MATHS WITHOUT GUESSWORK · FLAGSHIP

Board Final Pack

SEVEN FULL PAPERS.
ONE REAL EXAM FEEL.
FINISH STRONGER THAN YOU STARTED.

A full-syllabus mock-paper pack for **CBSE Class 10 Mathematics**
Syllabus session 2026–27 · Standard (041)

Book 1 of 2 · Question Papers

7 papers + High-Yield 50

Built to engineer three feelings — on purpose

Confidence	Engagement	Capability
Winnable marks first	Real Indian contexts	The recognition cue

Book 1 holds the 7 papers, diagnosis sheets & the High-Yield 50. Full solutions are in Book 2 (Answer Booklet). Original, code-verified questions.

Liked Paper 1? All 7 papers + answers are ₹399 →

Mock Paper 1 — Warm-up / Confidence

Mathematics (Standard · 041) · Time: 3 Hours · Maximum Marks: 80 · Target: 50+

◆ GENERAL INSTRUCTIONS

- This paper has **38 questions** in **five sections A–E**. All questions are compulsory.
- **Section A** — Q1–20, 1 mark each (18 MCQ + 2 Assertion–Reason).
- **Section B** — Q21–25, 2 marks each. **Section C** — Q26–31, 3 marks each.
- **Section D** — Q32–35, 5 marks each. **Section E** — Q36–38, 4 marks each (sub-parts 1+1+2).
- There is **no overall choice**, but an **internal choice (OR)** is given in 2 questions of B, 2 of C, 2 of D, and in the 2-mark sub-parts of E.
- Draw neat figures where needed. Take $\pi = 22/7$ unless stated otherwise.

Section A

*Questions 1–20 carry **1 mark** each. Q1–18 are multiple-choice; Q19–20 are Assertion–Reason. Start here — these are your sure-marks.*

1. The LCM of the numbers $2^3 \times 3 \times 5$ and $2 \times 3^2 \times 5$ is:

A. 30 **B.** 360

C. 90 **D.** 180

1 M GUIDED ★

2. If $x = 3$ is a zero of the polynomial $p(x) = x^2 - 7x + k$, then the value of k is:

A. −12 **B.** 10

C. 12 **D.** 21

1 M GUIDED ★

3. If $\sin\theta = 1/2$ and θ is acute, then θ equals:

A. 0° **B.** 30°

C. 45° **D.** 60°

1 M GUIDED ★

4. The common difference of the AP $7, 4, 1, -2, \ldots$ is:

A. 3 **B.** −3

C. −11 **D.** 11

1 M GUIDED ★

5. For a frequency distribution, $\text{Mode} = 3\cdot\text{Median} - 2\cdot\text{Mean}$. If the mean is 20 and the median is 24, the mode is:

A. 28 **B.** 22

C. 32 **D.** 26

1 M PART-GUIDED

6. Two triangles are similar and the ratio of a pair of corresponding sides is $2 : 3$. The ratio of their perimeters is:

A. 4 : 9 **B.** 2 : 3

C. 3 : 2 **D.** 9 : 4

1 M GUIDED ★

7. In $\triangle ABC$, $DE \parallel BC$ with D on AB and E on AC. If $AD = 2$ cm, $DB = 3$ cm, $AE = 4$ cm, then EC is:

A. 5 cm **B.** 6 cm

C. 2.67 cm **D.** 8 cm

1 M PART-GUIDED ★

8. The number of tangents that can be drawn to a circle from a point lying *outside* it is:

A. 0 **B.** 1

C. 2 **D.** infinite

1 M GUIDED ★

9. A tangent to a circle touches it at point P and O is the centre. The angle between the tangent and the radius OP is:

A. 60° **B.** 45°

C. 90° **D.** 120°

1 M GUIDED ★

10. The value of $\tan 45°$ is:

A. 0 **B.** 1

C. $1/\sqrt{3}$ **D.** $\sqrt{3}$

1 M GUIDED ★

11. The value of $\cos 60°$ is:

A. $\sqrt{3}/2$ **B.** 1

C. $1/2$ **D.** 0

1 M GUIDED

12. If $\cos A = 4/5$ and A is acute, then $\sin A$ equals:

A. 3/5 **B.** 5/4

C. 5/3 **D.** 4/3

1 M · PART-GUIDED

13. The value of $\tan 30° \times \tan 60°$ is:

A. 1/3 **B.** 3

C. √3 **D.** 1

1 M · PART-GUIDED

14. For grouped data, the quantity found using the formula $l + ((n/2 - cf)/f) \times h$ is the:

A. mean **B.** mode

C. median **D.** range

1 M · PART-GUIDED

15. A fair die is rolled once. The probability of getting a number greater than 4 is:

A. 1/6 **B.** 1/3

C. 1/2 **D.** 2/3

1 M · GUIDED ★

16. From an external point P, two tangents PA and PB are drawn to a circle with centre O. If $\angle APB = 70°$, then $\angle AOB$ is:

