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CBSE Class 10 Maths Board Paper 2026 (30/1/1) with Solutions

PREVIOUS YEAR PAPER · CLASS X · MATHEMATICS (STANDARD) (041) · BOARD EXAM 2026 · Q.P. CODE 30/1/1

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
3 hours	80	38 (A 20 · B 5 · C 6 · D 4 · E 3)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 38 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 18 are multiple choice questions (MCQs) and Questions 19 and 20 are assertion-reason based questions of 1 mark each.
4. In Section B, Q21–25 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q26–31 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q32–35 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q36–38 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 2 question of Section B, 2 question of Section C, 2 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Draw neat diagrams wherever required. Take $\pi = 22/7$ wherever required, if not stated. Use of calculator is not allowed.
10. This is the official 2026 board paper (Q.P. Code 30/1/1). The step marks shown in the solutions are our marking scheme in the CBSE style; CBSE's own marking scheme may award steps differently.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 3 hours before you look at them.

Questions: CBSE board examination 2026, Q.P. Code 30/1/1, as published by CBSE at cbse.gov.in; figures redrawn. Answers, step marks and worked solutions © Master Testing Agency. Free for personal practice; not for resale. Master Testing Agency is an independent test-prep publisher, not affiliated with, endorsed by or connected to the Central Board of Secondary Education (CBSE) or any other exam-conducting body.

Chapters: Full syllabus · **Topics:** Real Numbers · Polynomials · Pair of Linear Equations in Two Variables · Quadratic Equations · Arithmetic Progressions · Triangles · Coordinate Geometry · Introduction to Trigonometry · Some Applications of Trigonometry · Circles · Areas Related to Circles · Surface Areas and Volumes · Statistics · Probability

SECTION A

This section comprises 20 questions of 1 mark each: 18 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The HCF of 960 and 432 is : 1

(A) 48 (B) 54

(C) 72 (D) 36

2. The natural number 2 is : 1

(A) a prime number (B) a composite number

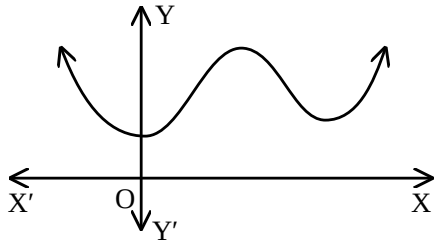
(C) prime as well as composite (D) neither prime nor composite

3. For any natural number n, 6^n ends with the digit : 1

(A) 0 (B) 6

(C) 3 (D) 2

4. The graph of $y = f(x)$ is given. The number of zeroes of $f(x)$ is : 1



(A) 0 (B) 1

(C) 2 (D) 4

5. If a pair of linear equations in two variables is represented by two coincident lines, then the pair of equations has : 1

(A) a unique solution (B) two solutions

(C) no solution (D) an infinite number of solutions

6. The common difference of the AP : $\sqrt{2}$, $2\sqrt{2}$, $3\sqrt{2}$, $4\sqrt{2}$, ... is : 1

(A) $\sqrt{2}$ (B) 1

(C) $2\sqrt{2}$ (D) $-\sqrt{2}$

7. If Δ ABC and Δ DEF are similar such that 2 AB = DE and BC = 8 cm, then EF is equal to : 1

(A) 4 cm (B) 8 cm

(C) 12 cm (D) 16 cm

8. The mid-point of the line segment joining the points $(5, -4)$ and $(6, 4)$ lies on : 1

(A) x-axis (B) y-axis

(C) origin (D) neither x-axis nor y-axis

9. Given that $\sin\theta = \frac{a}{b}$, then $\cos\theta$ is equal to : 1

(A) $\frac{b}{\sqrt{b^2 - a^2}}$ (B) $\frac{b}{a}$

(C) $\frac{\sqrt{b^2 - a^2}}{b}$ (D) $\frac{a}{\sqrt{b^2 - a^2}}$

10. If $\cos A = \frac{1}{2}$, then the value of $\sin^2 A + 2\cos^2 A$ is : 1

(A) $\frac{3}{2}$ (B) $\frac{5}{4}$

(C) -1 (D) $\frac{1}{2}$

11. A car is moving away from the base of a 30 m high tower. The angle of elevation of the top of the tower from the car at an instant, when the car is $10\sqrt{3}$ m away from the base of the tower, is : 1

