# CBSE Class 10 Mathematics - 02
# Solved Sample / Practice Paper - 2025-26
# CBSEGuess.com

Time Allowed: 3 hours | Maximum Marks: 80 (Theory)

Language: English | Calculator: Not allowed

**General Instructions:**

1. All questions are compulsory.
2. The paper contains five sections: A, B, C, D, and E.
3. Section A has 20 multiple-choice questions (MCQs) carrying 1 mark each.
4. Section B has 5 short answer-I (SA-I) type questions carrying 2 marks each.
5. Section C has 6 short answer-II (SA-II) type questions carrying 3 marks each.
6. Section D has 4 long answer (LA) type questions carrying 5 marks each.
7. Section E has 3 case based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
8. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
9. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

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## Section A (20 × 1 = 20 marks)

1. The prime factorization of 156 is:
   a) 2times3times13
   b) 22times3times13
   c) 2times32times13
   d) 22times32times13
2. If one zero of the quadratic polynomial x2+3x+k is 2, then the value of k is:
   a) 10
   b) -10

c) 5
d) -5

3. The lines represented by the equations $6x-3y+10=0$ and $2x-y+9=0$ are:
   a) Intersecting at exactly one point
   b) Parallel
   c) Coincident
   d) Intersecting at exactly two points
4. The discriminant of the quadratic equation 2x2−4x+3=0 is:
   a) 8
   b) -8
   c) 40
   d) -40
5. Which term of the AP: 21, 18, 15, ... is -81?
   a) 33rd
   b) 34th
   c) 35th
   d) 36th
6. The point which divides the line segment joining the points A(7, -6) and B(3, 4) in the ratio 1:2 internally lies in the:
   a) I quadrant
   b) II quadrant
   c) III quadrant
   d) IV quadrant
7. In triangleABC, right-angled at B, if sinA=3/5, then the value of cosA is:
   a) 4/5
   b) 3/4
   c) 5/4
   d) 5/3
8. The value of (1+tan2A)/(1+cot2A) is:
   a) sec2A
   b) −1
   c) cot2A
   d) tan2A
9. 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. The radius of the circle is:
   a) 7 cm
   b) 12 cm
   c) 15 cm
   d) 24.5 cm
10. If triangleABCsimtrianglePQR, area(triangleABC) = 81 $cm^2$, and area(trianglePQR) = 121 $cm^2$. If QR = 15.4 cm, then BC equals:
    a) 12.6 cm
    b) 13.1 cm
    c) 14.2 cm
    d) 11.2 cm

11. The area of the sector of a circle with radius 6 cm if the angle of the sector is 60° is:
    a) 132/7 $cm^2$
    b) 142/7 $cm^2$
    c) 152/7 $cm^2$
    d) 122/7 $cm^2$
12. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. The height of the cylinder is:
    a) 2.74 cm
    b) 3.74 cm
    c) 4.74 cm
    d) 5.74 cm
13. The cumulative frequency curve is also called:
    a) Histogram
    b) Ogive
    c) Bar graph
    d) Pictograph
14. Two dice are thrown together. The probability of getting a doublet is:
    a) 1/3
    b) 1/6
    c) 1/2
    d) 1/4
15. If 2sin(2theta)=sqrt3, then the value of theta is:
    a) 15°
    b) 30°
    c) 45°
    d) 60°
16. The top of two poles of height 20 m and 14 m are connected by a wire. If the wire makes an angle of 30° with the horizontal, then the length of the wire is:
    a) 10 m
    b) 12 m
    c) 14 m
    d) 8 m
17. The HCF of two numbers is 18 and their product is 12960. Their LCM will be:
    a) 420
    b) 600
    c) 720
    d) 800
18. A quadratic polynomial, whose zeroes are -3 and 4, is:
    a) x2−x+12
    b) x2+x+12
    c) x2−x−12
    d) 2x2+2x−24
19. Assertion (A): The sum of the first 'n' terms of an AP is given by S_n=3n2−4n. The common difference of the AP is 6.
    Reason (R): The common difference of an AP can be found by d=a_2−a_1.

