Time: 3hrs.   **M.M. 80**

General Instructions:
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
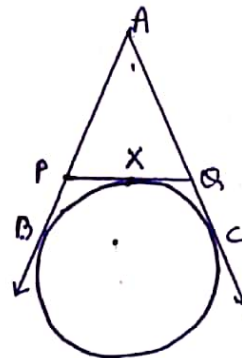
Section-A

1. $\frac{\sqrt{50}}{\sqrt{2}}$ is a

   a) irrational number   b) rational number   c) even number   d) none of these

2. If one of the zeros of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3, then the value of k is

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

3. If α and β are the zeros of the polynomial $f(x) = ax^2 + bx + c$, then $\frac{1}{\alpha^2} + \frac{1}{\beta^2} =$

   a) $\frac{b^2-2ac}{a^2}$ b) $\frac{b^2-2ac}{c^2}$ c) $\frac{b^2+2ac}{a^2}$ d) $\frac{b^2+2ac}{c^2}$

4. The value of k for which the system of equations $kx + y = k^2$ and $x + ky = 1$ has infinitely many solutions, is

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

5. The system of equation $x = 0$ and $y = 3$ has

   a) a unique solution   b) no solution   c) two solutions   d) infinitely many solutions

6. The value of c for which the equation $ax^2 + 2bx + c = 0$ has equal roots is

   a) $\frac{b^2}{a}$ b) $\frac{b^2}{4a}$ c) $\frac{a^2}{b}$ d) $\frac{a^2}{4a}$

7. The value of x for which $2x, x + 10$ and $3x + 2$ are three consecutive terms of an A.P. is

   a) -6   b) 18   c) 6   d) -18

8. The HCF of 961 and 155 is

   a) 1   b) 155   c) 961   d) 31

A-1

9. In the figure $AB \parallel PQ$. If $AB = 6cm$, $PQ = 2cm$ and $OB = 3cm$, then the length of OP is

   a) 9cm

   b) 3cm

   c) 4cm

   d) 1cm

10. If $\triangle ABC \sim \triangle PQR$ with $\angle A = 32^0$ and $\angle R = 65^0$ then the measure of $\angle B$ is

   a) 32^0 b) 65^0 c) 83^0 d) 97^0

11. The ratio in which the $x - axis$ divides the segment joining (3, 6) and (12, -3) is

   a) $2:1$ b) $1:2$ c) $2:3$ d) $3:2$

12. The perimeter of the sector OAB shown in figure is

   a) $\frac{64}{3}$ cm

   b) 26 cm

   c) $\frac{64}{5}$ cm

   d) 19 cm

13. The volume of a right circular cone whose area of the base is 156 cm² and the vertical height is 8cm, is

   a) $2496\ cm^3$ b) $1248\ cm^3$ c) $1664\ cm^3$ d) $416\ cm^3$

14. Two dice are rolled simultaneously. The probability that they show different faces is

   a) $\frac{2}{3}$ b) $\frac{1}{6}$ c) $\frac{1}{3}$ d) $\frac{5}{6}$

15. If P (A) denotes the probability of a random event A, then

   a) $P\ (A) < 0$ b) $P\ (A) \le 0$ c) $P\ (A) \le 1$ d) $0 \le P\ (A) \le 1$

16. If tangents PA and PB from a point P to a circle with centre O are inclined to eachother at angle of 80^0, then $\angle POA =$

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

17. If AB, AC and PQ are the tangents to the circle and AB = 5cm, then perimeter of $\triangle APQ$ is

   a) 15 cm

   b) 10 cm

   c) 5 cm

   d) 2.5 cm

A-2

18. If θ is an acute angle of a right angled triangle, then which of the following equation is not true?

   a) $\sin\theta\ \cot\theta = \cos\theta$ b) $\cos\theta\ \tan\theta = \sin\theta$ c) $\csc^2\theta - \cot^2\theta = 1$ d) $\tan^2\theta - \sec^2\theta = 1$

Direction: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).

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

19. Statement A (Assertion) : If the sum of zeros of the quadratic polynomial $f(x) = 3x^2 + kx + 5$

   is $\frac{-2}{3}$, then the value of k is 2.

   Statement R (Reason) : The product of zeroes of the polynomial $ax^2 + bx + c$ is $\frac{c}{a}$

20. Statement A (Assertion) : The system of equations $2x + y + 9 = 0\ and\ x + 3y + 7 = 0$ is consistent having unique solution.

   Statement R (Reason): The system of equations $a_1 x + b_1 y + c_1 = 0\ and\ a_2 x + b_2 y + c_2 = 0$ is

   always consistent, if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Section – B

21. If $4\cot^2 45^0 - \sec^2 60^0 + \sin^2 60^0 + x = \frac{3}{4}$, then find the value of x.
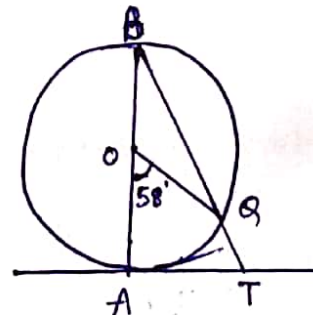
OR

   If $\cos A + \cos^2 A = 1$, then find the value of $\sin^2 A + \sin^4 A$

22. Find by prime factorization the LCM of the numbers 18180 and 7575. Also find HCF of these two numbers.

23. Determine whether the triangle whose vertices are (10, -18) (3, 6) and (-5, 2) is isosceles.

24. In the adjoining figure, AB is the diameter

   of a circle with centre O and AT is a tangent.