(A) 30° (B) 45°

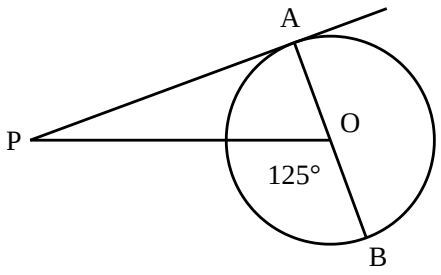
(C) 90° (D) 60°

12. If TP and TQ are two tangents to a circle with centre O from an external point T so that $\angle POQ = 120°$, then $\angle PTQ$ is equal to : 1

(A) 60° (B) 70°

(C) 80° (D) 90°

13. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 125°$, then $\angle APO$ is equal to : 1



(A) 25° (B) 65°

(C) 90° (D) 35°

14. The length of the arc of the sector of a circle with radius 21 cm and of central angle 60°, is : 1

(A) 22 cm (B) 44 cm

(C) 88 cm (D) 11 cm

15. The hour hand of a clock is 7 cm long. The angle swept by it between 7:00 a.m. and 8:10 a.m. is : 1

(A) (35/4)° (B) (35/2)°

(C) 35° (D) 70°

16. The total surface area of a solid hemisphere of diameter '$2d$' is : 1

(A) $3\pi d^2$ (B) $2\pi d^2$

(C) $\frac{1}{2}\pi d^2$ (D) $\frac{3}{4}\pi d^2$

17. If the mean and mode of a data are 12 and 21 respectively, then its median is : 1

(A) 6 (B) 13.5

(C) 15 (D) 14

18. A die is thrown once. Probability of getting a number other than 3 is : 1

(A) $\frac{1}{6}$ (B) $\frac{3}{6}$

(C) $\frac{5}{6}$ (D) 1

19. **Assertion (A) :** The probability that a leap year has 53 Mondays is $\frac{2}{7}$. 1

Reason (R) : The probability that a non-leap year has 53 Mondays is $\frac{5}{7}$.

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

(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

20. **Assertion (A) :** The polynomial $p(y) = y^2 + 4y + 3$ has two zeroes. 1

Reason (R) : A quadratic polynomial can have at most two zeroes.

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

(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

SECTION B

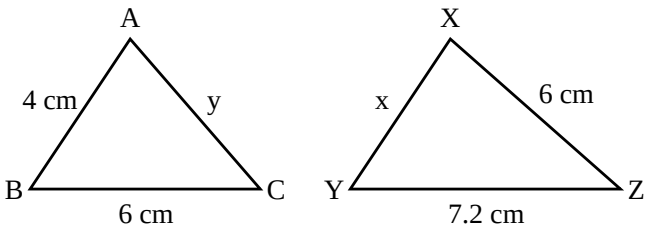
This section comprises 5 very short answer (VSA) type questions of 2 marks each.

21. If α, β are the zeroes of the polynomial $p(x) = x^2 - 3x - 1$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$. 2

22. (a) In Δ ABC, DE ∥ BC. If AD = x, DB = $x - 2$, AE = $x + 2$ and EC = $x - 1$, then find the value of x. 2

OR

(b) In the figure given below, Δ ABC ~ Δ XYZ, then find the values of x and y.



23. The coordinates of the centre of a circle are ($x - 7$, $2x$). Find the value(s) of 'x', if the circle passes through the point (− 9, 11) and has radius $5\sqrt{2}$ units. 2

24. (a) If $\tan\theta = \frac{24}{7}$, then find the value of $\sin\theta + \cos\theta$. 2

OR

(b) If $\cot\theta = \frac{7}{8}$, then find the value of $\frac{(1 + \sin\theta)(1 - \sin\theta)}{(1 + \cos\theta)(1 - \cos\theta)}$.