A. 70° **B.** 90°

C. 110° **D.** 140°

1 M · INDEPENDENT

17. The area of a circle of radius 7 cm (take $\pi = 22/7$) is:

A. 44 cm^2 **B.** 154 cm^2

C. 22 cm^2 **D.** 308 cm^2

1 M GUIDED ★

18. If $\triangle ABC \sim \triangle DEF$ with $AB = 4$ cm, $DE = 6$ cm, $BC = 5$ cm, then EF equals:

A. 7.5 cm **B.** 3.3 cm

C. 6 cm **D.** 10 cm

1 M PART-GUIDED

19. **Assertion (A):** A quadratic polynomial can have at most two zeros.
Reason (R): A polynomial of degree n has at most n zeros.

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

1 M INDEPENDENT

20. **Assertion (A):** The length of the tangent from a point 13 cm from the centre of a circle of radius 5 cm is 12 cm.
Reason (R): The tangent length from an external point at distance d is $\sqrt{(d^2 - r^2)}$.

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

1 M INDEPENDENT ★

Section B

*Questions 21–25 carry **2 marks** each. Internal choice is provided in two questions.*

21. Find the HCF and the LCM of 12 and 18, and verify that HCF × LCM = 12 × 18.

2 M GUIDED ★

22. Evaluate: $(\sin 30° + \cos 60°) / \tan 45°$.

— OR —

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

2 M PART-GUIDED

23. Which term of the AP 3, 8, 13, 18, … is equal to 78?

2 M GUIDED ★

24. A bag contains 5 red, 3 blue and 2 green balls. A ball is drawn at random. Find the probability that it is *not* blue.

— OR —

Two coins are tossed together. Find the probability of getting at least one head.

2 M PART-GUIDED ★

25. Find the distance between the points A(2, 3) and B(5, 7).

2 M GUIDED ★

Section C

*Questions 26–31 carry **3 marks** each. Internal choice is provided in two questions.*

26. Find the zeros of the quadratic polynomial $x^2 - 5x + 6$ and verify the relationship between the zeros and the coefficients.

3 M PART-GUIDED ★

27. Solve for x and y: $2x + 3y = 12$ and $x - y = 1$.

— OR —

Solve by elimination: $3x + 4y = 10$ and $2x - 2y = 2$.

3 M PART-GUIDED ★

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

3 M INDEPENDENT ★

29. Find the **median** of the following distribution:

Class	0–10	10–20	20–30	30–40	40–50
Frequency	5	8	12	10	5

— OR —

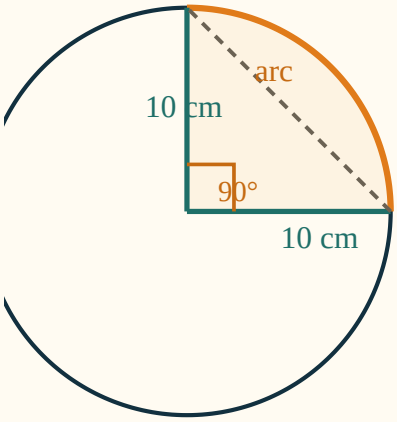
Find the **mean** of the same distribution by the direct method.

3 M PART-GUIDED ★

30. A quadrilateral ABCD is drawn to circumscribe a circle (each side touches the circle). Prove that $AB + CD = AD + BC$.

3 M INDEPENDENT ★

31. In a circle of radius 10 cm, a minor sector subtends a right angle (90°) at the centre. Find the area of the corresponding **minor segment**. (Take $\pi = 3.14$.)



