2 MATHEMATICS [STANDARD] (012) E

FORMAT OF THE QUESTION PAPER - 2023

Note : This format of the question paper is meant for the guidance of the students, teachers, paper setters, modrators, etc. The paper setter has liberty to change the format keeping in mind the basic objectives of the syllabus and the chapterwise weightage of marks.

Section A : Objective Questions

- Questions 1 to 16 (16 questions) (1 marks each) **16**
- All the questions are compulsory.
- In this section, objective questions like MCQs, MRQs, True / False statement, Fill in the blanks, Definitions, Formulae, Units, Very short answer questions, Answer in a word or a number or a sentence, Give full form, Pick the non-similar word/phrase, Arrange in order, Questions based on graph, Match the list, etc. can be asked.
- Care should be taken that the number of questions of the same type does not exceed 2 or 3.

Section B : Short Answer Questions

- Question No. 17 to 26 (10 questions) (2 marks each) **20**
- Internal options must be given in 4 questions.

Section C : Short Answer Questions

- Question No. 27 to 34 (8 questions) (3 marks each) **24**
- Internal option must be given in 3 questions.

Section D : Long Answer Questions

- Question No. 35 to 39 (5 questions) (4 marks each) **20**
- Internal option will be given in 2 questions.

CHAPTERWISE WEIGHTAGE OF MARKS

Chapter No.	Name of Chapter	Weightage of Marks
1	Real Numbers	04
2	Polynomials	06
3	Pair of Linear Equations in Two Variables	08
4	Quadratic Equations	06
5	Arithmetic Progressions	04
6	Triangles	06
7	Coordinate Geometry	04
8	Introduction to Trigonometry	06
9	Some Applications of Trigonometry	04
10	Circles	06
11	Constructions	04
12	Areas Related to Circles	04
13	Surface Areas and Volumes	08
14	Statistics	06
15	Probability	04
	Total Marks	**80**

Q.PAPER **1**

Mathematics (Standard)

QUESTION PAPER - 1

Std.-10

Time : 3 Hours

(FULLY SOLVED) (012) E

Total Marks : 80

Instructions :

(1) All questions are compulsory. Internal options are given.
(2) 39 questions of this question paper is divided in section A, B, C and D.
(3) Number given at right side of question represent it's marks.
(4) Draw figure wherever necessary.
(5) Start new section from new page. Write answer of question in sequence.
(6) Calculator is not allowed.

Section-A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **Answer the following questions.**

1. What would be the graph of $-2x^2 + 6x + 7$?
2. Write zeros of quadratic equation $ax^2 + bx + c = 0$ (Where $b^2 = 4ac$)

★ **Choose correct alternative from given below to make each of the following statement true.**

3. If $S_1 = 2 + 4 + ... + 2n$ and $S_2 = 1 + 3 + ... + (2n - 1)$ then $S_1 : S_2 =$ _____

(a) $\frac{n+1}{n}$ (b) $\frac{n}{n+1}$ (c) n^2 (d) n + 1

4. If $7\cos^2\theta + 3\sin^2\theta = 4$ then $\cot\theta =$ _____

(a) 7 (b) $\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{7}{3}$

5. Mode – Median = _____ (Median – Mean)

(a) 2 (b) 3 (c) 4 (d) 6

6. H.C.F. (24, 20) = $3x + 1$ then $x =$ _____

(a) 1 (b) $\frac{239}{3}$ (c) $\frac{3}{5}$ (d) $\frac{5}{3}$

★ **Fill in the blanks as to make each of the following statements true.**

7. _____ is the smallest integer by which, integers from 2 to 10 can divide without getting any remainder.
8. If $51x + 49y = 150$ and $49x + 51y = 50$ then value of $x - y : x + y$ is _____
9. Average age of Ronak, Vikas and Heyansh is x years, then _____ year will be their average age after y years.

★ **Answer the following in one sentence word or number.**

10. $M\left(\frac{k}{2}, 5\right)$ is the mid point of $\overline{AB}$, A (–6, 2) and B (–2, 3) then find the value of k.

11. If $\cos\theta = \frac{1}{3}$ then what is the value of $9\tan^2\theta + 9$.

12. The area of a square inscribed a circle with radius 14 cm is _____ cm^2.

13. The radii of two cylinders of the same height are in the ratio 16 : 9, then find the ratio of their volumes.

★ **State whether each of the following statement is true of false.**

14. Tangents drawns to a circle from an external point are of equal length.

15. Probability of scoring 100 marks in question paper of 100 marks is $\frac{1}{100}$.

16. The probability of complement event of impossible event is 0.

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Dice is tossed once, find the probability of getting,
    (i) Prime number,
    (ii) even number on dice, when fair dice is thrown once.

18. Prove that $\sqrt{11}$ is irrational number.

19. Find two consecutive odd positive integers, sum of whose square is 290.

20. Given pair of linear equations $x + y = 14$ and $x - y = 4$ has infinitely many solutions ?

OR

20. Find the value of the following equations having infinitely many solutions.
    $3x - (a+1)y = 20; (a+2)x - 10y = 40$

21. Prove : $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$

22. Find value : $2\tan^2 45^0 + \cos^2 30^0 - \sin^2 60^0$

OR

22. Find $\sin\alpha$ and $\sec\alpha$, if $15\cot\alpha = 8$

23. Two concentric circles are of radii 20 cm and 12 cm. Find the length of the chord of the larger circle which touches the smaller circle.

OR

23. If a parallelogram circumscribe in a circle then prove that it must be rhombus.

24. If for given data $l = 200, f_1 = 27, f_0 = 18, f_2 = 20$ and $h = 100$ then find the mode of data.

25. Draw a circle and two lines parallel to a given line that one is tangent and the other a secant to the circle.

26. Find the roots of quadratic equation $3x^2 - 5x + 2 = 0$ using the quadratic formula.

OR

26. Find the roots of quadratic equation $2x^2 - 5x + 3 = 0$ by the method of factorization.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. $(m-2)$ and $(-2m+4)$ are quotient and remainder respectively when polynomial m^3-3m^2+m+2 divided by polynomial g(m), then find g(m).

28. Find the roots of equation, $\frac{1}{x+4}-\frac{1}{x-7}=\frac{11}{30}; x \neq -4, 7$

29. Answer the following questions :
    (i) Find the sum of first 1000 positive integers.
    (ii) Find the sum of first n positive integers.

OR

29. $a_n=4$, $d=2$, $S_n=-14$ is given in an arithmetic progression, then find a and n.

30. In which ratio does the point $(-4, 6)$ divide the line segment joining the points A$(-6, 10)$ and B$(3, -8)$?

31. Prove that tangents drawn to a circle from an external point are of equal length.

32. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corrosponding (i) Minor segment (ii) major sector. (Use $\pi = 3.14$)

33. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2.

OR

33. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.

34. Find the mean of the following frequency distribution.

Class interval	10-25	25-40	40-55	55-70	70-85	85-100
Number of Students	2	3	7	6	6	6

OR

34. The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in Kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Number of Students	2	3	8	6	6	3	2

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Draw a line segment of length 7.6 cm and divide it in the ratio 5 : 8. Measure the two parts. Write steps of construction.

OR

35. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and write steps of construction.

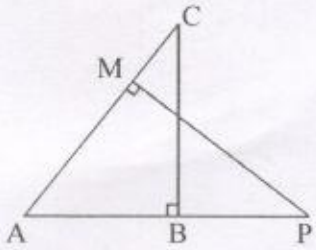
36. In ΔPQR, $\angle Q = 90^0$ then prove $PR^2 = PQ^2 + QR^2$

OR

36. Δ ABC and Δ AMP in given below figure, $\angle B = \angle M = 90^0$ then prove that.

(i) $\Delta ABC \sim \Delta AMP$

(ii) $\frac{CA}{PA} = \frac{BC}{MP}$



37. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30^0, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60^0. Find the time taken by the car to reach the foot of the tower from this point.

38. Solve the quadratic equation $ax^2 + bx + c = 0\ (a \neq 0)$ by perfect square method.

39. A hemispherical tank, full of water, is emptied by pipe at the rate of $3\frac{4}{7}$ litres/second. How much time will it take to empty half the tank if the diameter of the base of the tank is 3m ? $\left(\pi = \frac{22}{7}\right)$

✦

QUESTION PAPER : 1 - FULL SOLUSIONS

Section - A

1. Downward parabola
2. $\left(\frac{-b \pm \sqrt{b^2-4ac}}{2a}\right)$
3. $\frac{n+1}{n}$, $n \in N$
4. $\frac{1}{\sqrt{3}}$
5. 2
6. 1
7. 2520
8. 25 : 1
9. $x + y$
10. $k = -8$
11. 81
12. 392 cm^2
13. 256 : 81
14. True
15. False
16. False

Section - B

★ **Solve the following (Question number 17 to 26) (2 Marks each)**

17. Dice is tossed once, find the probability of getting,
    (i) Prime number,
    (ii) even number on dice, when fair dice is thrown once.

Ans. Possible outcomes of the experiment when fair dice thrown once $n \Rightarrow 6$ $\{1, 2, 3, 4, 5, 6\}$

(i) Event A = to get prime number,
Possible outcomes for event A,
$\{2, 3, 5\}$
$\therefore \quad n(A) = r = 3$

$$\therefore \quad P(A) = \frac{r}{n}$$

$$= \frac{3}{6}$$

$$\therefore \quad P(A) = \frac{1}{2}$$

(ii) Event B = to get an even number
Possible outcomes for event B,
$\{2, 4, 6\}$
$\therefore \quad n(B) = r = 3$

$$\therefore \quad P(B) = \frac{r}{n}$$

$$= \frac{3}{6}$$

$$\therefore \quad P(B) = \frac{1}{2}$$

18. Prove that $\sqrt{11}$ is irrational number.

Ans. Let $\sqrt{11}$ is a rational number.

$$\therefore \quad \sqrt{11} = \frac{x}{y} \quad \text{Where } x \in Z \; y \in N$$

$$\therefore \quad x^2 = 11y^2 \ldots\ldots (1) \qquad \text{(squaring at both side)}$$

$\therefore \quad x^2$ is divisible by 11
$\therefore \quad x$ is also divisible by 11. } (from theorem 1.3)

For some integer m, $x = 11m$

$\therefore$ $(11m)^2 = x^2$

$\therefore$ $(11m)^2 = 11y^2$ (from eq. 1)

$\therefore$ $121m^2 = 11y^2$

$\therefore$ $y^2 = 11m^2$

$\therefore$ y^2 is divisible by 11.

$\therefore$ y is also divisible by 11. } (from theorem 1.3)

$\therefore$ x and y are divisible by 11.

$\therefore$ Hence our assumption is wrong.

$\therefore$ $\sqrt{11}$ is irrational number.

19. Find two consecutive odd positive integers, Sum of whose square is 290.

Ans. Let, two consecutive odd positive integers are x and $x+2$.

Given that sum of their square is 290.

Sum of their square, Hence $x^2 + (x+2)^2 = 290$

$\therefore$ $x^2 + x^2 + 4x + 4 = 290$

$\therefore$ $2x^2 + 4x - 286 = 0$

$\therefore$ $x^2 + 2x - 143 = 0$

$\therefore$ $x^2 + 13x - 11x - 143 = 0$

$\therefore$ $x(x+13) - 11(x+13) = 0$

$\therefore$ $(x+13)(x-11) = 0$

$\therefore$ $x = 11$ or $x = -13$

($x = -13$ is not possible as it is not positive)

$\therefore$ Hence, first odd positive integer $x = 11$

$\therefore$ Second odd positive integer $= x + 2$

$= 11 + 2$

$= 13$

20. Given pair of linear equations $x + y = 14$ and $x - y = 4$ has infinitely many solutions ?

Ans. Subsitution Method

$x + y = 14$ ..... (1)

$x - y = 4$ ..... (2)

From eq. (1)

$y = 14 - x$ ..... (3)

Substitute the value of y in equation (2)

$\therefore$ $x - (14 - x) = 4$

$\therefore$ $x - 14 + x = 4$

$\therefore$ $2x - 14 = 4$

$\therefore$ $2x = 18$

$\therefore$ $\boxed{x = 9}$

Substitute the value of x in equation (1)

$\therefore$ $9 + y = 14$

$\therefore$ $y = 14 - 9$

$\therefore$ $\boxed{y = 5}$

$\rightarrow$ Therefore, the solution is $x = 9$ and $y = 5$

$\therefore$ No, given Pair of equations has finite solution. **OR**

20. Find the value of the following equations having infinitely many solutions.

$3x-(a+1)y=20;(a+2)x-10y=40$

Ans. $3x-(a+1)y-20=0$ .....(1)

$(a+2)x-10y-40=0$ .....(2)

Here, $\frac{a_1}{a_2}=\frac{3}{a+2};\frac{b_1}{b_2}=\frac{-(a+1)}{-10};\frac{c_1}{c_2}=\frac{-20}{-40}$

$\therefore \quad \frac{b_1}{b_2}=\frac{a+1}{10};\frac{c_1}{c_2}=\frac{1}{2}$

→ Condition to have infinitely many solutions

$$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$$

$\therefore \quad \frac{3}{a+2}=\frac{a+1}{10}=\frac{1}{2}$

$\Rightarrow \quad \frac{3}{a+2}=\frac{a+1}{10}$

$\therefore \quad (a+1)(a+2)=30$

$\therefore \quad a^2+3a+2=30$

$\therefore \quad a^2+3a-28=0$

$\therefore \quad (a+7)(a-4)=0$

$\therefore \quad a=-7 \text{ OR } a=4$

$\Rightarrow \quad \frac{a+1}{10}=\frac{1}{2}$

$\therefore \quad a+1=5$

$\therefore \quad a=5-1$

$\therefore \quad a=4$

Hence, for $a=4$ both the conditions are satisfied for linear equation to have infinitely many solution.

$\therefore$ For $a=4$ there are infinitely many solution to this pair of linear equations.

21. Prove : $\frac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}=\tan\theta$

Ans. LHS $=\frac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}$

$=\frac{\sin\theta(1-2\sin^2\theta)}{\cos\theta(2\cos^2\theta-1)}$

$=\frac{\sin\theta(\sin^2\theta-\cos^2\theta-2\sin^2\theta)}{\cos\theta(2\cos^2\theta-\sin^2\theta-\cos^2\theta)}$ $(\because \sin^2\theta+\cos^2\theta=1)$

$=\frac{\sin\theta(\cos^2\theta-\sin^2\theta)}{\cos\theta(\cos^2\theta-\sin^2\theta)}$

$=\frac{\sin\theta}{\cos\theta}$

$=\tan\theta$

$=\text{RHS}$

22. Find value : $2\tan^2 45^0+\cos^2 30^0-\sin^2 60^0$

Ans. $2\tan^2 45^0+\cos^2 30^0-\sin^2 60^0$

$=2(1)^2+\left(\frac{\sqrt{3}}{2}\right)^2-\left(\frac{\sqrt{3}}{2}\right)^2$

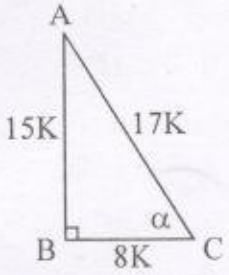
$=2+\frac{3}{4}-\frac{3}{4}$

$=2$

OR

22. Find $\sin\alpha$ and $\sec\alpha$ if $15\cot\alpha = 8$

Ans. We will take ΔABC in which $\angle B = 90^0$



→ Now $15\cot\alpha = 8$

$\therefore \quad \cot\alpha = \frac{8}{15}$

$\therefore \quad \frac{AB}{BC} = \frac{8}{15}$

→ So If AB=8 k then BC=15K (Where K is some positive real number)

→ In ΔABC, $\angle B = 90^0$

$\therefore$ As per Pythagoras theorem

$$AC^2 = AB^2 + BC^2$$
$$= (8K)^2 + (15K)^2$$
$$= 64K^2 + 225K^2$$

$\therefore \quad AC^2 = 289K^2$

$\therefore \quad AC = 17K$

→ $\sin\alpha = \frac{BC}{AC}$

$= \frac{15K}{17K}$

$\therefore \quad \sin\alpha = \frac{15}{17}$

→ $\sec\alpha = \frac{AC}{AB}$

$= \frac{17K}{8K}$

$\therefore \quad \sec\alpha = \frac{17}{8}$

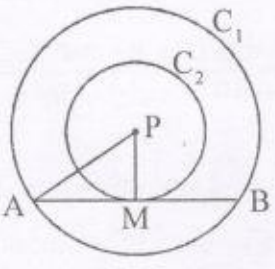
23. Two concentric circles are of radii 20 cm and 12 cm. Find the length of the chord of the larger circle which touches the smaller circle.

Ans. Two concentric circles C_1 and C_2 of centre P shown here.

→ Radius of $C_1 = 20$ cm

→ Radius of $C_2 = 12$ cm

Chord AB of larger circle C_1 touches smaller circle C_2 at point M.



$\therefore \quad PA = 20$ cm

$PM = 12$ cm

$\angle PMA = 90^0$

$\therefore \quad AB = 2AM$

→ As per pythagoras theorem

$PM2 + AM2 = PA2$

$\therefore \quad (12)^2 + AM^2 = (20)^2$

$\therefore \quad 144 + AM^2 = 400$

$\therefore \quad AM^2 = 400 - 144$

$\therefore \quad AM^2 = 256$

$\therefore \quad AM = \sqrt{256}$

$\therefore \quad AM = 16$ cm

$\therefore \quad AB = 2 \times AM = 2 \times 16 = 32$ cm

$\therefore$ The length of the chord of larger circle which touches the smller circle is 32 cm.

OR

23. If a parallelogram circumscribe a circle then prove that it must be rhombus.

Ans. **Data** : $\square^{m}PQRS$ circumscribs one circle.

To Prove : $\square^{m}PQRS$ is a rhombus.

Proof : Side PQ, QR, RS and PS touches the circle at A, B, C and D points respectively in $\square^{m}PQRS$.

$\therefore$ from theorem 10.2

$PA = PD$ ..... (1)

$QA = QB$ ..... (2)

$RC = RB$ ..... (3)

$SD = SC$ ..... (4)

$\rightarrow$ $PQ + RS = PA + AQ + RC + CS$

$= PD + BQ + RB + SD$ (from equation (1), (2), (3), (4))

$= PD + SD + BQ + RB$

$= PS + QR$

$\therefore$ $PQ + RS = PS + QR$ ..... (5)

$\therefore$ $PQ + PQ = QR + QR$ (from the given data)

$\therefore$ $2PQ = 2QR$

$\therefore$ $PQ = QR$

$\therefore$ $\square PQRS$ is a rhombus.

24. If for given data $l = 200, f_1 = 27, f_0 = 18, f_2 = 20$ and $h = 100$ then find the mode of data.

Ans. $l = 200$
$f_1 = 27$
$f_0 = 18$
$f_2 = 20$
$h = 100$
Mode = ?

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

$$= 200 + \left(\frac{27 - 18}{2(27) - 18 - 20}\right) \times 100$$

$$= 200 + \frac{9}{16} \times 100$$

$$= 200 + \frac{900}{16}$$

$$= 200 + 56.28$$

$$\text{Mode} = 256.25$$

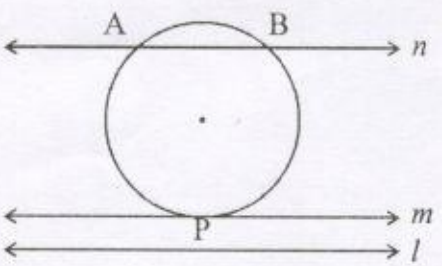
25. Draw a circle and two lines parallel to a given line that one is tangent and the other a secant to the circle.

Ans. Here line l is a given line.

$\rightarrow$ Line m and line n are parallel lines to given line l.

$\rightarrow$ Line m is a tangent to a circle which touches the circle at point P.

$\rightarrow$ Line n is a secant to a circle which intersect circle at point A and B.



26. Find the roots of quadratic equation $3x^2 - 5x + 2 = 0$ using the quadratic formula.

Ans. $3x^2 - 5x + 2 = 0$

we get $a = 3, b = -5, c = 2$ by comparing with its standard form.