25. Two concentric circles are of radii 5 cm and 4 cm. Find the length of the chord of the larger circle which touches the smaller circle. 2

SECTION C

This section comprises 6 short answer (SA) type questions of 3 marks each.

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

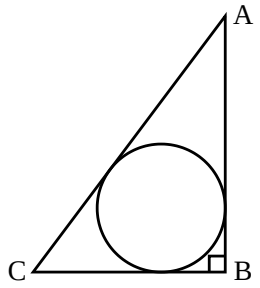
27. Find the ratio in which the x-axis divides the line segment joining the points (− 6, 5) and (− 4, − 1). Also, find the point of intersection. 3

28. (a) If $x = h + a\cos\theta$, $y = k + b\sin\theta$, then prove that : $\left(\frac{x - h}{a}\right)^2 + \left(\frac{y - k}{b}\right)^2 = 1$ 3

OR

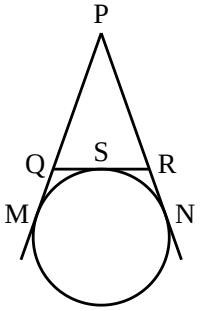
(b) Prove that : $\frac{\tan A}{1 + \sec A} - \frac{\tan A}{1 - \sec A} = 2\,\text{cosec}\,A$

29. (a) In the given figure, Δ ABC is a right triangle in which ∠ B = 90°, AB = 4 cm and BC = 3 cm. Find the radius of the circle inscribed in the triangle ABC. 3



OR

(b) In the given figure, if a circle touches the side QR of Δ PQR at S and extended sides PQ and PR at M and N respectively, then prove that : PM = $\frac{1}{2}$ (PQ + QR + PR)



30. A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 20 cm and the diameter of the cylinder is 7 cm. Find the total volume of the solid. (Use π = $\frac{22}{7}$) 3

31. Two dice of different colours are thrown at the same time. Write down all the possible outcomes. What is the probability that : 3

(i) same number appears on both the dice ?

(ii) different number appears on both the dice ?

SECTION D

This section comprises 4 long answer (LA) type questions of 5 marks each.

32. Determine graphically, the coordinates of vertices of a triangle whose equations are $2x - 3y + 6 = 0$; $2x + 3y - 18 = 0$ and $x = 0$. Also, find the area of this triangle. 5

33. (a) A faster train takes one hour less than a slower train for a journey of 200 km. If the speed of the slower train is 10 km/hr less than that of the faster train, find the speeds of the two trains. 5

OR

(b) The sum of the areas of two squares is 640 m^2. If the difference in their perimeters is 64 m, find the sides of the two squares.

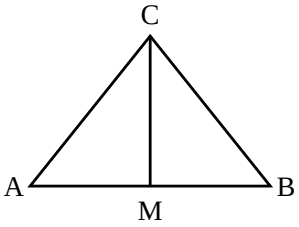
34. (a) State and prove Basic Proportionality Theorem. 5

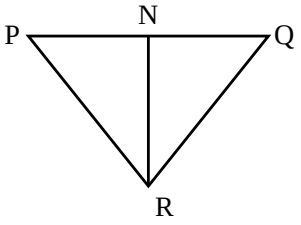
OR

(b) In the given figure, CM and RN are respectively the medians of Δ ABC and Δ PQR. If Δ ABC ~ Δ PQR, then prove that :

(i) Δ AMC ~ Δ PNR

(ii) Δ CMB ~ Δ RNQ





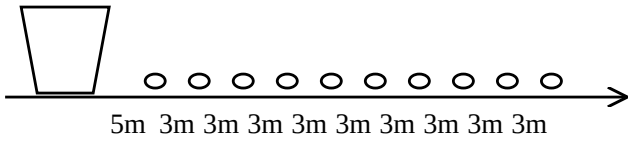
35. The mean of the following frequency distribution is 35. Find the values of *x* and *y*, if the sum of frequencies is 25 : 5

Class	**Frequency**
0-10	1
10-20	*x*
20-30	5
30-40	7
40-50	*y*
50-60	3
60-70	1

SECTION E

This section comprises 3 case study based questions of 4 marks each.

36. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato. The other potatoes are arranged 3 m apart in a straight line, with a total of 10 potatoes, as shown in the figure :



A competitor starts from the bucket, picks up the nearest potato, runs back to the bucket to drop it in, then returns to pick up the next potato. This process continues until all the potatoes are in the bucket.

Based on the above information, answer the following questions :

(i) What is the distance covered to pick up the first potato and drop it in bucket ? [1]

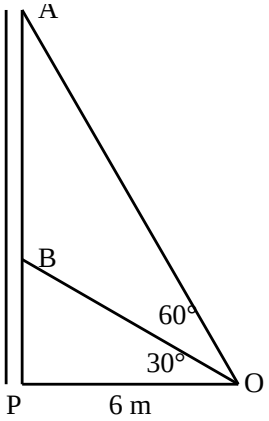
(ii) What is the distance covered to pick up the second potato and drop it in bucket ? [1]

(iii) (a) What is the total distance the competitor has to run ? [2]

OR

(iii) (b) If average speed of competitor is 5 m/s, then find the average time taken by competitor to put all the potatoes in the bucket. [2]

37. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two sections 'A' and 'B'. Tower is supported by wires from a point 'O' (as shown in figure).



Distance between the base of the tower and point 'O' is 6 m. From point 'O', the angle of elevation of the top of the section 'B' is 30° and the angle of elevation of the top of section 'A' is 60°.

Based on the above information, answer the following questions :

(i) Find the length of the wire from the point 'O' to the top of section 'B'. [1]

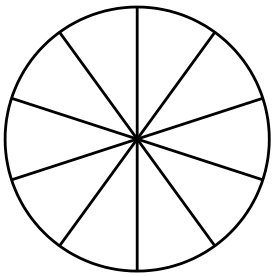
(ii) Find the length of the wire from the point 'O' to the top of section 'A'. [1]

(iii) (a) Find the distance AB. [2]

OR

(iii) (b) Find the area of Δ OPB. [2]

38. A brooch is crafted from silver wire in the shape of a circle with a diameter of 35 cm. The wire is also used to create 5 diameters, dividing the circle into 10 equal sectors as shown in figure.



Based on the above information, answer the following questions :

(i) What is the radius of circle ? [1]

(ii) What is the circumference of the brooch ? [1]

(iii) (a) What is the total length of silver wire required ? [2]

OR

(iii) (b) What is the area of each sector of the brooch ? [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
(A)	(A)	(B)	(A)	(D)	(A)	(D)	(A)	(C)	(B)	(D)	(A)	(D)	(A)	(C)	(A)	(C)	(C)	(C)	(B)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (A). $960 = 2^6 \times 3 \times 5$ and $432 = 2^4 \times 3^3$. HCF = product of the smallest powers of the common primes = $2^4 \times 3 = 48$.

Q2. Answer (A). 2 has exactly two factors, 1 and 2, so it is prime (the only even prime). A number cannot be both prime and composite.

Q3. Answer (B). $6 \times 6 = 36$ ends in 6, and a number ending in 6 times 6 again ends in 6, so every power 6^n ends with 6. It cannot end in 0, since $6^n = 2^n \times 3^n$ has no factor 5.

Q4. Answer (A). The zeroes are the x-coordinates of the points where the graph meets the x-axis. The whole curve lies above the x-axis and never meets it, so f(x) has no zeroes.

Q5. Answer (D). Coincident lines have every point in common, so every point on the line is a solution: infinitely many solutions.

Q6. Answer (A). $d = a_2 - a_1 = 2\sqrt{2} - \sqrt{2} = \sqrt{2}$ (and $3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$ as well).