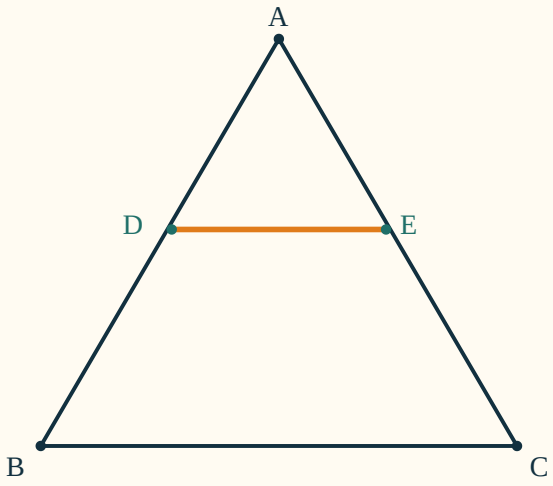
Minor segment = sector − triangle.

3 M INDEPENDENT

Section D

*Questions 32–35 carry **5 marks** each. Internal choice is provided in two questions. This is the stretch zone.*

32. State and prove the **Basic Proportionality Theorem** (Thales' Theorem). Using it, in $\triangle ABC$ with $DE \parallel BC$, if $AD = x$, $DB = x-2$, $AE = x+2$ and $EC = x-1$, find x.



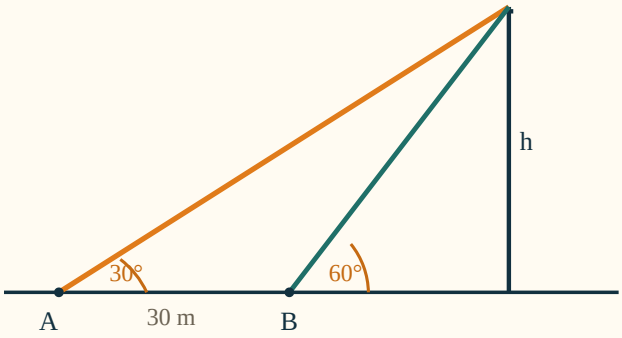
$DE \parallel BC$ divides AB and AC in the same ratio.

— OR —

In the figure, $LM \parallel CB$ and $LN \parallel CD$. Prove that $AM/AB = AN/AD$.

5 M UNFAMILIAR ★

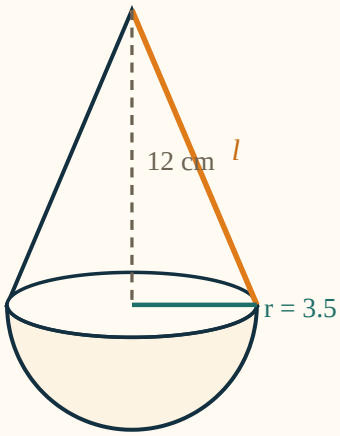
33. The angle of elevation of the top of a tower from a point on level ground is 30°. On walking 30 m straight towards the tower, the angle of elevation becomes 60°. Find the height of the tower. (Take $\sqrt{3} = 1.73$.)



Line of sight rises from 30° (at A) to 60° (at B) as you walk towards the tower.

5 M INDEPENDENT ★

34. A wooden toy is in the shape of a **cone mounted on a hemisphere** of the same radius 3.5 cm. The total height of the toy is 15.5 cm. Find the total surface area of the toy. (Take $\pi = 22/7$.)



Exposed surfaces: curved cone + curved hemisphere (the join is hidden).

— OR —

A solid is in the shape of a cylinder with two hemispherical ends (a capsule). The radius is 7 cm and the total length is 28 cm. Find its total surface area. (Take $\pi = 22/7$.)

5 M UNFAMILIAR

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

5 M UNFAMILIAR ★

Section E

*Questions 36–38 are **case studies** of 4 marks each (sub-parts 1 + 1 + 2). Internal choice is given in the 2-mark sub-part. These blend chapters, just like the real paper.*

36. The Cricket Academy

4 marks

A city cricket academy tracks a young batter's performance. In five successive practice matches his scores are **12, 17, 22, …** and continue in the same pattern (an AP). The academy squad has **5 batters and 3 bowlers**.

(i) Assuming the scores stay in AP, how many runs did he score in the 5th match? **1 M**

(ii) What is his mean (average) score over these five matches? **1 M**

(iii) One player from the squad of 8 is chosen at random to be captain. Find the probability that the captain is a bowler, and the probability that the captain is a batter.

— OR —

One card is drawn from a well-shuffled deck of 52 cards. Find the probability that it is a king. **2 M**

37. Festival Shopping

4 marks

During a festival sale, a shop sets up a rectangular banner and a fruit stall. The banner's area (in suitable units) is modelled by $x^2 + 7x + 12$. On a shopping-map grid, two stalls stand at $P(0, 0)$ and $Q(6, 8)$.