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

20. Assertion (A): In a circle of radius 6 cm, the angle of a sector is 60°.4 Then the area of the sector is 132/7 $cm^2$.
Reason (R): Area of a sector of a circle with radius r and angle theta is given by (theta/360)timespir2.
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

## Section B (5 × 2 = 10 marks)

21. Find the value of k for which the quadratic equation kx(x−2)+6=0 has two equal roots.
22. Find the ratio in which the y-axis divides the line segment joining the points (5, -6) and (-1, -4).
23. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that anglePTQ=2angleOPQ.
24. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red? (ii) not red?
25. In trianglePQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the value of sin P.
**OR**
If tanA=3/4, find the value of 1/sinA+1/cosA.

## Section C (6 × 3 = 18 marks)

26. Prove that 3+2sqrt5 is irrational.
27. If alpha and beta are the zeroes of the quadratic polynomial f(x)=x2−5x+4, find the value of 1/alpha+1/beta−2alphabeta.
28. A fraction becomes 1/3 when 1 is subtracted from the numerator and it becomes 1/4 when 8 is added to its denominator. Find the fraction.
**OR**
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.
29. Prove that the parallelogram circumscribing a circle is a rhombus.
30. Prove that: (cosectheta−cottheta)2=(1−costheta)/(1+costheta).
**OR**
If sin(A−B)=1/2, cos(A+B)=1/2, $0° \< A+B \\le 90°$, AB, find A and B.
31. A die is thrown twice. What is the probability that
(i) 5 will not come up either time?

(ii) 5 will come up at least once?
(iii) the sum of the numbers is 8?

## Section D (4 × 5 = 20 marks)

32. An express train takes 1 hour less than a passenger train to travel 132 km between Mysuru and Bengaluru. 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.
    **OR**
    The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field.
33. State and prove the Pythagoras Theorem.
34. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of the same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.
    **OR**
    A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment.
35. 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 E (3 × 4 = 12 marks)

36. Case Study 1: Parabolic Arch
    The arch of a bridge is in the shape of a parabola. The arch is 8m high at the center and 32m wide at the base. The parabolic shape can be represented by a quadratic polynomial.5 Consider the base of the arch to be along the x-axis with the vertex at (0, 8).
    *(A diagram showing a parabolic arch with vertex at (0,8) and base on the x-axis, spanning from x=-16 to x=16.)*
    (i) What are the zeroes of the polynomial that represents the arch? (1)
    (ii) Find the quadratic polynomial that represents the arch. (1)
    (iii) What is the height of the arch at a distance of 8m from the center? (2)
    **OR**
    (iii) The highway over the bridge has two lanes of 4m width each. How much width of the arch is over the highway? (2)
37. Case Study 2: Gardening
    A group of students of class 10 were selected for a school gardening project. They planted saplings in a triangular plot of land. The vertices of the triangular plot are P(0, 4), Q(3, 1), and R(3, 7).
    *(A coordinate plane showing a triangle with vertices P(0,4), Q(3,1), and R(3,7).)*

(i) Find the distance between the vertices P and Q. (1)
(ii) Find the coordinates of the centroid of the triangle PQR. (1)
(iii) Find the area of the triangular plot PQR. (2)
**OR**
(iii) Determine the type of triangle PQR based on its side lengths. (2)

38. Case Study 3: School Fete
A committee for a school fete is selling raffle tickets. They have 250 tickets in total. Out of these, one ticket will win the first prize (a laptop), 5 tickets will win the second prize (a tablet), and 20 tickets will win the third prize (a power bank). The rest of the tickets do not win any prize. A ticket is drawn at random.
(i) What is the probability that the ticket drawn wins the first prize? (1)
(ii) What is the probability that the ticket drawn wins any prize? (1)
(iii) What is the probability that the ticket drawn wins either the second or third prize? (2)