   If $\angle AOQ = 58^0$ find $\angle ATQ$

A-3

25. In the following A.P. find the missing terms in the boxes.

   $\square$, 13 , $\square$, 3

Section – C

26. Prove that $(cosec\ A - \sin A)(\sec A - \cos A) = \dfrac{1}{\tan A + \cot A}$

27. The sum of 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.

28. Give a relation that must exist between x and y so that $P(x, y)$ is equidistant from $Q(6, -1)$ and

    $R(2, 3)$

29. A train travels a distance of 300 km at constant speed. If the speed of the train is increased by 5 km an hour, the journey would have taken 2 hours less. Find the original speed of the train.
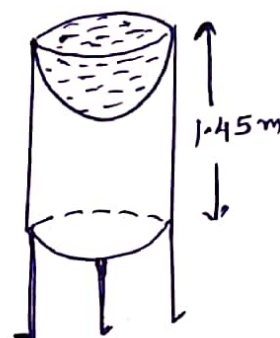
30. Mayank made a bird-bath for his garden in

    the shape of a cylinder with a hemispherical

    depression at one end. The height of the cylinder

    is 1.45m and its radius is 30 cm. Find the total

    surface area of the bird-bath. $\left(\pi = \dfrac{22}{7}\right)$

1.45m

31. Find the median of the following frequency distribution:

| Wages	Less than 300	Less than 400	Less than 500	Less than 600	Less than 700
No. of laboratories	3	8	28	38	44

Section – D

32. The mode of the following distribution is 55. Find the missing frequencies p and q.

Class interval	0-15	15-30	30-45	45-60	60-75	75-90	Total
Frequency	6	7	p	15	10	q	51

33. A man saved Rs. 30,000 in 8 years. Each year he saved Rs. 500 more than he saved in the preceding year. Find his savings in the first year.

34. Sides AB and BC and median AD of a $\triangle ABC$ are respectively proportional to sides PQ and QR and median PM of $\triangle PQR$. Shows that $\triangle ABC \sim \triangle PQR$

OR
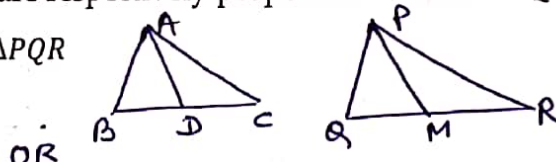
Sides AB and AC and median AD of $\triangle ABC$ are respectively proportional to sides PQ and PR and median PM of $\triangle PQR$ show that $\triangle ABC \sim \triangle PQR$

A-4

35. From a point on the ground the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45⁰ and 60⁰ respectively. Find the height of the tower.

<center>OR</center>

From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30⁰ and 45⁰ respectively. If the bridge is at a height of 3m from the banks, find the width of the river.

<center>Section – E</center>

Case Study : 1

36. Sumerian calendar is the first historically attested and formulised calendar dated to the Bronze Age. Nowadays, Gregorian calendar is the most widely used calendar in the world. This calendar is used in International standard for representation of date and time.

1. If a month is selected at random, what is the probability that it contains 31 days?

2. What is the probability for a non-leap year to have 53 Saturdays?

3. What is the probability for the month of July in 2025 to have 5 Wednesdays?

<center>OR</center>

What is the probability for a leap year to have 53 Mondays?

Case Study : 2

37. Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.
After survey, it was decided to build rectangular playground, with a semi-circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.
Based on the above information, answer the following questions :

Fig. 11.51

[CBSE 2023(30/4/1)]

(i) What is the total perimeter of the parking area?
(ii) (a) What is the total area of parking and the two quadrants?
<center>OR</center>
(b) What is the ratio of area of playground to the area of parking area?
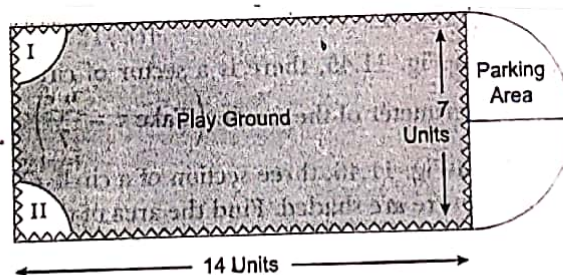(iii) Find the cost of fencing the playground and parking area at the rate of ₹ 2 per unit.

A – 5

Case Study : 3

38. Mathematics teacher of a school took her 10th standard students to show Red Fort. It was a part of their Educational trip. The teacher had interest in history as well. She narrated the facts of Red Fort to students. Then the teacher said in this monument one can find combination of solid figures. There are 2 pillars which are cylindrical in shape. Also 2 domes at the corners which are hemispherical and 7 smaller domes at the centre. Flag hoisting ceremony on Independence Day takes place near these domes.
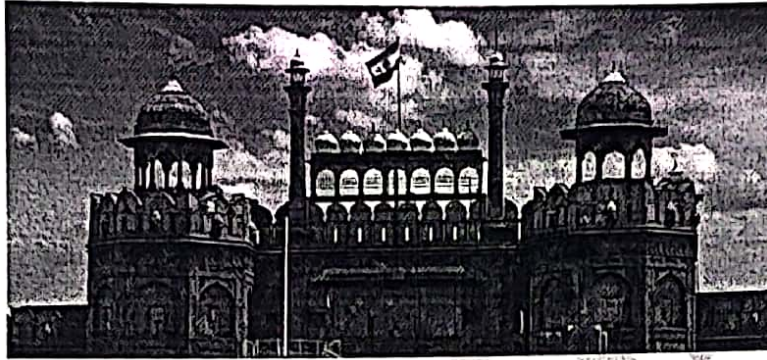
Based on the above information, answer the following questions:

(a) How much cloth material will be required to cover 2 big domes each of radius 2.5 metres?

(Take $\pi = \frac{22}{7}$)

(b) Write the formula to find the volume of a cylindrical pillar.

(c) Find the lateral surface area of two pillars if height of the pillar is 7 m and radius of the base is 1.4 m.

OR

What is the ratio of sum of volumes of two hemispheres of radius 1 cm each to the volume of a sphere of radius 2 cm?