$b^2 - 4ac = (-5)^2 - 4(3)(2) = 25 - 24 = 1$

$\therefore \quad b^2 - 4ac > 0$

$\therefore \quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \dfrac{5 \pm 1}{6}$

$\therefore \quad x = 1 \text{ OR } x = \dfrac{2}{3}$

OR

26. Find the roots of quadratic equation $2x^2 - 5x + 3 = 0$ by the method of factorization.

Ans. $2x^2 - 5x + 3 = 0$

$\therefore \quad 2x^2 - 3x - 2x + 3 = 0$

$\therefore \quad x(2x - 3) - 1(2x - 3) = 0$

$\therefore \quad (2x - 3)(x - 1) = 0$

$\therefore \quad 2x - 3 = 0 \text{ OR } x - 1 = 0$

$\therefore \quad x = \dfrac{3}{2} \text{ OR } x = 1$

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)**

27. $(m - 2)$ and $(-2m + 4)$ are quotient and remainder respectively. When polynomial $m^3 - 3m^2 + m + 2$ divided by polynomial $g(m)$ then find $g(m)$.

Ans. $p(m) = m^3 - 3m^2 + m + 2$

$q(m) = m - 2$

$r(m) = -2m + 4$

$g(m) = ?$

→ Now $p(m) = g(m) \times q(m) + r(m)$

$\therefore \quad m^3 - 3m^2 + m + 2 = g(m) \times (m - 2) + (-2m + 4)$

$\therefore \quad m^3 - 3m^2 + m + 2 + 2m - 4 = g(m) \times (m - 2)$

$\therefore \quad m^3 - 3m^2 + 3m - 2 = g(m) \times (m - 2)$

$\therefore \quad g(m) = \dfrac{m^3 - 3m^2 + 3m - 2}{m - 2}$

$$
\begin{array}{r|l}
 & m^2 - m + 1 \\
\hline
m - 2 & m^3 - 3m^2 + 3m - 2 \\
 & m^3 - 2m^2 \\
 & - \quad + \\
\hline
 & -m^2 + 3m - 2 \\
 & -m^2 + 2m \\
 & + \quad - \\
\hline
 & m - 2 \\
 & m - 2 \\
 & - \quad + \\
\hline
 & 0
\end{array}
$$

$\therefore \quad g(m) = m^2 - m + 1$

28. Find the roots of equation, $\frac{1}{x+4}-\frac{1}{x-7}=\frac{11}{30}; x \neq -4, 7$

Ans. $\frac{1}{x+4}-\frac{1}{x-7}=\frac{11}{30}; x \neq -4, 7$

$\therefore \quad \frac{(x-7)-(x+4)}{x^2-3x-28}=\frac{11}{30}$

$\therefore \quad \frac{-11}{x^2-3x-28}=\frac{11}{30}$

$\therefore \quad x^2-3x-28=-30$

$\therefore \quad x^2-3x+2=0$

→ Now $a=1, b=-3, c=2$ by comparing with its standard form

$\therefore \quad b^2-4ac=(-3)^2-4(1)(2)$

$=9-8$

$=1>0$

$\therefore \quad b^2-4ac>0$

$\therefore \quad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$\therefore \quad x=\frac{-(-3)\pm\sqrt{1}}{2(1)}$

$\therefore \quad x=\frac{3\pm1}{2}$

$\therefore \quad x=2 \text{ OR } x=1$

29. Answer the following questions :

(i) Find the sum of first 1000 positive integers.

(ii) Find the sum of first n positive integers.

Ans. (i) Let $S_{1000}=1+2+3+.....+1000$

$\therefore \quad Sn=\frac{n}{2}(a+l)$

$\therefore \quad S_{1000}=\frac{1000}{2}\cdot(1+1000)$

$\therefore \quad S_{1000}=500\times1001$

$\therefore \quad S_{1000}=500500$

(ii) Let $S_n=1+2+3+.....+n$

$a=1, l=n$

$\therefore \quad Sn=\frac{n}{2}(a+l)$

$\therefore \quad Sn=\frac{n}{2}(1+n)$

$\therefore \quad Sn=\frac{n(n+1)}{2}$

OR

29. $a_n=4, d=2, S_n=-14$ is given in an arithmetic progression, then find a and n.

Ans. $a_n=4, d=2, S_n=-14, a=?, n=?$

→ $a_n=a+(n-1)d$

$\therefore \quad 4=a+(n-1)2$

$\therefore \quad 4 = a + 2n - 2$

$\therefore \quad 6 = a + 2n$

$\therefore \quad a = 6 - 2n \qquad \ldots\ldots(1)$

$\rightarrow \quad Sn = \frac{n}{2}[2a + (n-1)d]$

$\therefore \quad -14 = \frac{n}{2}[2(6-2n) + (n-1)2]$

$\therefore \quad -14 = \frac{n}{2}[12 - 4n + 2n - 2]$

$\therefore \quad -28 = n[10 - 2n]$

$\therefore \quad -28 = 10n - 2n^2$

$\therefore \quad 2n^2 - 10n - 28 = 0$

$\therefore \quad n^2 - 5n - 14 = 0$

$\therefore \quad (n-7)(n+2) = 0$

$\therefore \quad n = 7$ OR $n = -2$

$(n = -2$ not possible.)

$\therefore \quad n = 7$

$\rightarrow$ from equation (1)

$a = 6 - 2n$

$\therefore \quad a = 6 - 2(7)$

$\therefore \quad a = 6 - 14$

$\therefore \quad a = -8$

30. In which ratio does the point $(-4, 6)$ divide the line segment joining the points $A(-6, 10)$ and $B(3, -8)$?

Ans. Let $(-4, 6)$ divides AB in $m_1 : m_2$ ratio By using section formula,

$\therefore \quad (-4, 6) = \left(\frac{3m_1 - 6m_2}{m_1 + m_2}, \frac{-8m_1 + 10m_2}{m_1 + m_2}\right)$

$\rightarrow$ If $(x, y) = (a, b)$
then $x = a; y = b$

$\therefore \quad -4 = \frac{3m_1 - 6m_2}{m_1 + m_2}$ *and* $6 = \frac{-8m_1 + 10m_2}{m_1 + m_2}$

$\therefore \quad -4m_1 - 4m_2 = 3m_1 - 6m_2$

$\therefore \quad -7m_1 = -2m_2$

$\therefore \quad \frac{m_1}{m_2} = \frac{2}{7}$

$\therefore \quad m_1 : m_2 = 2 : 7$

Short cut method :

Here, $x = -4$, $x_1 = -6$ and $x_2 = 3$

Now ratio $= \frac{x - x_1}{x_2 - x}$

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

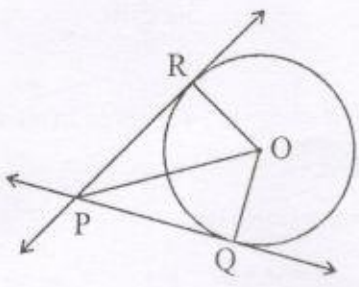
$= \frac{-4 + 6}{3 + 4}$

$= \frac{2}{7}$

31. Prove that tangents drawn to a circle from an external point are of equal length.

Ans. Data : Tangent $\overleftrightarrow{PQ}$ and $\overleftrightarrow{PR}$ drawn from point P, which is in the exterior of the circle with center O and the points of contact are Q and R respectively.

To Prove : PQ=PR



Proof : Join OP, OQ and OR.

In Δ OPQ and Δ ORP,

OQ = QR (Radius of the same circle.)

OP = OP (common side)

$\angle$ OQP = $\angle$ ORP (Right angle)

$\therefore$ Δ OQP $\cong$ Δ ORP (RHS)

$\therefore$ PQ = PR (CPCT)

32. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corrosponding (i) minor segment (ii) major sector. (Use $\pi = 3.14$)

Ans. $r = 10$ cm, $\theta = 90^0$

$\rightarrow$ Area of the sector $= \frac{\pi r^2 \theta}{360}$

$= \frac{314 \times 10 \times 10 \times 90}{100 \times 360}$

$= \frac{157}{2}$

$= 78.5\ cm^2$

$\rightarrow$ Area of triangle $= \frac{1}{2} \times$ Base $\times$ altitude

$= \frac{1}{2} \times 10 \times 10$

$= 50 cm^2$

$\rightarrow$ Area of Minor Segment

= Area of sector – Area of triangle

$= 78.5 - 50$

$= 28.5\ cm^2$

$\rightarrow$ Area of circle $= \pi r^2$

$= \frac{314}{100} \times 10 \times 10$

$= 314\ cm^2$

$\rightarrow$ Area of major Sector

= Area of circel – Area of Sector

$= 314 - 78.5$

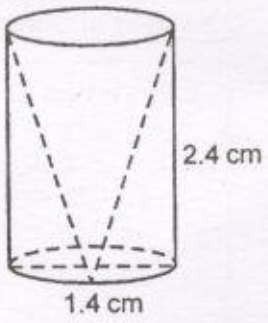
$= 235.5\ cm^2$

33. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remainging solid to the nearest cm^2.

Ans. Radius of Cylinder and a conical cavity hollowed out,

$r = \frac{diameter}{2}$

$= \frac{1.4}{2} = 0.7\ cm$



$\rightarrow$ Height of Cylinder and a conial cavity hollowed out,

$h = 2.4$ cm

$\rightarrow$ For conical cavity hollowed out,

$l = \sqrt{r^2 + h^2}$

$= \sqrt{(0.7)^2 + (2.4)^2}$

$= \sqrt{0.49 + 5.76}$

$= \sqrt{6.25}$

$= 2.5\ cm$

→ Total Surface area of remaining solid = Curved Surface area of cylinder + Surface area of base of Cylinder + Curved Surface area of a cone

$= 2\pi rh + \pi r^2 + \pi rl$

$= \pi r\,(2h + r + l)$

$= \frac{22}{7} \times 0.7\,(2 \times 2.4 + 0.7 + 2.7)\ cm^2$

$= 2.2 \times 8\ cm^2$

$= 17.6\ cm^2$

$\approx 18\ cm^2$

OR

33. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters fo its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.

Ans. $r_1 = \frac{4}{2} = 2cm$

$r_2 = \frac{2}{2} = 1cm$

$h = 14\ cm$

Capacity of glass = Volume of frustum of a cone

$= \frac{1}{3}\pi h\,(r_1^2 + r_2^2 + r_1 r_2)$

$= \frac{1}{3} \times \frac{22}{7} \times 14\,(2^2 + 1^2 + 2 \times 1)$

$= \frac{1}{3} \times 44 \times 7$

$= \frac{308}{3}\ cm^3$

$= 102\frac{2}{3}\ cm^3$

34. Find the mean of the following frequency distribution.

Class interval	10-25	25-40	40-55	55-70	70-85	85-100
Number of Students	2	3	7	6	6	6

Ans.

Class inverval	**Numer of Students** f_i	**Mid Value** x_i	$f_i x_i$
10 - 25	2	17.5	35
25 - 40	3	32.5	97.5
40 - 55	7	47.5	332.5
55 - 70	6	62.5	375
70 - 85	6	77.5	465
85 - 100	6	92.5	555
	$\sum fi$=30		**$\sum fixi$=1860**

Here $\sum fixi = 1860$

$\sum fi = 30, \quad \bar{x} = ?$

$\bar{x} = \frac{\sum fixi}{\sum fi} \quad \therefore \quad \bar{x} = \frac{1860}{30} \quad \therefore \quad \bar{x} = 62$

OR

34. The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in Kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Number of Students	2	3	8	6	6	3	2

Ans.

Weight (in Kg)	Number of Students f_i	Cumulative Frequency cf
40 - 45	2	2
45 - 50	3	5
50 - 55	8	13
55 - 60	6	19
60 - 65	6	25
65 - 70	3	28
70 - 75	2	30
	$\sum fi=30$	

Here $n=30$

$\therefore \quad \frac{n}{2}=15$

$\therefore$ Median class = 55 – 60

l = Lower limit of median calss = 55

cf = Cumulative frequency of class preceding the median class = 13

f = frequency of median class = 6

h = class size = 5

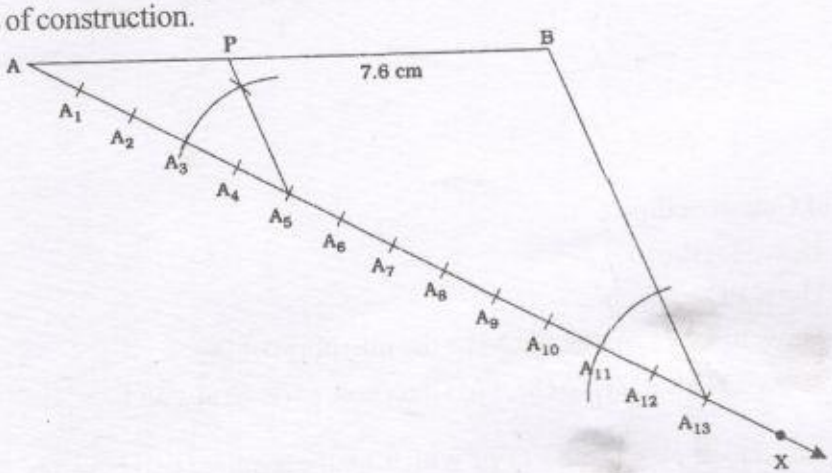
$$\text{Median} = l+\left(\frac{\frac{n}{2}-cf}{f}\right)\times h = 55+\left(\frac{15-13}{6}\right)\times 5 = 55+\frac{10}{6} \quad \therefore \text{Median} = 56.67 \text{ Kg.}$$

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)**

35. Draw a line segment of length 7.6 cm and divide it in the ratio 5 : 8. Measure the two parts. Write steps of construction.

Ans.



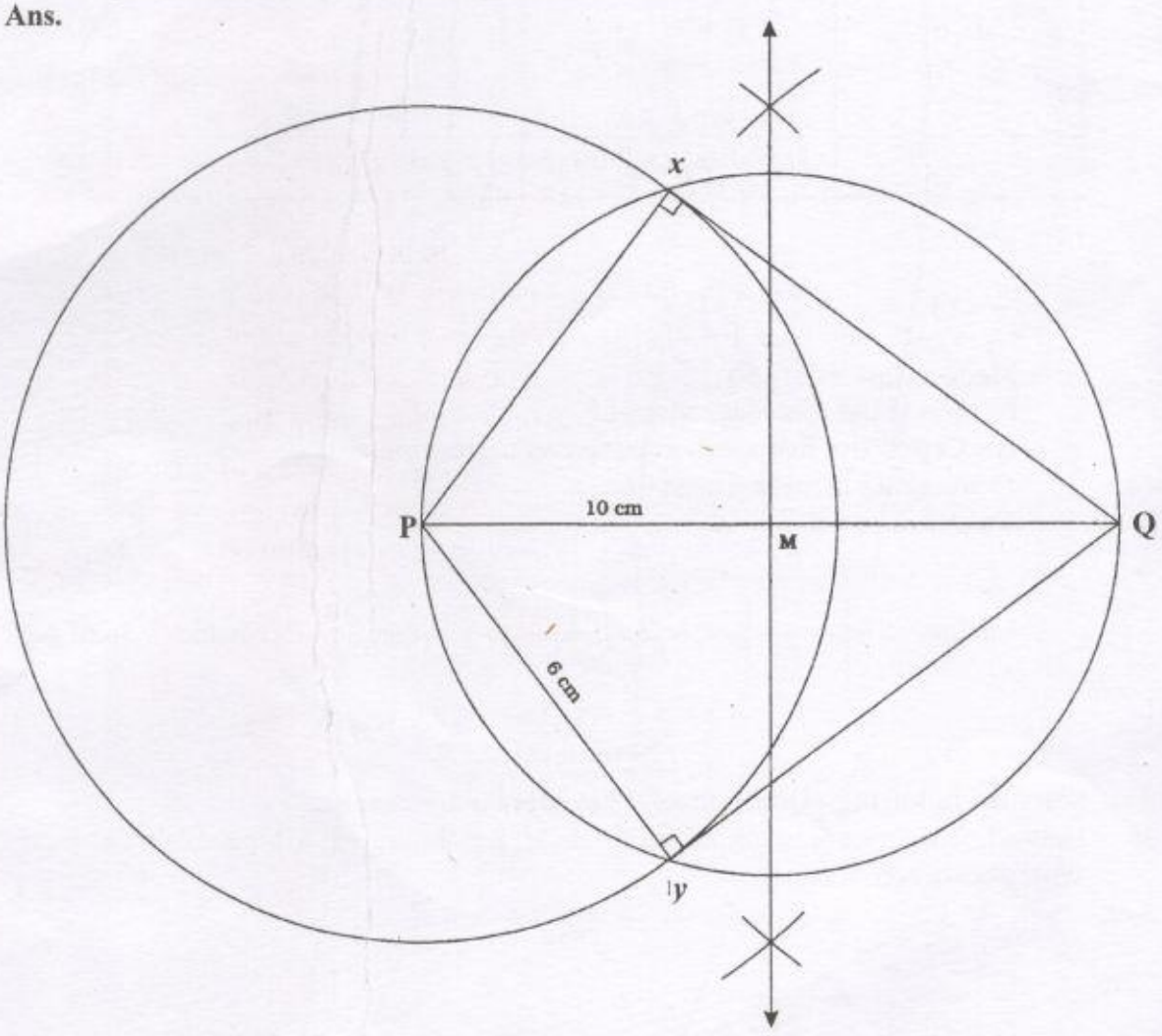
→ **Step of Construction :**

1. Draw linesegment AB of the given measue.
2. Draw $\overrightarrow{AX}$
3. Locate points $A_1, A_2, A_3, A_4, \ldots\ldots, A_{13}$ on $\overrightarrow{AX}$. So that $AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_5A_6 = A_6A_7 = A_7A_8 = A_8A_9 = A_9A_{10} = A_{10}A_{11} = A_{11}A_{12} = A_{12}A_{13}$.
4. Join $A_{13}B$
5. Draw $BA_{13\,11}PA_5$.

OR

35. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and write steps of construction.

Ans.



→ **Step of Construction:**

1. Draw ⊙(P, 6)
2. Draw PQ = 10 cm.
3. Draw bisector of PQ. Let M be the mid point of PQ.
4. Draw ⊙(M, PM). ⊙(M, PM) intersect ⊙(P, 6) at x and y.
5. Join and draw $\overleftrightarrow{QX}$ and $\overleftrightarrow{QY}$, Which are the required two tangents.

→ **Justification :** In ΔPxQ, $\angle X$ is a right angle.

According to pythagoras theorem

$PQ^2 = Px^2 + xQ^2$

$\therefore \quad (10)^2 = (6)^2 + xQ^2$

$\therefore \quad xQ = \sqrt{64} = 8\ cm$

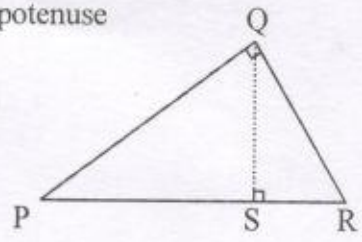
$\therefore$ Length of tangents $= xQ = xY = 8\ cm$

36. In ΔPQR, $\angle Q = 90^0$ then prove $PR^2 = PQ^2 + QR^2$

Ans. Data : In ΔPQR, $\angle Q$ is right angle. so PR is hypotenuse

To Prove : $PR^2 = PQ^2 + QR^2$

Proof : Let us draw $QS \perp PR$ in right angle triangle ΔPQR.



$\therefore$ ΔRSQ and ΔQSP are right triangle and P-S-R So $PS + SR = PR$.

→ If altitude drawn on hypotenuse from the point of vertex forming right angle then both the triangles formed on either side of altitude are similar.

$\therefore \quad \Delta PSQ \sim \Delta PQR$ and $\Delta QSR \sim \Delta PQR$

$\therefore \quad \dfrac{PS}{PQ} = \dfrac{PQ}{PR}$ and $\dfrac{SR}{QR} = \dfrac{QR}{PR}$

$\therefore \quad PQ^2 = PS \times PR$ .....(i)

$\therefore \quad QR^2 = SR \times PR$ .....(ii)

Equation (i) + (ii)

$\therefore \quad (PS \times PR) + (SR \times PR) = PQ^2 + QR^2$

$\therefore \quad PR\,(PS + SR) = PQ^2 + QR^2$

$\therefore \quad PR\,(PR) = PQ^2 + QR^2$

$\therefore \quad PR^2 = PQ^2 + QR^2$

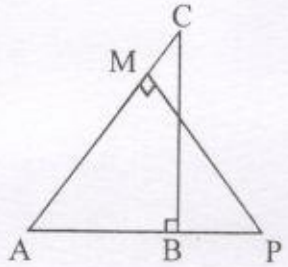
OR

36. ΔABC and ΔAMP in given below figure, $\angle B = \angle M = 90^0$ then prove that.

