H)
T	H	T	(T, H, T)
T	T	H	(T, T, H)
T	T	T	(T, T, T)

Sample Space of Deck of cards:

Deck of Card – Total cards = 52				
		Red 26 Cards		Black 26 cards
	Cards	Hearts	Diamonds	Clubs	Spades
Face cards	K	K ♥	K ♦	K ♣	K ♠
	Q	Q ♥	Q ♦	Q ♣	Q ♠
	J	J ♥	J ♦	J ♣	J ♠
Number cards	10	10 ♥	10 ♦	10 ♣	10 ♠
	9	9 ♥	9 ♦	9 ♣	9 ♠
	8	8 ♥	8 ♦	8 ♣	8 ♠
	7	7 ♥	7 ♦	7 ♣	7 ♠
	6	6 ♥	6 ♦	6 ♣	6 ♠
	5	5 ♥	5 ♦	5 ♣	5 ♠
	4	4 ♥	4 ♦	4 ♣	4 ♠
	3	3 ♥	3 ♦	3 ♣	3 ♠
	2	2 ♥	2 ♦	2 ♣	2 ♠
	A	A ♥	A ♦	A ♣	A ♠

Sample space of a die:
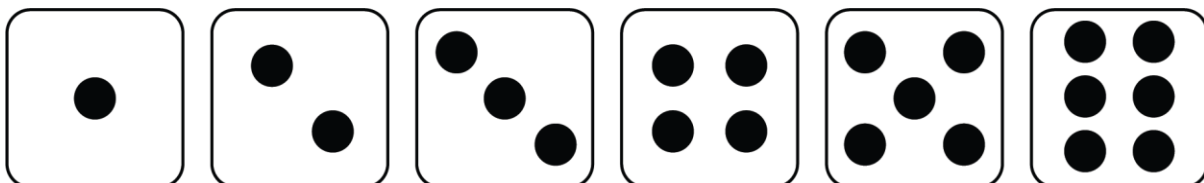
Sample space of two die:

Die	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

COMPETENCY BASED QUESTIONS
Multiple Choice Questions (MCQ)

Q1. When 9 fair coins are tossed simultaneously, what is the total number of possible outcomes?
a) 9   **b)** 5   **c)** 512   **d)** 81

Q2. In a lot of 500 chocolates, the probability of having a caramel-filled chocolate is 0.08. What is the expected number of caramel-filled chocolates in the lot?
a) 40   **b)** 50   **c)** 60   **d)** 80

Q3. The probability of a non-leap year having 53 Mondays is?
a) 2/7   **b)** 1/7   **c)** 3/7   **d)** 1/3

Q4. If P(**e**) = 0.13, then what is the probability of 'not E'?
a) 0.03   **b)** 0.8   **c)** 1.13   **d)** 0.87

Q5. A badminton club has 40 members, 12 from group X, 15 from group Y, 8 from group Z and 5 from group W. A single member is selected at random to be the president. The probability that the member is from X or Z is?
a) 1/2   **b)** 3/10   **c)** 1/5   **d)** 2/5

Q6. Which of the following cannot be the probability of an event?
a) 1.2   **b)** 3/7   **c)** 35%   **d)** 0.003

Q7. Consider the collection of points (a, **b)** in the coordinate plane such that a and b are integers such that $-5 \leq a \leq 5$ and $-5 \leq b \leq 5$. A point is selected at random from the collection. What is the probability the selected point is at a distance of at most 2 units from the origin?
a) 11/100   **b)** 13/100   **c)** 11/121   **d)** 13/121

Q8. If a card is selected from a deck of 52 cards, then the probability of its being a red face card is,
a) 5/52   **b)** 6/26   **c)** 3/26   **d)** 6/51

Q9. Two dice are thrown together. The probability that sums of the two numbers will be a multiple of 4, is,

a) 1/4   **b)** 8/36   **c)** 5/36   **d)** 3/4

Q10. On a single roll of a die, the probability of getting a number 8 is

a) 0.4   **b)** 0.5   **c)** 1   **d)** 0

Q11. Two unbiased coin are tossed simultaneously then the probability of getting head is A/B, then A^2-B^2 is equal to

a) -7   **b)** 7   **c)** 8   **d)** 9

Assertion and Reasoning Question

Q12. Assertion(A): The probability of getting at least one head when flipping two fair coins is 3/4.

