DEPARTMENT OF SCHOOL EDUCATION, VILLUPURAM DISTRICT.

10 MATHS

QUESTION BANK

Best Wishes

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STAGE - 1

Chapter 4 - Geometry

Stage 1 - 8 Marks

1. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle PQR (scale factor $\frac{3}{5} < 1$)
2. Cons Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{4}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{4} > 1$)
3. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{2}{3} < 1$).
4. Construct a triangle similar to a given triangle LMN with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle LMN (scale factor $\frac{4}{5} < 1$).
5. Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC (scale factor $\frac{6}{5} > 1$).
6. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3} > 1$).
7. Draw a circle of radius 3 cm. Take a point P on this circle and draw a tangent at P.
8. Draw a circle of radius 4 cm. At a point L on it draw a tangent to the circle using the alternate segment.
9. Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.
10. Draw a circle of radius 4.5 cm. Take a point on the circle. Draw the tangent at that point using the alternate segment theorem.
11. Draw a circle of radius 4.5 cm. Take a point on the circle. Draw the tangent at that point using the alternate segment theorem.
12. Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also, measure the lengths of the tangents.
13. Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from that point.
14. Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also, measure the lengths of the tangents.
15. Draw a tangent to the circle from the point P having radius 3.6cm, and centre at O. Point P is at a distance 7.2 cm from the centre.
16. Construct a ΔPQR in which PQ = 8 cm, R = 60° and the median RG from R to PQ is 5.8 cm. Find the length of the altitude from R to PQ.
17. Construct a triangle ΔPQR such that QR = 5 cm, $\angle P = 30°$ and the altitude from P to QR is of length 4.2 cm.
18. Draw a triangle ABC of base BC = 8 cm, A = 60° and the bisector of $\angle A$ meets BC at D such that BD = 6 cm.
19. Construct a ΔPQR in which QR = 5 cm, P = 40° and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR.
20. Construct a ΔPQR such that QR = 6.5 cm, P = 60° and the altitude from P to QR is of length 4.5 cm.

21. Construct a ΔABC such that AB = 5.5 cm, C = 25° and the altitude from C to AB is 4 cm.

22. Draw a triangle ABC of base BC = 5.6 cm, A = 40° and the bisector of ∠A meets BC at D such that CD = 4 cm.

23. Draw ΔPQR such that PQ = 6.8 cm, vertical angle is 50° and the bisector of the vertical angle meets the base at D where PD = 5.2 cm.

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Chapter 4 - Graph

Stage 1 - 8 Marks

1. Varshika drew 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference of each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6 cm.

Diameter (x) cm	1	2	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

2. A bus is travelling at a uniform speed of 50 km/hr. Draw the distance-time graph and hence find
   (i) the constant of variation
   (ii) how far will it travel in 1½ hr
   (iii) the time required to cover a distance of 300 km from the graph.

3. A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

   (i) Graph the above data and identify the type of variation.
   (ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?
   (iii) If the work has to be completed by 30 days, how many workers are required?

4. Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Ponmozhi, Jeyanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively. Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr.

5. A garment shop announces a flat 50% discount on every purchase of items for their customers. Draw the graph for the relation between the Marked Price and the Discount. Hence find
   (i) the marked price when a customer gets a discount of ₹ 3250 (from graph)
   (ii) the discount when the marked price is ₹ 2500

6. Draw the graph of $xy = 24$, x, $y > 0$. Using the graph find,
   (i) y when $x = 3$ and (ii) x when $y = 6$.

7. Graph the following linear function $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also (i) find y when $x = 9$ (ii) find x when $y = 7.5$.

8. The following table shows the data about the number of pipes and the time taken to till the same tank.

No. of pipes (x)	2	3	6	9
Time Taken (in min) (y)	45	30	15	10

   Draw the graph for the above data and hence
   (i) Find the time taken to fill the tank when five pipes are used
   (ii) Find the number of pipes when the time is 9 minutes.

9. A school announces that for a certain competitions, the cash price will be distributed for all the participants equally as show below

No. of participants (x)	2	4	6	8	10
Amount for each participant in ₹ (y)	180	90	60	45	36

   (i) Find the constant of variation.
   (ii) Graph the above data and hence, find how much will each participant get if the number of participants are 12.

10. A two wheeler parking zone near bus stand charges as below.

Time (in hours) (x)	4	8	12	24
Amount ₹ (y)	60	120	180	360

Check if the amount charged are in direct variation or in inverse variation to the parking time. Graph the data. Also (i) find the amount to be paid when parking time is 6 hr; (ii) find the parking duration when the amount paid is ₹150.

11. Discuss the nature of solutions of the following quadratic equations.
(i) $x^2 + x - 12 = 0$
(ii) $x^2 - 8x + 16 = 0$
(iii) $x^2 + 2x + 5 = 0$

12. Graph the following quadratic equations and state their nature of solutions.
(i) $x^2 - 9x + 20 = 0$ (ii) $x^2 - 4x + 4 = 0$
(iii) $x^2 + x + 7 = 0$ (iv) $x^2 - 9 = 0$
(v) $x^2 - 6x + 9 = 0$ (vi) $(2x - 3)(x + 2) = 0$

13. Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.

14. Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$

15. Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$

16. Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$

17. Draw the graph of $y = x^2 + 4x + 3$ and hence find the roots of $x^2 + x + 1 = 0$

18. Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$

19. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$

20. Draw the graph of $y = x^2 + x$ and hence solve $x^2 + 1 = 0$

21. Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$

22. Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$

23. Draw the graph of $y = (x - 1)(x + 3)$ and hence solve $x^2 - x - 6 = 0$

Chapter 1 - Relations and Functions

Stage: 1 - 2 Marks

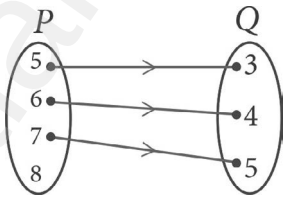
1. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B.

2. Find $A \times B$, $A \times A$ and $B \times A$
i) $A = \{2, -2, 3\}$ and $B = \{1, -4\}$
ii) $A = B = \{p, q\}$
iii) $A = \{m, n\}$; $B = f$

3. Let $A = \{1, 2, 3\}$ and $B = \{x \mid x$ is a prime number less than $10\}$. Find $A \times B$ and $B \times A$.

4. If $B \times A = \{(-2, 3), (-2, 4), (0, 3), (0, 4), (3, 3), (3, 4)\}$ find A and B.

5. The arrow diagram shows a relationship between the sets P and Q. Write the relation in



(i) Set builder form
(ii) Roster form
(iii) What is the domain and range of R.

6. Let $X = \{1, 2, 3, 4\}$ and $Y = \{2, 4, 6, 8, 10\}$ and $R = \{(1, 2), (2, 4), (3, 6), (4, 8)\}$. Show that R is a function and find its domain, co-domain and range?

7. Let $A = \{1, 2, 3, 4, ..., 45\}$ and R be the relation defined as "is square of a number" on A. Write R as a subset of $A \times A$. Also, find the domain and range of R.

8. A Relation R is given by the set $\{(x, y) / y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range.

9. Given the function $f: x \to x^2 - 5x + 6$, evaluate (i) $f(-1)$ (ii) $f(2a)$ (iii) $f(2)$ (iv) $f(x - 1)$

10. A function f is defined by $f(x) = 3 - 2x$. Find x such that $f(x^2) = (f(x))^2$.

11. Let $A = \{1, 2, 3, 4\}$ and $B = N$.
Let $f: A \to B$ be defined by $f(x) = x^3$ then, (i) find the range of f (ii) identify the type of function.

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Chapter 1 - Relations and Functions

Stage: 1 - 5 Marks

1. If A = {1, 3, 5} and B = {2, 3} then
   (i) Find A×B and B×A.
   (ii) Is A×B = B×A? If not why?
   (iii) Show that n(A×B) = n(B×A) = n(A)× n(B)

2. Let A = $\{x \in N \mid 1 < x < 4\}$, B = $\{x \in W \mid 0 \le x < 2\}$ and C = $\{x \in N \mid x < 3\}$. Then verify that
   (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
   (ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

3. If A = {5, 6}, B = {4, 5, 6}, C = {5, 6, 7}, Show that $A \times A = (B \times B) \cap (C \times C)$.

4. Given A = {1, 2, 3}, B = {2, 3, 5}, C = {3, 4} and D = {1, 3, 5}, check if $(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$ is true?

5. Let A = $\{x \in W \mid x < 2\}$, B = $\{x \in N \mid 1 < x \le 4\}$ and C = {3, 5}. Verify that
   (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
   (ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
   (iii) $(A \cup B) \times C = (A \times C) \cup (B \times C)$

6. Let A = The set of all natural numbers less than 8, B = The set of all prime numbers less than 8, C = The set of even prime number. Verify that
   (i) $(A \cap B) \times C = (A \times C) \cap (B \times C)$
   (ii) $A \times (B - C) = (A \times B) - (A \times C)$

7. Let A = {3, 4, 7, 8} and B = {1, 7, 10}. Which of the following sets are relations from A to B?
   (i) $R_1 = \{(3, 7), (4, 7), (7, 10), (8, 1)\}$
   (ii) $R_2 = \{(3, 1), (4, 12)\}$
   (iii) $R_3 = \{(3, 7), (4, 10), (7, 7), (7, 8), (8, 11), (8, 7), (8, 10)\}$

8. Let A = {1, 2, 3, 7} and B = {3, 0, –1, 7}, which of the following are relation from A to B ?
   (i) $R_1 = \{(2, 1), (7, 1)\}$ (ii) $R_2 = \{(-1, 1)\}$
   (iii) $R_3 = \{(2, -1), (7, 7), (1, 3)\}$
   (iv) $R_4 = \{(7, -1), (0, 3), (3, 3), (0, 7)\}$

9. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible.
   (i) $\{(x, y) \mid x = 2y, x \in \{2, 3, 4, 5\}, y \in \{1, 2, 3, 4\}$
   (ii) $\{(x, y) \mid y = x + 3$, x, y are natural numbers $< 10\}$

10. A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide ₹ 10,000, ₹ 25,000, ₹ 50,000 and ₹ 1,00,000 as salaries to the people who work in the categories A, C, M and E respectively. If A_1, A_2, A_3, A_4 and A_5 were Assistants; C_1, C_2, C_3, C_4 were Clerks; M_1, M_2, M_3 were managers and E_1, E_2 were Executive officers and if the relation R is defined by xRy, where x is the salary given to person y, express the relation R through an ordered pair and an arrow diagram.