(i) $\Delta ABC \sim \Delta AMP$

(ii) $\dfrac{CA}{PA} = \dfrac{BC}{MP}$

Ans. (i) $\Delta ABC \sim \Delta AMP$



→ In ΔABC and ΔAMP

$\angle ABC = \angle AMP$ ....(i) (90^0 angles)

$\angle BAC = \angle MAP$ ....(ii) (Common angle)

from equation (i) and (ii)

As per AA critcria $\Delta ABC \sim \Delta AMP$

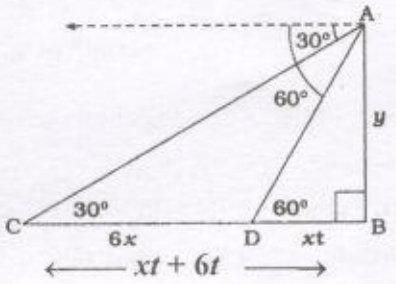
(ii) $\dfrac{CA}{PA} = \dfrac{BC}{MP}$

→ $\Delta ABC \sim \Delta AMP$ (As per above proof (i)) $\therefore \dfrac{CA}{PA} = \dfrac{BC}{MP}$ (CPCT)

37. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30^0, which is approaching the foot of the tower with a uniform speed. six seconds later, the angle of depression of the car is found to be 60^0. Find the time taken by the car to reach the foot of the tower from this point.

Ans. AB = height of tower

BD = Time taken to reach to tower from point D



→ Let the speed of car = $x\frac{m}{s}$

$\therefore$ Speed $= \frac{\text{Dis tan ce}}{\text{Time}}$

$\therefore \quad x = \frac{CD}{6} \qquad \therefore \quad CD = 6x$

→ $x = \frac{BD}{t}$

$\therefore \quad BD = xt$

Now In ΔABD

$$\tan 60^0 = \frac{\text{Opposite side}}{\text{Adjacent side}}$$

$\therefore \quad \sqrt{3} = \frac{y}{xt}$

$\therefore \quad y = \sqrt{3}xt$ ..... (i)

→ In ΔABC,

$$\tan 30^0 = \frac{\text{Opposite side}}{\text{Adjacent side}}$$

$\therefore \quad \frac{1}{\sqrt{3}} = \frac{y}{xt + 6x}$

$\therefore \quad \frac{1}{\sqrt{3}} = \frac{\sqrt{3}\,xt}{xt + 6x}$

$\therefore \quad xt + 6x = 3xt$

$\therefore \quad 6x = 3xt - xt$

$\therefore \quad 6x = 2xt$

$\therefore \quad t = \frac{6x}{2x}$

$\therefore \quad t = 3$ second

38. Solve the quadratic equation $ax^2 + bx + c = 0\ (a \neq 0)$ by perfect square method.

Ans. $ax^2 + bx + c = 0$

$\therefore \quad 4a^2x^2 + 4abx + 4ac = 0$ (multiply both side by 4a)

$\therefore \quad 4a^2x^2 + 4abx = -4ac$

$\therefore \quad 4a^2x^2 + 4abx + b^2 = b^2 - 4ac$ $\left(\because \text{last term} = \frac{(\text{middle term})^2}{4 \times \text{first term}}\right.$

so add b^2 at both side.)

$\therefore \quad (2ax + b)^2 = b^2 - 4ac$

$\therefore \quad 2ax + b = \pm\sqrt{b^2 - 4ac}$

$\therefore \quad 2ax = -b \pm \sqrt{b^2 - 4ac}$

$\therefore \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

39. A hemispherical tank, full of water, is emptied by pipe at the rate of $3\frac{4}{7}$ litres/second. How much time will it take to empty half the tank if the diameter of the base of the tank is 3m ? $\left(\pi = \frac{22}{7}\right)$

Ans. Radius of hemispherical tank $= \frac{3}{2}$ meter

$\rightarrow$ $\therefore$ Volume of tank $= \frac{2}{3} \times \frac{22}{7} \times \left(\frac{3}{2}\right)^3$

$= \frac{2}{3} \times \frac{22}{7} \times \frac{27}{8}$

$= \frac{99}{14}$ meter^3

$\rightarrow$ Hence Volume of emptied water $= \frac{1}{2} \times \frac{99}{14}$

$= \frac{99}{28} \times 1000$ litre

$= \frac{99000}{28}$ litre

$\rightarrow$ If time taken to emptied $\frac{25}{7}$ litre water = 1 second

$\therefore$ time taken to emptied $\frac{99000}{28}$ litre water = ?

$= \frac{99000}{28} \times \frac{7}{25}$

$= \frac{3960}{4}$

$= 990$ second or 16.5 minutes

✦

Q.PAPER **2**

Mathematics (Standard)

QUESTION PAPER - 2

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section-A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) **16**

★ **Answer the following questions.**

1. The ratio of HCF : LCM for smallest prime number and smallest composite number is _____

2. $7 \times 11 \times 13 + 13$ represented by product of different indivisible numbers. Hence $7 \times 11 \times 13 + 13$ is _____ number.

3. α, β and γ are the zeros of Cubic polynomial $ax^3 + bx^2 + cx + d\ (a \neq 0)$, then $(\alpha \cdot \beta \cdot \gamma) =$ _____

4. Pair of linear equation $8x + ky + 16 = 0$ and $4x + 4y + 4 = 0$ has one and only one solution, then _____ is the value of unknown k.

★ **Answer in one sentence, one word or number.**

5. Two Linear equations in two variables $x + y = 28$ and $x - y = 8$ are given. Find the value of x by suitable method.

6. Answer whether given equation $x^2 - 4x = (-4)(6 - x)$ is quadratic equation or not.

7. Write term in {} and complete given arithmetic progression. 4, {}, 52.

8. _____ unit is the distance of point (–3, 4) from origin.

★ **State whether each of the following statement is true or false.**

9. Value of $\cos\theta$ increases as we increase the value of θ.

10. Small change in data shows considerable impact in the value of mean.

11. A circle of 10 cm diameter have length of each tangent smaller than 10 cm.

12. For any event A, $P(A) = P(\bar{A})$ is possible.

★ **Fill in the blanks so as to make each of the following statements true.**

13. If $\sin\theta + \sin^2\theta = 1$ then $\frac{1}{\sec^2\theta} + \frac{1}{\sec^4\theta} =$ _____

(a) 0 (b) 1 (c) –1 (d) 2

14. If perimeter and area of circle is same number, then diameter of circle = _____

(a) 4 unit (b) 2 unit (c) 8 unit (d) 1 unit

15. If two cones have their heights in the ratio 5 : 3 and the radii of their bases are in the ratio 2 : 3, then ratio of their volumes = _____

(a) 27 : 20 (b) 9 : 4

(c) 4 : 9 (d) 20 : 27

16. Vikas and Ronak are two friends. Probability of their birthday on different-different dates is _____. (Avoid leap year)

(a) 1 (b) 0 (c) $\frac{364}{365}$ (d) $\frac{1}{365}$

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Prove : $3 + 2\sqrt{7}$ is irrational.

18. Find zeroes of a quadratic polynomial $-12 + t + 6t^2$

19. For which values of k will the pair of linear equations $kx + 3y - (k-3) = 0$ and $12x + ky - k = 0$ have infinite number of solutions.

OR

19. Write the conditions to have (i) no solution and (ii) one and only one (unique) solution for linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$.

20. Find the roots of quadratic equation $3x - 13 = \frac{30}{x}$ by the method of factorisation.

OR

20. Find discriminant D for quadratic equation $2x - 4 = -\frac{3}{x}$ and from that decide nature of its root.

21. If P, Q and R are angle of Δ PQR then prove that, $\operatorname{cosec}\left(\frac{P+R}{2}\right) = \sec\frac{Q}{2}$

22. Prove that : $\sin 30^0 \cos 60^0 + \cos 30^0 \sin 60^0 = \sin 90^0$

OR

22. Prove that : $\sec^4 A - \sec^2 A = \tan^4 A + \tan^2 A$

23. Define :
(1) Tangent of Circle (2) Secant of Circle

OR

23. Answer the following questions :
(i) If two circles intersect each other at two distinct points then how many common tangents can be drawn to them ?
(ii) If two circles touch externally, how many common tangents can be drawn to them ?

24. If a ladder 20 m long reaches a window 16 m above the ground then find the distance of the foot of the ladder from the base of wall.

25. A piggy bank contains hundred - 50 p coins, fifty 1 Rs coins, twenty - 2 Rs. coins and ten - 5 Rs. coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, What is the probability that the coin (i) will be a 50 p coin ? (ii) Will not be a 5 Rs. coin ?

26. In given data $l = 200, f_1 = 27, f_0 = 18, f_2 = 20$ and $h = 100$ then find mode of the data.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. $p(x) = -5x + x^4 + 6, q(x) = -x^2 + 2$ are two given polynomials. Divde $p(x)$ by $q(x)$ and verify the division algorithm.

28. Find the roots of quadratic equation $5x = 6 + \frac{2}{x}$ by the method of perfect square.

29. Find the sum of arithmetic progression $34 + 32 + 30 + ... + 10$

OR

29. Find the 31st term of an A.P. whose 11th term is 38 and the 16th term is 73.

30. Find the area of Δ PQR formed by the points P(2, 3), Q(−1, 0) and R(2, −4).

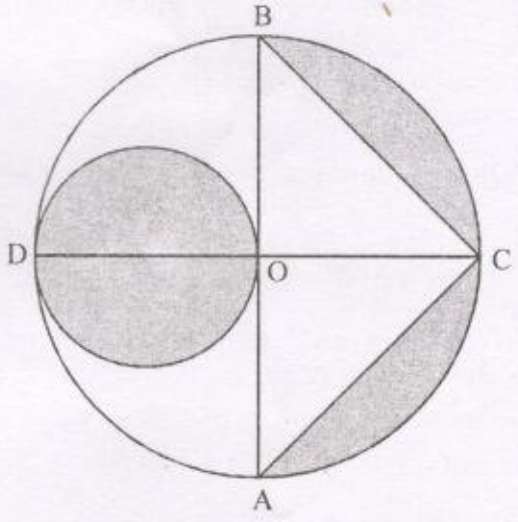
31. A chord of 4 circle of diameter 20 cm make a right angle at the centre of the circle.

(i) Find the area of minor segment,

(ii) Find the area of major sector. ($\pi = 3.14$)

OR

31. As shown in the below figure, AB and CD are two diameters of a circle with centre O, perpendicular to each other and OD is the diameter of the smaller circle. If OA = 7 cm, Find the area of the shaded region.



32. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

33. How many silver coins, 1.75 cm in diameter and of thickness 2mm, must be melted to form a cubiod of dimension 5.5 cm × 10 cm × 3.5 cm ?

34. Mean of the following frequency distribution is 18. Find the value of missing frequency x in class 19-21.

Class	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	3	6	9	13	x	5	4

OR

34. 100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows :

Number of letters	1-4	4-7	7-10	10-13	13-16	16-19
Number of Surnames	6	30	40	16	4	4

Determine the median number of letters in the surnames.

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Prove that in ΔXYZ, $XY^2 + YZ^2 = XZ^2$ then $\angle Y = 90^0$.

OR

35. Write the statement of pythagoras theorem. In ΔPQR, $\angle R = 90^0$ then prove that $PQ^2 = PR^2 + QR^2$

36. Draw a circle of radius 4.5 cm. From a point 7.5 cm away from its centre, construct the pair of tangent to the circle and measure their lengths.

37. Two poles of equal heights are standing opposite to each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60^0 and 30^0, respectively. Find the height of the poles and the distance of the point from the poles.

OR

37. A statue 1.6 m tall, stands on the top of pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60^0 and from the same point the angle of elevation of the top of the pedestal is 45^0. Find the height of the pedestal.

38. Rinku can row downstream 40 km in 4 hours and upstream 8 km in 4 hours. Find her speed of rowing in still water and the speed of the current.

39. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylinderical part are 4.2 m and 8 m respectively, and the slant height of the top is 5.6 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs. 1000 per m^2.
(Note : The base of the tent will not be covered with canvas)

✦

QUESTION PAPER : 2 - SHORT ANSWERS

1. 1 : 2

2. Composite

3. $-\frac{d}{a}$

4. $k \neq 8$

5. $x = 18$

6. Yes, it is a quadratic equation.

7. $\{\} = 28$

8. 5

9. False

10. True

11. False

12. True

13. (b) 1

14. (a) 4 unit

15. (d) 20 : 27

16. (c) $\frac{364}{365}$

18. $\frac{-3}{2}$ and $\frac{4}{3}$

19. $K = \pm 6$

19. OR $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

20. $X = 6$ or $X = \frac{-5}{3}$

20. OR $-8 < 0$

24. $QR = 12\,m$

25. (i) $\frac{5}{9}$, (ii) $\frac{17}{18}$

26. mode = 256.25

27. $Q = -x^2 - 2$; Remainder = $-5x + 10$

28. $\frac{3+\sqrt{19}}{-5}$ and $\frac{3-\sqrt{19}}{5}$

29. 286

29. OR $Q_{31} = 178$

30. $\frac{21}{2}$ Sq. unit

31. 28.5 cm^2; 314 cm^2; 235.5 cm^2

31. OR 38.5 cm^2, 665 cm^2

33. 192.5 cm^2; 400

34. $X = 8$

34. OR 8.05

36. 6 cm

37. $X = 20\sqrt{3}m$

38. OR $X = 0.8(\sqrt{3} + 1)m$

39. 176 m2; 176000 ₹

Q.PAPER **3**

Mathematics (Standard)

QUESTION PAPER - 3

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section-A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **Fill in the blanks so as to make each of the following statements true.**

1. Cubic polynomial $Q(t) = -t + t^3$ has _____ real zeros.
2. Probability of any event is larger than or equal to _____ and smaller than or equal to _____.
3. Equation $\frac{s}{3} - \frac{t}{5} = \frac{1}{15}$ can be written _____ in its standard form.
4. If tangents TA and TB from a point T to a circle with centre O are inclined to each other at an angle of 70^0, then $\angle TOA =$ _____

★ **Choose correct alternative from given below to make each of the following statement true.**

5. When $\theta =$ _____ then $\sin 2\theta = 2\sin\theta$ becomes true.
   (a) 45 (b) 30 (c) 0 (d) 60
6. If the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinite number of solution, then the relation among the coefficients is _____
   (a) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (b) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$
   (c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (d) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
7. If $n = 100$, $a = 45$, $\bar{x} = 45$ then $\sum fidi =$ _____
   (a) 45 (b) 25 (c) 0 (d) 35
8. If $P(A) - P(\bar{A}) = 0.8$ then $P(A) =$ _____
   (a) 0.8 (b) 0.9
   (c) 0.6 (d) 1

★ **Fill in the blanks.**

9. The foot of the perpendicular drawn from P(–6, 4) to the Y-axis is M. The coordinates of M are _____
10. If $x - 5, 11, x + 7$ are consecutive terms of an arithmetic progression then $x =$ _____
11. The maximum area of a triangle inscribed in a semicircle with diameter 40 cm is _____ sq. cm.
12. Probability that 5 friday occurs in the month of May in any year is _____.

★ **State whether each of the following statement true of false.**

13. 36 is the discriminant to equation $5x + \frac{1}{y} = 6$

14. $\frac{1}{3}\pi r^2 h$ is the formula to find volume of cylinder with r radius and h height.

15. Two fair coins are tossed simultaneously, probability of getting head on both coin is $\frac{1}{4}$.

16. Value of tan θ is always more than 1.

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Prove that $\sqrt{5}$ is an irrational number.

OR

17. Use Euclid's division algorithm to find H.C.F. of (616, 32)

18. Find H.C.F. and L.C.M. of integers 12, 144 and 240 by applying the prime factorisation method.

19. Find a quadratic polynomial with sum of its zeroes $\frac{1}{4}$ and Poduct of its zeroes -1.

20. Solve the following pair of linear equations by the elimination method

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

OR

20. Solve the following pair of linear equation by substitution method.

$2x = 13 - 3y$ and $4x + 5y = 23$

21. If cos A $= \frac{12}{13}$ then calculate tan A and cosec A.

22. Evaluate : $2\tan^2 45^0 + \cos^2 30^0 - \sin^2 60^0$

OR

22. Prove that $\frac{\cos\theta}{1+\sin\theta} + \frac{1+\sin\theta}{\cos\theta} = 2\sec\theta$

23. Two concentric circles are of radii 21 cm and 29 cm. Find the length of the chord of the larger circle which touches the smaller circel.

OR

23. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB + CD = AD + BC.

24. Write formula to find mean by step deviation method. By the use of this formula find mean for the given data $a = 47.5$, $\sum f_i u_i = 29$, $\sum f_i = 30$ and $h = 15$.

25. A ladder is placed against a wall such that its foot is at a distance of 2.5 m from the wall and its top reaches a window 6 m above the ground. Find the length of the ladder.

26. Check and write which of the following equation is quadratic equation.

(i) $(m+2)^3 = 2m(m^2-1)$

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

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. On dividing $5 + x^2 + 2x + 3x^3$ by a polynomial $q(x)$, the quotient and remainder were $3x-5$ and $9x+10$ respectively. Find $q(x)$.

28. Prove that : The lengths of tangents drawn from an external point to a circle are equal.

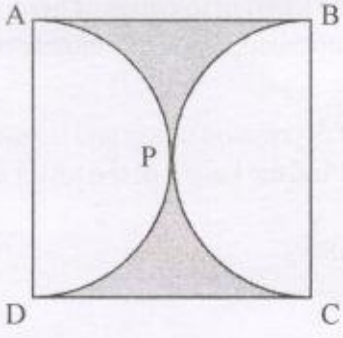
29. A wooden showpiece was made by scooping out a hemisphere from each end of a solid cylinder by Ronak. If the height of the cylinder is 10 cm and its base is of diameter 7 cm. Find total surface area of showpiece in cm^2.

$\left(\pi = \frac{22}{7}\right)$

OR

29. Metallic spheres of radii 6 cm, 8 cm and 10 cm respectively, are melted to form a single sphere. Find the diameter of the resulting sphere in cm.

30. Find the area of the shaded region in below figure, if ABCD is a square of side 14 cm and, APD and BPC are semicircles.



31. $a = 10, d = 6, a_n = 100$ given, then find n and S_n.

OR

31. Determine the A.P. Whose third term is 16 and 7^{th} term exceeds the 5^{th} term by 12.

32. Find the coordinates of the points of trisection of the line segment joining $(4, -1)$ and $(-2, -3)$

33. Find the roots of $2x^2 = -1 + 2\sqrt{2}x$ using quadratic formula.

34.

Literacy rate (in %)	45-55	55-65	65-75	75-85	85-95
Number of cities	3	10	11	8	3

Find the mean literacy rate for the above data.

OR

34. If the median of the distribution given below is 28.5 then find values of f_1 and f_2.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	f_1	20	15	f_2	5	60

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Prove that If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

OR

35. If $\Delta ABC \sim \Delta PQR$then prove that

$$\frac{ABC}{PQR} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2$$

36. Draw a line segment of length 5.5 cm and divide it in the ratio 5 : 8. Measure the two parts. Write the steps of construction.

OR

36. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 60^0. Write steps of construction.

37. A boat goes 40 km upstream and 49 km downstream in 15 hours. In 10 hours, it can go 25 km upstream and 35 km downstream. Determine the speed of the stream and that of the boat in still water (in km/hours.)

38. A container shaped like a right ciruclar cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled in to cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.