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## Answer Key (for Section A)

| Q.No. | Answer |
|---|---|
| 1 | b |
| 2 | b |
| 3 | b |
| 4 | b |
| 5 | c |

| | |
|---|---|
| 6 | d |
| 7 | a |
| 8 | d |
| 9 | a |
| 10 | a |
| 11 | a |
| 12 | a |
| 13 | b |
| 14 | b |
| 15 | b |
| 16 | b |

| | |
|---|---|
| 17 | c |
| 18 | c |
| 19 | a |
| 20 | a |

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### Detailed Marking Scheme & Fully Worked Solutions

#### Section A

1. **Solution:** (b) 22times3times13. 156=2times78=2times2times39=22times3times13. **(1 mark)**
2. **Solution:** (b) -10. If 2 is a zero, then (2)2+3(2)+k=0Rightarrow4+6+k=0Rightarrowk=−10. **(1 mark)**
3. **Solution:** (b) Parallel. Here, a_1/a_2=6/2=3, b_1/b_2=−3/−1=3, c_1/c_2=10/9. Since a_1/a_2=b_1/b_2neqc_1/c_2, the lines are parallel. **(1 mark)**
4. **Solution:** (b) -8. D=b2−4ac=(−4)2−4(2)(3)=16−24=−8. **(1 mark)**
5. **Solution:** (c) 35th. a_n=a+(n−1)dRightarrow−81=21+(n−1)(−3)Rightarrow−102=(n−1)(−3)Rightarrow34=n−1Rightarrown=35. **(1 mark)**
6. **Solution:** (d) IV quadrant. Using section formula, x=(1cdot3+2cdot7)/(1+2)=17/3. y=(1cdot4+2cdot(−6))/(1+2)=−8/3. Point (17/3,−8/3) is in IV quadrant. **(1 mark)**
7. **Solution:** (a) 4/5. sinA=P/H=3/5. B=sqrtH2−P2=sqrt52−32=sqrt16=4. cosA=B/H=4/5. **(1 mark)**
8. **Solution:** (d) tan2A. (1+tan2A)/(1+cot2A)=sec2A/cosec2A=(1/cos2A)/(1/sin2A)=sin2A/cos2A=tan2A. **(1 mark)**
9. **Solution:** (a) 7 cm. By Pythagoras theorem, r=sqrt252−242=sqrt(25−24)(25+24)=sqrt1times49=7 cm. **(1 mark)**
10. **Solution:** (a) 12.6 cm. Ratio of areas = square of ratio of sides. 81/121=(BC/QR)2Rightarrow9/11=BC/15.4RightarrowBC=(9times15.4)/11=12.6 cm. **(1 mark)**

11. **Solution:** (a) 132/7 cm$^2$. Area = (theta/360)timespir2=(60/360)times(22/7)times62=(1/6)times(22/7)times36=132/7 cm$^2$. **(1 mark)**
12. **Solution:** (a) 2.74 cm. Volume of sphere = Volume of cylinder. (4/3)pi(4.2)3=pi(6)2hRightarrowh=(4/3)times(4.2times4.2times4.2)/36approx2.74 cm. **(1 mark)**
13. **Solution:** (b) Ogive. **(1 mark)**
14. **Solution:** (b) 1/6. Doublets are (1,1), (2,2), ..., (6,6). Total 6 outcomes. Total possible outcomes = 36. P(doublet) = 6/36 = 1/6. **(1 mark)**
15. **Solution:** (b) 30°. sin(2theta)=sqrt3/2=sin(60°)Rightarrow2theta=60°Rightarrowtheta=30°. **(1 mark)**
16. **Solution:** (b) 12 m. Height difference = 20 - 14 = 6 m. Let L be the length of wire. sin30°=6/LRightarrow1/2=6/LRightarrowL=12 m. **(1 mark)**
17. **Solution:** (c) 720. HCF × LCM = Product of numbers. 18timesLCM=12960RightarrowLCM=12960/18=720. **(1 mark)**
18. **Solution:** (c) x2−x−12. Polynomial is k(x2−(textsumofzeroes)x+(textproductofzeroes)). Sum = -3+4=1. Product = -12. For k=1, x2−x−12. **(1 mark)**
19. **Solution:** (a) Both A and R are true and R is the correct explanation of A. S_1=a_1=3(1)2−4(1)=−1. S_2=3(2)2−4(2)=12−8=4. a_2=S_2−S_1=4−(−1)=5. d=a_2−a_1=5−(−1)=6. A is true. R is the definition used to find d, hence correct explanation. **(1 mark)**
20. **Solution:** (a) Both A and R are true and R is the correct explanation of A. Area = (60/360)times(22/7)times62=132/7 cm$^2$. R provides the formula used in A. **(1 mark)**