(i) Factorise $x^2 + 7x + 12$ to find expressions for the banner's length and breadth. **1 M**

(ii) Find the straight-line distance between the stalls P and Q on the grid. **1 M**

(iii) The shopkeeper notes: 2 kg apples and 1 kg grapes cost ₹160, while 1 kg apples and 2 kg grapes cost ₹140. Find the price per kg of apples and of grapes.

— OR —

5 pens and 3 pencils cost ₹21, and 2 pens and 1 pencil cost ₹8. Find the cost of one pen. **2 M**

38. Designing a Garden — 4 marks

A square garden is laid out on a coordinate grid (1 unit = 1 m). Two adjacent corners are at $A(2, 3)$ and $B(2, 8)$. A circular flower bed of radius 7 m is planned inside it, and a straight path runs along the diagonal from $(2, 3)$ to $(7, 8)$.

(i) Find the side length of the square garden (the distance AB). **1 M**

(ii) Find the area of the circular flower bed. (Take $\pi = 22/7$.) **1 M**

(iii) Find the coordinates of the midpoint of the diagonal path joining $(2, 3)$ and $(7, 8)$.

— OR —

Find the coordinates of the point that divides the path from $(2, 3)$ to $(7, 8)$ in the ratio $2 : 3$. **2 M**

◆ **END OF PAPER 1**

Well done for sitting the full paper. Now mark yourself honestly from the **Answer Booklet**, then fill in the **self-diagnosis sheet** on the next page. Every wrong answer points you to exactly one chapter Booster to revise — that's how Paper 2 comes out higher.

Chapter (Board Booster to revise)	Questions in Paper 1	Marks
Real Numbers	Q1, Q21, Q28	6
Polynomials	Q2, Q19, Q26, Q37(i)	6
Pair of Linear Equations	Q27, Q37(iii)	5
Quadratic Equations	Q35	5
Arithmetic Progressions	Q4, Q23, Q36(i)	4
Triangles	Q6, Q7, Q18, Q32	8
Circles	Q8, Q9, Q16, Q20, Q30	7
Introduction to Trigonometry	Q3, Q10, Q11, Q12, Q13, Q22	7
Some Applications of Trigonometry	Q33	5
Statistics	Q5, Q14, Q29, Q36(ii)	6
Probability	Q15, Q24, Q36(iii)	5
Areas Related to Circles	Q17, Q31, Q38(ii)	5
Surface Areas & Volumes	Q34	5
Coordinate Geometry	Q25, Q37(ii), Q38(i), Q38(iii)	6

◆ YOU'VE IMPROVED — REFLECTION

- **One thing I did better than I expected: _____**
- **The two chapters I'll revise before Paper 2: _____ & _____**
- **One silly mistake I'll watch for next time: _____**

Answer Booklet — Mock Paper 1

Full marking-scheme solutions. Each shows where the marks fall, a likely slip, and THE THINKING — the cue that cracks the next, unseen question.

Section A — Answers (1 mark each)

Q	Answer	Why
1	**B. 360**	LCM = highest power of each prime = $2^3 \times 3^2 \times 5 = 360$.
2	**C. 12**	Put x=3: 9 − 21 + k = 0 ⇒ k = 12.
3	**B. 30°**	sin 30° = 1/2.
4	**B. −3**	d = 4 − 7 = −3.
5	**C. 32**	Mode = 3(24) − 2(20) = 72 − 40 = 32.
6	**B. 2 : 3**	In similar triangles, ratio of perimeters = ratio of corresponding sides.
7	**B. 6 cm**	BPT: AD/DB = AE/EC ⇒ 2/3 = 4/EC ⇒ EC = 6.
8	**C. 2**	Exactly two tangents from an external point.
9	**C. 90°**	A tangent is perpendicular to the radius at the point of contact.
10	**B. 1**	tan 45° = 1.
11	**C. 1/2**	cos 60° = 1/2.
12	**A. 3/5**	sin A = √(1 − 16/25) = 3/5 (3-4-5 triangle).
13	**D. 1**	tan 30°·tan 60° = (1/√3)(√3) = 1.
14	**C. median**	That is the grouped-data median formula.
15	**B. 1/3**	Favourable {5,6} ⇒ 2/6 = 1/3.