A−6

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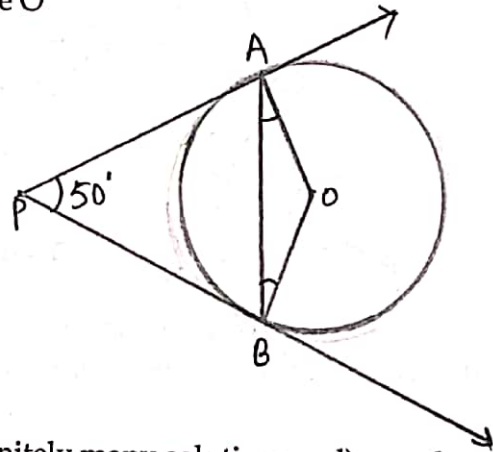
Section-A

1. Which of following equations has sum of its roots as 3 ?

   a) $2x^2 - 3x + 6 = 0$ b) $-x^2 + 3x - 3 = 0$ c) $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$ d) $3x^2 - 3x + 3 = 0$

2. What is the length of the arc of the sector of a circle with radius 14cm and of central angle 90^0

   a) 22 cm   b) 44 cm   c) 88 cm   d) 11 cm

3. It is given that $\triangle ABC \sim \triangle DEF, \angle A = 30^0, \angle C = 50^0$ $AB = 5cm, AC = 8cm$ and $DF = 16cm$, then the following is true

   a) $DE = 10cm, \angle F = 50^0$ b) $DE = 12cm, \angle F = 100^0$

   c) $EF = 12cm, \angle D = 100^0$ d) $EF = 12cm, \angle D = 30^0$

4. If the HCF of 65 and 117 is expressible in the form $65m - 117$ then value of m is

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

5. The distance between the points $(0,5)$ and $(-5,0)$ is

   a) 5   b) $5\sqrt{2}$ c) $2\sqrt{5}$ d) 10

6. For what value of k, do the equations $3x - y + 8 = 0$ and $6x - ky = -16$ represents co-incident lines

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

7. If the probability of an event is p, the probability of its complementary event will be

   a) $p - 1$ b) p c) $1 - p$ d) $1 - \frac{1}{p}$

B-1

8. The pair of equations $x = a$ and $y = b$ graphically represent lines which are

   a) Parallel   b) Intersecting at (b, a)   c) Co-incident   d) Intersecting at (a, b)

9. A quadratic polynomial whose zeroes are -3 and 4 is

   a) $x^2 - x - 12$ b) $x^2 + x + 12$ c) $\frac{x^2}{2} - \frac{x}{2} - 6$ d) $2x^2 + 2x - 24$

10. What is the total surface area of a solid hemisphere of diameter 'd'?

    a) $3\pi d^2$ b) $2\pi d^2$ c) $\frac{1}{2}\pi d^2$ d) $\frac{3}{4}\pi d^2$

11. If three coins are tossed simulataneously what is the probability of getting atmost one head?

    a) $\frac{3}{8}$ b) $\frac{4}{8}$ c) $\frac{5}{8}$ d) $\frac{7}{8}$

12. If in two triangles ABC and PQR, $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$ then

    a) $\Delta PQR \sim \Delta CAB$ b) $\Delta PQR \sim \Delta ABC$ c) $\Delta CBA \sim \Delta PQR$ d) $\Delta BCA \sim \Delta PQR$

13. The hour hand of a clock is 6cm long. The angle swept by it between 8:20 a.m. and 8:55 a.m. is

    a) $\left(\frac{35}{4}\right)^0$ b) $\left(\frac{35}{2}\right)^0$ c) 35^0 d) 70^0

14. If one zero of quadratic polynomial $x^2 + 3x + k$ is 2 then value of k is

    a) 10   b) -10 c) 5   d) -5

15. If PA and PB are tangents to a circle with centre O

    such that $\angle APB = 50^0$ then $\angle OAB$ is equal to

    a) 25^0

    b) 30^0

    c) 40^0

    d) 50^0

16. The pair of equations $y = 0$ and $y = -7$ has

    a) one solution   b) two solutions   c) infinitely many solutions   d) no solution

17. Values of k for which the quadratic equation $2x^2 + kx + k = 0$ has equal roots is

    a) 0 only   b) 4   c) 8 only   d) 0, 8

18. The 10th term of AP 5, 8, 11, 14 _____ is

    a) 32   b) 35   c) 38   d) 185

Direction: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).

   a) Both A and R are true and Reason (R) is correct explanation of A
   b) Both A and R are true but Reason (R) is not the correct explanation of A

B-2

c) A is true but R is false

d) A is false but R is true

19. Statement A (Assertion) : If $3, x, y, z, 20$ are in AP then Z is 15

Statement R (Reason) : n^{th} term of AP, $an = a + (n - 1)d$

20. Statement A (Assertion) : The tangents drawn at the end points of a diameter of a circle are parallel.

Statement R (Reason): Diameter of a circle is the longest chord.

Section – B

21. Prove that $5 + \sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

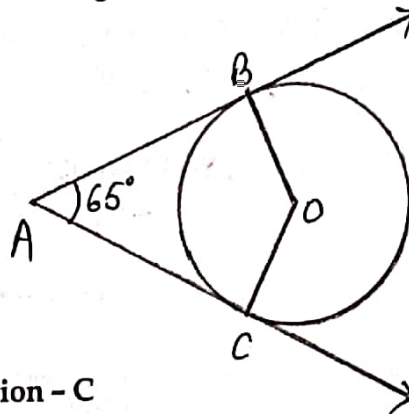22. Prove that $(\sqrt{3} + 1)(3 - \cot 30^0) = tan^3 60 - 2 \sin 60^0$

OR

Simplify $(1 + tan^2 \theta)(1 - \sin \theta)(1 + \sin \theta)$

23. Name the type of triangle formed by the points $A(-5,6), B(-4,-2)$ and $C(7,5)$

24. A pole 6m high casts a shadow $2\sqrt{3} \, m$ long on the ground then find sun's elevation.

25. In given figure, O is the centre of circle.

    AB and AC are tangents drawn to the circle

    from point A. If $\angle BAC = 65^0$ then

    find the measure of $\angle BOC$

Section – C

26. The Traffic lights at three different road crossing change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 am, at what time will they change simultaneously again.