**Section B**

21. **Solution:** The equation is kx2−2kx+6=0. For equal roots, D = 0. **(1/2 mark)**. (−2k)2−4(k)(6)=0Rightarrow4k2−24k=0. **(1 mark)**. 4k(k−6)=0. Since k cannot be 0 (for a quadratic equation), k=6. **(1/2 mark)**
22. **Solution:** Let the ratio be k:1. The point on the y-axis is (0, y). **(1/2 mark)**. The x-coordinate is 0=(k(−1)+1(5))/(k+1)Rightarrow−k+5=0Rightarrowk=5. **(1 mark)**. The ratio is 5:1. **(1/2 mark)**
23. **Solution:** Let angleOPQ=theta. In triangleOPQ, OP = OQ (radii), so angleOQP=theta. anglePOQ=180°−2theta. **(1/2 mark)**. In quadrilateral TPOQ, angleTPO=angleTQO=90°. So, anglePTQ+anglePOQ=180°. **(1 mark)**. anglePTQ=180°−(180°−2theta)=2theta=2angleOPQ. Hence proved. **(1/2 mark)**
24. Solution: Total balls = 3 + 5 = 8.
    (i) P(red) = Number of red balls / Total balls = 3/8. (1 mark)
    (ii) P(not red) = 1 - P(red) = 1 - 3/8 = 5/8. (1 mark)
25. Solution: Given PR + QR = 25 and PQ = 5. Let QR = x, then PR = 25 - x.
    In right trianglePQR, PR2=PQ2+QR2Rightarrow(25−x)2=52+x2. (1 mark)
    625−50x+x2=25+x2Rightarrow600=50xRightarrowx=12.
    So, QR = 12 cm, PR = 13 cm. sin P = QR/PR = 12/13. (1 mark)
    **OR**
    Solution: tanA=P/B=3/4. Hypotenuse H=sqrt32+42=5. (1/2 mark)
    sinA=3/5, cosA=4/5. (1/2 mark)
    1/sinA+1/cosA=5/3+5/4=(20+15)/12=35/12. (1 mark)