Q	Answer	Why
16	**C. 110°**	∠APB + ∠AOB = 180° ⇒ ∠AOB = 110°.
17	**B. 154 cm^2**	$\pi r^2 = (22/7)(49) = 154$.
18	**A. 7.5 cm**	AB/DE = BC/EF ⇒ 4/6 = 5/EF ⇒ EF = 7.5.
19	**(a)**	Both true; the degree bound (R) is exactly why a quadratic has at most 2 zeros (A).
20	**(a)**	$\sqrt{(13^2 - 5^2)} = \sqrt{144} = 12$; R is the formula that gives A.

◆ THE THINKING — SECTION A

One-markers reward *recognition, not working*. When you see "LCM from powers," take the highest power of every prime. When a value is given as a zero, *substitute it*. When a tangent meets a radius, think **90°**. Read the option list before you compute — it often tells you the form of the answer.

Section B — Solutions (2 marks each)

21.

$12 = 2^2 \times 3$, $18 = 2 \times 3^2$. **(½ m)**

HCF = $2 \times 3 = \mathbf{6}$; LCM = $2^2 \times 3^2 = \mathbf{36}$. **(1 m)**

Check: HCF×LCM = 6×36 = 216 = 12×18. ✓ **(½ m)**

Likely slip: taking the *lowest* power for LCM. HCF uses lowest powers, LCM uses highest.

THE THINKING: product of two numbers = HCF × LCM — a free check on every such question.

22.

Main: $(\sin 30° + \cos 60°)/\tan 45° = (½ + ½)/1 = \mathbf{1}$. **(2 m)**

OR: $2\tan^2 45° + \cos^2 30° - \sin^2 60° = 2(1)^2 + (\sqrt{3}/2)^2 - (\sqrt{3}/2)^2 = 2 + ¾ - ¾ = \mathbf{2}$. **(2 m)**

Likely slip: writing $\cos^2 30°$ as $\sqrt{3}/2$ instead of $(\sqrt{3}/2)^2 = 3/4$.

THE THINKING: substitute standard-angle values *first*, simplify after — never carry trig symbols through the arithmetic.

23.

$a = 3$, $d = 5$. $a_n = a + (n-1)d = 78$ **(½ m)**

$3 + (n-1)5 = 78 \Rightarrow (n-1)5 = 75 \Rightarrow n - 1 = 15$ **(1 m)**

$\Rightarrow n = \mathbf{16}$. So 78 is the 16th term. **(½ m)**

Likely slip: forgetting the "+1", giving n = 15.

THE THINKING: "which term equals a value?" ⇒ set a_n = value and solve for n.

24.

Main: Total = 10; not blue = 5+2 = 7. P(not blue) = **7/10**. **(2 m)**

OR: Sample space {HH, HT, TH, TT}; at least one head = 3 cases. P = **3/4**. **(2 m)**

Likely slip: computing P(blue) and forgetting to subtract from 1, or missing an outcome in the coin space.

THE THINKING: "not" or "at least" ⇒ use the complement: P(E) = 1 − P(not E).

25.

$AB = \sqrt{[(5-2)^2 + (7-3)^2]} = \sqrt{(9 + 16)} = \sqrt{25} = \mathbf{5\ units}$. **(2 m)**

Likely slip: subtracting coordinates in the wrong pairs (mixing x with y).

THE THINKING: distance = $\sqrt{(\Delta x^2 + \Delta y^2)}$ — a right triangle on the grid.

Section C — Solutions (3 marks each)

26.

$x^2 - 5x + 6 = (x-2)(x-3) \Rightarrow$ zeros **2 and 3**. **(1½ m)**

Sum = 2+3 = 5 = −(−5)/1 = −b/a. ✓ **(¾ m)**

Product = 2×3 = 6 = 6/1 = c/a. ✓ **(¾ m)**

Likely slip: sign of −b/a — it is −(coefficient of x).

THE THINKING: for ax^2+bx+c, sum of zeros = −b/a, product = c/a — always verify both.

27.

Main: From x − y = 1, x = y+1. Substitute: 2(y+1)+3y = 12 ⇒ 5y+2 = 12 ⇒ y = 2, then x = 3. **(2 m)**

Check: 2(3)+3(2) = 12. ✓ **x = 3, y = 2.** **(1 m)**

OR: 2x−2y = 2 ⇒ x−y = 1 ⇒ x = y+1. Then 3(y+1)+4y = 10 ⇒ 7y = 7 ⇒ y = 1, x = 2. **x = 2, y = 1.** **(3 m)**

Likely slip: not simplifying 2x−2y=2 to x−y=1 first in the OR part.