27. Prove that $\frac{tan A}{1 - cot A} + \frac{cot A}{1 - tan A} = 1 + \tan A + \cot A$

28. If the point A (2, -4) is equidistant from P (3, 8) and Q (-10, y). Find value of y. Also find distance PQ.

29. A car has two wipers which do not overlap. Each wiper has a blade of length 21cm sweeping through an angle of 120^0. Find total area cleaned at each sweep of the two blades.

30. Three years ago, Rashmi was thrice as old as Nazma. Ten years later, Rashmi will be twice as old as Nazma. How old are Rashmi and Nazma now?

B-3

31. If a circle touches the side BC of a triangle ABC at P and extend sides AB and AC at Q and R respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$
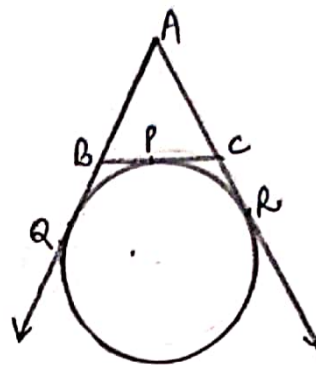
Section – D

32. Solve the equation $1 + 4 + 7 + 10 + \ldots\ldots + x = 287$

33. From a point on the ground, the angle of elevation of the bottom and top of a transmission tower fixed at the top of a 30m high building are 30^0 and 60^0 respectively. Find height of the transmission tower. $(Use \sqrt{3} = 1.13)$

OR

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 45^0 respectively. If the bridge is at a height of 3m from the banks, find the width of the river.

34. The median of following data is 50, find values of p and q if sum of all frequencies is 90.

Marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	p	15	25	20	q	8	10

35. Sides AB and BC and median AD of a ΔABC are respectively proportional to sides PQ, QR and median PM of ΔPQR. Show that $\Delta ABC \sim \Delta PQR$

Section – E

Case Study : 1

36. A man accepts a position with an initial salary of ₹ 5200 per month. It is understood that he will receive an automatic increase of ₹ 320 in the every next month and each month thereafter. He joins the job on 1st March 2022 and he receives his salary on the last day of every month.
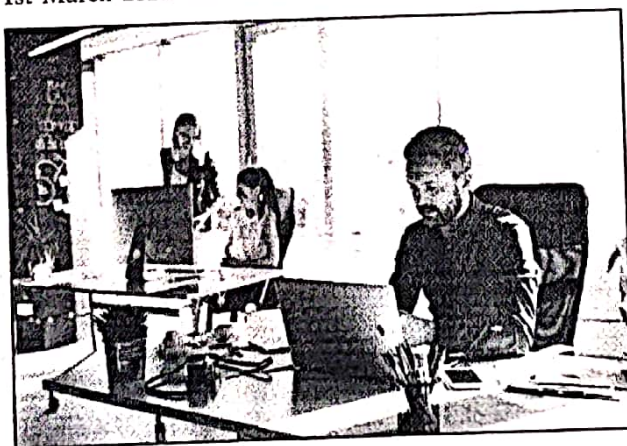
Now on the basis of above, answer the following:
   (i) Find the amount of salary received on 30th November 2022.
   (ii) When will he get ₹ 10,000 as his monthly salary?
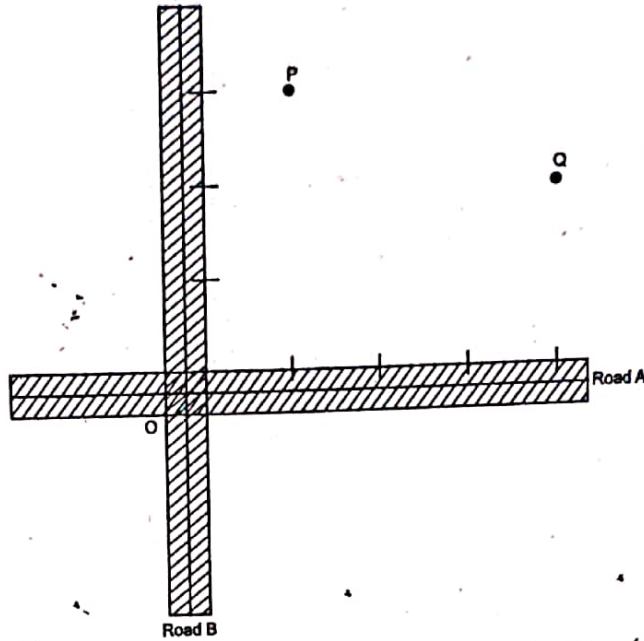   (iii) Find the total earning during his first year of job.

OR

When will his total earning be ₹ 36,000?

B-4

37. Two roads are intersecting at right angle as shown in figure.

Road A

Road B

Taking road A as x-axis, road B as y-axis and point of intersection O as origin. The house of Ramesh and Raj are at points P(1, 3) and Q(4, 2) respectively.