11. Let A = {1, 2, 3, 4} and B = {2, 5, 8, 11, 14} be two sets. Let $f : A \to B$ be a function given by $f(x) = 3x - 1$. Represent this function
   (i) by arrow diagram
   (ii) in a table form
   (iii) as a set of ordered pairs
   (iv) in a graphical form

12. Let f be a function $f : N \to N$ be defined by $f(x) = 3x + 2, x \in N$
   (i) Find the images of 1, 2, 3
   (ii) Find the pre-images of 29, 53
   (iii) Identify the type of function

13. Let $f : A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$ where A = {2, 4, 6, 10, 12}, B = {0, 1, 2, 4, 5, 9} . Represent f by
   i) set of ordered pairs ii) a table
   iii) an arrow diagram iv) a graph

14. Represent the function
   f = {(1, 2), (2, 2), (3, 2), (4, 3), (5, 4)} through
   (i) an arrow diagram
   (ii) a table form
   (iii) a graph

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Chapter 2 - Numbers and Sequences

Stage: 1 - 2 Marks

1. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.
2. Find the HCF of 252525 and 363636.
3. If $13824 = 2^a \times 3^b$ then find a and b.
4. Find the LCM and HCF of 408 and 170 by applying the fundamental theorem of arithmetic.
5. The general term of a sequence is defined as
$$a_n = \begin{cases} n(n+3);\ n \in N \text{ is odd} \\ n^2+1\ ;\ n \in N \text{ is even} \end{cases}$$
Find the eleventh and eighteenth terms.
6. Find the indicated terms of the sequences whose n^{th} terms are given by
(i) $a_n = \frac{5n}{n+2}$; a_6 and a_{13}
(ii) $a_n = -(n^2 - 4)$; a_4 and a_{11}
7. Find a_8 and a_{15} whose nth term is
$$a_n = \begin{cases} \frac{n^2-1}{n+3} & ;n \text{ is even},\quad n \in N \\ \frac{n^2}{2n+1} & ;n \text{ is odd},\quad n \in N \end{cases}$$
8. Find the 19th term of an A.P. –11, –15, –19, ...
9. Which term of an A.P. 16, 11, 6, 1,... is –54 ?
10. Find the middle term(s) of an A.P. 9, 15, 21, 27, …, 183.
11. If 3 + k, 18 – k, 5k + 1 are in A.P. then find k.
12. In a theatre, there are 20 seats in the front row and 30 rows were allotted. Each successive row contains two additional seats than its front row. How many seats are there in the last row?
13. Write an A.P. whose first term is 20 and common difference is 8.
14. Find the number of terms in the A.P. 3, 6, 9, 12, …, 111.
15. Write the first three terms of the G.P. whose first term and the common ratio are given below.
(i) a = 6, r = 3
(ii) $a = \sqrt{2}$, $r = \sqrt{2}$
(iii) a = 1000, $r = \frac{2}{5}$
16. In a G.P. 729, 243, 81, … find t_7 .
17. Find x so that $x + 6$, $x + 12$ and $x + 15$ are consecutive terms of a Geometric Progression.
18. Find the number of terms in the following G.P.
(i) 4, 8, 16, ..., 8192?
(ii) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots, \frac{1}{2187}$
19. In a G.P. the 9^{th} term is 32805 and 6^{th} term is 1215. Find the 12^{th} term.
20. Find the first term of a G.P. in which $S_6 = 4095$ and r = 4.
21. Find the value of 1 + 2 + 3 + ... + 50
22. Find the sum of the following series
1 + 2 + 3 + ... + 60
23. Find the sum of
(i) 1 + 3 + 5 + ... to 40 terms
(ii) 2 + 4 + 6 + ... 80
(iii) 1 + 3 + 5 + ... + 55
24. Find the sum of
(i) $1^2 + 2^2 + ... + 19^2$
(ii) $5^2 + 10^2 + 15^2 + ... + 105^2$
25. Find the sum of $1^3 + 2^3 + 3^3 + ... + 16^3$
26. If 1 + 2 + 3 + ... + n = 666 then find n.
27. If 1 + 2 + 3 + ... + k = 325 , then find $1^3 + 2^3 + 3^3 + ... + k^3$.
28. If $1^3 + 2^3 + 3^3 + ... + k^3 = 44100$ then find 1 + 2 + 3 + ... + k.
29. How many terms of the series $1^3 + 2^3 + 3^3 + ...$ should be taken to get the sum 14400?

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Chapter 2 - Numbers and Sequences

Stage: 1 - 5 Marks

1. If $p_1^{x_1} \times p_2^{x_2} \times p_3^{x_3} \times p_4^{x_4} = 113400$ where p_1, p_2, p_3, p_4 are primes in ascending order and x_1, x_2, x_3, x_4 are integers, find the value of p_1, p_2, p_3, p_4 and x_1, x_2, x_3, x_4
2. If $a_1 = 1$, $a_2 = 1$ and $a_n = 2a_{n-1} + a_{n-2}$ $n \geq 3$, $n \in N$, then find the first six terms of the sequence.
3. Find x, y and z, given that the numbers x, 10, y, 24, z are in A.P.
4. Find the sum to n terms of the series $5 + 55 + 555 + ...$
5. Find the sum to n terms of the series
   (i) $0.4 + 0.44 + 0.444 + ...$ to n terms
   (ii) $3 + 33 + 333 + ...$ to n terms
6. Find the sum of the Geometric series $3 + 6 + 12 + ... + 1536$
7. Find the value of $16 + 17 + 18 + ... + 75$
8. Find the sum of $9^3 + 10^3 + ... + 21^3$
9. Find the sum of the following series
   (i) $6^2 + 7^2 + 8^2 + ... + 21^2$
   (ii) $10^3 + 11^3 + 12^3 + ... + 20^3$
10. The sum of the cubes of the first n natural numbers is 2025, then find the value of n.
11. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm, ..., 24 cm. How much area can be decorated with these colour papers?
12. Find the sum of $15^2 + 16^2 + 17^2 + ... + 28^2$

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Chapter 3 - Algebra

Stage: 1 - 2 Marks

1. Find the LCM of the given polynomials
   (i) $4x^2y$, $8x^3y^2$
   (ii) $9a^3b^2$, $12a^2b^2c$
   (iii) $16m$, $12m^2n^2$, $8n^2$
   (iv) $p^2 - 3p + 2$, $p^2 - 4$
   (v) $2x^2 - 5x - 3$, $4x^2 - 36$
   (vi) $(2x^2 - 3xy)^2$, $(4x - 6y)^3$, $8x^3 - 27y^3$
2. Simplify:
   i) $\frac{4x^2y}{2z^2} \times \frac{6xz^3}{20y^4}$
   ii) $\frac{p^2 - 10p + 21}{p - 7} \times \frac{p^2 + p - 12}{(p-3)^2}$
   iii) $\frac{5t^3}{4t - 8} \times \frac{6t - 12}{10t}$
3. Simplify: $\frac{x^3}{x - y} + \frac{y^3}{y - x}$
4. Find the excluded values of the following expressions (if any).
   i) $\frac{x + 10}{8x}$ ii) $\frac{7p + 2}{8p^2 + 13p + 5}$
5. Find the excluded values, if any of the following expressions.
   i) $\frac{y}{y^2 - 25}$ ii) $\frac{t}{t^2 - 5t + 6}$
   iii) $\frac{x^2 + 6x + 8}{x^2 + x - 2}$ iv) $\frac{x^3 - 27}{x^3 + x^2 - 6x}$
6. Find the square root of the following rational expression.
   $\frac{400x^4y^{12}z^{16}}{100x^8y^4z^4}$
7. Find the square root of the following expressions
   i) $256(x - a)^8(x - b)^4(x - c)^{16}(x - d)^{20}$
   ii) $\frac{144a^8b^{12}c^{16}}{81f^{12}g^4h^{14}}$
8. Find the square root of the following rational expression.
   $\frac{121(a+b)^8(x+y)^8(b-c)^8}{81(b-c)^4(a-b)^{12}(b-c)^4}$

9. Determine the quadratic equations, whose sum and product of roots are
   (i) –9, 20 (ii) $\frac{5}{3}$, 4

10. Find the sum and product of the roots for each of the following quadratic equations
    (i) $x^2 + 3x - 28 = 0$ (ii) $x^2 + 3x = 0$

11. In the matrix A = $\begin{pmatrix} 8 & 9 & 4 & 3 \\ -1 & \sqrt{7} & \frac{\sqrt{3}}{2} & 5 \\ 1 & 4 & 3 & 0 \\ 6 & 8 & -11 & 1 \end{pmatrix}$, write
    (i) The number of elements
    (ii) The order of the matrix
    (iii) Write the elements a_{22}, a_{23}, a_{24}, a_{34}, a_{43}, a_{44}.

12. If a matrix has 18 elements, what are the possible orders it can have? What if it has 6 elements?

13. Construct a 3×3 matrix whose elements are given by
    (i) $a_{ij} = i - 2j$ (ii) $a_{ij} = \frac{(i+j)^3}{3}$

14. Construct a 3×3 matrix whose elements are $a_{ij} = i^2j^2$

15. If A = $\begin{pmatrix} 5 & 4 & 3 \\ 1 & -7 & 9 \\ 3 & 8 & 2 \end{pmatrix}$ then find the transpose of A.

16. If A = $\begin{pmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{pmatrix}$ then find the transpose of –A.

17. If A = $\begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$ then verify $(A^T)^T = A$

18. Find the values of x, y and z from the following equations
    (i) $\begin{pmatrix} 12 & 3 \\ x & 5 \end{pmatrix} = \begin{pmatrix} y & z \\ 3 & 5 \end{pmatrix}$
    (ii) $\begin{pmatrix} x+y & 2 \\ 5+z & xy \end{pmatrix} = \begin{pmatrix} 6 & 2 \\ 5 & 8 \end{pmatrix}$
    (iii) $\begin{pmatrix} x+y+z \\ x+z \\ y+z \end{pmatrix} = \begin{pmatrix} 9 \\ 5 \\ 7 \end{pmatrix}$

19. If A = $\begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}$, B = $\begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$ then Find 2A + B.

20. If A = $\begin{pmatrix} 5 & 4 & -2 \\ \frac{1}{2} & \frac{3}{4} & \sqrt{2} \\ 1 & 9 & 4 \end{pmatrix}$, B = $\begin{pmatrix} -7 & 4 & -3 \\ \frac{1}{4} & \frac{7}{2} & 3 \\ 5 & -6 & 9 \end{pmatrix}$, find 4A–3B.

21. If A = $\begin{pmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{pmatrix}$, B = $\begin{pmatrix} 5 & 7 \\ 3 & 3 \\ 1 & 0 \end{pmatrix}$ then verify that (i) A+B = B +A
    (ii) A+(−A) = (−A)+A =O.

22. If A = $\begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$, B = $\begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ find the value of (i) B – 5A (ii) 3A – 9B

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Chapter 3 - Algebra

Stage: 1 - 5 Marks

1. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$

2. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of a and b.

3. Find the square root of the following polynomials by division method
   i. $x^4 - 12x^3 + 42x^2 - 36x + 9$
   ii. $37x^2 - 28x^3 + 4x^4 + 42x + 9$
   iii. $16x^4 + 8x^2 + 1$
   iv. $121x^4 - 198x^3 - 183x^2 + 216x + 144$

4. Find the values of a and b if the following polynomials are perfect squares
   i. $4x^4 - 12x^3 + 37x^2 + bx + a$
   ii. $ax^4 + bx^3 + 361x^2 + 220x + 100$

5. Find the values of m and n if the following polynomials are perfect squares
   i. $36x^4 - 60x^3 + 61x^2 - mx + n$
   ii. $x^4 - 8x^3 + mx^2 + nx + 16$

6. If $A = \begin{pmatrix} 4 & 3 & 1 \\ 2 & 3 & -8 \\ 1 & 0 & -4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 3 & 4 \\ 1 & 9 & 2 \\ -7 & 1 & -1 \end{pmatrix}$ and $C = \begin{pmatrix} 8 & 3 & 4 \\ 1 & -2 & 3 \\ 2 & 4 & -1 \end{pmatrix}$ then verify that $A + (B + C) = (A + B) + C$.