Reason(R): When flipping two fair coins, there are four equally likely outcomes: HH, HT, TH, and TT. Out of these four outcomes, two of them have at least one head (HH, HT). Therefore, the probability of getting at least one head is 2 out of 4, which simplifies to 1/2.

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (**A**) is false but Reason (R) is true

Q13. Assertion(A): The probability of winning a game is 0.4, then the probability of losing it, is 0.6.

Reason(R): P(e) + P (not E) = 1

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (**A**) is false but Reason (R) is true

Q14. Assertion(A): If a fair six-sided die is thrown, the probability of getting a number less than 4 and greater than 2 is 1/3.

Reason(R): There are one favourable outcome (numbers 3) out of the six possible outcomes (numbers 1 through 6) when throwing a fair six-sided die. Therefore, the probability of getting a number less than 4 and greater than 2 is 1 out of 6, which simplifies to 1/6.

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).

(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (**A**) is false but Reason (R) is true

Q15. Assertion (A): If a pair of dice is thrown once, then the probability of getting a sum of 9 is 4/36.

Reason(R): In a simultaneous toss of two coins, the probability of getting exactly one head is 1/2.

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).

(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (**A**) is false but Reason (R) is true

Q16. Assertion(A): Card numbered as 1, 2, 3……………15 are put in a box and mixed thoroughly, one card is then drawn at random. The probability of drawing an odd number is 7/15.

Reason(R): For any event E, we have $0 \leq P(e) \leq 1$

(a) Both Assertion (**A**) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).

(b) Both Assertion (A) and Reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (**A**) is false but Reason (R) is true

Case Based Questions

Case Study 1:

Q17. Airplane Meal Service

On a given day, an airplane is carrying 78 meals, of which 39 are vegetarian and the rest are non-vegetarian. If the air hostess started distributing the meals.

(i) What is the probability that the first meal picked by the air hostess is vegetarian?
a) 1/2   **b)** 38/78   **c)** 39/117   **d)** 1/3

(ii) If the first passenger is randomly served a vegetarian meal, what is the probability that the next meal served to another passenger will be non-vegetarian?
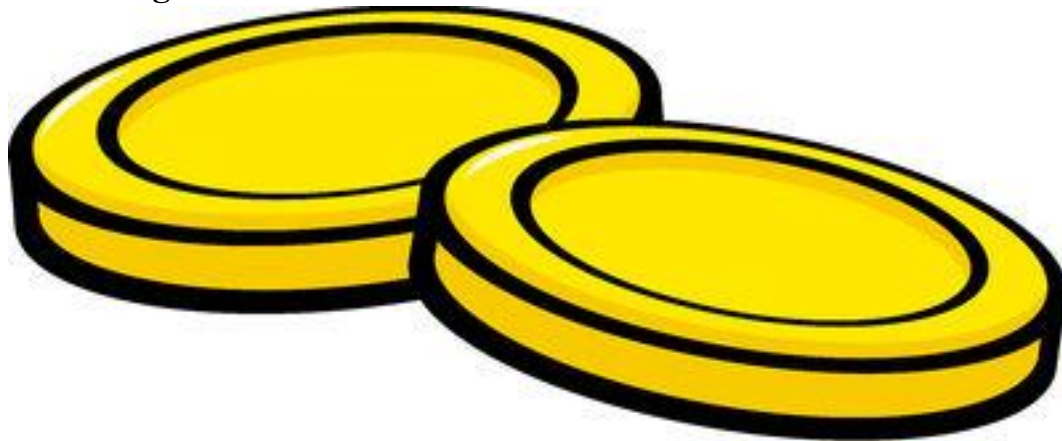**a)** 1/2   **b)** 39/77   **c)** 39/78   **d)** None of this

(iii) What is the probability that the 10th meal served will be vegetarian?
a) 80%   **b)** 20%   **c)** 50%   **d)** 70%

Case Study 2:

Q18. Friend's game

Farah and Sheena are playing a game with number tokens. Each of them has four number tokens, 2, 3, 4 and 5. A token is randomly picked by each of them from their stack simultaneously. If the sum of the numbers picked by each of them is a prime number, Farah wins the game and if it is a composite number, then Sheena wins the Game

(i) What is the probability that Farah wins the game when each player randomly selects a number token from their stack simultaneously?
a)1/4   **b)** 1/2   **c)** 3/16   **d)** 5/8

(ii) If Farah and Sheena each randomly select a number token from their stack simultaneously, what is the probability that the sum of the numbers picked is an even number?
a) 1/2   **b)** 3/8   **c)** 7/16   **d)** 9/16

Q19. Game of Coloured cards

Ravinder is excited to play some coloured cards which grandfather has given to him. Grandfather wanted to teach Ravinder about the wonderful world of probability and chances so, he tells Ravinder how to play the cards. He told him to select any coloured card or cards from the box and then calculate the chances of getting that specific card.

The pack of coloured card has 7 orange cards, 5 blue cards, 6 red cards and 2 black cards.

(i) The probability of getting orange and blue cards is
a) 2/5   **b)** 3/5   **c)** 4/5   **d)** 1/5

(ii) The probability of getting yellow coloured card.
a) 0   **b)** 2   **c)** 1   **d)** 3

(iii) The probability of getting a red and black card is
a) 3/5   **b)** 1/5   **c)** 4/5   **d)** 2/5

(iv) The probability of getting blue and red card is
a) more than probability of getting orange card_____
b) less than the probability of getting black card
c) equal to probability of drawing orange and black cards
d) none of these

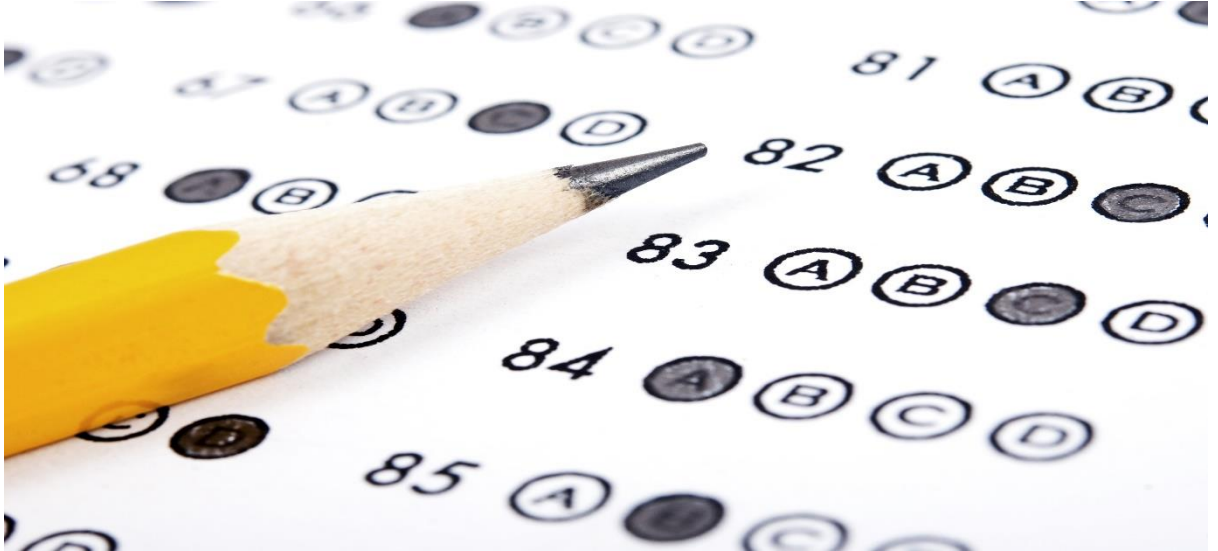**(v)** P(**e**) + P($\overline{E}$) =
a) 0   **b)** 2   **c)** 1   **d)** -1

Case study 4:

Q20. MCQ test

After completion of the syllabus for subject teacher conducted a test in the form of 50 multiple-choice question each question containing four choices one of which is correct. This test conducted to assess the understanding of the subject.