THE THINKING: make one variable the subject from the simpler equation, then substitute.

28.

Suppose, to the contrary, √5 is rational: √5 = p/q with p, q coprime, q ≠ 0. **(½ m)**

Then $5q^2 = p^2$, so $5 \mid p^2 \Rightarrow 5 \mid p$. Write p = 5m. **(1 m)**

$5q^2 = 25m^2 \Rightarrow q^2 = 5m^2$, so $5 \mid q^2 \Rightarrow 5 \mid q$. **(1 m)**

Then 5 divides both p and q — contradicting "coprime". Hence √5 is irrational. **(½ m)**

Likely slip: skipping "$5 \mid p^2 \Rightarrow 5 \mid p$" (true because 5 is prime) — state it.

THE THINKING: irrationality proofs = assume rational & coprime → force a common factor → contradiction.

29.

Main (median): cumulative freq: 5, 13, 25, 35, 40. n = 40, n/2 = 20. **(1 m)**

Median class = 20–30 (first cf ≥ 20). l = 20, cf = 13, f = 12, h = 10. **(½ m)**

Median = 20 + ((20−13)/12)×10 = 20 + 70/12 = 20 + 5.83 = **25.83**. **(1½ m)**

OR (mean, direct): midpoints 5,15,25,35,45; Σf x = 25+120+300+350+225 = 1020; mean = 1020/40 = **25.5**. **(3 m)**

Likely slip: using the frequency of the median class as "cf". cf is the cumulative frequency *before* that class.

THE THINKING: median needs the cf column; the median class is where cf first reaches n/2.

30.

Let the circle touch AB, BC, CD, DA at P, Q, R, S. Tangents from a common external point are equal: **(1 m)**

AP = AS, BP = BQ, CR = CQ, DR = DS. **(1 m)**

AB + CD = (AP+BP) + (CR+DR) = (AS+DS) + (BQ+CQ) = AD + BC. ✓ **(1 m)**

Likely slip: pairing the wrong equal tangents — label the contact points and group carefully.

THE THINKING: "circumscribed quadrilateral" ⇒ equal tangents from each vertex ⇒ opposite sides add equally.

31.

Area of sector = (90/360)πr² = ¼ × 3.14 × 100 = 78.5 cm². **(1½ m)**

Area of right triangle (legs = radii) = ½ × 10 × 10 = 50 cm². **(1 m)**

Minor segment = sector − triangle = 78.5 − 50 = **28.5 cm²**. **(½ m)**

Likely slip: forgetting to subtract the triangle — a sector is not a segment.

THE THINKING: segment = sector − triangle. For 90°, the triangle is ½r².

Section D — Solutions (5 marks each)

32.

Basic Proportionality Theorem: If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, it divides those sides in the same ratio.

Proof: In △ABC, DE ∥ BC. Join BE and CD. △ADE and △BDE share the same height from E to AB, so ar(ADE)/ar(BDE) = AD/DB. Similarly ar(ADE)/ar(CDE) = AE/EC. **(1½ m)**

△BDE and △CDE are on the same base DE and between the same parallels DE and BC, so ar(BDE) = ar(CDE). **(1 m)**

Hence AD/DB = AE/EC. ✓ **(½ m)**

Application: $x/(x-2) = (x+2)/(x-1) \Rightarrow x(x-1) = (x+2)(x-2) \Rightarrow x^2-x = x^2-4 \Rightarrow x = \mathbf{4}$. **(2 m)**

Check: 4/2 = 6/3 = 2. ✓

Likely slip: expanding (x+2)(x−2) wrongly — it is x^2-4, not x^2+4.

THE THINKING: parallel line inside a triangle ⇒ BPT ⇒ set the two ratios equal and cross-multiply.

33.

Let height = h, and the nearer point B be at distance d from the foot. **(½ m)**

From B: $\tan 60° = h/d \Rightarrow d = h/\sqrt{3}$. **(1 m)**

From A (30 m further): $\tan 30° = h/(d+30) \Rightarrow d + 30 = h\sqrt{3}$. **(1 m)**

Subtract: $30 = h\sqrt{3} - h/\sqrt{3} = h(3-1)/\sqrt{3} = 2h/\sqrt{3}$. **(1 m)**

$\Rightarrow h = 30\sqrt{3}/2 = 15\sqrt{3} = 15 \times 1.73 =$ **25.95 m** (≈ 25.98 m exact). **(1½ m)**

Likely slip: using the 30 m on the wrong side — the farther point has the smaller angle (30°).