7. If $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 \\ -4 & 2 \end{pmatrix}$, $C = \begin{pmatrix} -7 & 6 \\ 3 & 2 \end{pmatrix}$ verify that $A(B + C) = AB + AC$.

8. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ show that $(AB)^T = B^T A^T$

9. Given that $A = \begin{pmatrix} 1 & 3 \\ 5 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -1 & 2 \\ 3 & 5 & 2 \end{pmatrix}$, $C = \begin{pmatrix} 1 & 3 & 2 \\ -4 & 1 & 3 \end{pmatrix}$ verify that $A(B + C) = AB + AC$.

10. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$

11. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

***

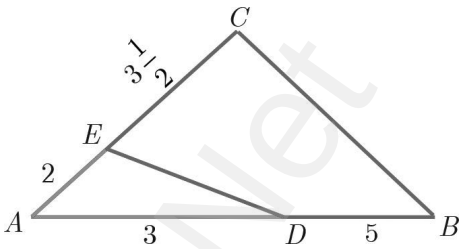
Chapter 4 - Geometry

Stage: 1 - 2 Marks

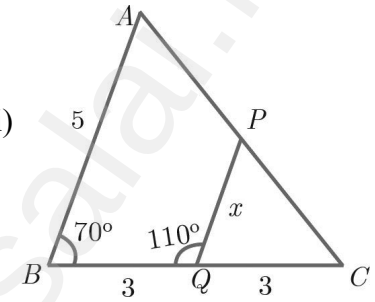
1. If ΔABC is similar to ΔDEF such that BC = 3 cm, EF= 4 cm and area of ΔABC = 54 cm^2. Find the area of ΔDEF.

2. Check whether the which triangles are similar and find the value of x.

i)



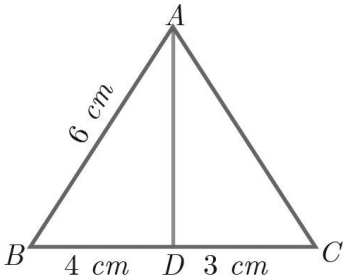
ii)



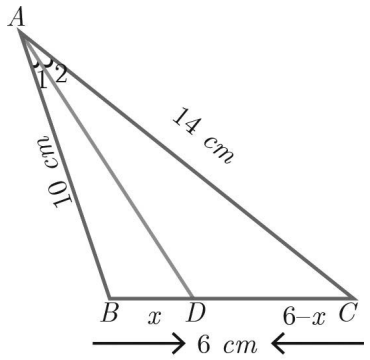
3. If $\Delta ABC \sim \Delta DEF$ such that area of ΔABC is 9 cm^2 and the area of ΔDEF is 16 cm^2 and BC = 2.1 cm. Find the length of EF.

4. D and E are respectively the points on the sides AB and AC of a ΔABC such that AB = 5.6 cm, AD = 1.4 cm, AC = 7.2 cm and AE = 1.8 cm, show that DE || BC .

5. In the Figure, AD is the bisector of $\angle A$. If BD = 4 cm, DC = 3 cm and AB = 6 cm, find AC.



6. In the Figure, AD is the bisector of ∠BAC, if AB = 10 cm, AC = 14 cm and BC = 6 cm. Find BD and DC.



7. In ΔABC, D and E are points on the sides AB and AC respectively such that DE || BC
   (i) If $\frac{AD}{DB} = \frac{3}{4}$ and AC = 15 cm find AE.
   (ii) If AD = 8x − 7, DB = 5x − 3, AE = 4x − 3 and EC = 3x − 1, find the value of x.

8. In ΔABC, D and E are points on the sides AB and AC respectively. For each of the following cases show that DE || BC.
   (i) AB = 12 cm, AD = 8 cm, AE = 12 cm and AC = 18 cm.
   (ii) AB = 5.6 cm, AD = 1.4 cm, AC = 7.2 cm and AE = 1.8 cm.

9. Check whether AD is bisector of ∠A of ΔABC in each of the following
   (i) AB = 5 cm, AC = 10 cm, BD= 1.5 cm and CD= 3.5 cm.
   (ii) AB= 4 cm, AC = 6 cm, BD = 1.6 cm and CD= 2.4 cm.

***

Chapter 4 - Geometry

Stage: 1 - 5 Marks

1. State and Prove Basic Proportionality Theorem (BPT) or Thales Theorem.
2. State and Prove Angle Bisector Theorem.
3. State and Prove Pythagoras Theorem.
4. Show that in a triangle, the medians are concurrent.

***

Chapter 5 - Coordinate Geometry

Stage: 1 - 2 Marks

1. Find the area of the triangle whose vertices are (–3, 5), (5, 6) and (5, –2).
2. Show that the points P (–1.5, 3), Q (6, –2), R (–3, 4) are collinear.
3. If the area of the triangle formed by the vertices A (–1, 2), B (*k*, –2) and C (7, 4) (taken in order) is 22 sq. units, find the value of *k*.
4. Find the area of the triangle formed by the points (i) (1, –1), (–4, 6) and (–3, –5)
   (ii) (ii) (–10, –4), (–8, –1) and (–3, –5)
5. Determine whether the sets of points are collinear?
   (i) $\left(-\frac{1}{2}, 3\right)$ (–5, 6) and (–8, 8)
   (ii) (a, b+c), (b, c+a) and (c, a+b)
6. Vertices of given triangles are taken in order and their areas are provided aside. In each case, find the value of 'p'.

S.No.	Vertices	Area (sq.units)
(i)	(0, 0), (p, 8), (6, 2)	20
(ii)	(p, p), (5, 6), (5, –2)	32

7. In each of the following, find the value of '*a*' for which the given points are collinear.
   (i) (2, 3), (4, a) and (6, –3)
   (ii) (a, 2–2a), (–a+1, 2a) and (–4–a, 6–2a)

***

Chapter 5 - Coordinate Geometry

Stage: 1 - 5 Marks

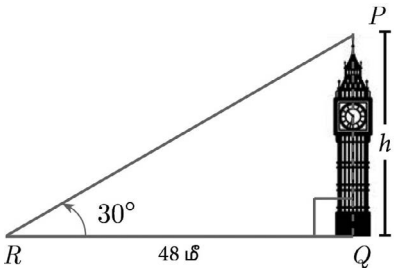
1. The floor of a hall is covered with identical tiles which are in the shapes of triangles. One such triangle has the vertices at (–3, 2), (–1, –1) and (1, 2). If the floor of the hall is completely covered by 110 tiles, find the area of the floor.
2. Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (–5, 12) and (–4, 3)..
3. The given diagram shows a plan for constructing a new parking lot at a campus. It is estimated that such construction would cost ₹ 1300 per square feet. What will be the total cost for making the parking lot?
4. Find the area of the quadrilateral whose vertices are at
   (i) (–9, –2), (–8, –4), (2, 2) and (1, –3)
   (ii) (–9, 0), (–8, 6), (–1, –2) and (–6, –3)
5. Find the value of k, if the area of a quadrilateral is 28 sq.units, whose vertices are (–4, –2), (–3, k), (3, –2) and (2, 3)
6. If the points A (–3, 9), B (a, b) and C (4, –5) are collinear and if a + b = 1, then find a and b.
7. A triangular shaped glass with vertices at A (–5, –4) , B (1, 6) and C (7, –4) has to be painted. If one bucket of paint covers 6 square feet, how many buckets of paint will be required to paint the whole glass, if only one coat of paint is applied.

***

Chapter 6 - Trigonometry

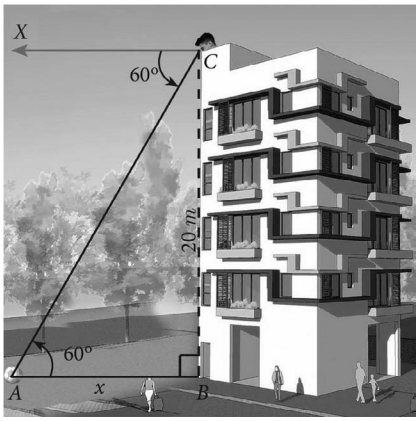
Stage: 1 - 2 Marks

1. Prove that $\frac{\sin A}{1+\cos A} = \frac{1-\cos A}{\sin A}$
2. Prove that $1 + \frac{\cot^2 \theta}{1+cosec\theta} = \text{cosec}\theta$
3. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\theta + \cot\theta$
4. Prove the following identities.
   i) $\cot\theta + \tan\theta = \sec\theta\ \text{cosec}\theta$
   ii) $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$
5. Prove the following identities.
   i) $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta\ \tan\theta$
   ii) $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$
6. A tower stands vertically on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower.



7. A kite is flying at a height of 75 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string, assuming that there is no slack in the string.
8. Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.
9. A road is flanked on either side by continuous rows of houses of height $4\sqrt{3}$ m with no space in between them. A pedestrian is standing on the median of the road facing a row house. The angle of elevation from the pedestrian to the top of the house is 30°. Find the width of the road.

10. A player sitting on the top of a tower of height 20 m observes the angle of depression of a ball lying on the ground as 60°. Find the distance between the foot of the tower and the ball. ($\sqrt{3}$ = 1.732)



11. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30°. Find the distance of the car from the rock.

12. The horizontal distance between two buildings is 70 m. The angle of depression of the top of the first building when seen from the top of the second building is 45°. If the height of the second building is 120 m, find the height of the first building. ($\sqrt{3}$ = 1.732)

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Chapter 7 - Mensuration

Stage: 1 - 2 Marks

1. The slant height of a frustum of a cone is 5 cm and the radii of its ends are 4 cm and 1 cm. Find its curved surface area.

2. The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.

3. The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3. Find the ratio of heights.

4. If the ratio of radii of two spheres is 4:7, find the ratio of their volumes.

5. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volume is $3\sqrt{3}$:4.

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Chapter 7 - Mensuration

Stage: 1 - 5 Marks

1. An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10 m and 4 m and whose height is 4 m. Find the curved and total surface area of the bucket.

2. The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is ₹ 2.

3. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹40 per litre.

4. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

***

Chapter 8 - Statistics and Probability

Stage: 1 - 2 Marks

1. Find the range and coefficient of range of the following data: 25, 67, 48, 53, 18, 39, 44.
2. Find the range of the following distribution.

Age (in years)	16-18	18-20	20-22	22-24	24-26	26-28
Number of students	0	4	6	8	2	2

3. The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value.
4. Find the range and coefficient of range of following data
   i) 63, 89, 98, 125, 79, 108, 117, 68
   ii) 43.5, 13.6, 18.9, 38.4, 61.4, 29.8
5. If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.
6. Calculate the range of the following data.