39. From the top of a hill 100 m high the angle of depression of top and bottom of a tower are observed to be 30^0 and 45^0 respectively. Find the height of the tower and distance of tower from the bottom of hill. $\left(\frac{1}{\sqrt{3}} = 0.58\right)$

✦

QUESTION PAPER : 3 - SHORT ANSWERS

1. 3

2. 0 and 1

3. $5s-3t-1=0$

4. $\angle TOA = 55^0$

5. 0

6. (c) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$

7. (c) 0

8. (b) 0.9

9. Coordinates of M (0, 4)

10. $x = 10$

11. 400 Sq cm.

12. $\frac{3}{7}$

13. False

14. False

15. True

16. False

17. OR H.C.F. (676, 32) = 8

18. H.C.F. = 12; L.C.M. = 720

19. $P(x)=4x^2-x-4$

20. $y=-3; x=2$

20. OR $(x, y)=(2, 3)$

21. $\frac{5}{12}, \frac{13}{5}$

22. 2

23. 40 cm

24. $\bar{X}=62$

25. 6.5 m

27. $q(x)=x^2+2x+1$

29. 374 cm^2

29. OR R = 12 cm

30. 7 cm ; 154 cm^2; 42 cm^2

31. n = 16; $S_n = 880$

31. OR 4, 10, 16, 22

32. $P=\left(2, \frac{-5}{3}\right), Q\left(0, \frac{-7}{3}\right)$

33. $\frac{1}{\sqrt{2}}$ and $\frac{1}{\sqrt{2}}$

34. $\bar{X}=69.43\%$

34. OR $f_1=8; f_2=7$

37. $x=6; y=1$

38. 10 cones

39. 42 metre; bottom = 100 metre

Q.PAPER 4

Mathematics (Standard)

QUESTION PAPER - 4

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section-A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **Choose correct alternative to make each of the following statement true.**

1. α, β and γ are the zeroes of the cubic polynomial $p(x) = ax^3 + bx^2 + cx + d\ (a \neq 0)$ then $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma} =$ _____

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

2. $37x + 53y = 150$ and $53x + 37y = 30$ then $x + y =$ _____

   (a) 4 (b) 1 (c) 2 (d) 6

3. If 4 is the root of quadratic equation $-8 + x^2 + kx = 0$ then value of unknown k is _____

   (a) 2 (b) 4 (c) –2 (d) –4

4. For arithmetic progression $S_n - 2S_{n-1} + S_{n-2} =$ _____ $(n > 2)$

★ **Answer in one sentense, word or number.**

5. If $P(\overline{D}) = \frac{14}{27}$ then $P(D) =$ _____

6. _____ is taken on y-axis to draw cumulative frequency curve.

7. If a sphere of diameter $2r$ is divided into four identical parts, then total surface area of 4^{th} part is _____

8. Two different sectors of a circle with diameter 30 cm subtend angle 60^0 and 150^0 respectively at the centre of a circle. Then the ratio of areas of both sectors is _____

★ **State whether each of the following statement is true or false.**

9. $\frac{1}{2}, \frac{2}{3}, \frac{5}{6}, \frac{1}{4}$ is an arithmetic progression.

10. Point (–4, 6) have perpendicular distand 4 from y-axis.

11. $8\sec^2 A - 8\tan^2 A = 8$

12. Two lines $y = 4x$ and $x = 4y$ intersect each other at point (1, 1).

★ **Fill in the blanks.**

13. $\cot^2 \alpha - \operatorname{cosec}^2 \alpha =$ _____

14. 20th term of an arithmetic progression 10, 7, 4, ... is _____

15. Tangent intersect circle in _____ point / points.

16. For any arithmetic progression $a_{45} - a_{30} = 75$ then d = _____

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Given that HCF (72, 120) = 24, find LCM (72, 120).

18. Prove that $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ is a composite number.

OR

18. Prove that $\frac{1}{\sqrt{2}}$ is irrational.

19. 3 is one zero of the polynomial $p(x) = 3x^3 - x^2 - 9x + k$, then find value of k.

20. Find the solution of 25 = 11 – 3t and 25 – 4t = –24 by any suitable method.

OR

20. Solve the following pair of linear equation by cross-multiplication method.
$2x = 5 - y$ and $3x + 2y = 8$

21. In Δ ABC, DE || BC. If AD = 1.5 cm, DB = 3 cm and AE = 1 cm then find AC in cm.

22. If cot 4A = tan (A - 20). Where 4A is an acute angle, find the value of A.

23. If $2 \cot^2 45 + M - \cos^2 30 = 2$ then find M.

OR

23. Prove that sec A (1 – sin A) (sec A + tan A) = 1.

24. The length of a tangent drawn from a point A at 10 cm distance from centre of circle is 8 cm. Then find diameter of a circle.

OR

24. Prove that the parallelogram circumscribing a circle is a rhombus.

25. The product of two consecutive positive integer is 306. From the quadratic equation to find the integers.

26. In any given data $l = 35$, $n = 45$, $cf = 15$, $f = 10$ and $h = 5$ then find median of data.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. A box contains 90 discs. Which are numbered rom 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square (iii) a number divisible by 5.

28. Find the mean number of days a student was absent from the given data.

Number of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40
Number of students	11	10	7	4	4	3	1

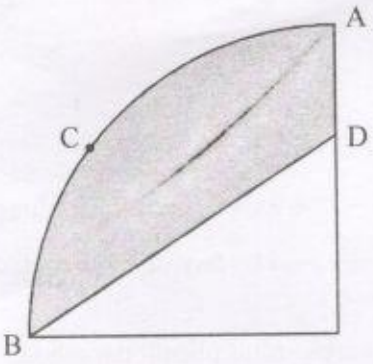
OR

28. The median of the following frequency distribution is 525. If total frequency is 100 then find the value of f_1 and f_2.

Class interval	0-100	100-200	200-300	300-400	400-500	500-600
Frequency	2	5	f_1	12	17	20

600-700	700-800	800-900	900-1000
f_2	9	7	4

29. In given figure, OACB is quadrant of a circle with centre O and diameter 7 cm. If OD = 2 cm. Find the area of the (i) quadrant OACB (ii) shaded region.



OR

29. The cost of fencing a circular field at the rate of Rs 24 per metre is Rs. 5280. The field is to be ploughed at the rate of Rs. 0.50 per Sq. m. Find the cost of ploughing the field.

$\left(\pi = \frac{22}{7}\right)$

30. 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. Find the length PT in cm.

OR

30. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

31. Vikas made a birdbath for this garden in the shape of cylinder with hemispherical depression at one end. The height of the cylinder is 1.45 cm and its diameter is 60 cm.

Find the total surface area of the bird-bath in m^2. $\left(\pi = \frac{22}{7}\right)$

32. $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$ are two zeroes of $6x^3 - 2x^2 - 5 - 10x + 3x^4$, then find other zeroes.

33. Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

34. Find the area of the quadrilateral PQRS. Whose vertices, taken in order are P(2, 3), Q(3, –2), R(–3, –5) and 5 (–4, –2).

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. In ΔABC; $BC^2 = AB^2 + AC^2$ then prove $\angle A = 90^0$.

OR

35. BL and CM are medians of triangle ΔABC in which $\angle A = 90^0$. Prove that $4(BL^2 + CM^2) = 5BC^2$.

36. Line segment AB is given. Divide it in $m : n = 3 : 2$ ratio for positive integers m and n.

37. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30^0, which is approaching the foot of the tower with a uniform speed. 6 second later, the angle of depression of the car is found to be 60^0. Find the time taken by the car to reach the foot of the tower from this point.

38. Solve the pairs of linear equation by any method $\frac{2}{x} + \frac{3}{y} = 13$ and $\frac{5}{x} - \frac{4}{y} = -2$.

OR

38. Before five years, age of Mona was three times the age of Rinku. After ten years age of Mona will be double the age of Rinku. Find present age of Mona and Rinku.

39. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per second. How much time will it take to empty $\frac{1}{2}$ the tank, if it is 3m in diameter.

$\left(\pi = \frac{22}{7}\right)$

✦

QUESTION PAPER : 4 - SHORT ANSWERS

1. (B) $-\frac{c}{d}$

2. (C) 2

3. (C) –2

4. (A) d

5. $P(D) = \frac{13}{27}$

6. Cumulative frequency

7. $2\pi r^2$

8. 2 : 5

9. False

10. True

11. Ture

12. False

13. –1

14. –47

15. one and only one

16. d = 5

17. L.C.M. $(x, y) = 360$

19. K = –45

20. S = –2

20. OR $x = 2; y = 1$

21. AC = 3 cm

22. $A = 22^0$

23. $M = \frac{+3}{4}$

24. Diameter = 12 cm

25. $x^2 + x - 306 = 0$

26. M = 38.75

27. (i) $\frac{9}{10}$ (ii) $\frac{1}{10}$ (iii) $\frac{1}{5}$

28. 12.48 days

28. OR $f_1 = 9, f_2 = 15$

29. $\frac{77}{8}$ cm^2; $\frac{7}{8}$ cm^2; $\frac{49}{8}$ cm^2

29. 1925₹

30. $TP = \frac{20}{3}$ cm

31. 3.3 m^2

32. X = –1

33. 12 m; Square=18 m

34. 25 Sq. unit

37. t = 3 second

38. $\frac{1}{X} = 2; \frac{1}{Y} = \frac{1}{3}$

38. OR x =.50 year, y = 20 year

39. 990 second

Q.PAPER **5**

Mathematics (Standard)

QUESTION PAPER - 5

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section-A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement are true or false.**

1. $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ is not a composite number.
2. $b^2 - 4ac$ is the formula to find discriminant for quadratic equation.
3. For every value of θ $\sin\theta = \cos\theta$.
4. The probability of an event : 'one dies who takes the birth' is 1.

★ **Fill in the blanks to make each of the following statement true.**

5. _____ is the Median class for the following data.

Class	0-10	10-20	20-30	30-40	40-50
Frequency	7	15	13	17	10

6. Two cubes each of volume 216 cm^3 are joined to form a cuboid. _____ cm is the length of resulting cuboid.
7. If $\frac{10}{a} + \frac{6}{b} = 8$ and $\frac{6}{a} + \frac{10}{b} = 4$ then $\frac{1}{a} - \frac{1}{b} =$ _____
8. HCF (12, P) = 6 and LCM (12, P)=36 then P = _____

★ **Answer in one sentence, word or figure.**

9. What will be the graph of pair of linear equations $3x - 4y = -8$ and $\frac{3}{2}x - 2y + 4 = 0$.
10. If the radius of a circle is decreased 20%, then _____ % decreased in its area.
11. If α and β are zeroes of polynomial $p(x) = x^2 - 3x + 2m$ and $\alpha + \beta = \alpha \cdot \beta$ then the value of M is _____
12. _____ is sixth prime number on an arithmetic progression 5, 7, 9, 11, 13, 15,....

★ **Choose correct alternative to make each of the following statement true.**

13. $\frac{1 - \tan^2 45^0}{1 + \tan^2 45^0} =$ _____

(a) 1 (b) 0 (c) –1 (d) None of these

14. The distance of $p(x, y)$ from origin is _____

(a) $|x + y|$ (b) $|x - y|$

(c) $\sqrt{x^2 + y^2}$ (d) $\sqrt{x + y}$

15. Two circles have radius r_1 and r_2 and distance between their centre is d. $|r_1 - r_2| < d < r_1 + r_2$ then _____ common tangent they have.
(a) 1 (b) 2 (c) 0 (d) 4

16. (2, 0), (0, 2) and (2, 2) are coordinates of _____ triangle.
(a) Right angle (b) Acute angle
(c) Scalene (d) Isosceles

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. A sweet seller has 420 Kaju barfis and 130 badam barfis. He wants to stack them in such a way that each stack has the same number, and they take up the least area of the tray. What is the maximum number of barfis that can be placed in each stack for this purpose ?

18. Find sum of the zeroes and product of the zeroes for quadratic polynomial $p(t) = 3t^2 + 4 + 7t$ without finding its zeroes.

OR

18. Prove that $x - 3$ is a factor of $x^3 - 9x$.

19. Find out whether following pair of linear equations are consistent or inconsistent.

(i) $\frac{4}{3}x + 2y = 8$ and $2x + 3y = 12$ (ii) $2x - 3y = 8$ and $4x - 6y = 9$

OR

19. Solve the pair of linear equations $x - y = 3$ and $\frac{x}{3} + \frac{y}{2} = 6$ by substitution mathod.

20. Find roots of quadratic equation $2x^2 = -x + 6$ by factorisation method.

21. The following table gives production yield per hectare of wheat of 100 farms of a village.

Producton Yield	50-55	55-60	60-65	65-70	70-75	75-80
Number of farms	2	8	12	24	38	16

Change the distribution to a more than type distribution.

22. A Circle touches all sides of quadrilateral PQRS. If PQ = 5.8, QR = 7.2 and RS = 12.3 then find SP.

OR

22. In Δ FOX, $\angle O = 90^0$, FO = 20 and OX = 21 then find diameter of incircle of Δ FOX.

23. If $\sin\theta = a$ then find value of $\cot\theta + \sec\theta$

OR

23. Prove that : $(\text{cosec A} - \cot A)^2 = \frac{1 - \cos A}{1 + \cos A}$

24. Express (i) $\cot 85^0 + \cos 75^0$ and (ii) $\sin 67^0 + \cos 75^0$ in terms of trigonometric ratios of angles between 0^0 and 45^0.

25. Distance of point P on X-axis from point A(11, 12) is 13 unit. Find coordinates of point P.

26. Write statement of pythagoras theorem and show that 12, 16 and 20 is triplet of pythagoras.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** 24

27. Find the Median of the following data.

Class	4-8	8-12	12-16	16-20	20-24	24-28
Frequency	9	16	12	7	15	1

OR

27. Find the Mean of following frequency distribution by step deviation method.

Class	0-50	50-100	100-150	150-200	200-250	250-300	300-350
Frequency	10	15	30	20	15	8	2

28. A coin is tossed three times. Find the probability of the following events :
(i) A : getting at most one head. (ii) B : getting at least two heads.
(iii) C : getting exactly two heads.

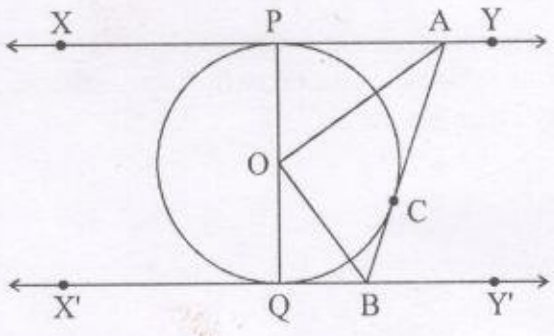
29. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 15 minutes on circular dial. Find the area of remaining part to complete one rotation. $\left(\pi = \frac{22}{7}\right)$ **OR**

29. A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameter which divide the circle into 10 equal sectors.
Find (i) the total length of the silver wire required.
(ii) the area of each sector of the brooch.

30. Δ ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into wich BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC.

OR

30. In given below figure, XY and X'Y' are tow parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. prove that $\angle AOB = 90^0$.



31. Divide the polynomial $p(x) = x^3 - 3x^2 + 5x - 3$ by the polynomial $q(x) = x^2 - 2$ and verify the division algorithm.

32. Find the roots of quadratic equation $x - \frac{1}{x} = 3 \ (x \neq 0)$ by using quadratic formula.

33. For what value of n, are the n^{th} terms of two APs : 63, 65, 67, ... and 3, 10, 17, ... equal ?

34. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its end. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area. $\left(\pi = \frac{22}{7}\right)$

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Prove : if a line is drawn parallel to one side of a triangle to intersect the othe two sides in distinct points, the other two sides are divided in the same ratio.

36. Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Write steps of construction.

OR

36. Draw a right triangel in which the sides (other than hypotenuse) are of lengths 4 cm and 3cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangels.

37. A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 22 m $\times$ 14 m. Find the height of the platform in cm. $\left(\pi = \frac{22}{7}\right)$

38. The angles of elevation of the top of a tower form 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. prove that the height of the tower is 6 m.

OR

38. A contractor plans to install two slides for the children to play in a park. For the children below the age of 5 years, she prefers to have a slide whose top is at a height of 1.5 m and is inclined at an angle of 30^0 to the ground, Whereas for elder children, she wants to have a steep slide at a height of 3 m, and inclined at an angle of 60^0 to the ground. What should be the length of the slide in each case ?

39. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.

✦

QUESTION PAPER : 5 - SHORT ANSWERS

1. False

2. True

3. False

4. True

5. 20 - 30

6. 12 cm

7. 1

8. P=18

9. The lines coincide

10. 36%

11. $M = \frac{3}{2}$

12. 19

13. (b) 0

14. (c) $\sqrt{x^2 + y^2}$

15. (b) 2

16. (d) Isosceles

17. 10 number

18. $\frac{4}{3}$

19. (i) $\frac{c_1}{c_2} = \frac{2}{3}$ (ii) $\frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

19. OR $x = 9, y = 6$

20. $x = 2$ or $x = \frac{3}{2}$

21. 98, 90, 78, 54, 16

22. PS $\approx$ 10.9 Unit

22. OR 12 unit

24. (i) $\tan 5^0 + \sin 15^0$ (ii) $\cos 23^0 + \sin 15^0$

25. P(6, 0) or P(16, 0)

27. median = 13.66

27. OR X=148.5

29. 462 cm^2

29. (i) 285 mm (ii) $\frac{385}{4}$ mm^2

30. 13 cm

31. $x - 3; 7x - 9$

32. $\frac{3+\sqrt{13}}{2}$ and $\frac{3-\sqrt{13}}{2}$

33. $a_n = 31 + 2n; n = 13$

34. 220 mm^2

36. 4.5 cm

37. H = 2.5 m

38. $y = 6$

38. OR $x = 3m; y = \sqrt[2]{3}$

39. 18 days; 36 days

Q.PAPER 6

Mathematics (Standard)

QUESTION PAPER - 6

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section-A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **Fill in the blanks so as to make each of the following statements true.**

1. _____ is the terminating decimal expression of number $\frac{337}{125}$.

2. Product of the zeroes of $p(x) = mx^2 - 14x - 12$ is $-\frac{6}{5}$, then m = _____

3. Two lines of the equations $x + 2y + 7 = 0$ and $2x + ky + 18 = 0$ do not intersect each other, then value of k = _____

4. Discriminant of quadratic equation $3x^2 = 4x - p$ is 64, then P = _____

★ **Choose correct alternative from given below to make each of the following statement true.**

5. The graph of equation $2x - 3y + 6 = 0$ intersect Y-axis at _____ point.
   (a) (0, 2) (b) (2, 0) (c) (0, 3) (d) (0, –2)

6. There are 40 steps to reach a temple. Each step has height 30 cm, then what is the total height of this temple from the ground ?
   (a) 40 m (b) 12 m (c) 12.30 m (d) 90 m

7. The probability of getting 81 marks in the question paper in your hand just now is _____.
   (a) 0 (b) 1 (c) 0.5 (d) 0.3

8. The volume of cone having same radius and height x cm is _____ cm^3.
   (a) $\frac{1}{3}\pi x^3$ (b) $\frac{1}{3}\pi r^3$ (c) $\frac{1}{3}\pi h^3$ (d) $\frac{1}{3}r^3h$

★ **Fill in the blanks to make each of the following statement true.**

9.

Class	0-10	10-20	20-30	30-40	40-50
Frequency	7	15	13	17	10

Cumulative frequency of class 20-30 = _____ in the above table.

10. Length of minor arc is l in the circle with centre O and radius r. Then area of minor sector = _____

11. M (a, b) is the mid point of line segment AB, A(2 a-b, b) and B(b, 2a-b) then M (a, b) = _____

12. If θ is the measure of acute angle and $y \sin\theta = x \cos\theta$, then $\frac{x\sin\theta - y\cos\theta}{x\sin\theta + y\cos\theta}$ = _____

★ **State whether each of the following statement true of false.**

13. $\sin\theta = \frac{4}{3}$ is possible for some angle θ.
14. Tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game?
15. There are infinite number of tangents to a circle.
16. A line joining A(2, 2) and B(2, –2) intersect Y-axis in (0, 2)

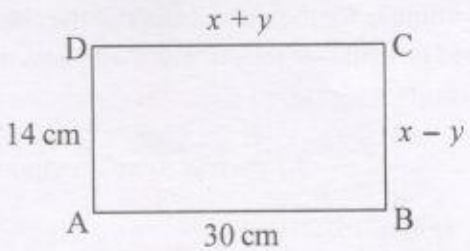
Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. A trader bought $(2x^2 - x + 2)$ TV sets for Rs. $(8x^4 + 7x - 6)$. Find the price of one TV set.