Q7. Answer (D). $\Delta ABC \sim \Delta DEF$ gives DE/AB = EF/BC. DE/AB = 2, so EF = 2 × BC = 2 × 8 = 16 cm.

Q8. Answer (A). Mid-point = ((5 + 6)/2, (−4 + 4)/2) = (11/2, 0). Its y-coordinate is 0 and x-coordinate is not 0, so it lies on the x-axis.

Q9. Answer (C). Take a right triangle with the side opposite θ = a and hypotenuse = b. The adjacent side = $\sqrt{(b^2 - a^2)}$, so $\cos\theta = \sqrt{(b^2 - a^2)}/b$. (Option (D) is $\tan\theta$.)

Q10. Answer (B). $\cos^2 A = 1/4$, so $\sin^2 A = 3/4$. $\sin^2 A + 2\cos^2 A = 3/4 + 2/4 = 5/4$.

Q11. Answer (D). $\tan\theta$ = height/distance = $30/(10\sqrt{3}) = 3/\sqrt{3} = \sqrt{3}$, so $\theta = 60°$.

Q12. Answer (A). In quadrilateral OPTQ, $\angle OPT = \angle OQT = 90°$ (radius $\perp$ tangent). So $\angle PTQ = 360° - 90° - 90° - 120° = 60°$.

Q13. Answer (D). AOB is a straight line, so $\angle AOP = 180° - 125° = 55°$. $\angle OAP = 90°$ (radius $\perp$ tangent). In ΔOAP, $\angle APO = 180° - 90° - 55° = 35°$.

Q14. Answer (A). Arc length = $(\theta/360°) \times 2\pi r = (60/360) \times 2 \times (22/7) \times 21 = (1/6) \times 132 = 22$ cm.

Q15. Answer (C). The hour hand turns 360° in 12 hours, i.e. 30° per hour or ½° per minute. From 7:00 to 8:10 is 70 minutes: 70 × ½° = 35°. (The length 7 cm is not needed for the angle.)

Q16. Answer (A). Diameter 2d means radius r = d. TSA of a solid hemisphere = curved surface $2\pi r^2$ + flat base $\pi r^2 = 3\pi r^2 = 3\pi d^2$.

Q17. Answer (C). Empirical relation: Mode = 3 Median − 2 Mean. 21 = 3 Median − 24, so 3 Median = 45 and Median = 15.

Q18. Answer (C). Six equally likely outcomes; five of them (1, 2, 4, 5, 6) are not 3. P = 5/6.

Q19. Answer (C). A leap year has 366 days = 52 weeks + 2 days. The 2 extra days are one of 7 equally likely pairs (Sun–Mon, Mon–Tue, …, Sat–Sun); 2 of them contain a Monday, so P = 2/7: A is true. A non-leap year has 52 weeks + 1 day, and that day is a Monday with probability 1/7, not 5/7: R is false. Answer (C).

Q20. Answer (B). $y^2 + 4y + 3 = (y + 1)(y + 3)$, with zeroes −1 and −3: A is true. A polynomial of degree 2 has at most 2 zeroes: R is true. But R only gives an upper limit (a quadratic can have 0, 1 or 2 zeroes); it does not explain why this polynomial has two. That follows from the factorisation (or D = 16 − 12 = 4 > 0). Answer (B).

Q21. (2 marks) Answer: −3.
$\alpha + \beta = -(-3)/1 = 3$ and $\alpha\beta = -1/1 = -1$. [1]
$1/\alpha + 1/\beta = (\alpha + \beta)/\alpha\beta = 3/(-1) = -3$. [1]

Q22. (2 marks) Answer: (A) x = 4; (B) x = 4.8 cm, y = 5 cm.
(A) By the Basic Proportionality Theorem, AD/DB = AE/EC: $x/(x - 2) = (x + 2)/(x - 1)$. [1]
$x(x - 1) = (x + 2)(x - 2)$, so $x^2 - x = x^2 - 4$, giving x = 4. [1]
OR (B) Δ ABC ~ Δ XYZ gives AB/XY = BC/YZ = AC/XZ, i.e. $4/x = 6/7.2 = y/6$. [1]
$x = 4 \times 7.2/6 = 4.8$ cm and $y = 6 \times 6/7.2 = 5$ cm. [½ + ½]