## Section C

26. Solution: Let us assume, to the contrary, that 3+2sqrt5 is rational. So, 3+2sqrt5=a/b, where a and b are coprime integers, bneq0. (1/2 mark)
    2sqrt5=a/b−3=(a−3b)/b. (1 mark)
    sqrt5=(a−3b)/(2b). (1/2 mark)
    Since a and b are integers, (a−3b)/(2b) is rational, and so sqrt5 is rational. But this contradicts the fact that sqrt5 is irrational. (1 mark)
    This contradiction arises from our incorrect assumption. Thus, 3+2sqrt5 is irrational.
27. Solution: For x2−5x+4, we have alpha+beta=−(−5)/1=5 and alphabeta=4/1=4. (1 mark)
    We need to find 1/alpha+1/beta−2alphabeta.
    1/alpha+1/beta=(alpha+beta)/(alphabeta)=5/4. (1 mark)
    So, the value is 5/4−2(4)=5/4−8=(5−32)/4=−27/4. (1 mark)
28. Solution: Let the fraction be x/y.
    (x−1)/y=1/3Rightarrow3x−3=yRightarrow3x−y=3 ... (i) (1 mark)
    x/(y+8)=1/4Rightarrow4x=y+8Rightarrow4x−y=8 ... (ii) (1 mark)
    Subtracting (i) from (ii), we get x=5.
    From (i), y=3(5)−3=12. The fraction is 5/12. (1 mark)
    **OR**
    Solution: Let the digits be x and y. Number = 10x + y. Reversed number = 10y + x.
    Given (10x+y)+(10y+x)=66Rightarrow11x+11y=66Rightarrowx+y=6 ... (i) (1 mark)
    Also, ∣x−y∣=2Rightarrowx−y=2 or y−x=2. (1 mark)
    Case 1: x−y=2. Solving with (i), we get 2x=8Rightarrowx=4,y=2. Number is 42.
    Case 2: y−x=2. Solving with (i), we get 2y=8Rightarrowy=4,x=2. Number is 24.
    The number is either 42 or 24. (1 mark)
29. Solution: Let ABCD be a parallelogram circumscribing a circle.
    We know that AB + CD = AD + BC (from property of circumscribing quadrilateral). (1 mark)
    Since ABCD is a parallelogram, AB = CD and AD = BC. (1 mark)
    Substituting these in the property, we get AB+AB=AD+ADRightarrow2AB=2ADRightarrowAB=AD.
    Since adjacent sides are equal, the parallelogram is a rhombus. Hence proved. (1 mark)
30. Solution: LHS = (cosectheta−cottheta)2=(1/sintheta−costheta/sintheta)2=((1−costheta)/sintheta)2. (1 mark)
    =(1−costheta)2/sin2theta=(1−costheta)2/(1−cos2theta). (1 mark)
    =(1−costheta)2/((1−costheta)(1+costheta))=(1−costheta)/(1+costheta) = RHS. (1 mark)
    **OR**
    Solution: sin(A−B)=1/2RightarrowA−B=30° ... (i) (1 mark)
    cos(A+B)=1/2RightarrowA+B=60° ... (ii) (1 mark)
    Adding (i) and (ii), 2A=90°RightarrowA=45°.
    Substituting in (ii), 45°+B=60°RightarrowB=15°. (1 mark)
31. Solution: Total outcomes = 6times6=36.
    (i) Favorable outcomes for '5 will not come up' are 5 outcomes for each die (1,2,3,4,6). So, 5times5=25 outcomes. P(5 will not come up) = 25/36. (1 mark)
    (ii) P(5 will come up at least once) = 1 - P(5 will not come up either time) = 1 - 25/36 = 11/36. (1 mark)
    (iii) Sum is 8: (2,6), (3,5), (4,4), (5,3), (6,2). Total 5 outcomes. P(sum is 8) = 5/36. (1 mark)