OR

17. Prove that $(3x + 7)$ is a factor of $P(x) = 6x^3 + 29x^2 + 44x + 21$.
18. Find value of x and y in the following figure of rectangle.



OR

18. Solve the pair of linear equation $x - y = 28$ and $x - 3y = 0$. Find such m so that $y = mx - 28$.
19. Quadratic equation $(P + 1)x^2 - 2(P - 1)x + 1 = 0$ have real and equal roots, then find value of P.
20. Diagonals of trapezium ABCD with AB || CD intersect each other at the point D. If AB = 2 CD then find AOB : COD.
21. Find the value of m for (7, –2), (5, 1) and (3, m) points are collinear.
22. If $\sin(x - y) = \frac{1}{2}$ and $\cos(x + y) = \frac{1}{2}$; find x and y.

    (where $0^0 < x + y \leq 90^0$ and $x > y$).
23. Prove that $\cot 48^0 \cdot \cot 23^0 \cdot \cot 42^0 \cdot \cot 67^0 = 1$

OR

23. Prove that $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$
24. P point is in the exterior of circle with centre O and radius r. Tangents drawn from point P touches circle at X and Y points. If $\angle XOY = 110$ then find $\angle YPO$.

OR

24. A tangent at point P of a circle of radius 10 cm meets a line through the centre O at a point Q so that OQ = 26 cm then find PQ.

25.

Daily Wages	100-120	120-140	140-160	160-180	180-200
Number of Workers	12	14	8	6	10

Change the distribution to 'less than' type from the above given data.

26. If dice is rolled once. Find,

(i) Probability of getting number more than 4 on the top face of the dice.

(ii) Probability of getting number 4 or less than 4 on the top face of the dice.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. Prove that 4 and 1 are the zeroes of quadratic polynomial $p(x) = x^2 - 5x + 4$. Verify the relationship between zeroes and its coefficients.

28. There is a circular path around a sport field. Mona takes 144 minutes to dirve on round of the field, while Rinku takes 96 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point ?

29. Find roots of quadratic equation $2x = -1 + \frac{4}{x}$ by perfect square method.

OR

29. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

30. Find the 20th term from the last term of AP :
3, 8, 13, ..., 253.

OR

30. Which term of the AP : 21, 18, 15, ... is –81 ? Also, is any term 0 ? Give reason for your answer.

31. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

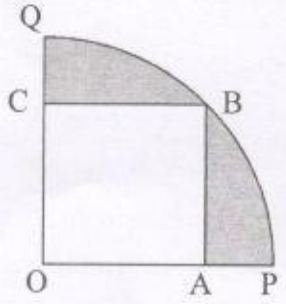
32. A hourse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope.

(i) the area of the part of the field in which the hourse can graze.

(ii) the increase in the grazing area if the length of rope taken double then earlier.

OR

32. A square OABC is inscribed in quadrant OPBQ. If OA = 20 cm, find the area of the shaded region.



33. The following frequecny distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median, mean and mode of the data.

Monthly consumption (in units)	65-85	85-105	105-125	125-145	145-165	165-185	185-205
Number of consumers	4	5	13	20	14	8	4

34. Mona, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminium sheets. 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 air contained in the model that Mona made. $\left(\pi = \frac{22}{7}\right)$

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. As observed from the top of a 100 m high lighthouse from the sea-level, the angle of depression of two ships are 30^0 and 45^0. If one ship is exactly behind the other on the same side of lighthouse, find the distance between the two ships. $(\sqrt{3} = 1.73)$.

OR

35. The angle of elevation of the top of a building from the foot of the tower is 30^0 and the angle of elevation of the top of the tower from the foot of the building is 60^0. If the tower is 50 m high, find the height of the buidling.

36. Rinku travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.

37. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

38. A fez, the cap used by the Turks, is shaped like the frustum of a cone. If its diameter on the open side is 20 cm and, diameter at the upper base is 8 cm and its slant height is 15 cm, find the area of material used for making it.

39. In $\triangle DEF$, $DF^2 = DE^2 + EF^2$ then prove $\angle E = 90^0$

OR

39. The ratio of the area of two similar triangles is equal to the square of the ratio of their corresponding sides.

✦

QUESTION PAPER : 6 - SHORT ANSWERS

1. 2.696

2. m = 10

3. K = 4

4. P = –4

5. (a) (0, 2)

6. (b) 12 metre

7. (a) 0

8. (a) $\frac{1}{3}\pi x^3$

9. 35

10. $\left(\frac{1}{2} \times r\right)$

11. M$(a, b) = (a, b)$

12. $\frac{x^2 - y^2}{x^2 + y^2}$

13. False

14. True

15. True

16. False

17. $4x^2 + 2x - 3$

18. $x = 22$ cm and $y = 8$ cm

19. value of P is 0 or 3

20. AOB : CAD = 4 : 1

21. 8 = 2 m

22. $x=48^0$ and $y=15^0$

24. $\angle YPO = 35^0$

24. OR OQ = 26 cm; PQ = 24

25. $\overline{X} = 145.2$

27. Product of Zeroes = (4) (1)

28. 288 min (4 hous 48 min.)

29. $X = \frac{1 \pm \sqrt{33}}{4}$

29. X = 40 km/hour

30. 20^{th} term from end = 33

30. OR 8th term is 0.

32. (1) S=19.625 m^2 (2) 58.875 m^2

32. OR 228 cm^2

33. M = 137; mode $\approx$ 135.77 consumers

34. 66 cm^2

35. CD = X = 73 m

35. OR 16.67 m

36. $x=60$; $y=80$

38. $710\frac{2}{7}$ cm^2

Q.PAPER 7

Mathematics (Standard)

QUESTION PAPER - 7

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement is true or false.**

1. No real roots exist to a cubic polynomial $p(x) = x^3 - x$.
2. No real roots exist to a quadratic equation if $D < 0$.
3. $\frac{1}{2}, \frac{2}{3}, \frac{5}{6}, \frac{1}{4}, \ldots$ is an arithmetic progression.
4. Value of $\sin\theta$ increases on increases the value of θ.

★ **Choose the correct alternative to make each of the following statement true.**

5. Which of the following is true if graph of given pair of linear equation $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$ is parallel lines.

   (a) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (b) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

   (c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (d) None of these

6. _____ × Median = Mode + _____ × Mean

   (a) 2 and 3 (b) 3 and 4

   (c) 3 and 2 (d) None of these

7. Which of the following expriements have equally likely outcomes ?

   (a) Experiment : A driver attempts to start a car
   Result : The car starts or does not start.

   (b) Experiment : A player attempts to shoot a basket ball.
   Result : She / he shoots or missed the shot.

   (c) Experiment : A baby is born
   Result : It is a boy or a girl.

   (d) None.

8. Probability of the event : 'Rinku scores 70 marks in the exam of 100 marks' is _____

   (a) $\frac{70}{100}$ (b) $\frac{1}{140}$ (c) $\frac{1}{101}$ (d) $\frac{1}{1}$

★ **Fill in the blanks to make each of the following statement true.**

9. The standard form of equation $\frac{x}{2} - \frac{y}{3} = 5$ is _____
10. The distance of P(a, b) from origin is _____
11. $\cot 4\theta \cdot \cot 5\theta = 1$ then θ = _____
12. There are / is _____ tangent / tangents to a circle.

★ **Answer in one sentence, word or number.**

13. Perimeter and area of circle are same then find radius of circle.
14. The area of the top of the cuboid is 250 cm. Find the area of its bottom.
15. Find probability of complement of an event : 'Sun rise in West'.
16. Probability of an event E + Probability of the event not E = _____

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Use Euclid's division algorithm to find HCF of 867 and 255.
18. Prove that $5-\sqrt{3}$ is irrational.
19. Find a quadratic polynomial, Sum of its zeroes $-\frac{1}{4}$ and product of its zeroes $\frac{1}{4}$.
20. The larger of two supplementary angles exceeds the smaller by 18 degrees. Find the angles by Substitution method.

OR

20. Use elimination method to find all possible solutions of the given pair of linear equations: $2x+3y=8; 4x+6y=7$
21. Find the roots of quadratic equation $9x^2-15x+6=0$ by perfect square method.

OR

21. Find two consecutive positive integers; sum of whose squares is 365.
22. In Δ ABC, $\angle$B is right angle and BD is the altitude drawn on its hypotenus. If AB=8, BC=6 then find area of Δ BDC.
23. For the acute angle measure of θ; If $\cos\theta=\sin\theta$ then find value of $2\tan^2\theta+\sin^2\theta+1$.
24. If $A+B=90^0$ then prove that ;

$$\sqrt{\frac{\tan A\cdot\tan B+\tan A\cdot \text{Cot } B}{\sin A\cdot \text{Sec } B}}=\sec A$$

OR

24. Prove that : $\frac{1+\tan^2 A}{1+\cot^2 A}=\left(\frac{1-\tan A}{1-\cot A}\right)^2$
25. $r_1>r_2$ in $\odot(O, r_1)$ and $\odot(O, r_2)$. Chord AB of $\odot(O, r_1)$ touches $\odot(O, r_2)$. Find value of AB in the form of r_1 and r_2.

OR

25. AB is a diameter of $\odot(O, 10)$. A tangent is drawn from B to $\odot(O, 8)$. Which touches $\odot(O, 8)$ at D. Ray $\overrightarrow{BD}$ intersects $\odot(O, 10)$ in C. Find AC.
26. A group of student has conducted Survey on 20 families of a society and prepare following frequency distribution. Find the mode of the given data.

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of patients	6	11	21	23	14	5

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. On dividing polynomial $p(x) = x^4 + 5x^3 + 10x^2 + 16x + 7$, by polynomial $q(x) = x^2 + 2x + 3$, the remainder polynomial is $ax + b$, then find value of a and b.

28. Find the roots of equation, $x - \frac{1}{x} = 3; x \neq 0$

29. Find the 31st term of an AP. Whose 11th term is 38 and 16th term is 73.

OR

29. The ratio of sum to n terms of two AP is $\frac{7n+1}{4n+27}$. Find the ratio of their m^{th} term.

30. Area of Δ ABC is 5 square unit. It has two vertices A(2, 1) and B(3, -2). Its third vertice C is lying on line $y - x + 3 = 0$. Find coordinates of point C.

31. Prove : The tangent at any point of a circle is perpendicular to the radius through the point of contact.

32. The difference of areas of two concentric circles is 770 cm^2 and the difference of their radii is 7 cm. Find the radius of each circle.

33. A drinking glass is in the shape of frustum of a cone of height 21 cm. The diameter of its two circular ends are 6 cm and 4 cm. Find the capacity of the glass.

OR

33. A solid iron pole consists of a cylinder of heigth 220 cm and base diameter 24 cm. Which is surmounted by another cyliner of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (Use $\pi = 3.14$)

34. To find out concentration of SO_2 in the air (in parts per million, i.e. ppm), the data was collected for 30 localities in certain city and is presented below :

Concentration of SO_2 (in ppm)	0.00 - 0.04	0.04 - 0.08	0.08 - 0.12	0.12 - 0.16	0.16 - 0.20	0.20 - 0.24
Number of days	4	9	9	2	4	2

OR

34. Draw ogive for 'less than type' and 'more than type' from the given below data.

Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	8	12	24	6	10	15	25

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Place A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other they meet in 1 hour. What are the speeds of the two cars ?

36. In Δ ABC, $AC^2 = AB^2 + BC^2$ then prove that $\angle B = 90^0$. **OR**

36. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

37. There is a tower situated on the top of the house of height 20 m from the ground. Angle of elevation of bottom and top of tower are 45^0 and 60^0 respectively from the point on ground. Find the height of tower.

38. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

OR

38. Draw line segment AB of length 6.5 cm and divide it in ratio 1 : 2 : 3.

39. Metallic sphere of radii 6 cm, 8 cm and 10 cm, respectively are melted to form a single solid sphere. Find the radius of the resulting sphere.

✦

QUESTION PAPER : 7 - SHORT ANSWERS

1. False
2. True
3. False
4. Ture
5. (b) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
6. (c) 3 and 2
7. Experiment : A baby is born; Reslut : It is a boy or a girl.
8. (c) $\frac{1}{101}$
9. $3x - 2y - 30 = 0$
10. $\sqrt{a^2 + b^2}$
11. 10
12. Infinite
13. 2
14. 250 Sq. cm.
15. 1
16. 1
17. 51
20. $x=90^0$; $y=81^0$
21. Roots = 1 and $\frac{2}{3}$
21. OR 13 and 14
22. 24 Sq. unit
23. $\frac{7}{2}$
25. $AB = 2\sqrt{r_1^2 - r_2^2}$
26. Mode, $Z = 36.82$
27. $a = 5; b = 4$
28. $X = \frac{3 \pm \sqrt{13}}{2}$
29. 178
29. OR $\frac{14m - 6}{8m + 23}$
30. $(x, y) = ((7, -4))$
32. $x - 21m; 14\ cm$
33. 418 cm^3
33. OR $418M = \approx 0.809\ ppm$
35. x=60 km/h; y = 40 km/h
37. x = 14.6 m
38. r = 12 cm

Q.PAPER **8**

Mathematics (Standard)

QUESTION PAPER - 8

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement is true or false.**

1. A quadratic polynomial has no real roots exist, then its graph intersect X-axis.
2. Euclid gave an explicit formula to solve quadratic equation.
3. For an arithmetic progression $a_{30} - a_{25} = 25$ then $d = 5$.
4. Value of cos θ increases on increase the value of θ.

★ **Choose the correct alternative to make each of the following statement true.**

5. If pair of linear equation coincident then lines are _____
   (a) intersecting (b) parallel
   (c) always coincident (d) intersecting or coinsident
6. Which of the following measure of central tendency depends on each of the given observation.
   (a) Mean (b) Median
   (c) Mode (d) None of the given
7. Which of the following cannot be the probability of an event ?
   (a) $\frac{2}{3}$ (b) -1.5 (c) 15% (d) 0.7
8. In the throw of a dice, the probability of getting the number 7 is _____
   (a) $\frac{1}{6}$ (b) $\frac{2}{3}$ (c) $\frac{1}{7}$ (d) 0

★ **Fill in the blank to make each of the following statement true.**

9. $\frac{5}{x}+\frac{3}{y}=4$ and $\frac{3}{x}+\frac{5}{y}=2$ then $\frac{1}{x}-\frac{1}{y}=$ _____
10. (1, 0), (0, 1), (1, 1) are the vertices of _____ triangle.
11. $\cot^2\theta - \operatorname{cosec}^2\theta + \sec^2\theta - \tan^2\theta =$ _____
12. Tangent touches the circle at _____ point / points.

★ **Answer in one sentence, word or number.**

13. Find the area of sector of angle P of circle with radius R.
14. Dumbbells use for exercise is a combination of which shapes ?
15. If a card is drawn at random from a deck of 52 cards, what is the probability that the card is red colour and face card.
16. What is the probability that Mathematics exam will be held on 26th January ?

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Use Euclid's division algorithm to find HCF (144, 610)

18. Show that $3\sqrt{2}$ is irrational.

19. A trader bought $(2x^2 - x + 2)$ TV sets for Rs. $(8x^4 + 7x - 6)$. Find the price of one TV set.

20. Find out whether the lines representing the given pairs of linear equation intersect at a point, are parallel or coincident.

$5x - 4y + 8 = 0$ *and* $7x + 6y = 9$

OR

20. Solve the following pair of linear equation by elimination method.

$x + y = 5$ and $2x - 3y = 4$.

21. Check whether following is a equadratic equation or not ?

$(a-2)^2 + 1 = 2a - 3$

OR

21. A train travels 480 km at a uniform speed. If the speed had been 8 km/h less, it would have taken 3 hours more for the same journey. Write quadratic equation to find the speed of the train.

22. In Δ ABC, DE||BC. If AD = 1.5 cm, DB = 3 cm and AE = 1 cm then find AC.

23. $2\tan^2 45 + k - \sin^2 60 = 2$ then find k.

24. Evaluate : $2\cot^2 45 + \cos^2 60 - \sin^2 60$

OR

24. Evaluate : $\cos 60 \cdot \sin 30 + \cos 30 \cdot \sin 60$

25. A quadrilateral PQRS is drawn to circumscribe a circle.

Prove that PQ + RS = PS + QR.

OR

25. Prove that the parallelogram circumscribing a circle is a rhombus.

26. For given data Mean $(\bar{x}) = 25.857$; $\sum fidi = 120$ and $\sum fi = 140$ then find assumed mean (a).

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. Divide $2x^2 + 3x + 1$ by $x + 2$ and verify the division algorithm.

28. A rectengular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square meters more than the area of a park that has already been made in the shape of an isosceles triangles with its base as the breadth of the rectangular park and of altitude 12 m. Find length and breadth of rectangular park.

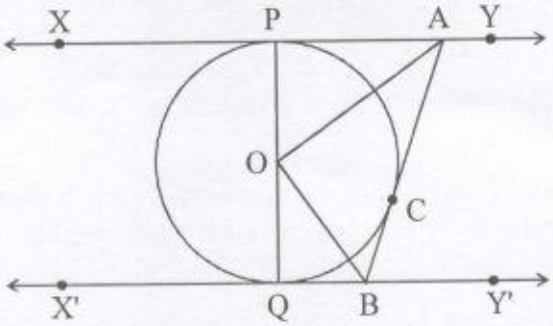
29. In an arithmetic progression $a = 8$, $a_n = 33$, $S_n = 123$ then find d and n.

OR

29. Find the sum : $(-100) + (-92) + (-84) + ... + 92$

30. Find the coordinates of the points which divide the line segment joining A(–2, 2) and B(2, 8) into four equal parts.

31. In given figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. prove that $\angle AOB = 90^0$.



32. The cost of fencing a circular field at the rate of Rs. 24 per metre is Rs. 5280. The field is to be ploughed at the rate of Rs. 0.50 per m^2. Find the cost of ploughing the field.

$\left(\text{Take } \pi = \frac{22}{7}\right)$

33. Ronak made a bird-bath for his garden in the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath in m^2.

$\left(\pi = \frac{22}{7}\right)$

OR

33. A cone of height 24 cm and diameter of base 12 cm is made up to modelling clay. A child reshapes it in the form of sphere. Find the diameter of the sphere.

34. If the median of the distribution given below is 28.5, find the value of a and b.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	a	20	15	b	5	60

OR

34.

Number of Wickets	20-60	60-100	100-150	150-250	250-350	350-450
Number of bowlers	7	5	16	12	2	3

Find the mean number of wickets for the above frequency distribution. What does the mean signify?

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save Rs. 2000 per month, find their monthly incomes.

36. Write statement of converse of Pythagoras theorem and prove the theorem.

OR

36. Write Statement of Pythagoras theorem and Prove the theorem.

37. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60^0. From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30^0. Find the height of the tower and the width of the canal.

38. Line segment AB is given. For positive integers m, n divide it in the ratio $m : n = 3 : 2$.

OR

38. Draw a pair of tangents to a circle of radius 5 cm. Which are inclinded to each other at an angle of 60^0.

39. A fez, the cap used by the Turks, is shaped like the frustam of a cone. If its radius on the open side is 10 cm, radius at the upper base is 4 cm and its slant height is 15 cm, find the area of material used for making it.