Income	400-450	450-500	500-550
Number of workers	8	12	30
Income	550-600	600-650	
Number of workers	21	6	

7. Find the standard deviation of first 21 natural numbers.
8. If the standard deviation of a data is 4.5 and if each value of the data is decreased by 5, then find the new standard deviation.
9. If the standard deviation of a data is 3.6 and each value of the data is divided by 3, then find the new variance and new standard deviation.
10. The mean of a data is 25.6 and its coefficient of variation is 18.75. Find the standard deviation.
11. The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the coefficient of variation.
12. If the mean and coefficient of variation of a data are 15 and 48 respectively, then find the value of standard deviation.
13. If n = 5 , x = 6 , x^2 = 765, then calculate the coefficient of variation.
14. A bag contains 5 blue balls and 4 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) blue (ii) not blue.
15. Two coins are tossed together. What is the probability of getting different faces on the coins?
16. A coin is tossed thrice. What is the probability of getting two consecutive tails?
17. What is the probability that a leap year selected at random will contain 53 Saturdays.
18. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.
19. If P(A) = 0.37 , P(B) = 0.42 , P(A$\cap$B) = 0.09 then find P(A$\cup$B) .
20. What is the probability of drawing either a king or a queen in a single draw from a well shuffled pack of 52 cards?
21. If P(A) = 23, P(B) =25, P(A$\cup$B) = 13 then find P(A$\cap$B).
22. The probability that atleast one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find P($\overline{A}$)+P($\overline{B}$).

***

Chapter 8 - Statistics and Probability

Stage: 1 - 5 Marks

1. Find the mean and variance of the first n natural numbers.
2. Two dice are rolled. Find the probability that the sum of outcomes is (i) equal to 4 (ii) greater than 10 (iii) less than 13
3. From a well shuffled pack of 52 cards, one card is drawn at random. Find the probability of getting (i) red card (ii) heart card (iii) red king (iv) face card (v) number card
4. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.
5. If A is an event of a random experiment such that P(A) : P($\overline{A}$)=17:15 and n(S) = 640 then find (i) P($\overline{A}$) (ii) n(A).

6. Two unbiased dice are rolled once. Find the probability of getting
   (i) a doublet (equal numbers on both dice)
   (ii) the product as a prime number
   (iii) the sum as a prime number
   (iv) the sum as 1

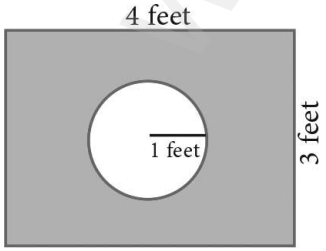
7. Three fair coins are tossed together. Find the probability of getting
   (i) all heads
   (ii) atleast one tail
   (iii) atmost one head
   (iv) atmost two tails

8. A bag contains 5 red balls, 6 white balls, 7 green balls, 8 black balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is
   (i) white
   (ii) black or red
   (iii) not white
   (iv) neither white nor black

9. In a box there are 20 non-defective and some defective bulbs. If the probability that a bulb selected at random from the box found to be defective is $\frac{3}{8}$ then, find the number of defective bulbs.

10. The king and queen of diamonds, queen and jack of hearts, jack and king of spades are removed from a deck of 52 playing cards and then well shuffled. Now one card is drawn at random from the remaining cards. Determine the probability that the card is (i) a clavor (ii) a queen of red card (iii) a king of black card.

11. Some boys are playing a game, in which the stone thrown by them landing in a circular region (given in the figure) is considered as win and landing other than the circular region is considered as loss. What is the probability to win the game? ($\pi = 3.14$)



12. The standard deviation and coefficient of variation of a data are 1.2 and 25.6 respectively. Find the value of mean.

13. Two customers Priya and Amuthan are visiting a particular shop in the same week (Monday to Saturday). Each is equally likely to visit the shop on any one day as on another day. What is the probability that both will visit the shop on
   (i) the same day
   (ii) different days
   (iii) consecutive days?

14. In a game, the entry fee is ₹ 150. The game consists of tossing a coin 3 times. Dhana bought a ticket for entry . If one or two heads show, she gets her entry fee back. If she throws 3 heads, she receives double the entry fees. Otherwise she will lose. Find the probability that she (i) gets double entry fee (ii) just gets her entry fee (iii) loses the entry fee.

15. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.

16. If A and B are two events such that $P(A) = \frac{1}{4}$ $P(B) = \frac{1}{2}$ and $P(A \text{ and } B) = \frac{1}{8}$, find
   (i) P (A or B)
   (ii) P(not A and not B).

17. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.

18. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that
   (i) The student opted for NCC but not NSS.
   (ii) The student opted for NSS but not NCC.
   (iii) The student opted for exactly one of them.

19. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

20. A box contains cards numbered 3, 5, 7, 9, … 35, 37. A card is drawn at random from the box. Find the probability that the drawn card have either multiples of 7 or a prime number.

21. Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or atleast 2 heads.

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STAGE - 2

Chapter 1 - Relations and Functions

Stage: 2 - 2 Marks

1. If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if fog = gof, then find the value of k.
2. Find k if $fof(k) = 5$ where $f(k) = 2k - 1$.
3. Using the functions f and g given below, find fog and gof . Check whether fog = gof .
   (i) $f(x) = x - 6$, $g(x) = x^2$
   (ii) $f(x) = \frac{2}{x}$, $g(x) = 2x^2 - 1$
   (iii) $f(x) =$ ——, $g(x) = 3 - x$
   (iv) $f(x) = 3 + x$, $g(x) = x - 4$
   (v) $f(x) = 4x^2 - 1$, $g(x) = 1 + x$
4. Find the value of k, such that fog = gof
   (i) $f(x) = 3x + 2$, $g(x) = 6x - k$
   (ii) $f(x) = 2x - k$, $g(x) = 4x + 5$
5. If $f(x) = 2x - 1$, $g(x) = \frac{x+1}{2}$, show that fog = gof = x
6. If $f(x) = x^2 - 1$, $g(x) = x - 2$ find a, if go f(a) = 1.

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Chapter 1 - Relations and Functions

Stage: 2 - 5 Marks

1. If the function f : R → R is defined by

$$f(x) = \begin{cases} 2x + 7; & x < -2 \\ x^2 - 2; & -2 \le x < 3 \\ 3x - 2; & x \ge 3 \end{cases}$$

   then find the values of (i) f(4) (ii) f(–2)
   (iii) f(4) + 2f(1) (iv) $\frac{f(1) - 3f(4)}{f(-3)}$

2. If the function f is defined by

$$f(x) = \begin{cases} x + 2; & x > 1 \\ 2; & -1 \le x \le 1 \\ x - 1 & -3 < x < -1 \end{cases}$$

   find the values of
   (i) f (3) (ii) f (0)
   (iii) f (−1 5) (iv) f (2) + f (−2)
3. A function f:[−5, 9] → R is defined as follows:

$$f(x) = \begin{cases} 6x + 1; & -5 \le x < 2 \\ 5x^2 - 1; & 2 \le x < 6 \\ 3x - 4; & 6 \le x \le 9 \end{cases}$$

   Find (i) f (−3) + f (2) (ii) f (7) – f (1)
   (iii) 2f (4) + f (8) (iv) $\frac{2f(-2) - f(6)}{f(4) + f(-2)}$
4. The distance S an object travels under the influence of gravity in time t seconds is given by $S(t) = \frac{1}{2}gt + at + b$ where, (g is the acceleration due to gravity), a, b are constants. Verify whether the function S(t) is one-one or not.
5. The function 't' which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by t(C) = F where $F = \frac{9}{5}C + 32$.
   Find, (i) t(0) (ii) t(28) (iii) t(–10)
   (iv) the value of C when t(C) = 212
   (v) the temperature when the Celsius value is equal to the Farenheit value.
6. If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that fo(goh) = (fog)oh
7. Find x if gff(x) = fgg(x), given $f(x) = 3x + 1$ and $g(x) = x + 3$.
8. Consider the functions f(x), g(x), h(x) as given below. Show that (fog)oh = fo(goh) in each case.
   (i) $f(x) = x - 1$, $g(x) = 3x + 1$ and $h(x) = x^2$
   (ii) $f(x) = x^2$, $g(x) = 2x$ and $h(x) = x + 4$
   (iii) $f(x) = x - 4$, $g(x) = x^2$ and $h(x) = 3x - 5$

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Chapter 2 - Numbers and Sequences

Stage: 2 - 2 Marks

1. If the Highest Common Factor of 210 and 55 is expressible in the form $55x - 325$, find x.
2. Use Euclid's Division Algorithm to find the Highest Common Factor (HCF) of
   (i) 340 and 412
   (ii) 867 and 255
   (iii) 10224 and 9648

3. If d is the Highest Common Factor of 32 and 60, find x and y satisfying d = 32x + 60y.
4. Find the remainders when 70004 and 778 is divided by 7.
5. Determine the value of d such that $15 \equiv 3 \pmod{d}$
6. Find the least positive value of x such that
   (i) $67 + x \equiv 1 \pmod 4$ (ii) $98 \equiv (x + 4) \pmod 5$
7. Solve $8x \equiv 1 \pmod{11}$
8. Compute x, such that $10^4 \equiv x \pmod{19}$
9. Find the number of integer solutions of $3x \equiv 1 \pmod{15}$.
10. Find the least positive value of x such that
    (i) $71 \equiv x \pmod 8$
    (ii) $78 + x \equiv 3 \pmod 5$
    (iii) $89 \equiv (x + 3) \pmod 4$
    (iv) $96 \equiv \frac{x}{7} \pmod 5$
    (v) $5x \equiv 4 \pmod 6$
11. Solve: $5x \equiv 4 \pmod 6$
12. Solve: $3x - 2 \equiv 0 \pmod{11}$

***

Chapter 2 - Numbers and Sequences

Stage: 2 - 5 Marks

1. Find the HCF of 396, 504, 636.
2. Use Euclid's Division Algorithm to find the Highest Common Factor (HCF) of 84, 90 and 120.
3. The sum of three consecutive terms that are in A.P. is 27 and their product is 288. Find the three terms.
4. The ratio of 6th and 8th term of an A.P. is 7:9. Find the ratio of 9th term to 13th term.
5. Priya earned ₹ 15,000 in the first month. Thereafter her salary increased by ₹ 1500 per year. Her expenses are ₹ 13,000 during the first year and the expenses increases by ₹ 900 per year. How long will it take for her to save ₹ 20,000 per month.
6. A mother divides ₹ 207 into three parts such that the amount are in A.P. and gives it to her three children. The product of the two least amounts that the children had ₹ 4623. Find the amount received by each child.
7. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.
8. The sum of first n, 2n and 3n terms of an A.P. are S_1, S_2, and S_3 respectively.
   Prove that $S_3 = 3(S_2 - S_1)$.
9. In a Geometric progression, the 4th term is $\frac{8}{9}$ and the 7th term is $\frac{64}{243}$.
   Find the Geometric Progression.
10. Find x, y and z, given that the numbers x, 10, y, 24, z are in A.P.
11. Find the sum of all odd positive integers less than 450.