THE THINKING: two angles, one unknown height ⇒ write tan at each point, eliminate the distance.

34.

Main (toy): r = 3.5 cm; cone height = 15.5 − 3.5 = 12 cm. **(½ m)**

Slant l = √(3.5² + 12²) = √(12.25+144) = √156.25 = 12.5 cm. **(1 m)**

TSA = curved cone + curved hemisphere = πrl + 2πr² = πr(l + 2r) **(1½ m)**

= (22/7)(3.5)(12.5 + 7) = (22/7)(3.5)(19.5) = **214.5 cm²**. **(2 m)**

OR (capsule): r = 7, cylinder length = 28 − 2(7) = 14 cm. TSA = 2πrh + 2(2πr²) = 2πr(h + 2r) = 2(22/7)(7)(14 + 14) = 44 × 28 = **1232 cm²**. **(5 m)**

Likely slip: adding the flat base of the cone or the hemisphere — the join is *hidden*, so no base circles count.

THE THINKING: for a combination solid, add only the *exposed* curved surfaces; drop the hidden join faces.

35.

Let speed = x km/h. Time at x = 360/x; at (x+5) = 360/(x+5), one hour less: **(1 m)**

360/x − 360/(x+5) = 1 ⇒ 360(x+5−x) = x(x+5) ⇒ 1800 = x² + 5x. **(1½ m)**

x² + 5x − 1800 = 0. Discriminant = 25 + 7200 = 7225, √7225 = 85. **(1½ m)**

x = (−5 + 85)/2 = **40 km/h** (reject −45). **(1 m)**

Check: 360/40 − 360/45 = 9 − 8 = 1. ✓

Likely slip: keeping the negative root. Speed must be positive — reject x = −45.

THE THINKING: "same distance, changed speed, changed time" ⇒ set up a time-difference equation; it becomes a quadratic.

Section E — Solutions (4 marks each)

36.

(i) AP with a = 12, d = 5: $a_5 = 12 + 4(5) =$ **32 runs**. (1 m)

(ii) Scores 12,17,22,27,32; sum = 110; mean = 110/5 = **22**. (1 m)

(iii) Main: P(bowler) = 3/8; P(batter) = 5/8. (2 m)

OR: P(king) = 4/52 = **1/13**. (2 m)

Likely slip: in (ii), the mean of an AP of 5 terms is just the middle term (22) — use it as a quick check.

THE THINKING: equally spaced data ⇒ AP tools; "chosen at random" ⇒ favourable/total.

37.

(i) $x^2 + 7x + 12 =$ **(x+3)(x+4)** (since 3+4 = 7, 3×4 = 12). (1 m)

(ii) PQ = $\sqrt{(6^2 + 8^2)} = \sqrt{100} =$ **10 units**. (1 m)

(iii) Main: 2a + g = 160, a + 2g = 140. Multiply 2nd by 2: 2a+4g = 280; subtract: 3g = 120 ⇒ g = 40, a = 60. **Apples ₹60/kg, grapes ₹40/kg.** (2 m)

OR: 5p + 3c = 21, 2p + c = 8 ⇒ c = 8−2p; 5p + 3(8−2p) = 21 ⇒ −p + 24 = 21 ⇒ p = **₹3**. (2 m)

Likely slip: a 3-4-5 scaled triangle (6,8,10) — don't compute √100 the long way.

THE THINKING: two unknown prices, two conditions ⇒ two linear equations; eliminate one variable.

38.

(i) AB = $|8 - 3|$ = **5 m** (same x, so vertical distance). (1 m)

(ii) Area = $\pi r^2 = (22/7)(7^2) =$ **154 m²**. (1 m)

(iii) Main: midpoint = ((2+7)/2, (3+8)/2) = **(4.5, 5.5)**. (2 m)

OR (2:3): ((2·7+3·2)/5, (2·8+3·3)/5) = (20/5, 25/5) = **(4, 5)**. (2 m)

Likely slip: in the section formula, mixing up which ratio part multiplies which point.

THE THINKING: midpoint = average of coordinates; a given ratio m:n ⇒ section formula $((mx_2+nx_1)/(m+n), \ldots)$.

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