✦

QUESTION PAPER : 8 - SHORT ANSWERS

1. False
2. False
3. True
4. False
5. (d) intersecting or coincident
6. (a) Mean
7. (b) -1.5
8. (d) 0
9. 1
10. Isosceles
11. 0
12. One and only one
13. $\pi R^2 \times \frac{P}{360}$ OR $\frac{P}{720} \times 2\pi R^2$
14. Cylinder and two sphere
15. $\frac{3}{26}$
16. 0
17. 2
19. $4x^2 + 2x - 3$
20. $x = \frac{19}{5}$ and $y = \frac{6}{5}$
20. OR $\frac{-2}{3}$
21. $x^2 - 8x + 1280 = 0$
22. AC = 3 cm
23. $K = \frac{3}{4}$
24. $\frac{3}{2}$
24. OR 1
26. $a = 22.857$
27. $2x - 1; 3$
28. $x = 7; x = 2$
29. $n = 6; d = 5$
29. OR $S_{25} = -100$
30. $\left(-1, \frac{7}{2}\right)$, R$\left(1, \frac{13}{2}\right)$
32. ₹ 1925
33. $3.3\ m^2$
33. OR 12 cm
34. $a = 8; b = 7$
34. OR 152.89
35. First ₹ 18000, Second ₹ 14000
37. $X = 10\sqrt{3}m; y = 10m$
39. $710\frac{2}{7}\ cm^2$

Q.PAPER 9

Mathematics (Standard)

QUESTION PAPER - 9

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement are true or false.**

1. $\sqrt{5}$ is zero of polynomial $p(x) = \sqrt{5}x - 5$
2. Quadratic equation in variable x is of $ax^2 + bx + c = 0$ type for real number a, b, c where $a = 0$.
3. Sum of first n terms of an arithmetic progression obtain by $S_n = \frac{n}{2}[2a + (n-1)d]$.
4. $8\sec^2\theta - 8\tan^2\theta + 8\sin^2\theta + 8\cos^2\theta = 12$

★ **Choose the correct alternative to make each of the following statement true.**

5. If $am \neq bl$ then $ax + by = 0$ and $lx + my = n$ have _____ solution.
   (a) Unique (b) Null Set
   (c) Infinite (d) May have solution or may not
6. Which of the following is not measure of central tendency.
   (a) Mean (b) Median
   (c) Mode (d) Class interval
7. Probability of sunday as the first day of the month is _____.
   (a) $\frac{1}{14}$ (b) $\frac{1}{7}$ (c) $\frac{1}{28}$ (d) $\frac{1}{30}$
8. Probability of scoring 51 marks in the question paper of 50 marks is _____.
   (a) 0.3 (b) 0.98 (c) 0 (d) 1

★ **Fill in the blanks to make each of the following statement true.**

9. For the pair of linear equation $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has _____ relation then have infinite many solution, _____ relation then have no solutin and _____ relation then have unique solution.
10. If A $(0, a)$ and B$(0, b)$ then distance between these points AB = _____
11. $\frac{2\tan 30^0}{1 + \tan^2 30^0} =$ _____
12. The line intersecting a circle at two distinct points is known as _____.

★ **Answer in one sentence, word or number.**

13. If the ratio of radii of two circles is 3 : 4 then what is the ratio of their areas ?
14. Plumb bob (instrument use by mason to check wall is slant or straight) is a combination of which two shapes ?

15. P(A) and P($\overline{A}$) are what kind of events to each other ?
16. What is the smallest value of probability P(A) of any event A.

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

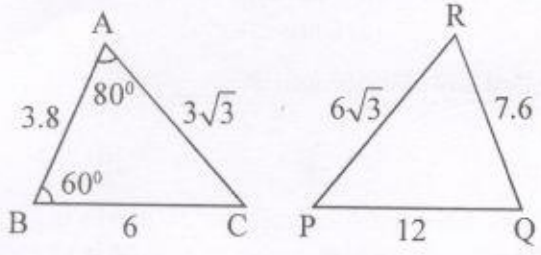
17. Use Euclid's division algorithm to find HCF (135, 225).
18. A Sweet seller has 210 Kaju barfis and 65 badam barfis. He wants to Stack them in such a way that each stack has the same number and they take up the least area of the tray. What is the maximum number of barfis that can be placed in each stack for this purpose ?
19. Find sum of the zeroes and product of zeroes of quadratic polynomial $p(x) = 7x + 4 + 3x^2$ without find their zeroes.
20. Find out whether the lines representing the pairs of linear equations $6x - 3y = -10$ and $2x - y + 9 = 0$ intersect at a point, are parallel or coincident.

OR

20. Solve the following pair of linear equation by elimination method $3x + 4y = 10$ and $2x - 2y = 2$
21. Check whether following is a qudratic equation or not ?
$x(x+1) + 8 = (x + 2)(x - 2)$

OR

21. The product of two consecutive positive integers is 306. Find both positive integers.
22. Observe both the following figures and find $\angle P$.



23. $2 \cos A + \sin A = 2$ then find cot A.
24. If $\sec \theta = \frac{13}{12}$ then find the value of $\tan \theta$, $\sin \theta$, $\cos \theta$, $\cot \theta$.

OR

24. If $15 \tan A = 8$ then find cos A and cosec A.
25. The length of tangent drawn from point A. Which is 10 cm away from the centre of circle is 8 cm. Then find diameter of the circle.

OR

25. PQ is chord of 8 cm length to the circle of 5 cm radius. Tangents passes through points P and Q intersect each other at point T. Find length of TP.
26. In given data $l = 200$, $f_1 = 27$, $f_0 = 18$, $f_2 = 20$ and $h = 100$, then find mode of the given data.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. Divide $3x^2 - 3x - x^3 + 5$ by $-1 - x^2 + x$ and verify the division algorithm.

28. A motorboat whose speed in still water is 18 km/h. It takes 1 hour more to go 24 km upstream then to return downstream to the same spot. Find the speed of the stream.

29. In an arithmetic progression $a_7 = 18, a_{18} = 7$ then find a_{25}.

OR

29. In an arithmetic progression $a=5, d=3, a_n=50$ given, then find n and S_n.

30. Find the coordinates of the points of trisection of the line segment joining the points $(4, -1)$ and $(-2, -3)$.

31. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.

32. The diameter of two circles are 16 cm and 12 cm respectively. Find the diameter of the circle having area equal to the sum of the areas of the two circles.

33. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2.

OR

33. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of π.

34. The median of the following data is 525. Find the value of f_1 and f_2, if the total frequency is 100.

Class interval	0-100	100-200	200-300	300-400	400-500	500-600
Frequency	2	5	f_1	12	17	20

600-700	700-800	800-900	900-1000
f_2	9	7	4

OR

34. The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median and model of the data.

Monthly consumption (in units)	65-85	85-105	105-125	125-145
Number of consumers	4	5	13	20

145-165	165-185	185-205
14	8	4

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction.

36. BL and CM are medians of a triangle ABC right angled at A.

Prove that $4(BL^2 + CM^2) = 5BC^2$.

OR

36. Prove that, The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

37. 1.5 m tall Ronak is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30^0 to 60^0 as he walks towards the building. Find the distance he walked towards the building.

38. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

OR

38. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.

39. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.

✦

QUESTION PAPER : 9 - SHORT ANSWERS

1. True
2. False
3. True
4. False
5. (a) Unique
6. (d) Class interval
7. (b) $\frac{1}{7}$
8. (c) 0
9. $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ and $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$ and $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$
10. $AB = |a - b|$
11. $\sin 60^0$ or $\frac{\sqrt{3}}{2}$
12. Secant
13. 9 : 16
14. Cone and hemisphere
15. Complementary event
16. 0
17. 45
18. 5
19. $\frac{4}{3}$
20. $x=2;\ y=1$
21. 17 and 18
22. $\angle P = 40^0$
23. $\frac{3}{4}$
24. $\frac{12}{13};\frac{12}{5}$
24. OR $\frac{15}{17};\frac{17}{8}$
25. 12 cm
25. OR $TP = \frac{20}{9}$ cm
26. Mode; Z = 256.25
27. $g(x)\,q(x)+r(x)-p(x)$
28. X = 6 km/hour
29. $a_{25}=0$
29. OR $S_{16}=S_n=440$
30. $Q\left(0,\frac{-7}{3}\right)$
32. 20 cm
33. $\approx 18\ cm^2$
33. OR $\pi\ cm^3$
34. $f_2=15$
34. OR Median = 24, Mode = 135.77
35. $\frac{x}{y}=\frac{5}{12}$
37. $X = 19\sqrt{3}m = 32.87\ m$

Q.PAPER **10**

Mathematics (Standard)

QUESTION PAPER - 10

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement are true or false.**

1. $p(x) = 5x + 3$ where x is a real number. Then its graph is *a* line.
2. In a quadratic equation $ax^2 + bx + c = 0$ if $b^2 - 4ac < 0$ then it has two distinct real roots.
3. There is last term in an infinite arithmetic progression.
4. For every value of θ; $\sin\theta = \cos\theta$.

★ **Choose the correct alternative to make each of the following statement true.**

5. In cross multiplication method what comes below x ?

   (a) $a_1c_1 - a_1c_2$ (b) $a_1b_2 - a_2b_1$

   (c) $b_1c_2 - b_2c_1$ (d) $b_2c_1 - b_1c_2$

6. _____ is taken on Y-axis to draw ogive :

   (a) Lower limit points (b) Upper limit points

   (c) Cumulative frequency (d) Mid point Values

7. $P(A') = 0.57$ then $P(A) =$ _____

   (a) $\frac{27}{100}$ (b) 0.013

   (c) 0.43 (d) 0

8. India reached in world cup semi-final match. Australia, Newzealand and England are other three terms in semi-final then probability of event that India will win world cup is _____

   (a) $\frac{1}{4}$ (b) 4 (c) 8 (d) $\frac{1}{8}$

★ **Fill in the blanks to make each of the following statement true.**

9. Two lines $y=3x$ and $x=3y$ intersect each other in _____ point.
10. _____ is perpendicular distance of point $(-2, -3)$ from Y-axis.
11. $\frac{1-\tan^2 45}{1+\tan^2 45} =$ _____
12. Atmost _____ tangents, to a circle parallel to a given secant.

★ **Answer in one sentence, word or number.**

13. Write formula to find length of minor arc.

14. State volume, curved surface area and total surface area of a five rupees coin.

15. Write total number of outcomes for event 'Ten coins are tossed simultaneously'.

16. What is the probability of certain event ?

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Express each given number as product of its prime factors (1) 3825 (2) 5005.

18. Find LCM and HCF of the following integers by the prime factorisation method.
(1) 6, 72 and 120 (2) 12, 15 and 21

19. Find the zeroes of the given quadratic polynomial and verify the relationship between the zeroes and the coefficients : $8t + 4t^2$

20. Find out whether the line representing $9x + 3y + 12 = 0$ and $18x + 6y + 24 = 0$ pair of linear equation intersect at a point, are parallel or coincident.

OR

20. Find out whether following pair of linear equations are consistent or inconsistent.

$\frac{3}{2}x + \frac{5}{3}y = 7$ and $9x - 10y = 14$

21. Mother of Ronak is 26 years elder than him. Product of the number representing their ages after 3 years is 360. Then Write quadratic equation to find present age of Ronak.

OR

21. Solve the following quadratic equation by factorisation method $3x = 2\sqrt{6} - \frac{2}{x}$.

22. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.

23. $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$; $0 < A + B < 90$; $A > B$ then find A and B.

24. If, $\sin 3A = \text{Cos}(A - 26^0)$, where 3A is an acute angle, find value of A.

OR

24. If $\sec 4A = \text{cosec}(A - 20^0)$, where 4A is an acute angle, find the value of A.

25. Radii of two concentric circles are 21 cm and 29 cm. A chord of the bigger circle touches to the smaller circel. Find the length of a chord.

OR

25. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at 80^0 angle then find $\angle POA$.

26. In a given data l=35, n=45, cf=15, f=10 and h=5 then find median of the given data.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. Divide $p(x) = 4x + x^4 + 5 - 3x^2$ by $g(x) = -x + x^2 + 1$ and verify the division algorithm.

28. The sum of the reciprocals of Rinku's age 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age.

29. Find the sum of an arithmetic progression $(-5) + (-8) + (-11) + ... + (-230)$

OR

29. For what value of n, are the n^{th} terms of two APs : 63, 65, 67, ... and 3, 10, 17, ... equal?

30. If A(−5, 7), B(−4, −5), C(−1, −6) and D(4, 5) are the vertices of a quadrilateral, Find the area of the quadrilateral ABCD.

31. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the center.

32. A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divided the circle into 10 equal sectors. Find
(i) the total length of the silver wire required.
(ii) The area of each sector of the brooch.

33. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respetively and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, Find the cost of the canvas of the tent at the rate of Rs. 500 per m^2.

OR

33. A hemispherical depression is cut from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

34. The lengths of 40 leaves of a plant are measured correct to the nearest millimeter, and the data obtained is represented in the following table :

Length (in mm)	118-126	127-135	136-144	145-153	154-162
Number of leaves	3	5	9	12	5

163-171	172-180
4	2

Find the median length of the leaves.

OR

34. The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs 18. Find the missing frequency f.

Daily pocket allowance (in Rs.)	11-13	13-15	15-17	17-19
Number of children	7	f	9	13

19-21	21-23	23-25
20	5	4

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2. Find the number. How many such numbers are there ?

36. In ΔXYZ, $XZ^2 = XY^2 + YZ^2$ then prove that $\angle Y = 90$.

OR

36. In, ΔPQR, $\angle R = 90$ then prove that $PQ^2 = QR^2 + PR^2$.

37. A statue, 1.6 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60^0 and from the same point the angle of elevation of the top of the pedestal is 45^0. Find the height of the pedestal.

38. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.

OR

38. Draw a circle of radius 6 cm. From a point 10 cm away from its centre construct the pair of tangents to the circle and measure their lengths.

39. A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radius of its lower and upper ends as 8 cm and 20 cm respectively. Find the cost of the milk which can completely fill the container, at the rate of Rs. 20 per litre.

✦

QUESTION PAPER : 10 - SHORT ANSWERS

1. True
2. False
3. False
4. False
5. (c) $b_1c_2 - b_2c_1$
6. (c) Cumulative frequency
7. (c) 0.43
8. (a) $\frac{1}{4}$
9. (0, 0)
10. 2
11. 0
12. Two
13. $\frac{\pi r\theta}{180}$
14. Volume $= \pi r^2 h$, Curved Surface area $= 2\pi rh$ Total Surface area $= 2\pi r(r+h)$
15. 1024
16. 1
17. (i) $5^2 \times 3^2 \times 17$ (ii) $5 \times 7 \times 11 \times 13$
18. (i) 360; (ii) 420
19. $\frac{-8}{4}, \frac{0}{4}$
20. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
21. $x^2 + 32x - 273 = 0$
21. OR $X = \frac{\sqrt{2}}{\sqrt{3}} = \sqrt{\frac{2}{3}}$
22. X = 1.6 m
23. $A = 45^0; B = 15^0$
24. A = 29
24. OR A = 22
25. AB = 40 cm
25. OR $\angle POA = 50^0$
26. M = 38.75
27. $q(x) = x^2 + x - 3; r(x) = 8$
28. $X \neq -3$; X = 7 year of Rinku
29. $S_{76} = -8930$
29. OR $n = 13$
30. 46.5 Sq. unit
32. (i) 285 m^2 (ii) 96.25 mm^2
33. 26.4 m^2, total cost = 22,000 rupees
33. OR $\frac{6^2}{4}(24 + \pi)$ sq. unit
34. 146.75 mm
34. OR $f = 12$
35. 24 and 42
37. X = 2.28 m
39. Cost of 1 litre milk = 20 ₹ ; cost of 10.45 = 209

Q.PAPER **11**

Mathematics (Standard)

QUESTION PAPER - 11

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement is true or false.**

1. A polynomial of degree n has at most n^2 zeros.
2. End term exist in the finite arithmetic progression.
3. If $b^2 - 4ac = 0$ then qudratic equation $ax^2 + bx + c = 0$ has two different real roots.
4. $\sin(A + B) = \sin A + \sin B$.

★ **Choose the correct alternative to make each of the following statement true.**

5. What comes in denominator of y in the method of cross multiplication ?

   (a) $c_1a_2 - c_2a_1$ (b) $c_1c_2 - c_2a_1$

   (c) $a_1b_2 - a_2b_1$ (d) $b_1c_2 - b_2c_1$

6. Generally for any frequency distribution $Z - M =$ _____ $(M - \bar{x})$

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

7. Two fair coins are tossed simultaneously, Probability of getting tail on both the coins is _____.

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

8. Two fair dice are tossed simultaneously. Probability of not getting same digit on both the dice is _____

   (a) 1 (b) $\frac{5}{6}$ (c) $\frac{1}{6}$ (d) 0

★ **Fill in the blanks to make each of the following statement true.**

9. Before 3 years sum of the ages of father and his son was 40 years. Sum of their ages after two years will be _____
10. _____ is the perpendicular distence of point (–4, –6) from x-axis.
11. If A = _____ then $\sin 2A = 2 \sin A$ is true.
12. The common point of a circle and its tangent is known as _____.

★ **Answer in one sentence, word or number.**

13. Find the area of sector of a circle whose radius is r and length of the arc is l.
14. A sphere of radius r is divided into four identical parts. Find the total surface area of one part.
15. What is the sum of probability of all event of a trial ?

16. What is the probability that Mahendra singh Dhoni wins the toss for three consecutive matches in the series of three matches.

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. If HCF (306, 657) = 9 is given then find LCM (306, 657)

18. Prove that $5+2\sqrt{7}$ is irrational number.

19. Find the quaratic polynomial, Sum of whose zeroes = –3 and product of zeroes = 2.

20. Solve the following pair of linear equation by cross multiplication Method.

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

OR

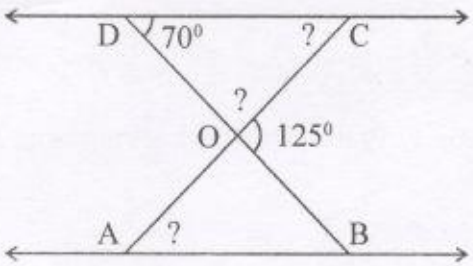
20. Solve the equation $2x+3y=11$ and $2x-4y=-24$ and find such k so that $y=kx+3$.

21. The area of a rectangular plot is 528 m^2. The length of the plot (in meters) is one metre more than twice its breadth. Write quadratic equation to find length and breadth of the plot in metre.

OR

21. Solve the following quadratic equation by factorisation method $2x^2-x+\frac{1}{8}=0$.

22. In given below figure $\Delta ODC \sim \Delta OBA$, $\angle BOC = 125^0$, and $\angle CDO = 70^0$ then find $\angle DOC$, $\angle DCO$ and $\angle OAB$.



23. Express each of the given in terms of trigonometric ratios of angles having measure between 0^0 and 45^0 : (i) $\cot 85^0 + \cos 75^0$ (ii) $\sin 67^0 + \cos 75^0$.

24. **Prove that :** $\cos 38^0 \cdot \cos 52^0 - \sin 38^0 \cdot \sin 52^0 = 0$

OR

24. If $\tan A = \cot B$ then prove that $A + B = 90$.

25. Radii of two concentric circles are 3.9 cm and 6.5 cm. A chord of the bigger circle touches to the smaller circle. Find the length of a chord.

OR

25. From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm, then find radius of a circle.

26. In a given data $a = 47.5$, $\Sigma fiui = 29$, $\Sigma fi = 30$, $h = 15$ then find mean.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** 24

27. On dividing $2-3x^2+x^3+x$ by a polynomial $g(x)$, the quotient and remainder were $x-2$ and $-2x+4$ respectively. Find $g(x)$.

28. In a class test, the sum of Mona's marks in Mathematics and science is 30. Had she got 2 marks more in Mathamatics and 3 marks less in science, the product of their marks would have been 210. Find the marks in the two subjects.

29. Find the 20^{th} term from the last term of the AP : 3, 8, 13, ..., 253.

OR

29. Which term of the AP : 21, 18, 15, ... is –81 ? Also, is any term 0? Give reason for your answer.

30. In the following find the value of 'K', for which the points are collinear.
(7, –2), (5, 1), (3, K)

31. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

32. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find.
(i) The area of that part of the field in which the horse can graze.
(ii) The increase in the grazing area if the length of the rope make double. ($\pi = 3.14$)

33. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area in mm^2.

OR

33. A toy is in the form of a cone of diameter 7 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

34. The daily wages of 50 workers in a factory are given below.

Daily wages (in Rs.)	500-520	520-540	540-560	560-580	580-600
No. of workers	12	14	8	6	10

Find the mean of daily wages of workers by step derivation method.