## Section D

32. Solution: Let the speed of the passenger train be x km/h. Speed of express train = (x+11) km/h.6 (1/2 mark)
Time by passenger train = 132/x. Time by express train = 132/(x+11). (1/2 mark)
According to question, 132/x−132/(x+11)=1. (1 mark)
132(x+11−x)/(x(x+11))=1Rightarrow132times11=x2+11x.
x2+11x−1452=0. (1 mark)
x2+44x−33x−1452=0Rightarrowx(x+44)−33(x+44)=0.
(x−33)(x+44)=0. Since speed cannot be negative, x = 33. (1 mark)
Speed of passenger train = 33 km/h. Speed of express train = 44 km/h. (1 mark)
**OR**
Solution: Let the shorter side be x m. Longer side = (x+30) m. Diagonal = (x+60) m. (1 mark)
By Pythagoras theorem, (x+60)2=(x+30)2+x2. (1 mark)
x2+120x+3600=x2+60x+900+x2.
x2−60x−2700=0. (1 mark)
x2−90x+30x−2700=0Rightarrowx(x−90)+30(x−90)=0.
(x+30)(x−90)=0. Since side cannot be negative, x = 90. (1 mark)
Shorter side = 90 m. Longer side = 120 m. (1 mark)
33. Solution: Statement: In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.7 (1 mark)
Given: A right-angled triangle ABC, right-angled at B. To Prove: AC2=AB2+BC2. (1 mark)
Construction: Draw BD ⊥ AC. (1/2 mark)
Proof: In triangleADB and triangleABC, angleA=angleA (common), angleADB=angleABC=90°.
So, triangleADBsimtriangleABC (AA similarity). (1 mark)
Therefore, AD/AB=AB/ACRightarrowAB2=ADtimesAC ... (i)
Similarly, in triangleBDC and triangleABC, triangleBDCsimtriangleABC.
Therefore, CD/BC=BC/ACRightarrowBC2=CDtimesAC ... (ii) (1 mark)
Adding (i) and (ii), AB2+BC2=ADtimesAC+CDtimesAC=AC(AD+CD)=ACtimesAC=AC2.
Hence proved. (1/2 mark)
34. Solution: Radius r = 3.5 cm. Total height = 15.5 cm.
Height of cone, h = 15.5 - 3.5 = 12 cm. (1 mark)
Slant height of cone, l=sqrtr2+h2=sqrt(3.5)2+122=sqrt12.25+144=sqrt156.25=12.5 cm. (1 mark)
TSA of toy = CSA of cone + CSA of hemisphere = pirl+2pir2=pir(l+2r). (1 mark)
=(22/7)times3.5(12.5+2times3.5)=22times0.5(12.5+7)=11times19.5. (1 mark)
=214.5 cm². (1 mark)
**OR**
Solution: Volume of earth dug = Volume of well = pir2h=(22/7)times(1.5)2times14=99 m³. (2 marks)
The embankment is a cylindrical shell. Inner radius r_1=1.5 m. Outer radius r_2=1.5+4=5.5 m. (1 mark)
Volume of embankment = pi(r_22−r_12)H, where H is the height.
99=(22/7)times((5.5)2−(1.5)2)timesH. (1 mark)
99=(22/7)times(5.5−1.5)(5.5+1.5)timesH=(22/7)times4times7timesH=88H.
H=99/88=9/8=1.125 m. (1 mark)

35. Solution:

| Weight (in kg) | Frequency (f) | Cumulative Frequency (cf) |
|---|---|---|
| 40-45 | 2 | 2 |
| 45-50 | 3 | 5 |
| 50-55 | 8 | 13 |
| 55-60 | 6 | 19 | <-- Median Class |
| 60-65 | 6 | 25 |
| 65-70 | 3 | 28 |
| 70-75 | 2 | 30 |

(1 mark for cf table)
N = 30. N/2 = 15. The median class is 55-60. (1 mark)
l = 55, N/2 = 15, cf = 13, f = 6, h = 5. (1 mark)
Median = l+[(N/2−cf)/f]timesh=55+[(15−13)/6]times5. (1 mark)
=55+(2/6)times5=55+5/3=55+1.67=56.67 kg. (1 mark)

## Section E

36. Solution:
(i) The base is 32m wide, centered at the origin. So the arch touches the x-axis at x=-16 and x=16. The zeroes are -16 and 16. (1 mark)
(ii) The polynomial is of the form p(x)=k(x−16)(x+16)=k(x2−256). The vertex is (0, 8), so p(0)=8. 8=k(0−256)Rightarrowk=−8/256=−1/32. So, p(x)=(−1/32)(x2−256)=8−x2/32. (1 mark)
(iii) At a distance of 8m from the center, x=8. Height = p(8)=8−82/32=8−64/32=8−2=6 m. (2 marks)
**OR**
(iii) The highway spans from x=-4 to x=4. The width is 4−(−4)=8 m. **(2 marks)**

37. Solution:
(i) PQ=sqrt(3−0)2+(1−4)2=sqrt32+(−3)2=sqrt9+9=sqrt18=3sqrt2 units. (1 mark)
(ii) Centroid = ((0+3+3)/3,(4+1+7)/3)=(6/3,12/3)=(2,4). (1 mark)
(iii) Area = 1/2∣x_1(y_2−y_3)+x_2(y_3−y_1)+x_3(y_1−y_2)∣
=1/2∣0(1−7)+3(7−4)+3(4−1)∣=1/2∣0+3(3)+3(3)∣=1/2∣18∣=9 sq. units. (2 marks)
**OR**
(iii) PQ=3sqrt2. QR=sqrt(3−3)2+(7−1)2=sqrt0+62=6.
PR=sqrt(3−0)2+(7−4)2=sqrt32+32=sqrt18=3sqrt2.
Since PQ = PR, the triangle is an isosceles triangle. (2 marks)