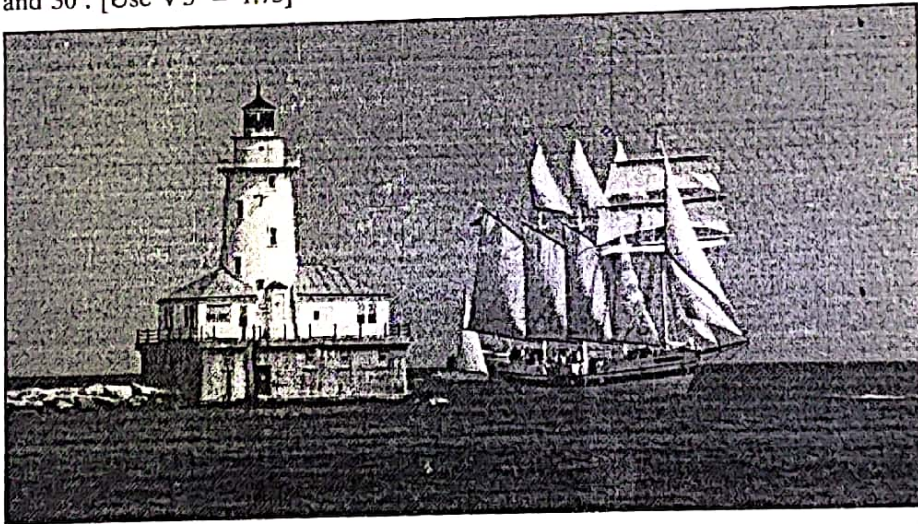On the basis of above, answer the following:

(i) Find the distance of Ramesh's house from origin.

(ii) Find the distance between Ramesh's and Raj's house.

(iii) If Sheetal's house is at road A such that her house is equidistant from Raj's and Ramesh's house, find the coordinates of the point where Sheetal's house is located.

OR

Find the length of median of $\triangle OPQ$ through vertex P.

Case Study-3

38. A boy is standing at the top of a lighthouse of height 100 m and observes that two boats approaching to lighthouse from opposite sides. Boy found that the angle of depression of both the boats are 45° and 30°. [Use $\sqrt{3} = 1.73$]

On the basis of above answer the following:

(i) Draw a labelled diagram of the situation.

(ii) Find the distance of the boat from the lighthouse whose angle of depression is 45°.

(iii) What is the distance between both the boats?

OR

If angle of depression of boats become 60° and 45°, then find the distance between the boats.

B-5

Time: 3hrs.

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6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.

Section-A

1. If the H.C.F. of 360 and 64 is 8, then their L.C.M. is

   a) 2480   b) 2780   c) 512   d) 2880

2. If one zero of the polynomial $f(x) = 3x^2 + 11x + p$ is reciprocal of the other, then the value of p is

   a) zero   b) 3   c) $\frac{1}{3}$ d) -3

3. Value(s) of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is

   a) zero only   b) 4   c) 8 only   d) 0, 8

4. The distance between the points (a, b) and $(-a, -b)$ is

   a) $\sqrt{a^2 + b^2}$ b) $a^2 + b^2$ c) $2\sqrt{a^2 + b^2}$ d) $4\sqrt{a^2 + b^2}$

5. In the given figure PQ and PR are the tangents to a circle centred at O. If $\angle QPR = 35^0$ then $\angle QOR$ is equal to

   a) 70^0

   b) 90^0

   c) 135^0

   d) 145^0

6. In the given figure, $PQ \parallel AC$. If $BP = 4cm$

   $AP = 2.4cm$ and $BQ = 5m$ then the length

   of BC is

   a) 8 cm   b) 3 cm   c) 0.3 cm   d) $\frac{25}{3}$ cm
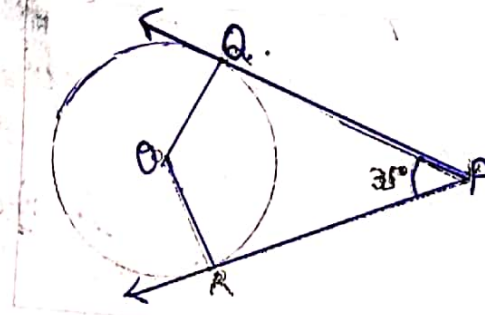
$A - 1$

7. $(\sec A + \tan A)(1 - \sin A)$ is equal to

a) $\sec A$ b) $\sin A$ c) $\csc A$ d) $\cos A$

8. H.C.F of $(3^3 \times 5^2 \times 2), (3^2 \times 5^3 \times 2^2)$ and $(3^4 \times 5 \times 2^3)$ is

a) 450   b) 90   c) 180   d) 630

9. The L.C.M. of smallest two digit composite number and smallest composite number is

a) 12   b) 4   c) 20   d) 44

10. In figure $\angle ACB = \angle CDA, AC = 8\ cm, AD = 3cm$

then BD is equal to

a) $\frac{22}{3} cm$

b) $\frac{26}{3} cm$

c) $\frac{55}{3} cm$

d) $\frac{64}{3} cm$

11. The 12th term of an A.P whose first two terms are -3 and 4 is

a) 67   b) 74   c) 60   d) 81

12. The length of the tangent AP from one external point A is 24 cm. If the distance of the point A from the centre O of the circle is 25 cm, then diameter of the circle is

a) $15cm$ b) $14cm$ c) $7cm$ d) $12cm$

13. $\frac{1-\tan^2 30^0}{1+\tan^2 30^0}$ is equal to

a) $\cos 60^0$ b) $\sin 60$ c) 1   d) $\tan^2 60^0$

14. The total surface area of solid hemisphere of radius r is

a) πr^2 b) $2\pi r^2$ c) $3\pi r^2$ d) $4\pi r^2$

15. Which of the following cannot be the probability of an event?

a) 0.4   b) 4%   c) 0.04%   d) 4

16. The roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ are

a) not real   b) real and equal   c) rational and distinct   d) irrational and distinct

17. For the following distribution

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

The sum of the lower limit of the median and modal class is

a) 15   b) 25   c) 30   d) 35

A-2

18. If α, β are zero's of the polynomial $p(x) = 4x^2 + 3x + 7$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to

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

Direction: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).
a) Both A and R are true and Reason (R) is correct explanation of A
b) Both A and R are true but Reason (R) is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

19. Statement A (Assertion) : If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
Statement R (Reason) : HCF is always a factor of LCM.