OR

34. Find the mean number of days a student was absent.

Number of days	0-6	6-10	10-14	14-20	20-28
Number of students	11	10	7	4	4

28-38	38-40
3	1

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Solve the following pair of linear equation.

$$\frac{1}{3x+y}+\frac{1}{3x-y}=\frac{3}{4} \text{ and } \frac{1}{2(3x+y)}-\frac{1}{2(3x-y)}=\frac{1}{8}$$

36. Write the statement of fundamental Theorem of proportionality (theorem of thales) and prove that.

OR

36. If $\Delta PQR \sim \Delta XYZ$, then prove that $\frac{PQR}{XYZ} = \left(\frac{PQ}{XY}\right)^2 = \left(\frac{QR}{YZ}\right)^2 = \left(\frac{PR}{XZ}\right)^2$

37. The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30^0 than when it is 60^0. Find the height of the tower.

38. We are given a circle with centre O and a point P outside it. Construct the two tangents from P to the circle. **OR**

38. Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

39. A bucket open at the top is in the form of a frustum of a cone with capacity of 12308.8 cm^3. The radii of the top and bottom circular ends are 20 cm and 12 cm respectively. Find the height of the bucket. Find the cost of preparing a bucket at the rate of 10 Rs per cm^2. ($\pi = 3.14$)

✦

QUESTION PAPER : 11 - SHORT ANSWERS

1. False
2. True
3. False
4. False
5. (a) $c_1a_2 - c_2a_1$
6. (b) 2
7. (d) $\frac{1}{4}$
8. (b) $\frac{5}{6}$
9. 50 years
10. 6
11. 0
12. Point of contact
13. $\frac{1}{2}$ lr
14. $2\pi r^2$
15. 1
16. $\frac{1}{2}$
17. 22338
19. $12(x^2 - 3x + 2)$
20. $(x, y) = (2, -3)$
20. OR $(x, y) = (-2, 5)$
21. $(2x + 1)$ m and bradth = $2x^2 + x - 528 = 0$
21. OR $X = \frac{1}{4}$
22. $\angle C = 55^0$; $\angle A = 55^0$
23. (i) $\tan 5^0 + \tan 15^0$
25. 10.4 cm
25. OR 7 cm.
26. $\overline{X} = 62$
27. $9x = (x^2 - x + 1)$
28. Math = 12 marks, Science = 18 makrs
29. $20^{th} = 33$
29. 8^{th} term is 0.
30. K = 4
32. (i) $S = 19.625\ m^2$ (ii) $58.875\ m^2$
33. $220\ m^2$
33. OR $214\ m^2$
34. $\overline{X} = 545.2$ ₹
34. OR 11.725 absent days
35. $(x, y) = (1, 1)$
37. $X = 20\sqrt{3}m$
39. $2160.32\ cm^2$

Q.PAPER **12**

Mathematics (Standard)

QUESTION PAPER - 12

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement are true or false.**

1. For the zeroes of polynomial $p(x) = ax^2 + bx + c$; α and β; $\alpha + \beta = \frac{b}{a}$.
2. If $b^2 - 4ac < 0$ then quadratic equation $ax^2 + bx + c = 0$ $(a \neq 0)$ has no real root.
3. The common difference between terms of an arithmetic progression is only either positive or negative number.
4. Value fo tan A is always less than 1.

★ **Choose the correct alternative to make each of the following statement true.**

5. What comes under denominator of constant term in cross multiplication method.

   (a) $b_1c_2 - b_2c_1$ (b) $c_1a_2 - c_2a_1$

   (c) $a_1b_1 - a_2b_2$ (d) $a_1b_2 - a_2b_1$

6. For given data $z + \bar{x} = 71$ and $z - \bar{x} = 3$ then as per inter relationship between Mean, median and mode M = _____

   (a) 31 (b) 38 (c) 35 (d) 34

7. The probability to have 53 Mondays in non leap year is _____

   (a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{4}{7}$

8. Three fair coins are tossed simultaneously, probability of getting at most two heads is _____

   (a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{5}{8}$ (d) $\frac{7}{8}$

★ **Fill in the blanks to make each of the following statement true.**

9. Graph of the Pairs of linear equation $3x - 4y + 8 = 0$ and $\frac{3}{2}x - 2y + 4 = 0$ shows _____ lines.
10. M(x, y) is the mid point of line segment XY, X$(2x - y, y)$ and Y$(y, 2x - y)$ then M(x, y) = _____
11. $\frac{2\tan 30^0}{1 - \tan^2 30^0}$ = _____

12. Two circles having radius r_1 and r_2 and the distance between the centres of them is d. If $d > r_1 + r_2$ then number of common tangent is / are _____

★ **Answer in one sentence, word or number.**

13. If the radius of a circle is increased 20% then now much increased in the corresponding area of the circle ? And if the radius of circle decreased 10% then how much decreased in the corresponding area of the circle ?

14. Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius r.

15. Find probability of unit's digit of mobile number does not have zero.

16. What is the probability to have a tuesday in a week.

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** **20**

17. Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expression or a non-terminating repeating decimal expression :

(a) $\frac{77}{100}$ (b) $\frac{15}{1600}$ (c) $\frac{35}{50}$ (d) $\frac{64}{455}$

18. Prove that $\sqrt{7}$ is irrational.

19. Find the quadratic polynomial whose sum of zeroes is 0 and product of zeroes is $\sqrt{5}$.

20. Solve the pair of linear equation by substituion method.
$0.2x + 0.3y = 1.3$ and $0.4x + 0.5y = 2.3$

OR

20. Solve the equation by substituion method $x + y = 14$ and $x - y = 4$.

21. Check whether following equation is a quadratic equation or not.
$x^3 - 4x^2 - x + 1 = (x - 2)^3$

OR

21. Solve the given quadratic equation by factorization method $2a^2 = 6 - a$.

22. A guy attached a wire 24 m long to a vertical pole of height 18 m and has a stake attached to the other end. How far from the base of the pole should the stake be driven so that the wire will be tight ?

23. Prove that : $\tan 48^0 \cdot \tan 23^0 \cdot \tan 42^0 \cdot \tan 67^0 = 1$

24. Evaluate : $\cos 48^0 - \sin 42^0$

OR

24 Evaluate : $\text{cosec } 31^0 - \sec 59^0$

25. Radii of two concentric circles are 5 cm and 3 cm. A chord of the bigger circle touches to the smaller circle. Find the length of a chord.

OR

25. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$

26. The distribution below gives the weight of 30 students of a class. Find the median weight of the students.

Weight (in Kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75
No. of Students	2	3	8	6	6	3	2

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** **24**

27. Find all the zeroes of $-2 + 6x + 2x^4 - 3x^3 - 3x^2$ if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

28. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

29. How many three digit numbers are divisible by 7.

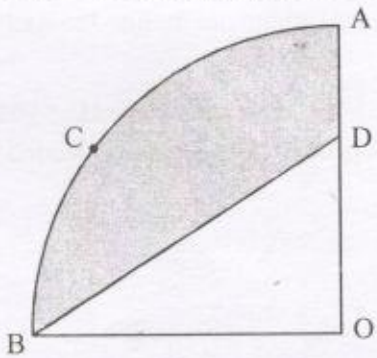
OR

29. Determine the AP whose third term is 16 and the 7^{th} term exceeds the 5^{th} term by 12.

30. If P(2, 3), Q(3, −2), R(−3, −5) and S(−4, −2) are the vertices of a quadrilateral PQRS, Find its area.

31. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segment BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC.

32. In figure given below, OACB is a quadrant of a circle with centre O and diameter 7 cm. If OD = 2 cm, find the area of the shaded region and quadrant OACB.



33. A Metallic sphere of radius 15 cm is melted then recast into smaller sphere of diameter 1.2 cm. How many such smaller spheres are obtained ?

OR

33. A fez, the cap used by the Turks, is shaped like the frustum of a cone. If its radius on the open side is 10 cm, radius at the upper base is 4 cm and its slant height is 15 cm, Find the area of material used for making it.

34. A survey was conducted by a group of students as a part of their environmental awareness programme, in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per houses.

Number of plants	0-2	2-4	4-6	6-8	8-10	10-12	12-14
Number of houses	1	2	1	5	6	2	3

OR

34. From the given table, find the mean literacy rate.

Literacy rate (in %)	45-55	55-65	65-75	75-85	85-95
Number of Cities	3	10	11	8	3

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. From a bus stand in Bangalore, if we buy 2 tickets to Malleswaram and 3 tickest to Yeshwanthpur, the total cost is Rs. 46; but if we buy 3 tickets to Malleswaram and 5 tickets to Yeshwanthpur the total cost is Rs. 74. Find the fares from the bus stand to Malleswaram and to Yeshwanthpur.

36. Write the statement of converse of pythagoras theorem and prove it.

OR

36. PM is a meadian of Δ PQR then prove that $PQ^2 + PR^2 = 2(PM^2 + QM^2)$

37. A ladder rest against a wall at an angle α to the horizontal. Its foot is pulled away from the wall through a distance x meter so that it slides a distance y down the wall making an angle β with the horizontal than prove that $x \sin \alpha - x \sin \beta = y \cos \beta - y \cos \alpha$.

38. Draw a line segment AB of length 7.6 cm and divide it in the ratio 2 : 3 : 5. Write the steps of construction.

OR

38. Draw a pair of tangents to a circle $\odot$(O, 5 cm) which are inclined to each other at an angle 45^0.

39. Water in a canal, 6 m wide and 1.5 m deep is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minues, if 8 cm of standing water is needed ?

✦

QUESTION PAPER : 12 - SHORT ANSWERS

1. False

2. True

3. False

4. False

5. (d) $a_1b_2 - a_2b_1$

6. (c) 35

7. (a) $\frac{1}{7}$

8. (d) $\frac{7}{8}$

9. Coincident

10. (x, x)

11. $\tan 60^0$ or $\sqrt{3}$

12. Four

13. 44% increase and 19% decrease

14. $\frac{1}{3}\pi r^3$

15. $\frac{9}{10}$

16. $\frac{1}{7}$

19. $p(x)\,k\,[x^2 + \sqrt{5}]$

20. $y=3$; $x=2$

21. $a = -2,\ a = \frac{3}{2}$

22. $X = \sqrt[6]{7}$ m

24. 0

24. OR 0

25. AB = 8 cm

26. M = 56.67 kg

27. Zeroes of $p(x) = \sqrt{2},\ -\sqrt{2},\ 1,\ \frac{1}{2}$

28. X = 40 km/hour

29. 890

29. OR 4, 10, 16 .... $6n - 2$

30. PQRS = 34 sq. unit

31. AB = 15 cm; AC = 13 cm

32. 6.125 cm^2

33. 15625

33. OR $710\frac{2}{7}$ cm^2

34. 8.1

34. OR X = 69.43

35. $x = 8;\ y = 10$

39. 562500 m^2, means : 56.25

Q.PAPER 13

Mathematics (Standard)

QUESTION PAPER - 13

Std.-10

Time : 3 Hours

(012) E

Total Marks : 80

Instructions : Same as question Paper - 1.

Section : A

Answer as per given instruction : (Question number 1 to 16) (1 mark each) 16

★ **State whether following statement are true or false.**

1. Degree of the polynomial $p(x) = 3 + 54x + x^3 + x^2$ is 3.
2. $D = b^2 - 4ac$ is the formula to find discriminant.
3. 3, 3, 3, ... is an arithmetic progression.
4. $\cos 45^0 = \frac{1}{\sqrt{2}}$

★ **Fill in the blank to make each of the following statement true.**

5. If $\bar{x} = 25$ and $Z = 25$then $M =$ _____
   (a) 25 (b) 0 (c) 1 (d) 75
6. $P(A) + P(\bar{A}) =$ _____
   (a) 1 (b) 0 (c) –1 (d) 2
7. One card is drawn from well-shuffled deck of 52 cords. The probability of getting a king of red colour is _____
   (a) $\frac{1}{13}$ (b) $\frac{1}{26}$ (c) $\frac{1}{52}$ (d) $\frac{3}{26}$
8. If $17x + 23y = 40$ and $23x + 17y = 80$ then $x + y =$ _____
   (a) 120 (b) 40 (c) 3 (d) 80

★ **Fill in the blanks to make each of the following statement true.**

9. (1, 0) is one solution of an equation $8x + 5K = 18$ then $K =$ _____
10. The distance between points (2, 3) and (4, 1) is _____
11. $\tan^2\theta - \sec^2\theta =$ _____
12. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80^0 then $\angle POA =$ _____

★ **Answer in one sentence, word or number.**

13. Find area of a sector of angle P^0 of circel with radius R.
14. Find the volume of hemisphere of radius 7 cm.
15. A dice is thrown once. Find the Probability of getting a prime number.
16. The probability that Ramesh wins the match is 0.48 then what is the probability that Ramesh does not win the match.

Section : B

★ **Solve the following (Question number 17 to 26) (2 Marks each)** 20

17. Prove that $3+\sqrt{2}$ is irrational number.

18. Find the LCM and HCF of 12, 72 and 120 by applying the prime factorisation method.

19. Find quadratic polynomial whose sum of zeroes is $-\frac{1}{4}$ and product of zeroes is $\frac{1}{4}$.

20. Solve the following pair of linear equation by substitution method.
$7x-15y-2=0$ and $x+2y=3$

OR

20. Solve the following pair of linear equation by elimination method :
$x+y=5$ and $2x-3y-4=0$

21. If $\sec\theta=\frac{13}{12}$ then calculate and find $\sin\theta$ and $\cot\theta$.

22. Evaluate : $2\tan^2 45^0+\cos^2 30^0-\sin^2 60^0$ **OR**

22. Prove that $\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta\cdot\operatorname{cosec}\theta$

23. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q. So that OQ = 12, Find length of PQ. **OR**

23. A quadrilateral ABCD is drawn to circumscribe a circle.
Prove that AB + CD = AD + BC.

24. The following data gives the information on the observed lifetime (in hours) of 225 electrical components.

Lifetime (in hours)	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

25. A ladder is place against a wall such that its foot is at a distance of 2.5 m from the wall and its top reaches a window 6 m above the ground. Find the length of the ladder.

26. Find two consecutive odd positive integers, Sum of whose squares is 290.

OR

26. Find the root of the quadratic equation $2x^2=7x-3$ by the method of completing the square.

Section : C

★ **Solve the following (Question number 27 to 34) (3 marks each)** 24

27. On dividing x^3-3x^2+x+2 by a polynomial $g(x)$, the quatient and remainder were $x-2$ and $4-2x$ respectively. Find $g(x)$.

28. $\frac{1}{x+4}-\frac{1}{x-7}=\frac{11}{30}$, $x\neq -4, 7$ Find roots of given equation.

29. Find the 20^{th} term from the last erm of the AP 3, 8, 13....253.

OR

29. In an AP $a_n = 4$, $d = 2$, $S_n = -14$, find n and a.

30. In what ratio does the point (4, 6) divided the line segment joining the points A (6, –10) and B(3, –8)?

31. The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in Kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Number of Students	2	3	8	6	6	3	2

OR

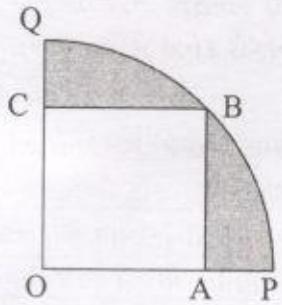
31. The table below shows the daily expenditure on food of 25 households in a locality.

Daily expenditure (in Rs.)	100-150	150-200	200-250	250-300	300-350
Number of households	4	5	12	2	2

Find the mean daily expenditure by step-deviation method.

32. Prove that, the lengths of tangents drawn from an external point to a circle are equal.

33. In given fig, a square OABC is inscribed in a quadrant OPBQ. If OA = 20 cm, Find the area of the shaded region. (Use $\pi = 3.14$)



34. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^3. **OR**

34. Metallic spheres of radii 6 cm, 8 cm and 10 cm respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.

Section : D

★ **Solve the following. (Question no. 35 to 39) (4 marks each)** **(20)**

35. Draw a line segment of length 6.5 cm and divide it in the ratio 3 : 4. Measure the two parts and write steps of construction.

OR

35. Draw a pair of tangents to a circle of radius 5 cm. Which are inclined to each other at an angle of 60^0.

36. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream. Determine the speed of the stream and boat in still water.

37. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30^0, Which is approahing the foot of the tower with a uniform speed. six seconds later, the angle of depression of the car is found to be 60^0. Find the time taken by the car to reach the foot of the tower from this points.

38. The slant height of a frustum of a cone is 4 cm and the perimeters (circumference) of its circular ends are 18 cm and 6 cm. Find the curved Surface area of the frustum. Also discuss whether curved surface area of a frustum of a cone and volume of a frustum of cone are equal ?

39. In ΔPQR, $\angle Q = 90$, then prove that $PQ^2 + QR^2 = PR^2$. **OR**

39. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their coresponding sides.

✦

QUESTION PAPER : 13 - SHORT ANSWERS

1. True
2. True
3. False
4. True
5. (a) 25
6. (a) 1
7. (b) $\frac{1}{26}$
8. (c) 3
9. $K = 2$
10. $2\sqrt{2}$
11. -1
12. $\angle POA = 50^0$
13. $\frac{\pi R^2 P}{360}$
14. $\frac{686}{3}\pi\ cm^3$
15. $\frac{1}{2}$
16. 0.52
18. 360
19. $k(4x^2 + x + 1)$
20. $x, y = \left(\frac{19}{29}; \frac{49}{29}\right)$
20. OR $(x, y) = \left(\frac{19}{5}, \frac{6}{5}\right)$
21. $\theta = \frac{25}{169}; \cot\theta = \frac{12}{5}$
22. 2
23. $PG = \sqrt{11.9}$ cm
24. 65.625 hours
25. AC = 6.5 m
26. X = 11 and 13
26. OR X = 3 and $\frac{1}{2}$
27. $g(x) = x^2 - x + 1$
28. X = 2 and X = 1
29. 33
29. OR $n = 7, a = -8$
30. K : 1 = 2 : 1
31. M = 56.67
31. OR 211 ₹
34. $17.6\ cm^3 \approx 18\ cm^2$
34. $r = 12$ cm
36. 8 km/hour; stream = y=3 km / hour
37. 3 sec.
38. $h = \sqrt[2]{\frac{4\pi - 9}{\pi}}; \sqrt[70]{\frac{4\pi^2 - 9}{\pi^2}}\ cm^3$

Q.PAPER **14**

Mathematics (Standard)

QUESTION PAPER - 14

Std.-10

Time : 3 Hours

MARCH-2022 (012)E

Total Marks : 80

Instructions :

(1) Write in a clear legible handwriting.
(2) This question paper has five sections A, B, C, D & E and Question Numbers from 1 to 54.
(3) All questions are compulsory. General options are given.
(4) The numbers to the right represent the marks of the questions.
(5) Draw neat diagrams wherever necessary.
(6) New sections should be writtne in a new page. Write the answers in numerical order.
(7) Calculator is not allowed.

Section-A

★ **Answer the following as per instruction given (Questions 1 to 24) (1 mark each) [24]**

★ **State True or False for questions given below. (Question 1 to 6).**

1. All similar triangles are congruent.
2. If P(3)=0, then $(x-3)$ is one of the factor of $P(x)$.
3. The perpendicular distance of point (3, –7) from Y-axis is 7.
4. $\sec^2\theta - \tan^2\theta = 1$.
5. A circle have infinite tangents at a point of the circle.
6. If the perimeter and area of a circle are numerically equal, then the radius of a circle is 2 units.