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Chapter 3 - Algebra

Stage: 2 - 2 Marks

1. Solve: $2x - 3y = 6$, $x + y = 1$
2. Reduce each of the following rational expressions to its lowest form.
   i) $\frac{x^2-1}{x^2+x}$ ii) $\frac{x^2-11x+18}{x^2-4x+4}$
   iii) $\frac{9x^2+81x}{x^3-8x^2-9x}$ iv) $\frac{p^2-3p-40}{2p^3-24p^2-64p}$
3. Determine the nature of roots for the following quadratic equations
   (i) $x^2 - x - 20 = 0$
   (ii) $9x^2 - 24x + 16 = 0$
   (iii) $2x^2 - 2x + 9 = 0$
4. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.
5. Determine the nature of the roots for the following quadratic equations
   (i) $15x^2 + 11x + 2 = 0$
   (ii) $x^2 - x - 1 = 0$

***

Chapter 3 - Algebra

Stage: 2 - 5 Marks

1. Solve the following system of linear equations in three variables
$3x - 2y + z = 2$, $2x + 3y - z = 5$, $x + y + z = 6$.

2. Solve: $x + 2y - z = 5$; $x - y + z = -2$;
$-5x - 4y + z = -11$

3. Solve: $3x + y - 3z = 1$; $-2x - y + 2z = 1$;
$-x - y + z = 2$.

4. Solve the following system of linear equations in three variables
$x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$

5. Discuss the nature of solutions of the following system of equation
$x + 2y - z = 6$; $-3x - 2y + 5z = -12$;
$x - 2z = 3$

6. Vani, her father and her grand father have an average age of 53. One-half of her grand father's age plus one-third of her father's age plus one fourth of Vani's age is 65. Four years ago if Vani's grandfather was four times as old as Vani then how old are they all now?

7. Find the GCD of the polynomials
$x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.

8. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$.

9. Find the GCD of the given polynomials
(i) $x^4 + 3x^3 - x - 3$, $x^3 + x^2 - 5x + 3$
(ii) $x^4 - 1$, $x^3 - 11x^2 + x - 11$
(iii) $3x^4 + 6x^3 - 12x^2 - 24x$, $4x^4 + 14x^3 + 8x^2 - 8x$
(iv) $3x^3 + 3x^2 + 3x + 3$, $6x^3 + 12x^2 + 6x + 12$

10. Simplify: $\dfrac{b^2+3b-28}{b^2+4b+4} \div \dfrac{b^2-49}{b^2-5b-14}$

11. If $A = \dfrac{2x+1}{2x-1}$, $B = \dfrac{2x-1}{2x+1}$
find $\dfrac{1}{A-B} - \dfrac{2B}{A^2-B^2}$

12. If $A = \dfrac{x}{x+1}$, $B = \dfrac{1}{x+1}$
prove that $\dfrac{(A+B)^2+(A-B)^2}{A \div B} = \dfrac{2(x^2+1)}{x(x+1)^2}$

13. Simplify:
$\dfrac{1}{x^2-5x+6} + \dfrac{1}{x^2-3x+2} - \dfrac{1}{x^2-8x+15}$

14. Find the square root of the following expressions
(i) $16x^2 + 9y^2 - 24xy + 24x - 18y + 9$
(ii) $(6x^2 + x - 1)(3x^2 + 2x - 1)(2x^2 + 3x + 1)$
(iii) $\sqrt{15}x^2 + \left(\sqrt{3}+\sqrt{10}\right)x + \sqrt{2}$
$\sqrt{5}x^2 + \left(2\sqrt{5}+1\right)x + 2$
$\sqrt{3}x^2 + \left(\sqrt{2}+2\sqrt{3}\right)x + 2\sqrt{2}$

15. The product of Kumaran's age (in years) two years ago and his age four years from now is one more than twice his present age. What is his present age?

16. A passenger train takes 1 hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the trains.

17. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.

18. If the roots of the equation
$(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are real and equal prove that either $a = 0$ (or)
$a^3 + b^3 + c^3 = 3abc$

19. If the difference between the roots of the equation $x^2 - 13x + k = 0$ is 17 find k.

20. If α and β are the roots of $x^2 + 7x + 10 = 0$ find the values of
i) $(\alpha - \beta)$ ii) $\alpha^2 + \beta^2$ iii) $\alpha^3 - \beta^3$
iv) $\alpha^4 + \beta^4$ v) $\dfrac{\alpha}{\beta} + \dfrac{\beta}{\alpha}$ vi) $\dfrac{\alpha^2}{\beta} + \dfrac{\beta^2}{\alpha}$

21. If α, β are the roots of the equation $3x^2 + 7x - 2 = 0$, find the values of
i) $\dfrac{\alpha}{\beta} + \dfrac{\beta}{\alpha}$ ii) $\dfrac{\alpha^2}{\beta}$ $\dfrac{\beta^2}{\alpha}$

22. If α, β are the roots of the equation $2x^2 - x - 1 = 0$, then form the equation whose roots are (i) $\dfrac{1}{\alpha}, \dfrac{1}{\beta}$ (ii) $\alpha^2\beta, \beta^2\alpha$
(iii) $2\alpha + \beta, 2\beta + \alpha$

23. The roots of the equation $x^2 + 6x - 4 = 0$ are α, β. Find the quadratic equation whose roots are (i) α^2 and β^2 (ii) $\dfrac{2}{\alpha}$ and $\dfrac{2}{\beta}$ (iii) $\alpha^2\beta$ and $\beta^2\alpha$

24. If α, β are the roots of $7x^2 + ax + 2 = 0$ and if $\beta - \alpha = \frac{-13}{7}$. Find the values of a.

25. If one root of the equation $2y^2 - ay + 64 = 0$ is twice the other then find the values of a.

26. If one root of the equation $3x^2 + kx + 81 = 0$ (having real roots) is the square of the other then find k.

27. Find X and Y if $X + Y = \begin{pmatrix} 7 & 0 \\ 3 & 5 \end{pmatrix}$ and $X - Y = \begin{pmatrix} 3 & 0 \\ 0 & 4 \end{pmatrix}$

28. Find x and y if $x \begin{pmatrix} 4 \\ -3 \end{pmatrix} + y \begin{pmatrix} -2 \\ 3 \end{pmatrix} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$

29. Find the non-zero values of x satisfying the matrix equation
$$x\begin{pmatrix} 2x & 2 \\ 3 & x \end{pmatrix} + 2\begin{pmatrix} 8 & 5x \\ 4 & 4x \end{pmatrix} = 2\begin{pmatrix} x^2+8 & 24 \\ 10 & 6x \end{pmatrix}$$

30. Solve for x, y $\begin{pmatrix} x^2 \\ y^2 \end{pmatrix} + 2\begin{pmatrix} -2x \\ -y \end{pmatrix} = \begin{pmatrix} 5 \\ 8 \end{pmatrix}$

31. If A = (1 −1 2), $B = \begin{pmatrix} 1 & -1 \\ 2 & 1 \\ 1 & 3 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix}$ show that(AB)C = A(BC).

***

Chapter 4 - Geometry

Stage: 2 - 2 Marks

1. What length of ladder is needed to reach a height of 7 ft along the wall when the base of the ladder is 4 ft from the wall? Round off your answer to the next tenth place.

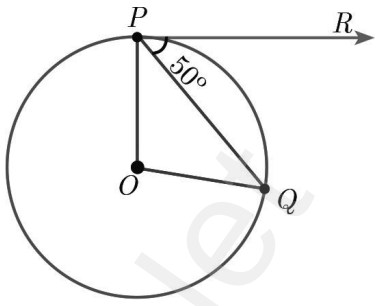
2. A man goes 18 m due east and then 24 m due north. Find the distance of his current position from the starting point?

3. There are two paths that one can choose to go from Sarah's house to James house. One way is to take C street, and the other way requires to take B street and then A street. How much shorter is the direct path along C street? (Using figure).

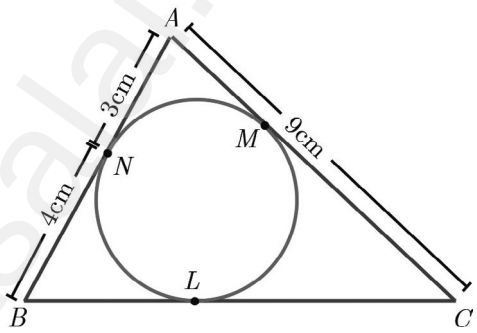
4. To get from point A to point B you must avoid walking through a pond. You must walk 34 m south and 41 m east. To the nearest meter, how many meters would be saved if it were possible to make a way through the pond?

5. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

6. In Figure, O is the centre of a circle. PQ is a chord and the tangent PR at P makes an angle of 50° with PQ. Find ∠POQ.



7. In Figure, ΔABC is circumscribing a circle. Find the length of BC.



8. If radii of two concentric circles are 4cm and 5cm then find the length of the chord of one circle which is a tangent to the other circle.

9. The length of the tangent to a circle from a point P, which is 25 cm away from the centre is 24 cm. What is the radius of the circle?

10. PQ is a tangent drawn from a point P to a circle with centre O and QOR is a diameter of the circle such that ∠POR = 120°. Find ∠OPQ.

11. A tangent ST to a circle touches it at B. AB is a chord such that ∠ABT = 65° . Find ∠AOB, where "O" is the centre of the circle.

12. In two concentric circles, a chord of length 16 cm of larger circle becomes a tangent to the smaller circle whose radius is 6 cm. Find the radius of the larger circle.

13. An artist has created a triangular stained glass window and has one strip of small length left before completing the window. She needs to figure out the length of left out portion based on the lengths of the other sides as shown in the figure.

14. CEVA'S Theorem
15. MENELAUS Theorem (Without Proof)

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Chapter 4 - Geometry

Stage: 2 - 5 Marks

1. A circle is inscribed in ΔABC having sides 8 cm, 10 cm and 12 cm as shown in figure, Find AD, BE and CF.
2. An insect 8 m away initially from the foot of a lamp post which is 6 m tall, crawls towards it moving through a distance. If its distance from the top of the lamp post is equal to the distance it has moved, how far is the insect away from the foot of the lamp post?
3. 5 m long ladder is placed leaning towards a vertical wall such that it reaches the wall at a point 4m high. If the foot of the ladder is moved 1.6 m towards the wall, then find the distance by which the top of the ladder would slide upwards on the wall.
4. In the adjacent figure, ABC is a right angled triangle with right angle at B and points D, E trisect BC. Prove that $8AE^2 = 3AC^2 + 5AD^2$
5. PQ is a chord of length 8 cm to a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length of the tangent TP.
6. Show that the angle bisectors of a triangle are concurrent.