20. Statement A (Assertion) : The sum of 20 terms of the A.P. 1, 3, 5, 7 is 400.

Statement R (Reason): The sum of first n odd natural numbers in n^2

Section – B

21. Find the point on the $x - axis$ which is equidistant from $(2, -5) and (-2, 9)$

OR

Find the coordinates of the point which divides the line segment joining the points $(4, -3) and (8, 5)$ in the ratio $3 : 1$ internally.

22. Find the mode of the following distribution

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	4	6	7	12	5	6

23. In two concentric circles, a chord of length 8cm of the larger circle touches the smaller circle. If the radius of the large circle is 5cm then find the radius of the smaller circle.

24. If $\sin(A + B) = 1$ and $\cos(A - B) = \frac{\sqrt{3}}{2}$ $0^0 < A + B \le 90^0$ and $A > B$, then find the measure of angles A and B.

25. If the 3rd and the 9th terms of an A.P are 4 and $- 8$ respectively, which term of this A.P is zero?

OR

The sum of 5th and the 9th terms of an A.P is 30. If its 25th term is three time its 8th term, find the A.P.

Section – C

26. Prove that $\sqrt{3}$ is an irrational number.

27. 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?

A-3

28. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of circle.

OR

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

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

30. The arithmetic mean of the following frequency distribution in 53. Find the value of k

Class	0-20	20-40	40-60	60-80	80-100
Frequency	12	15	32	k	13

31. Find the ratio in which the y-axis divides the line segment joining the points $(4, -5)$ and $(-1, 2)$ Also find the point of intersection.

OR

Line $4x + y = 4$ divides the line segment joining the points $(-2, -1)$ and $(3, 5)$ in a certain ratio. Find the ratio.

Section – D

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

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

34. As observed from the top of a 75 m high lighthouse from the sea-level the angles of depression of two ships are 30^0 and 45^0. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

OR

The angles of depression of the top and the bottom of 50m high building from the top of a tower are 45^0 and 60^0 respectively. Find the height of the tower and the horizontal distance between the two buildings.   (use $\sqrt{3} = 1.73$)

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

OR

The coach of cricket team buys 7 bats and 6 balls for Rs. 3800. Later she buys 3 bats and 5 balls for Rs. 1750. Find the cost of each bat and each ball.

A-4

Section – E (Case Study Questions)

A group of students conducted a survey to find out about the preferred mode of transportation to school among their classmates. They surveyed 200 students from their school. The results of the survey are as follows :

120 students preferred to walk to school.

25% of the students preferred to use bicycles.

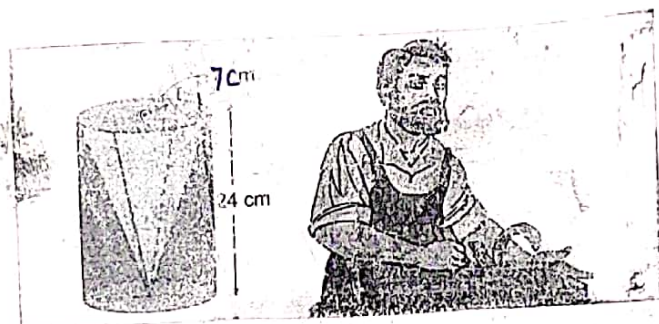10% of the students preferred to take the bus.

Remaining students preferred to be dropped off by car.

Based on the above information, answer the following questions:

a) What is the probability that a randomly selected student does not prefer to walk to school?

b) Find the probability of a randomly selected student who prefers to walk or use a bicycle.

c) One day 50% of walking students decided to come by bicycle. What is the probability that a randomly selected student comes to school using a bicycle on that day?

OR

c) What is the probability that a randomly selected student prefers to be dropped off by car?

37. One day Rinku was on his way home from school when he noticed a carpenter working with wood. The carpenter was carving a cone out of a cylinder, with the same height and same diameter. The cylinder had a height of 24 cm and a base radius of 7 cm. As Rinku observed, a few questions started to form in his mind.

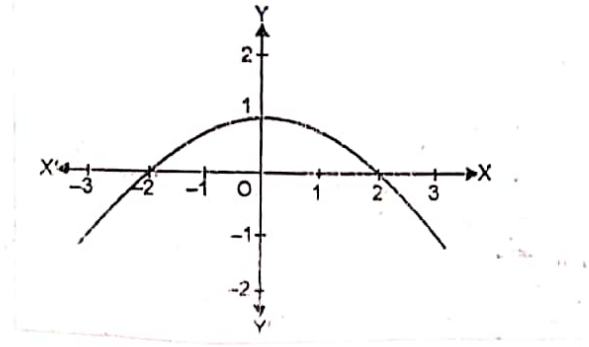Based on the above information, answer the following questions:

a) After carving out cone from the cylinder, is CSA of the cylinder increases or decreases?

b) Find the slant height of the conical cavity so formed.

c) Find the curved surface area of the conical cavity so formed.

OR

d) What is external curved surface area of the cylinder?

A-5

38. Speed humps are parabolic in shape which prevents overspeeding and minimize road accidents. It also gives a chance for pedestrians to cross the road. A parabola is the graph that results from $p(x) = ax^2 + bx + c$. Mathematical representation of a speed hump is shown in the given graph.

Based on the given graph and above information, answer the following questions:

a) Write the zeroes of the polynomial represented in the graph of speed hump.

b) Write the expression of the polynomial represented by the above graph.

c) If the speed hump is represented by $x^2 - 5x + 6$, then find its zeroes.

A-6

Time: 3hrs.