Q23. (2 marks) Answer: x = 3 or x = 5.
Distance from the centre to (−9, 11) = radius: $(x - 7 + 9)^2 + (2x - 11)^2 = (5\sqrt{2})^2 = 50$. [½]
$(x + 2)^2 + (2x - 11)^2 = 50$ gives $5x^2 - 40x + 125 = 50$, i.e. $x^2 - 8x + 15 = 0$. [1]
$(x - 3)(x - 5) = 0$, so x = 3 or x = 5. [½]

Q24. (2 marks) Answer: (A) 31/25; (B) 49/64.
(A) Take the opposite side 24k and the adjacent side 7k; hypotenuse = $\sqrt{(576 + 49)}\ k = 25k$. [1]
$\sin\theta + \cos\theta = 24/25 + 7/25 = 31/25$. [1]
OR (B) $(1 + \sin\theta)(1 - \sin\theta) / [(1 + \cos\theta)(1 - \cos\theta)] = (1 - \sin^2\theta)/(1 - \cos^2\theta) = \cos^2\theta / \sin^2\theta$ [1]
$= \cot^2\theta = (7/8)^2 = 49/64$. [1]

Q25. (2 marks) Answer: 6 cm.
The chord touches the smaller circle, so the radius (4 cm) to the point of contact is perpendicular to the chord and bisects it. [½]
Half-chord = $\sqrt{(5^2 - 4^2)} = \sqrt{9} = 3$ cm. [1]
Length of the chord = 2 × 3 = 6 cm. [½]

Q26. (3 marks) Answer: proved.
Suppose √3 is rational: $\sqrt{3} = a/b$, where a and b are co-prime integers and $b \neq 0$. [½]
Then $a = \sqrt{3}\ b$, so $a^2 = 3b^2$. Hence 3 divides a^2, and so 3 divides a (3 is prime). Write a = 3c. [1]
Then $9c^2 = 3b^2$, so $b^2 = 3c^2$: 3 divides b^2, and so 3 divides b. [1]
So 3 divides both a and b, which contradicts that a and b are co-prime. Hence √3 is irrational. [½]

Q27. (3 marks) Answer: 5 : 1; (−13/3, 0).
Let the x-axis divide the segment in the ratio k : 1 at P(x, 0). The y-coordinate of P: $(k(-1) + 1 \times 5)/(k + 1) = 0$. [1]
So $-k + 5 = 0$, k = 5: the ratio is 5 : 1. [1]
$x = (5 \times (-4) + 1 \times (-6))/(5 + 1) = -26/6 = -13/3$. The point is (−13/3, 0). [1]

Q28. (3 marks) Answer: proved.
(A) $x - h = a\cos\theta$, so $(x - h)/a = \cos\theta$; $y - k = b\sin\theta$, so $(y - k)/b = \sin\theta$. [1½]
$((x - h)/a)^2 + ((y - k)/b)^2 = \cos^2\theta + \sin^2\theta = 1$. [1½]
OR (B) LHS = $\tan A [(1 - \sec A) - (1 + \sec A)] / [(1 + \sec A)(1 - \sec A)] = \tan A (-2 \sec A)/(1 - \sec^2 A)$. [1]
Since $1 - \sec^2 A = -\tan^2 A$, LHS = $(-2 \tan A \sec A)/(-\tan^2 A) = 2 \sec A/\tan A$. [1]
$= 2 \times (1/\cos A) \times (\cos A/\sin A) = 2/\sin A = 2 \operatorname{cosec} A$ = RHS. [1]