Rachit appeared for the test. He either guesses or copies or knows the answer to a question. He knows the answer to 50% of the questions, he guesses the answer of 15 question and copies the answer of remaining questions.

(i) What is the probability that he knows the answer of a question?
(a) 1/3   **(b)** 3/5   **(c)** 3/10   **(d)** 1/2

(ii) What is the probability that Rachit guesses the answer of a question?
a) 1/2   **b)** 1/4   **c)** 3/10   **d)** 3/5

(iii) What is the probability that Rachit copies the answer of a question?
a) 1/4   **b)** 1/3   **c)** 1/5   **d)** 2/3

(iv) If Rachit guesses the answer of the question, what is the probability that his answer is correct?
a) 1/2   **b)** 1/4   **c)** 3/10   **d)** 3/5

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## Solutions

Q1. **c)** $2^9 = 512$

Q2. **a)** The expected number of caramel-filled chocolates = Probability of getting a caramel-filled chocolate * Total number of chocolates= 0.08 * 500

Q3. **b)** 365/7 = 52 weeks and remainder = 1, So it may one of any seven days so the Probability of Monday is 1/7.

Q4. **d)** 1-0.13 = 0.87

Q5. **a)** The number of members in groups X and Z is 12 + 8 = 20. The total number of members is 40. So, the probability of selecting a member from X or Z is 20/40 = 1/2.

Q6. **a)** Probability can never greater than 1.
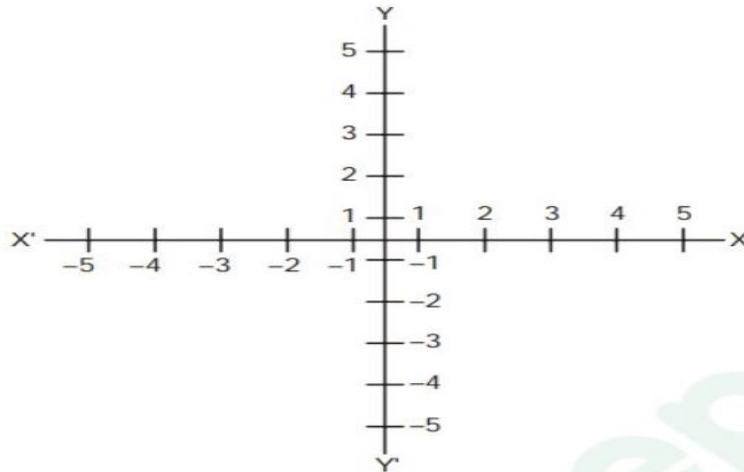
Q7. **d)**
  Total possible point= 11 x 11 = 121
  Favourable point =Total favourable points= 13
  Probability 13/121

Q8. **(c)** Favourable outcome = 2 red suits * 3 face cards = 6

  Total outcome = 52, Thus probability is 6/52=3/26

Q9. **(a)** Favourable outcomes (check the sample space) = 9 and total outcomes = 36

Q10. **(d)** 0 since 8 is not possible.

Q11. **(a)** the sample space = 4, the favourable outcome = 3 therefore $\frac{A}{B} = \frac{3}{4}$
  A = 3, B = 4 therefore, $3^2 - 4^2 = 9 - 16 = -7$.

Q12. **(c)**   Q13. **(a)**   Q14. **(d)**   Q15. **(b)**   Q16. **(d)**

Q17. **(i) (a)** The probability of a meal to be vegetarian is 39/78 = 1/2
  (ii) (b) The probability of next meal to be non-vegetarian is 39/77 since only 77 meals are left in the stock.
  (iii) (c) The probability of the 10th meal being vegetarian is the same as the probability of any meal being vegetarian, which is 50%.

Q18. **(i) (c)** 3/16 Since, total times when the sum is prime number is 3. Therefore, favourable outcomes = 3.

Since both players select from 4 tokens in the game then Total outcomes = 4*4 = 16.

(ii) (a) Favourable outcome for sum of the token number is even = 8

Therefore probability is 8/16 = 1/2.

Q19. **(i)** b   **(ii)** a   **(iii)** d   **(iv)** a   **(v)** c

Q20. **(i)** d   **(ii)** c   **(iii)** c   **(iv)** b

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