★ **Fill in the blanks with correct option as to make the given statement correct. [6] (Questions 7 to 12)**

7. LCM (180, 40) = _____. (360, 220, 180)
8. The product of $P(x) = 6x^2 - 3 - 7x$ zeroes of is _____. $\left(\frac{1}{2}, -\frac{1}{2}, 1\right)$
9. For a given pair of linear equation in two variables, if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ then equation has _____.
   (One and only solution, Infinite solution, No solution)
10. The value of Discriminant for a given quadratic equation $x^2 + 6x + 9 = 0$ is _____. (72, 0, 36)
11. All _____ are similar. (Circle, Rectangle, Triangle)
12. The area of minor setion having radius r and angle α is _____.
    $\left(\frac{\pi r^2 a}{180}, \frac{\pi r a}{360}, \frac{\pi r^2 a}{360}\right)$

★ **Choose the correct option from the question given below : (Questions 13 to 18) [6]**

13. If $m + n = 14$ and $m - n = 4$, then m = _____.

(A) 18 (B) 10 (C) 9 (D) 56

14. If $b^2 - 4ac$ _____ 0, then quadratic equation has two equal roots.

(A) $\geq$ (B) $>$ (C) $<$ (D) $=$

15. The distance of point A(a, b) from origin is _____.

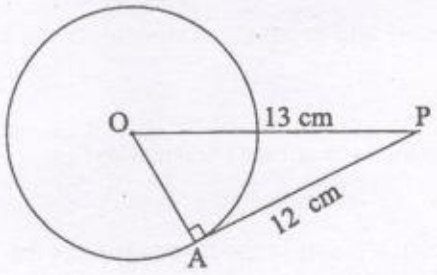
(A) $\sqrt{a^2 - b^2}$ (B) $a^2 + b^2$

(C) $\sqrt{a^2 + b^2}$ (D) $a^2 - b^2$

16. If tangents PA and PB from a point P to a circle with centre O are inclinded to each other at angle of 80^0, then $\angle POA$ is equal to _____.

(A) 50^0 (B) 60^0 (C) 70^0 (D) 80^0

17. Find the radius of a circle from a figure given below :



(A) 25 (B) 5

(C) 13 (D) 12

18. For a given pair of linear equation in two variables $2x + 3y - 8 = 0$ and $4x + 6y - 16 = 0$, the geometrical representation of the pair so formed is _____.

(A) Intersecting lines (B) Coincident lines

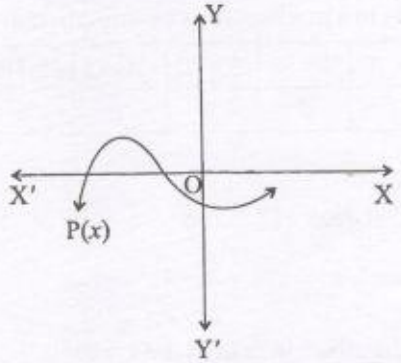
(C) Parallel lines (D) Non of the given

★ **Answer the following in one word of figure (Question : 19 to 22)** [4]

19. What is the HCF of 35 and 22 ?

20. Which mathematical derived a formula for solving quadratic equation by the method of completing the square ?

21. Find the number of zeroes of $y = P(x)$ from figure given below :



22. If P(E)=0.63, then find the value of $P(\bar{E})$.

★ **Match the pair : (Questions 23 to 24)** [2]

	Part-A	Part-B
23.	The zeroes of $P(x) = 2x - 6$ is	(a) 0
24.	The probability of having -5 as natural number is	(b) 1
		(c) 3

Section : B

★ **Answer the following briefly with calculaion : (Any 9) (Questions : 25 to 37) (2 marks each).** [18]

25. Find HCF and LCM of 85 and 136 by prime factorization method.

26. Show thatn $3-\sqrt{5}$ is irrational.

27. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $\frac{1}{3}$ respectively.

28. Solve the following pair of linear equations by substitution method.
$2x+3y=13, 4x+5y=23$

29. In an agriculture field, there are 23 cotton plants in the first row, 21 in the second row, 19 in the third row, and so on. There are 5 cotton plants in the last row. How many rows are there in the agriculture field ?

30. Find the sum of first 20 multiples of 7.

31. Find the values of y for which the distance between the points P (3, -2) and Q(7, y) is 4 units.

32. Find the ratio in which the line segments joining the points (-3, 10) and (6, -8) is divided by (-1, 6).

33. Evaluate : $\frac{5\cos^2 60^0 + 4\sec^2 30^0 - \tan^2 45^0}{\sin^2 30^0 + \cos^2 30^0}$

34. If $\sin 60\theta = \cos(2\theta + 10^0)$, where 6θ is an acute angle, find the value of θ.

35. The marks distribution of 30 students in a mathamatics examination are given :

Class Interval	10-25	25-40	40-55	55-70	70-85	85-100
Number of Students	2	3	7	6	6	6

Find the mode of the data.

36. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:
i. a spade
ii. a red face card

37. Find Mean of data for one classical distribution data in the symbols
$a = 50, \sum f_i u_i = -36, \sum f_i = 35$ and $h = 10$.

Section : C

★ **Answer the following as asked with calculation : (any 6) (Questions : 38 to 46) (3 marks each).** **(18)**

38. Ravi scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awared for each correct answer and 2 marks been deducted for each incorrect answer, the Ravi would have scored 50 makrs. How many questions were there in the test ?

39. Solve the following pair of equation by reading them to a pair of liner equations :

$6x + 3y = 6xy$

$2x + 4y = 5xy$

40. An express train takes 1 hour less than a passenger train to travel 132 km between Gandhinagar and VAdodara (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11 km/h more than that of the passenger train, find the average speed of the two trains.

41. Find the roots of the following equation.

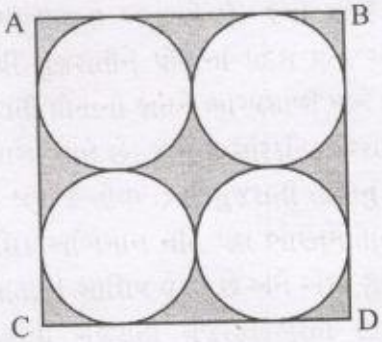
$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, (x \neq -4, 7)$$

42. Prove that :

$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

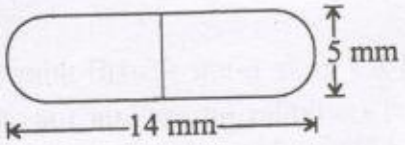
43. Prove that "The lengths of tangents drawn from an external point to a circle are equal".

44. Find the area of the shaded region in given figure, where ABCD is a square of side 14 cm.



45. A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 22 m by 14 m. Find the height of the platform.

46. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. Find its surface area.



Section : D

★ **Answer the following questions any 5 from 47 to 54 (8 questions) with calculation. (4 marks each)** **20**

47. Prove that "The ratio of the areas of two similar triangles is equal to the square of the ratio of the their correspoding sides".

48. In ΔPQR if $\angle Q=90^0$, then prove that $PR^2 = PQ^2 + QR^2$.

49. Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm. Write steps of construction.

50. JDraw a triangle XYZ with side YZ=5 cm, XY=4 cm and $\angle XYZ=60^0$. Then construct a triangle whose sides are $\frac{4}{5}$ of the correspondings sides of the triangles XYZ. (Steps of construction not required).

51. A 1.2 m tall girl spots a ballon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the ballon from the eyes of the girl at any instant is 60^0. AFter some time, the angle of elevation reduces to 30^0. Find the distance travelled by the balloon during the interval.

52. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30^0 and 60^0, respectively. If the bridge is at a height of 3 m from the banks, find the width of the river.

53. A container, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm, respectively. Find the cost of the milk which can completely fill the container, at the rate of r 20 per litre. ($\pi=3.14$)

54. The median of the following data is 525. Find the values of f_1 and f_2.

Class Interval	Frequency
0 - 100	2
100 - 200	5
200 - 300	f_1
300 - 400	12
400 - 500	17
500 - 600	20
600 - 700	f_2
700 - 800	9
800 - 900	7
900 - 1000	4
Total	**100**

✦

QUESTION PAPER : 15 : MARCH-2022 : SHORT ANSWERS

1. False
2. Ture
3. False
4. True
5. Fase
6. True
7. 360
8. $\frac{-1}{2}$
9. one and only solution
10. 0
11. Circle
12. $\frac{\pi r^2 a}{360}$
13. (C) 9
14. (D) =
15. (C) $\sqrt{a^2+b^2}$
16. (A) 50^0
17. (B) 5
18. (B) Coincident lines
19. 1
20. Shreedhar Acharya
21. 3
22. 0.37
23. (C) 3
24. (A) 0
25. H.C.F. = 17; and L.C.F. = 680
26. $3-\sqrt{5}$
27. $3x^2-3\sqrt{2x}+1$
28. $(x, y) = (2, 32)$
29. $n = 10$
30. $S_{20} = 1470$
31. $y = -2$
32. $(-1, 6)$ divides; ratio 2 : 7
33. $\frac{67}{12}$
34. $\theta = 10$
35. $Z = 52$
36. $P = \frac{3}{26}$
37. $\overline{X} = 39.71$
38. $x + g = 15 + 5 = 20$
39. $(x, y) = (1, 2)$
40. Passenger train is 33 km/h, express train = 44 km/h
41. X=2 or X=1
44. 42 cm^2
45. $h = 2.5$ m
46. 220 mm^2
51. $58\sqrt{3}$
52. 6.92 m
53. 10.45; 209 Rs.
54. $f_1 = 9; f_2 = 15$

Q.PAPER **15**

Mathematics (Standard)

QUESTION PAPER - 15

Std.-10

Time : 3 Hours

JULY-2022 (012)E

Total Marks : 80

Instructions :

(1) Write in a clear legible handwriting.
(2) This question paper has five sections A, B, C, D & E and Question Numbers from 1 to 54.
(3) All questions are compulsory. General options are given.
(4) The numbers to the right represent the marks of the questions.
(5) Draw neat diagrams wherever necessary.
(6) New sections should be writtne in a new page. Write the answers in numerical order.
(7) Calculator is not allowed.

Section-A

★ **Do as directed : (Questions : 1 to 24, 1 makr each).** [24]

★ **Answer the following by choosing the correct option given below.**

1. If the number 13 A L 016 is exactly divisible by 11, then A = _____, L = _____.

(A) A = 0, L = 0 (B) A = 1, L = 2
(C) A = 5, L = 8 (D) A = 8, L = 5

2. If equation $px + qy = p - q$
$qx - py = p + q$
if $x = 1$, then $y =$ _____.

(A) 0 (B) 1 (C) –1 (D) 2

3. 1 + 2 + 3 + ... + 50 + 49 + 48 + ... + 1 = _____

(A) 2499 (B) 2500
(C) 2501 (D) 2599

4. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angles of 80°, then ∠POA is equal to

(A) 50° (B) 60° (C) 70° (D) 80°

5. There is a empirical relationship between the three measures of central tendency :

$3M = Z + 2\bar{x}$, then $\frac{Z - M}{M - \bar{x}} =$ _____

(A) 0 (B) 1 (C) –2 (D) 2

★ **Fill in the blanks so as to make each of the following statement true :**

6. $2520 = 2^3 \times 3^p \times q \times 7$, than $p =$ _____ and $q =$ _____.

7. If α and β are the roots of the quadratic equation $ax^2 + bx + c = 0, a \neq 0$, and D = 0 then $\alpha = \beta =$ _____

8. In an Arithmetic progression, $d = 5$, $a = -\frac{35}{3}$, $a_9 = \frac{85}{3}$, then $S_9 =$ _____.

9. sin 2A = 2sin A is true, when A = _____.

10. Mean, $\bar{x} = a + h\left[\frac{\Sigma fiui}{\Sigma fi}\right]$, then $u_i =$ _____.

★ **Match the following.**

	Part-A	Part-B
11.	Curved surface area of a frustum of a cone	(a) πd
12.	Volume of a ₹ 5 coin	(b) $3\pi r^2$
13.	Circumference of a circle	(c) $\pi l (r_1 + r_2)$
14.	Total surface area of a hemisphere	(d) $\pi r^2 h$
		(e) $4\pi r^2$

★ **State True or False.**

15. If α, β, γ are the roots of the cubic polynomial $ax^3 + bx^2 + cx + d, a \neq 0$ then $a + \beta + \gamma = -\frac{d}{a}$.

16. In the pair of linear equations $x - 2y = 8$ and $5x - 10y = c\ (c \in R)$, having one and only one solution.

17. The distance of a point P(x, y) from the origin O$(0, 0)$ is OP = $\sqrt{x^2 - y^2}$.

18. The line containing the radius through the point of contact is called the "normal" to the circle at the point.

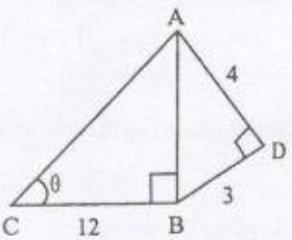
19. If P(E) = 0.05, then the probability of not E is 0.95.

★ **Answer the following in one sentence or one word.**

20. The measure of angles of a triangle are x^0, y^0 and 40^0. If $x - y = 30^0$, find x^0 and y^0.

21. In a quadratic equation $kx^2 + \left[\frac{a}{a-b} + \frac{a-b}{a}\right]x + 1 = 0\ (k \neq 0)$, the roots are reciprocal, then find k.

22. From the given figure find cot θ.



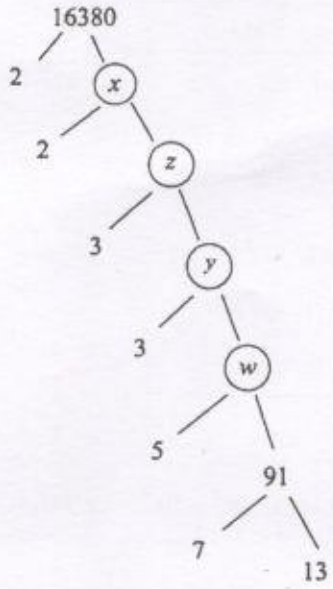
23. A tower stands vertically on the ground. From a point on the ground, which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60^0. Find the height of the tower.

24. What is the angle made by the hour hand in the clock in one minute ?

Section-B

★ **Answer the following questions [Questions : 25 to 37]** **[18]**
[Any 9 - each carries 2 marks.]

25. From the given tree find $x + y - z - w$.



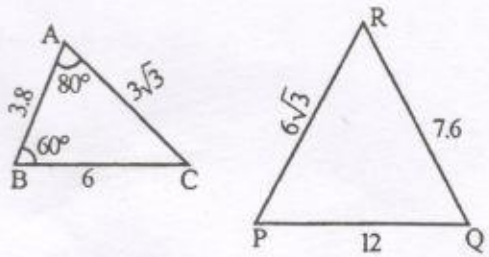
26. Prove that $3 + 2\sqrt{5}$ is irrational.

27. Find a quadratic polynomial whose sum and product of its zeroes are $\frac{1}{4}$ and $-\frac{1}{4}$ respectively.

28. Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of "m" for which $y = mx + 3$.

29. How many three-digit numbers are divisible by 7 ?

30. From the given figure, find $\angle P$.



31. Find the value of k, if the points A(2, 3), B(4, k) and C(6, –3) are collinear.

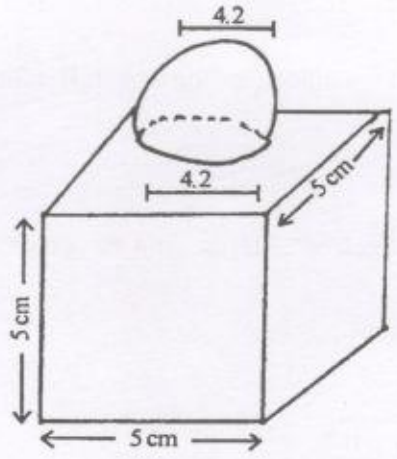
32. If 3 cot A = 4, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ or not.

33. If $\sin(A - B) = \frac{1}{2}, \cos(A + B) = \frac{1}{2}, 0^0 < A + B \leq 90^0, A > B$,
find A and B.

34. Prove that $\frac{\sin\theta-\cos\theta+1}{\sin\theta+\cos\theta-1}=\frac{1}{\sec\theta-\tan\theta}$ using the identity $\sec^2\theta=1+\tan^2\theta$.

35. A 20 m deep well with diameter 7m is dug and the earth from digging is evenly spread out to form a platform 22m by 14 m. Find the height of the platform.

36. The decorative block shown in the figure is made of two solids - a cube and a hemisphere. The base of the block is a cube. Find the total surface area of the block. Measures are given in the figure. (Take $\pi=\frac{22}{7}$)



37. In a retail market, fruit vendors were selling magoes kept in packing boxes. These boxes contained varying number of mangoes. The following was the distribution of mangoes according to the number of boxes.

Number of mangoes	50-52	53-55	56-58	59-61	62-64
Number of boxes	15	110	135	115	25

Find the mean number of mangoes kept in a packing box. Which method of finding the mean did you choose ?

Section : C

★ **Answer the following questions [Questions : 38 to 46]** **(18)**
[Any 6 - each carries 3 marks]

38. If α and β are zeroes of the quadratic polynomial $P(x)=kx^2+4x+4, k\neq 0$ and $\alpha^2+\beta^2=24$, find k.

39. Sum and difference of reciprocals of present age of mother and daughter is $\frac{3}{40}$ and $\frac{1}{40}$ respectively, then find the present age of mother and daughter.

40. Place A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 60 minutes. What are the speeds of the two cars ?

41. Find the roots of $ax^2+bx+c=0, a\neq 0$ by the method of completing the square.

42. If A and B are (-2, -2) and (2, -4) respectively, find the coordinates of P such that $AP=\frac{3}{7}AB$ and P lies on the line segment AB.

43. The angles of elevation of the top of a tower from two points at a distance of 3 m and 12 m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6 m.

44. A chord of a circle of radius 15 cm subtends an angle of 60^0 at the centre. Find the areas of the corresponding minor and major segments of the circle.
(Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)

45. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per second. How much time (in minutes) will it take to empty $\frac{1}{3}$ of the tank, if it is 3m in diameter ?
(Take $\pi = \frac{22}{7}$).

46. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting.
i) a king of red colour
ii) a red face card
iii) a spade

Section : D

★ **Answer the following questions [Questions : 47 to 54]**
[Any 5 - each carries 4 marks] **20**

47. Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

48. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

49. BL and CM are medians of a triangle ABC right angled at A.
Prove that $4(BL^2 + CM^2) = 5BC^2$.

50. The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyed building are 30^0 and 45^0, respectively. Find the height of the multi-storeyed building and the distance between the two buildings.

51. In $\odot(P, r)$, Q is an exterior point. QM and QN are tangents of the $\odot(P, r)$. Prove that QM = QN.

52. Draw a triangle ABC with side BC = 7 cm, $\angle B = 45^0$, $\angle A = 105^0$, Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of Δ ABC. Write steps of construction.

53. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle. Write steps of construction.

54. The median of the following data is 525. Find the value of x and y, if the total frequency is 100.

Class interval	Frequency
0 - 100	2
100 - 200	5
200 - 300	9
300 - 400	x
400 - 500	17
500 - 600	20
600 - 700	15
700 - 800	9
800 - 900	y
900 - 1000	4

✦

QUESTION PAPER : 15 : JULY-2022 : SHORT ANSWERS

1. (C) A = 5, L = 8
2. (C) –1
3. (B) 2500
4. (A) 50^0
5. (D) 2
6. $p = 2, q = 5$
7. $\frac{-b}{20}$
8. 75
9. 0^0
10. $\mu_i = \frac{x_i - a}{h}$
11. $\pi l (r_1 + r_2)$
12. $\pi r^2 h$
13. πd
14. $3\pi r^2$
15. False
16. Flase
17. False
18. True
19. True
20. $x = 85$ & $y = 55$
21. $k = 1$
22. $\cot\theta = \frac{5}{12}$
23. $15\sqrt{3}$
24. 0.5^0
25. 5005
26. $\sqrt{5}$ ∴ $3 + 2\sqrt{5}$
27. $k(ax^2 - x - 1)$ where K is non zero real number
28. $y = 5; x = -2; m = -1$
29. $n = 128$
30. $\angle C = 40^0$
31. K = 0
33. A = 45^0 and B=15^0
35. 2.5 m
36. 163.86 cm^2
37. 27.19
38. K=$\frac{2}{3}$ or K = –1
39. X = 40 yrs.
40. 60 km/hr and 40 km/hr
41. $X = -6 + \sqrt{\frac{b^2 - 4ac}{2a}}$
42. $p(x, y) = \frac{-2}{7}, \frac{-20}{7}$
43. AB = 6 m
44. 686.07 cm^2
45. 660 seconds and 11 min
46. (i) $\frac{1}{26}$ (ii) $\frac{3}{26}$ (iii) $\frac{1}{4}$
47. 12 m and 18 m
50. $4(3 + \sqrt{3})$m
54. $x = 12; y = 7$