M.M. 80

General Instructions:
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
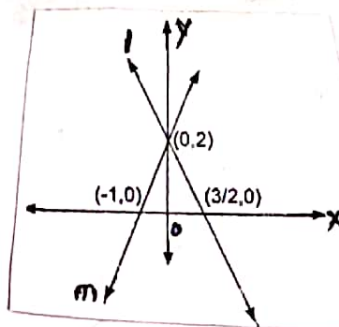
Section-A

1. H.C.F of $(3^3 \times 5^2 \times 2), (3^2 \times 5^3 \times 2^2)$ and $(3^4 \times 5 \times 2^3)$ is

   a) 450   b) 90   c) 180   d) 630

2. The system of linear equations represented by the lines l and m ms

   a) consistent with unique solution

   b) inconsistent

   c) consistent with three solutions

   d) consistent with many solutions

3. The value of k for which the quadratic equation $kx^2 - 5x + 1 = 0$ does not have a real solutions, is
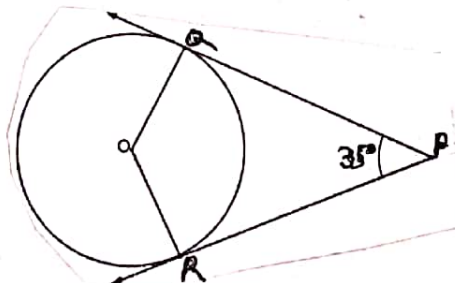
   a) 0   b) $\frac{25}{4}$ c) $\frac{4}{25}$ d) 7

4. The distance between the points (a, b) and $(-a, -b)$ is

   a) $\sqrt{a^2 + b^2}$ b) $a^2 + b^2$ c) $2\sqrt{a^2 + b^2}$ d) $4\sqrt{a^2 + b^2}$

5. In the given figure PQ and PR are the tangents to a circle centred at O. If $\angle QPR = 35^0$ then $\angle QOR$ is equal to

   a) 70^0

   b) 90^0

   c) 135^0

   d) 145^0

6. If $\triangle ABC \sim \triangle PQR$ such that $3AB = 2PQ$ and $BC = 10cm$, then length QR is equal to

   a) 10 cm   b) 15 cm   c) $\frac{20}{3}$ cm   d) 30 cm
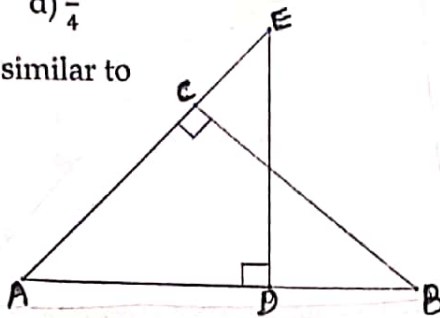
B-1

7. $5 \cot A = 4$, where $0^0 < A < 90^0$, then $\sec A$ is equal to

   a) $\frac{5}{4}$ b) $\frac{4}{3}$ c) $\frac{5}{3}$ d) $\frac{3}{4}$

8. In given figure, $\triangle BAC$ is similar to

   a) $\triangle AED$

   b) $\triangle EAD$

   c) $\triangle ACB$

   d) $\triangle BCA$

9. If H.C.F. (420, 189)=21 then L.C.M. (420, 189) is
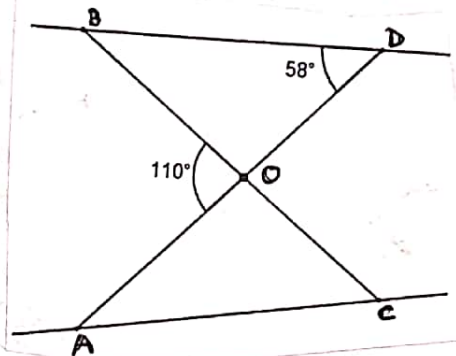
   a) 420   b) 1890   c) 3780   d) 3680

10. The 4th term from the end of the A.P $-8, -5, -2 ...., 49$ is

    a) 37   b) 40   c) 1   d) 43

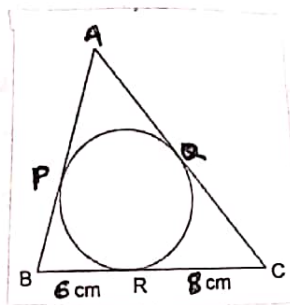11. The given figure, if $\triangle OCA \sim \triangle OBD$ then $\angle OAC$

    is equal to

    a) 58^0

    b) 55^0

    c) 128^0

    d) 52^0

12. If perimeter of given triangle is 38cm, then length AP is equal to

    a) $19cm$

    b) $5cm$

    c) $10cm$

    d) $8cm$

13. $\frac{1-\tan^2 30^0}{1+\tan^2 30^0}$ is equal to

    a) $\cos 60^0$ b) $\sin 60^0$ c) 1   d) $\tan^2 60^0$

14. The total surface area of solid hemisphere of radius r is

    a) πr^2 b) $2\pi r^2$ c) $3\pi r^2$ d) $4\pi r^2$

15. Which of the following cannot be the probability of an event?

    a) 0.4   b) 4%   c) 0.04%   d) 4

B-2

16. The roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ are

    a) not real   b) real and equal   c) rational and distinct   d) irrational and distinct

17. For the following distribution shows the marks distribution of 80 students.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	2	12	28	56	76	80

The median class is

    a) $20-30$ b) $40-50$ c) $30-40$ d) $10-20$

18. A quadratic polynomial whose zeroes are $\frac{2}{5}$ and $\frac{-1}{5}$ is

    a) $25x^2 + 5x - 2$ b) $5x^2 - 2x + 1$ c) $5x^2 + 2x - 1$ d) $25x^2 - 5x - 2$

Direction: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).
    a) Both A and R are true and Reason (R) is correct explanation of A
    b) Both A and R are true but Reason (R) is not the correct explanation of A
    c) A is true but R is false
    d) A is false but R is true

19. Statement A (Assertion) : If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
    Statement R (Reason) : HCF is always a factor of LCM.