38. Solution:
(i) Total tickets = 250. First prize tickets = 1. P(first prize) = 1/250. (1 mark)
(ii) Total prize tickets = 1 + 5 + 20 = 26. P(any prize) = 26/250 = 13/125. (1 mark)
(iii) Second or third prize tickets = 5 + 20 = 25. P(second or third prize) = 25/250 = 1/10. (2 marks)

## Syllabus-to-Question Map

| Q.No. | Unit | Chapter/Sub-topic | Skill |
|---|---|---|---|
| 1 | Number Systems | Real Numbers | Conceptual |
| 2 | Algebra | Polynomials | Conceptual |
| 3 | Algebra | Pair of Linear Equations | Conceptual |
| 4 | Algebra | Quadratic Equations | Conceptual |
| 5 | Algebra | Arithmetic Progressions | Application |
| 6 | Coordinate Geometry | Section Formula | Application |
| 7 | Trigonometry | Introduction to Trigonometry | Application |
| 8 | Trigonometry | Trigonometric Identities | Conceptual |
| 9 | Geometry | Circles | Application |
| 10 | Geometry | Triangles | Application |

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|---|---|---|---|
| 11 | Mensuration | Areas Related to Circles | Application |
| 12 | Mensuration | Surface Areas and Volumes | Application |
| 13 | Statistics & Probability | Statistics | Conceptual |
| 14 | Statistics & Probability | Probability | Application |
| 15 | Trigonometry | Trigonometric Ratios | Application |
| 16 | Trigonometry | Heights and Distances | Application |
| 17 | Number Systems | Real Numbers | Application |
| 18 | Algebra | Polynomials | Application |
| 19 | Algebra | Arithmetic Progressions | HOTS (Assertion-Reason) |
| 20 | Mensuration | Areas Related to Circles | HOTS (Assertion-Reason) |
| 21 | Algebra | Quadratic Equations | Application |

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|---|---|---|---|
| 22 | Coordinate Geometry | Section Formula | Application |
| 23 | Geometry | Circles (Proofs) | HOTS (Proof) |
| 24 | Statistics & Probability | Probability | Application |
| 25 | Trigonometry | Introduction to Trigonometry | Application |
| 26 | Number Systems | Real Numbers (Proofs) | HOTS (Proof) |
| 27 | Algebra | Polynomials | Application |
| 28 | Algebra | Pair of Linear Equations | Application |
| 29 | Geometry | Circles (Proofs) | HOTS (Proof) |
| 30 | Trigonometry | Trigonometric Identities | HOTS (Proof) |
| 31 | Statistics & Probability | Probability | Application |
| 32 | Algebra | Quadratic Equations | HOTS (Application) |

| | | | |
|---|---|---|---|
| 33 | Geometry | Triangles (Theorems) | HOTS (Proof) |
| 34 | Mensuration | Surface Areas and Volumes | HOTS (Application) |
| 35 | Statistics & Probability | Statistics | Application |
| 36 | Algebra / Coordinate Geo | Polynomials | Competency-based |
| 37 | Coordinate Geometry | Distance & Area Formula | Competency-based |
| 38 | Statistics & Probability | Probability | Competency-based |

## Analytics Snapshot

- **Total Marks per Unit:**
    - Number Systems: 6 marks
    - Algebra: 20 marks
    - Coordinate Geometry: 6 marks
    - Geometry: 15 marks
    - Trigonometry: 12 marks
    - Mensuration: 10 marks
    - Statistics & Probability: 11 marks
- **Competency-based % of Paper:** 42.5% (34 marks / 80 marks)
    - Includes case studies (12 marks), Assertion-Reason (2 marks), and several application/HOTS questions.
- **Difficulty Distribution Achieved:**
    - Easy (approx. 30%): ~24 marks
    - Moderate (approx. 50%): ~41 marks
    - Challenging/HOTS (approx. 20%): ~15 marks