Q29. (3 marks) Answer: (A) 1 cm; (B) proved.
(A) AC = √(AB² + BC²) = √(16 + 9) = 5 cm. [½]
Let the radius be r with centre O. Area of Δ ABC = ar(OAB) + ar(OBC) + ar(OCA): ½ × 4 × 3 = ½ r (4 + 3 + 5). [1½]
6 = 6r, so r = 1 cm. [1]
OR (B) Tangents from an external point are equal: PM = PN, QM = QS and RN = RS. [1]
PQ + QR + PR = PQ + (QS + SR) + PR = (PQ + QM) + (PR + RN) = PM + PN. [1]
= 2 PM, since PM = PN. Hence PM = ½ (PQ + QR + PR). [1]

Q30. (3 marks) Answer: 4081/6 cm³ ≈ 680.17 cm³.
Radius r = 7/2 = 3.5 cm; height of the cylindrical part h = 20 − 2 × 3.5 = 13 cm. [1]
Volume = πr²h + 2 × (2/3)πr³ = πr² (h + 4r/3) = (22/7) × (49/4) × (13 + 14/3) [1]
= (77/2) × (53/3) = 4081/6 ≈ 680.17 cm³. [1]

Q31. (3 marks) Answer: (i) 1/6; (ii) 5/6.
The outcomes are the 36 ordered pairs (a, b) with a, b = 1, 2, …, 6: (1, 1), (1, 2), …, (1, 6), (2, 1), …, (6, 6). [1]
(i) Same number: (1, 1), (2, 2), …, (6, 6), 6 outcomes: P = 6/36 = 1/6. [1]
(ii) Different numbers: 36 − 6 = 30 outcomes: P = 30/36 = 5/6. [1]

Q32. (5 marks) Answer: (0, 2), (0, 6), (3, 4); area 6 sq. units.
Table for 2x − 3y + 6 = 0: (0, 2), (3, 4), (−3, 0). Table for 2x + 3y − 18 = 0: (0, 6), (3, 4), (9, 0). [1 + 1]
Draw both lines and the line x = 0 (the y-axis) on graph paper. [1]
The two lines meet at (3, 4); they cut x = 0 at (0, 2) and (0, 6). The vertices are (0, 2), (0, 6) and (3, 4). [1]
Base on the y-axis = 6 − 2 = 4 units; height = distance of (3, 4) from the y-axis = 3 units. Area = ½ × 4 × 3 = 6 square units. [1]

Q33. (5 marks) Answer: (A) 50 km/h and 40 km/h; (B) 24 m and 8 m.
(A) Let the speed of the faster train be x km/h; the slower train runs at (x − 10) km/h. [1]
200/(x − 10) − 200/x = 1. [1]
200x − 200(x − 10) = x(x − 10), so x² − 10x − 2000 = 0. [1]
(x − 50)(x + 40) = 0, so x = 50 (speed cannot be negative). [1]
Faster train 50 km/h, slower train 40 km/h. [1]
OR (B) Let the sides be x m and y m with x > y. Then x² + y² = 640 and 4x − 4y = 64, i.e. x = y + 16. [1 + 1]
(y + 16)² + y² = 640 gives 2y² + 32y − 384 = 0, i.e. y² + 16y − 192 = 0. [1]
(y + 24)(y − 8) = 0, so y = 8 (a side cannot be negative). [1]
The sides are 24 m and 8 m. [1]

Q34. (5 marks) Answer: proved.
(A) Statement: 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. [1]
Given: in Δ ABC, DE ∥ BC, with D on AB and E on AC. To prove: AD/DB = AE/EC. Construction: join BE and CD; draw EN ⊥ AB and DM ⊥ AC. [1]
ar(ADE)/ar(BDE) = (½ AD × EN)/(½ DB × EN) = AD/DB, and ar(ADE)/ar(DEC) = (½ AE × DM)/(½ EC × DM) = AE/EC. [1]
Δ BDE and Δ DEC are on the same base DE and between the same parallels DE and BC, so ar(BDE) = ar(DEC). [1]
Hence AD/DB = AE/EC. [1]
OR (B) Δ ABC ~ Δ PQR gives ∠A = ∠P, ∠B = ∠Q and AB/PQ = AC/PR = BC/QR. [1]
M and N are mid-points, so AM = AB/2 and PN = PQ/2, hence AM/PN = AB/PQ = AC/PR. [1]
(i) In Δ AMC and Δ PNR: AM/PN = AC/PR and ∠A = ∠P, so Δ AMC ~ Δ PNR (SAS similarity). [1½]
(ii) Similarly MB = AB/2 and NQ = PQ/2, so MB/NQ = AB/PQ = BC/QR, and ∠B = ∠Q. Hence Δ CMB ~ Δ RNQ (SAS similarity). [1½]