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Chapter 5 - Coordinate Geometry

Stage: 2 - 2 Marks

1. Find the slope of a line joining the given points (i) (–6, 1) and (–3, 2) (ii) (14, 10) and (14, –6)
2. Find the slope of a line joining the points
   (i) $(5, \sqrt{5})$ with the origin
   (ii) $(\sin\theta, -\cos\theta)$ and $(-\sin\theta, \cos\theta)$
3. The line r passes through the points (–2, 2) and (5, 8) and the line s passes through the points (–8, 7) and (–2, 0). Is the line r perpendicular to s?
4. What is the slope of a line perpendicular to the line joining A(5, 1) and P where P is the mid-point of the segment joining (4, 2) and (–6, 4).
5. Show that the points (–2, 5) , (6, –1) and (2, 2) are collinear.
6. Show that the given points are collinear: (–3, –4) , (7, 2) and (12, 5)
7. If the three points (3, –1) , (a, 3) and (1, –3) are collinear, find the value of a.
8. The line through the points (–2, a) and (9, 3) has slope –12. Find the value of a.
9. The line through the points (–2, 6) and (4, 8) is perpendicular to the line through the points (8, 12) and (x, 24) . Find the value of x.
10. The line p passes through the points (3, –2), (12, 4) and the line q passes through the points (6, –2) and (12, 2). Is p parallel to q?
11. Find the equation of a straight line whose
    (i) Slope is 5 and y intercept is –9
    (ii) Inclination is 45° and y intercept is 11
12. Calculate the slope and y intercept of the straight line $8x - 7y + 6 = 0$
13. Find the equation of a line passing through the point (3, –4) and having slope $\frac{5}{7}$
14. Find the equation of a line passing through the point A (1, 4) and perpendicular to the line joining points (2, 5) and (4, 7).
15. Find the equation of a line which passes through (5, 7) and makes intercepts on the axes equal in magnitude but opposite in sign.
16. Find the intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axes.
17. Find the equation of a straight line passing through the mid-point of a line segment joining the points (1, –5), (4, 2) and parallel to (i) X axis (ii) Y axis
18. Find the equation of a line through the given pair of points
    (i) $\left(2, \frac{2}{3}\right)$ $\left(\frac{-1}{2}, -2\right)$
    (ii) (2, 3) and (–7, –1)
19. A cat is located at the point (–6, –4) in xy plane. A bottle of milk is kept at (5, 11). The cat wish to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.

22. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the point (–1, 2).
23. Find the equation of a line whose intercepts on the x and y axes are given below.
    (i) 4, –6 (ii) –5, $\frac{3}{4}$
24. Find the intercepts made by the following lines on the coordinate axes.
    (i) $3x - 2y - 6 = 0$
    (ii) $4x + 3y + 12 = 0$
25. Find the slope of the straight line $6x + 8y + 7 = 0$.
26. Find the slope of the line which is
    (i) parallel to $3x - 7y = 11$
    (ii) perpendicular to $2x - 3y + 8 = 0$
27. Show that the straight lines $2x + 3y - 8 = 0$ and $4x + 6y + 18 = 0$ are parallel.
28. Show that the straight lines $x - 2y + 3 = 0$ and $6x + 3y + 8 = 0$ are perpendicular.
29. Find the slope of the following straight lines (i) $5y - 3 = 0$ (ii) $7x - \frac{3}{17} = 0$
30. Find the slope of the line which is
    (i) parallel to $y = 0.7x - 11$
    (ii) perpendicular to the line $x = -11$

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Chapter 5 - Coordinate Geometry

Stage: 2 - 5 Marks

1. If the points P(–1, –4), Q(b, c) and R(5, –1) are collinear and if 2b + c = 4, then find the values of b and c.
2. If the points A(–3, 9) , B(a, b) and C(4, –5) are collinear and if a + b = 1, then find *a* and *b*.
3. Let P(11,7), Q(13.5, 4) and R(9.5, 4) be the midpoints of the sides AB, BC and AC respectively of ΔABC. Find the coordinates of the vertices A, B and C. Hence find the area of ΔABC and compare this with area of ΔPQR.
4. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (–3, 8). Find its equation.
5. Show that the given points form a right angled triangle and check whether they satisfies Pythagoras theorem.
   (i) A (1, –4), B (2, –3) and C (4, –7)
   (ii) L (0, 5), M (9, 12) and N (3, 14)
6. Show that the given points form a parallelogram :
   A(2.5, 3.5) , B(10, –4), C(2.5, –2.5) and D(–5, 5)
7. If the points A(2, 2), B(–2, –3), C(1, –3) and D(*x*, y) form a parallelogram then find the value of *x* and y.
8. Find the equation of the median and altitude of ΔABC through A where the vertices are A(6, 2) , B(–5, –1) and C(1, 9)
9. A(–3, 0) B(10, –2) and C(12, 3) are the vertices of ΔABC. Find the equation of the altitude through A and B.
10. Without using Pythagoras theorem, show that the points (1, –4), (2, –3) and (4, –7) form a right angled triangle.
11. Find the equation of the perpendicular bisector of the line joining the points A(–4, 2) and B(6, –4).

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Chapter 6 - Trigonometry

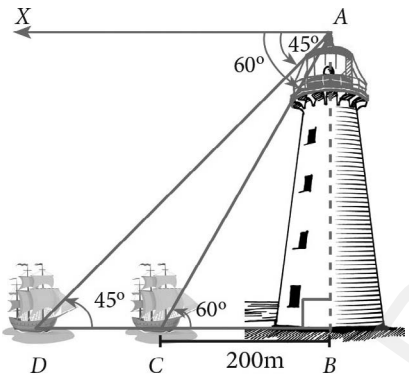
Stage: 2 - 5 Marks

1. If $\operatorname{cosec}\theta + \cot\theta = P$, then prove that $\cos\theta = \frac{P^2 - 1}{P^2 + 1}$
2. Prove that $\left(\frac{\cos^3 A - \sin^3 A}{\cos A - \sin A}\right) - \left(\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A}\right) = 2 \sin A \cos A$
3. Prove the following identities.
   $\frac{\sin^3 A + \cos^3 A}{\sin A + \cos A} + \frac{\sin^3 A - \cos^3 A}{\sin A - \cos A} = 2$
4. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a 30 m high building are 45° and 60° respectively. Find the height of the tower. ($\sqrt{3} = 1.732$)

5. To a man standing outside his house, the angles of elevation of the top and bottom of a window are 60° and 45° respectively. If the height of the man is 180 cm and if he is 5 m away from the wall, what is the height of the window? ($\sqrt{3}$ = 1.732)

6. An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats. ($\sqrt{3}$ = 1.732)

7. A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45°. What is the approximate speed of the boat (in km / hr), assuming that it is sailing in still water? ($\sqrt{3}$ = 1.732)



8. From the top of a tree of height 13 m the angle of elevation and depression of the top and bottom of another tree are 45° and 30° respectively. Find the height of the second tree. ($\sqrt{3}$ = 1.732)

9. A man is standing on the deck of a ship, which is 40 m above water level. He observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30°. Calculate the distance of the hill from the ship and the height of the hill. ($\sqrt{3}$ = 1.732)

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Chapter 7 - Mensuration

Stage: 2 - 2 Marks

1. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2. Find the diameter of the cylinder.

2. A garden roller whose length is 3 m long and whose diameter is 2.8 m is rolled to level a garden. How much area will it cover in 8 revolutions?

3. If the total surface area of a cone of radius 7 cm is 704 cm^2, then find its slant height.

4. Find the diameter of a sphere whose surface area is 154 m^2.

5. The radius of a spherical balloon increases from 12 cm to 16 cm as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.

6. Find the volume of a cylinder whose height is 2 m and whose base area is 250 m^2.

7. The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

8. The ratio of the volumes of two cones is 2:3. Find the ratio of their radii if the height of second cone is double the height of the first.

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Chapter 7 - Mensuration

Stage: 2 - 5 Marks

1. A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface area and the total surface area.
2. A funnel consists of a frustum of a cone attached to a cylindrical portion 12 cm long attached at the bottom. If the total height be 20 cm, diameter of the cylindrical portion be 12 cm and the diameter of the top of the funnel be 24 cm. Find the outer surface area of the funnel.
3. A metallic sphere of radius 16 cm is melted and recast into small spheres each of radius 2 cm. How many small spheres can be obtained?
4. A cylindrical glass with diameter 20 cm has water to a height of 9 cm. A small cylindrical metal of radius 5 cm and height 4 cm is immersed it completely. Calculate the raise of the water in the glass?
5. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter is 14 cm and the height of the vessel is 13 cm. Find the capacity of the vessel.
6. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of the model that Nathan made.
7. An aluminium sphere of radius 12 cm is melted to make a cylinder of radius 8 cm. Find the height of the cylinder.
8. A solid right circular cone of diameter 14 cm and height 8 cm is melted to form a hollow sphere. If the external diameter of the sphere is 10 cm, find the internal diameter.
9. If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.

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Chapter 8 - Statistics and Probability

Stage: 2 - 5 Marks

1. Find the coefficient of variation of 24, 26, 33, 37, 29, 31.
2. The time taken (in minutes) to complete a homework by 8 students in a day are given by 38, 40, 47, 44, 46, 43, 49, 53. Find the coefficient of variation.
3. A coin is tossed thrice. Find the probability of getting exactly two heads or atleast one tail or two consecutive heads.
4. If A, B, C are any three events such that probability of B is twice as that of probability of A and probability of C is thrice as that of probability of A and if $P(A \cap B) = \frac{1}{6}$, $P(B \cap C) = \frac{1}{4}$, $P(A \cap C) = \frac{1}{8}$, $P(A \cup B \cup C) = \frac{9}{10}$, $P(A \cap B \cap C) = \frac{1}{15}$, then find P(A), P(B) and P(C)?