20. Statement A (Assertion) : $(2 + \sqrt{3})\sqrt{3}$ is an irrational number.

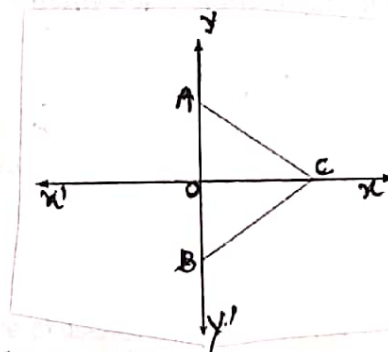   Statement R (Reason): Product of two irrational numbers is always irrational.

Section – B

21. $P(x, y)$ is a point equidistant from the points $A(4, 3)$ and $B(3, 4)$. Prove that $x - y = 0$

<div align="center">OR</div>

In the given figure, ΔABC is an equilateral triangle.
Coordinates of vertices A and B are (0, 3) and (0, -3)
respectively. Find the coordinates of points C.

22. In two concentric circles, a chord of length 8cm of the larger circle touches the smaller circle. If the radius of the large circle is 5cm then find the radius of the smaller circle.

23. The sum of the first 12 terms of an A.P. is 900. If its first term is 20 then find the common difference and 12th term.

24. If $\sin(A - B) = \frac{1}{2}$ and $\cos(A + B) = \frac{1}{2}$, $0^0 < A + B \le 90^0$ and $A > B$, then find the value of A and B.

B-3

25. Calculate mode of the following distribution

Class	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	5	6	15	10	5	4

Section – C

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

27. Line $4x + y = 4$ divides the line segment joining the points $(-2, -1)$ and $(3, 5)$ in a certain ratio. Find the ratio.

OR

Find the ratio in which the y-axis divides the line segment joining the points $(4, -5)$ and $(-1, 2)$ Also find the point of intersection.

28. Prove that $(cosec\, A - \sin A)(\sec A - \cos A) = \dfrac{1}{\tan A + \cot A}$

29. Find the mean using the step deviation method

Class	0-10	10-20	20-30	30-40	40-50
Frequency	6	10	15	9	10

30. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of circle.

OR

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

31. 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?

Section – D

32. Amita buys some books for Rs. 1920. If she had bought 4 more books for the same amount each book would cost her Rs. 24 less. How many books did she buy? What was the initial price of one book?

OR

A train travels at a certain average speed for a distance of 132km and then travels a distance of 140 km at an average speed of 4km/h more than the initial speed. If it takes 4 hours to complete the whole journey, what was the initial average speed? Determine the time taken by train to cover the distances separately.

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

34. A chord of a circle of radius 10 cm subtends a right angles at the centre. Find the area of the corresponding (i) minor segment (ii) major sector (use $\pi = 3.14$)

B-4

35. From the top of a 9 m high building, the angle of elevation of the top of a cable tower is 60^0 and angle of depression of its foot is 45^0. Determine the height of the tower and distance between building and tower. (use $\sqrt{3} = 1.732$)

OR

As observed from the top of a 75 m high lighthouse from the sea-level the angles of depression of two ships are 30^0 and 45^0. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

Section – E (Case Study Questions)

36. Speed humps are parabolic in shape which prevents overspeeding and minimize road accidents. It also gives a chance for pedestrians to cross the road. A parabola is the graph that results from $p(x) = ax^2 + bx + c$. Mathematical representation of a speed hump is shown in the given graph.
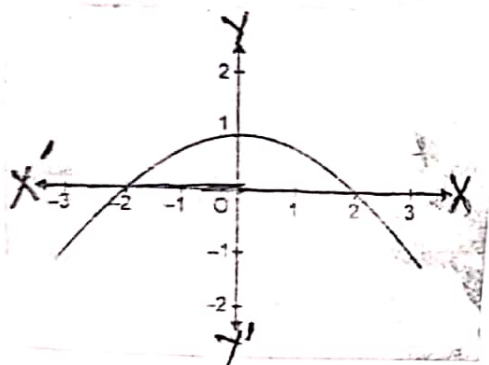
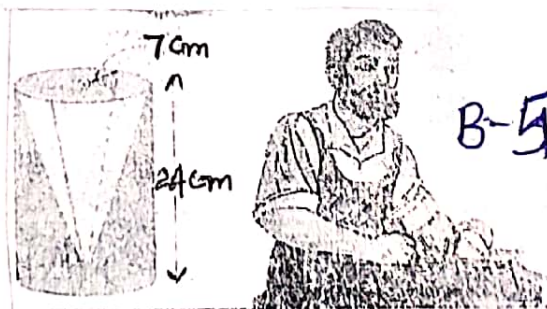Based on the given graph and above information, answer the following questions:
a) Write the zeroes of the polynomial represented in the graph of speed hump.
b) Write the expression of the polynomial represented by the above graph.
c) If the speed hump is represented by $x^2 - 5x + 6$, then find its zeroes.

37. One day Rinku was on his way home from school when he noticed a carpenter working with wood. The carpenter was carving a cone out of a cylinder, with the same height and same diameter. The cylinder had a height of 24 cm and a base radius of 7 cm. As Rinku observed, a few questions started to form in his mind.

Based on the above information, answer the following questions:
a) After carving out cone from the cylinder, is CSA of the cylinder increases or decreases.
b) Find the slant height of the conical cavity so formed.
c) Find the curved surface area of the conical cavity so formed.

OR

d) What is external curved surface area of the cylinder?

7 cm

24 cm

B-5

38. A group of students conducted a survey to find out about the preferred mode of transportation to school among their classmates. They surveyed 200 students from their school. The results of the survey are as follows :

120 students preferred to walk to school.

25% of the students preferred to use bicycles.

10% of the students preferred to take the bus.

Remaining students preferred to be dropped off by car.

Based on the above information, answer the following questions:

a) What is the probability that a randomly selected student does not prefer to walk to school?

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c) One day 50% of walking students decided to come by bicycle. What is the probability that a randomly selected student comes to school using a bicycle on that day?

OR

c) What is the probability that a randomly selected student prefers to be dropped off by car?

B-6