Q35. (5 marks) Answer: x = 3, y = 5.

$\Sigma f = 1 + x + 5 + 7 + y + 3 + 1 = 17 + x + y = 25$, so $x + y = 8$. [1]

Class marks 5, 15, 25, 35, 45, 55, 65: $\Sigma fx = 5 + 15x + 125 + 245 + 45y + 165 + 65 = 605 + 15x + 45y$. [2]

Mean = $\Sigma fx/\Sigma f$: $(605 + 15x + 45y)/25 = 35$, so $15x + 45y = 270$, i.e. $x + 3y = 18$. [1]

Subtracting $x + y = 8$: $2y = 10$, so $y = 5$ and $x = 3$. [1]

Q36. (4 marks) Answer: (i) 10 m; (ii) 16 m; (iii)(a) 370 m; (iii)(b) 74 s.

(i) $2 \times 5 = 10$ m. [1]

(ii) The second potato is $5 + 3 = 8$ m away: $2 \times 8 = 16$ m. [1]

(iii)(a) The distances run for the 10 potatoes are 10, 16, 22, …, an AP with $a = 10$, $d = 6$, $n = 10$. [½]

$S_{10} = (10/2)[2 \times 10 + 9 \times 6] = 5 \times 74 = 370$ m. [1½]

OR (iii)(b) Total distance = 370 m (as in (a)). [1]

Time = distance/speed = 370/5 = 74 s. [1]

Q37. (4 marks) Answer: (i) $4\sqrt{3}$ m; (ii) 12 m; (iii)(a) $4\sqrt{3}$ m; (iii)(b) $6\sqrt{3}$ m².

(i) In Δ OPB, $\cos 30° = OP/OB$: $OB = 6/(\sqrt{3}/2) = 12/\sqrt{3} = 4\sqrt{3}$ m (≈ 6.93 m). [1]

(ii) In Δ OPA, $\cos 60° = OP/OA$: $OA = 6/(1/2) = 12$ m. [1]

(iii)(a) $PB = 6 \tan 30° = 6/\sqrt{3} = 2\sqrt{3}$ m; $PA = 6 \tan 60° = 6\sqrt{3}$ m. [1]

$AB = PA - PB = 6\sqrt{3} - 2\sqrt{3} = 4\sqrt{3}$ m (≈ 6.93 m). [1]

OR (iii)(b) $PB = 6 \tan 30° = 2\sqrt{3}$ m. [1]

Area of Δ OPB = ½ × OP × PB = ½ × 6 × $2\sqrt{3} = 6\sqrt{3}$ m² (≈ 10.39 m²). [1]

Q38. (4 marks) Answer: (i) 17.5 cm; (ii) 110 cm; (iii)(a) 285 cm; (iii)(b) 96.25 cm².

(i) $r = 35/2 = 17.5$ cm. [1]

(ii) Circumference = $\pi d = (22/7) \times 35 = 110$ cm. [1]

(iii)(a) Wire = circumference + 5 diameters = 110 + 5 × 35 [1]

= 110 + 175 = 285 cm. [1]

OR (iii)(b) Each sector is 1/10 of the circle (central angle 36°): area = $(1/10) \times (22/7) \times (35/2)^2$ [1]

= $(1/10) \times (22/7) \times (1225/4) = 96.25$ cm². [1]

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