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Chapter 1 - Relations and Functions

1 Mark

1. If n(A×B) = 6 and A = {1, 3} then n(B) is
   A) 1 B) 2 C) 3 D) 6

2. A = {a, b, p}, B = {2, 3}, C = {p, q, r, s} then n[(A×C)×B] is
   A) 8 B) 20 C) 12 D) 16

3. If A = {1, 2}, B = {1, 2, 3, 4},C = {5, 6} and D = {5, 6, 7, 8} then state which of the following statement is true.
   A) (A×C) ⊂ (B×D) B) (B×D) ⊂ (A×C)
   C) (A×B) ⊂ (A×D) D) (D×A) ⊂ (B×A)

4. If there are 1024 relations from a set A = {1, 2, 3, 4, 5} to a set B, then the number of elements in B is
   A) 3 B) 2 C) 4 D) 8

5. The range of the relation R = $\{(x, x^2) \mid x$ is a prime number less than 13$\}$ is
   A) {2,3,5,7} B) {2,3,5,7,11}
   C) {4,9,25,49,121} D) {1,4,9,25,49,121}

6. If the ordered pairs (a +2, 4) and (5, 2a +b) are equal then (a, b) is
   A) (2, –2) B) (5, 1) C) (2, 3) D) (3, –2)

7. Let n(A) = m and n(B) = n then the total number of non-empty relations that can be defined from A to B is
   A) m^n B) n^m C) $2^{mn} - 1$ D) 2^{mn}

8. If {(a, 8), (6, b)} represents an identity function, then the value of a and b are respectively
   A) (8, 6) B) (8, 8) C) (6, 8) D) (6, 6)

9. Let A = {1, 2, 3, 4} and B = {4, 8, 9, 10}. A function f : A → B given by f = {(1, 4), (2, 8), (3, 9), (4, 10)} is a
   A) Many-one function
   B) Identity function
   C) One-to-one function
   D) Into function

10. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then fog is
    A) $\frac{3}{2x^2}$ B) $\frac{2}{3x^2}$ C) $\frac{2}{9x^2}$ D) $\frac{1}{6x^2}$

11. If f : A → B is a bijective function and if n(B) = 7 , then n(A) is equal to
    A) 7 B) 49 C) 1 D) 14

12. Let f and g be two functions given by $f = \{(0, 1), (2, 0), (3, -4), (4, 2), (5, 7)\}$ $g = \{(0, 2), (1, 0), (2, 4), (-4, 2), (7, 0)\}$ then the range of fog is
    A) {0, 2, 3, 4, 5} B) {–4, 1, 0, 2, 7}
    C) {1, 2, 3, 4, 5} D) {0, 1, 2}

13. Let $f(x) = 1 + x^2$ then
    A) f (xy) = f(x) . f (y) B) $f(xy)^3 \geq f(x) . f(y)$
    C) f (xy) ≤ f (x) . f (y) D) None of these

14. If g = {(1, 1), (2, 3), (3, 5), (4, 7)} is a function given by $g(x) = \alpha x + \beta$ then the values of a and b are
    A) (–1, 2) B) (2, –1) C) (–1, –2) D) (1, 2)

15. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is
    A) linear B) cubic
    C) reciprocal D) quadratic

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Chapter 2 - Numbers and Sequences

1 Mark

1. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that a = bq +r, where r must satisfy.
   A) 1 < r < b B) 0 > r > b
   C) 0 ≤ r < b D) 0 < r ≤ b

2. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are
   A) 0, 1, 8 B) 1, 4, 8
   C) 0, 1, 3 D) 1, 3, 5

3. If the HCF of 65 and 117 is expressible in the form of 65m -117 , then the value of m is
   A) 4 B) 2 C) 1 D) 3

4. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   A) 1 B) 2 C) 3 D) 4

5. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
   A) 2025 B) 5220 C) 5025 D) 2520

6. 74k ≡ _____ (mod 100)
   A) 1 B) 2 C) 3 D) 4

7. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
   A) 3 B) 5 C) 8 D) 11

8. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P.
A) 4551 B) 10091
C) 7881 D) 13531

9. If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is
A) 0 B) 6 C) 7 D) 13

10. An A.P. consists of 31 terms. If its 16th term is m, then the sum of all the terms of this A.P. is
A) 16 m B) 62 m
C) 31 m D) $\frac{31}{2}$ m

11. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P. must be taken for their sum to be equal to 120?
A) 6 B) 7 C) 8 D) 9

12. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + ... + 2^0$ which of the following is true?
A) B is 264 more than A
B) A and B are equal
C) B is larger than A by 1
D) A is larger than B by 1

13. The next term of the sequence 3
A) 124 B) 127 C) 23 D) 181

14. If the sequence $t_1, t_2, t_3, ...$ are in A.P. then the sequence $t_6, t_{12}, t_{18}, ...$ is
A) a Geometric Progression
B) an Arithmetic Progression
C) neither an Arithmetic Progression nor a Geometric Progression
D) a constant sequence

15. The value of $(1^3 + 2^3 + 3^3 + ... + 15^3) - (1 + 2 + 3 + ... + 15)$ is
A) 14400 B) 14200
C) 14280 D) 14520

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Chapter 3 - Algebra

1 Mark

1. A system of three linear equations in three variables is inconsistent if their planes
A) intersect only at a point
B) intersect in a line
C) coincides with each other
D) do not intersect

2. The solution of the system $x + y - 3z = -6$, $-7y + 7z = 7$, $3z = 9$ is
A) $x = 1, y = 2, z = 3$
B) $x = -1, y = 2, z = 3$
C) $x = -1, y = -2, z = 3$
D) $x = 1, y = -2, z = 3$

3. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
A) 3 B) 5 C) 6 D) 8

4. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is
A) $\frac{9y}{7}$ B) $\frac{9y^3}{(21y-21)}$
C) $\frac{21y^2-42y+21}{3y^3}$ D) $\frac{7(y^2-2y+1)}{y^2}$

5. $y^2 + \frac{1}{y^2}$ is not equal to
A) $\frac{y^4+1}{y^2}$ B) $\left(y+\frac{1}{y}\right)^2$
C) $\left(y-\frac{1}{y}\right)^2+2$ D) $\left(y+\frac{1}{y}\right)^2-2$

6. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ gives
A) $\frac{x^2-7x+40}{(x-5)(x+5)}$ B) $\frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$
C) $\frac{x^2-7x+40}{(x^2-25)(x+1)}$ D) $\frac{x^2+10}{(x^2-25)(x+1)}$

7. The square root of is $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ equal to
A) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ B) $16\left|\frac{y^2}{x^2z^4}\right|$
C) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ D) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

8. Which of the following should be added to make $x^4 + 64$ a perfect square
A) $4x^2$ B) $16x^2$ C) $8x^2$ D) $-8x^2$

9. The solution of $(2x - 1)^2 = 9$ is equal to
A) -1 B) 2
C) $-1, 2$ D) None of these

10. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
A) 100, 120 B) 10, 12
C) -120, 100 D) 12, 10

11. If the roots of the equation $q^2x^2 + p^2x + r^2 = 0$ are the squares of the roots of the equation $qx^2 + px + r = 0$, then q, p, r are in _____.
A) A.P B) G.P
C) Both A.P and G.P D) None of these

12. Graph of a linear equation is a _____.
A) straight line B) circle
C) parabola D) hyperbola

13. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is
A) 0 B) 1 C) 0 or 1 D) 2

14. For the given matrix $A = \begin{pmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{pmatrix}$ the order of the matrix A^T is
A) 2×3 B) 3×2 C) 3×4 D) 4×3

15. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have
A) 3 B) 4 C) 2 D) 5

16. If number of columns and rows are not equal in a matrix then it is said to be a
A) diagonal matrix B) rectangular matrix
C) square matrix D) identity matrix

17. Transpose of a column matrix is
A) unit matrix B) diagonal matrix
C) column matrix D) row matrix

18. Find the matrix X if $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$
A) $\begin{pmatrix} -2 & -2 \\ 2 & -1 \end{pmatrix}$ B) $\begin{pmatrix} 2 & 2 \\ 2 & -1 \end{pmatrix}$
C) $\begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix}$ D) $\begin{pmatrix} 2 & 1 \\ 2 & 2 \end{pmatrix}$

19. Which of the following can be calculated from the given matrices
$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$
(i) A^2 (ii) B^2 (iii) AB (iv) BA
A) (i) and (ii) only B) (ii) and (iii) only
C) (ii) and (iv) only D) all of these

20. If $A = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 \\ 2 & -1 \\ 0 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 0 & 1 \\ -2 & 5 \end{pmatrix}$.
Which of the following statements are correct?
(i) $AB+C = \begin{pmatrix} 5 & 5 \\ 5 & 5 \end{pmatrix}$ (ii) $BC = \begin{pmatrix} 0 & 1 \\ 2 & -3 \\ -4 & 10 \end{pmatrix}$
(iii) $BA+C = \begin{pmatrix} 2 & 5 \\ 3 & 0 \end{pmatrix}$ (iv) $(AB)C = \begin{pmatrix} -8 & 20 \\ -8 & 13 \end{pmatrix}$
A) (i) and (ii) only B) (ii) and (iii) only
C) (iii) and (iv) only D) all of these

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Chapter 4 - Geometry

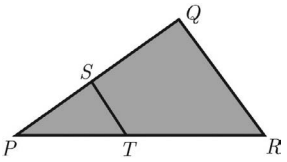
1 Mark

1. If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when
A) $\angle B = \angle E$ B) $\angle A = \angle D$
C) $\angle B = \angle D$ D) $\angle A = \angle F$

2. In ΔLMN, $\angle L = 60°$, $\angle M = 50°$. If $\Delta LMN \sim \Delta PQR$ then the value of $\angle R$ is
A) 40° B) 70°
C) 30° D) 110°

3. If ΔABC is an isosceles triangle with $\angle C = 90°$ and AC = 5 cm, then AB is
A) 2.5 cm B) 5 cm
C) 10 cm D) $5\sqrt{2}$ cm

4. In a given figure ST || QR, PS = 2 cm and SQ = 3 cm. Then the ratio of the area of ΔPQR to the area of ΔPST is
A) 25 : 4
B) 25 : 7
C) 25 : 11
D) 25 : 13



5. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10 cm, then the length of AB is

A) $6\frac{2}{3}$ cm B) $\frac{10\sqrt{6}}{3}$ cm

C) $66\frac{2}{3}$ cm D) 15 cm

6. If in ΔABC , DE || BC. AB = 3.6 cm, AC = 2.4 cm and AD = 2.1 cm then the length of AE is

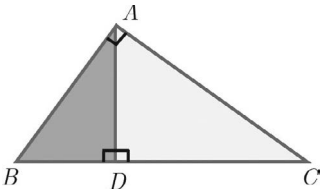
A) 1.4 cm B) 1.8 cm

C) 1.2 cm D) 1.05 cm

7. In a ΔABC, AD is the bisector of ∠BAC. If AB = 8 cm, BD = 6 cm and DC = 3 cm. The length of the side AC is

A) 6 cm B) 4 cm C) 3 cm D) 8 cm

8. In the adjacent figure ∠BAC = 90° and AD ⊥ BC then



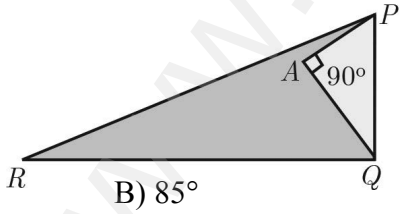
A) $BD \cdot CD = BC^2$ B) $AB \cdot AC = BC^2$

C) $BD \cdot CD = AD^2$ D) $AB \cdot AC = AD^2$

9. Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?

A) 13 m B) 14 m C) 15 m D) 12.8 m

10. In the given figure, PR = 26 cm, QR = 24 cm, ∠PAQ = 90° , PA = 6 cm and QA = 8 cm. Find ∠PQR.



A) 80° B) 85°

C) 75° D) 90°

11. A tangent is perpendicular to the radius at the

A) centre B) point of contact

C) infinity D) chord

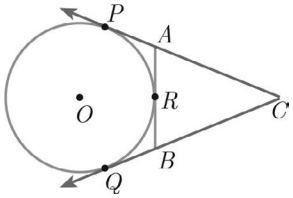
12. How many tangents can be drawn to the circle from an exterior point?

A) one B) two C) infinite D) zero

13. The two tangents from an external points P to a circle with centre at O are PA and PB. If ∠APB = 70° then the value of ∠AOB is

A) 100° B) 110° C) 120° D) 130°

14. In figure CP and CQ are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If CP = 11 cm and BC = 7 cm, then the length of BR is



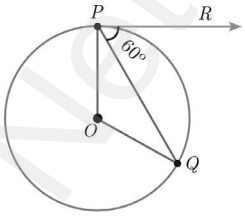
A) 6 cm

B) 5 cm

C) 8 cm

D) 4 cm

15. In figure if PR is tangent to the circle at P and O is the centre of the circle, then ∠POQ is



A) 120°

B) 100°

C) 110°

D) 90°

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Chapter 5 - Coordinate Geometry

1 Mark

1. The area of triangle formed by the points (−5, 0) , (0, −5) and (5, 0) is

A) 0 sq.units B) 25 sq.units

C) 5 sq.units D) none of these

2. A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the Y axis. The path travelled by the man is

A) $x = 10$ B) $y = 10$

C) $x = 0$ D) $y = 0$

3. The straight line given by the equation $x = 11$ is

A) parallel to X axis

B) parallel to Y axis

C) passing through the origin

D) passing through the point (0, 11)

4. If (5, 7), (3, p) and (6, 6) are collinear, then the value of p is

A) 3 B) 6 C) 9 D) 12

5. The point of intersection of $3x - y = 4$ and $x + y = 8$ is

A) (5, 3) B) (2, 4)

C) (3, 5) D) (4, 4)

6. The slope of the line joining (12, 3), (4, a) is $\frac{1}{8}$. The value of 'a' is

A) 1 B) 4 C) –5 D) 2

7. The slope of the line which is perpendicular to a line joining the points (0, 0) and (–8, 8) is
A) –1 B) 1
C) $\frac{1}{3}$ D) –8

8. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector of PQ is
A) $\sqrt{3}$ B) $-\sqrt{3}$
C) $\frac{1}{\sqrt{3}}$ D) 0

9. If A is a point on the Y axis whose ordinate is 8 and B is a point on the X axis whose abscissae is 5 then the equation of the line AB is
A) $8x + 5y = 40$ B) $8x - 5y = 40$
C) $x = 8$ D) $y = 5$

10. The equation of a line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$ is
A) $7x - 3y + 4 = 0$ B) $3x - 7y + 4 = 0$
C) $3x + 7y = 0$ D) $7x - 3y = 0$

11. Consider four straight lines
(i) $l_1 : 3y = 4x + 5$; (ii) $l_2 : 4y = 3x - 1$
(iii) $l_3 : 4y + 3x = 7$ (iv) $l_4 : 4x + 3y = 2$
Which of the following statement is true?
A) l_1 and l_2 are perpendicular
B) l_1 and l_4 are parallel
C) l_2 and l_4 are perpendicular
D) l_2 and l_3 are parallel

12. A straight line has equation $8y = 4x + 21$. Which of the following is true?
A) The slope is 0.5 and the y intercept is 2.6
B) The slope is 5 and the y intercept is 1.6
C) The slope is 0.5 and the y intercept is 1.6
D) The slope is 5 and the y intercept is 2.6

13. When proving that a quadrilateral is a trapezium, it is necessary to show
A) Two sides are parallel.
B) Two parallel and two non-parallel sides.
C) Opposite sides are parallel.
D) All sides are of equal length.

14. When proving that a quadrilateral is a parallelogram by using slopes you must find
A) The slopes of two sides
B) The slopes of two pair of opposite sides
C) The lengths of all sides
D) Both the lengths and slopes of two sides

15. (2, 1) is the point of intersection of two lines.
A) $x - y - 3 = 0; 3x - y - 7 = 0$
B) $x + y = 3; 3x + y = 7$
C) $3x + y = 3; x + y = 7$
D) $x + 3y - 3 = 0; x - y - 7 = 0$

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Chapter 6 - Trigonometry

1 Mark

1. The value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$ is equal to
A) $\tan^2\theta$ B) 1
C) $\cot^2\theta$ D) 0

2. $\tan\theta\operatorname{cosec}^2\theta - \tan\theta$ is equal to
A) $\sec\theta$ B) $\cot 2\theta$
C) $\sin\theta$ D) $\cot\theta$

3. If $(\sin\alpha + \operatorname{cosec}\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$, then the value of k is equal to
A) 9 B) 7 C) 5 D) 3

4. If $\sin\theta + \cos\theta = a$ and $\sec\theta + \operatorname{cosec}\theta = b$, then the value of $b(a^2 - 1)$ is equal to
A) 2a B) 3a C) 0 D) 2ab

5. If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to
A) 25 B) $\frac{1}{25}$ C) 5 D) 1

6. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to
A) $\frac{-3}{2}$ B) $\frac{3}{2}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$

7. If $x = a\tan\theta$ and $y = b\sec\theta$ then
A) $\frac{y^2}{b^2} - \frac{x^2}{a^2} =$ B) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$
C) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ D) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

8. $(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)$ is equal to
A) 0 B) 1 C) 2 D) –1

9. $a\cot\theta + b\operatorname{cosec}\theta = p$ and $b\cot\theta + a\operatorname{cosec}\theta = q$ then $p^2 - q^2$ is equal to
A) $a^2 - b^2$ B) $b^2 - a^2$
C) $a^2 + b^2$ D) $b - a$

10. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure
A) 45° B) 30° C) 90° D) 60°

11. The electric pole subtends an angle of 30° at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the pole is 60°. The height of the pole (in metres) is equal to
A) $\sqrt{3}\,b$ B) $\frac{b}{3}$ C) $\frac{b}{2}$ D) $\frac{b}{\sqrt{3}}$

12. A tower is 60 m heigh. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30°, then x is equal to
A) 41.92m B) 43.92m C) 43 m D) 45.6 m

13. The angle of depression of the top and bottom of 20 m tall building from the top of a multistoried building are 30° and 60° respectively. The height of the multistoried building and the distance between two buildings (in metres) is
A) 20, $10\sqrt{3}$ B) 30, $5\sqrt{3}$
C) 20, 10 D) 30, $10\sqrt{3}$

14. Two persons are standing 'x' metres apart from each other and the height of the first person is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shorter person (in metres) is
A) $\sqrt{2}\,x$ B) $\frac{x}{2\sqrt{2}}$ C) $\frac{x}{\sqrt{2}}$ D) $2x$

15. The angle of elevation of a cloud from a point h metres above a lake is b . The angle of depression of its reflection in the lake is 45°. The height of location of the cloud from the lake is
A) $\frac{h(1+\tan\beta)}{1-\tan\beta}$ B) $\frac{h(1-\tan\beta)}{1+\tan\beta}$
C) $h\tan(45° - \beta)$ D) none of these

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Chapter 7 - Mensuration

1 Mark

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
A) 60π cm^2 B) 68π cm^2
C) 120π cm^2 D) 136π cm^2

2. If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is
A) $4\pi r^2$ sq. units B) $6\pi r^2$ sq. units
C) $3\pi r^2$ sq. units D) $8\pi r^2$ sq. units

3. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
A) 12 cm B) 10 cm
C) 13 cm D) 5 cm

4. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is
A) 1 : 2 B) 1 : 4
C) 1 : 6 D) 1 : 8

5. The total surface area of a cylinder whose radius is 1/3 of its height is
A) $\frac{9\pi h^2}{8}$ sq.units B) $24\pi h^2$ sq.units
C) $\frac{8\pi h^2}{9}$ sq.units D) $\frac{56\pi h^2}{9}$ sq.units

6. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is
A) 5600π cm^3 B) 11200π cm^3
C) 56π cm^3 D) 3600π cm^3

7. If the radius of the base of a cone is tripled and the height is doubled then the volume is
A) made 6 times B) made 18 times
C) made 12 times D) unchanged

8. The total surface area of a hemi-sphere is how much times the square of its radius.
A) π B) 4π C) 3π D) 2π

9. A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is
A) 3x cm B) x cm
C) 4x cm D) 2x cm

10. A frustum of a right circular cone is of height 16cm with radii of its ends as 8cm and 20cm. Then, the volume of the frustum is
A) 3328π cm^3 B) 3228π cm^3
C) 3240π cm^3 D) 3340π cm^3

11. A shuttle cock used for playing badminton has the shape of the combination of
A) a cylinder and a sphere
B) a hemisphere and a cone
C) a sphere and a cone
D) frustum of a cone and a hemisphere

12. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r^2 units. Then $r_1 : r_2$ is
A) 2 : 1 B) 1 : 2 C) 4 : 1 D) 1 : 4

13. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is
A) $\frac{4}{3}\pi$ B) $\frac{10}{3}\pi$ C) 5π D) $\frac{20}{3}\pi$

14. The height and radius of the cone of which the frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1 := 1 : 2$ then $r_2 : r_1$ is
A) 1 : 3 B) 1 : 2 C) 2 : 1 D) 3 : 1

15. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
A) 1 : 2 : 3 B) 2 : 1 : 3
C) 1 : 3 : 2 D) 3 : 1 : 2

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Chapter 8 - Statistics and Probability

1 Mark

1. Which of the following is not a measure of dispersion?
A) Range B) Standard deviation
C) Arithmetic mean D) Variance

2. The range of the data 8, 8, 8, 8, 8. . . 8 is
A) 0 B) 1 C) 8 D) 3

3. The sum of all deviations of the data from its mean is
A) Always positive B) always negative
C) zero D) non-zero integer

4. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all deviations is
A) 40000 B) 160900
C) 160000 D) 30000

5. Variance of first 20 natural numbers is
A) 32.25 B) 44.25 C) 33.25 D) 30

6. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is
A) 3 B) 15 C) 5 D) 225

7. If the standard deviation of x, y, z is p then the standard deviation of $3x + 5$, $3y + 5$, $3z + 5$ is
A) 3p+5 B) 3p C) p+5 D) 9p+15

8. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is
A) 3.5 B) 3 C) 4.5 D) 2.5

9. Which of the following is incorrect?
A) $P(A) > 1$ B) $0 \le P(A) \le 1$
C) $P(\varphi) = 0$ D) $P(A) + P(\overline{A}) = 1$

10. The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is
A) $\frac{q}{p+q+r}$ B) $\frac{p}{p+q+r}$
C) $\frac{p+q}{p+q+r}$ D) $\frac{p+r}{p+q+r}$

11. A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is
A) $\frac{3}{10}$ B) $\frac{7}{10}$
C) $\frac{3}{9}$ D) $\frac{7}{9}$

12. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$ then the value of x is
A) 2 B) 1 C) 3 D) 1.5

13. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is $\frac{1}{9}$, then the number of tickets bought by Kamalam is
A) 5 B) 10 C) 15 D) 20

14. If a letter is chosen at random from the English alphabets {a, b, ..., z}, then the probability that the letter chosen precedes x
A) $\frac{12}{13}$ B) $\frac{1}{13}$
C) $\frac{23}{26}$ D) $\frac{3}{26}$

15. A purse contains 10 notes of ₹ 2000, 15 notes of ₹ 500, and 25 notes of ₹ 200. One note is drawn at random. What is the probability that the note is either a ₹ 500 note or ₹ 200 note?
A) $\frac{1}{5}$ B) $\frac{3}{10}$ C) $\frac{2}{3}$ D) $\frac{4}{5}$

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