

TALLENTEX Mathematics

Sample Paper – 5

Duration: 23 Minutes

Maximum Marks: 60

Instructions

- This paper contains **15 MCQ** questions with a **single correct answer**, modelled on the Mathematics portion of **TALLENTEX**.
- Marking scheme: **+4** for correct answer, **–1** for incorrect answer, **0** for unattempted.
- Only **one** option is correct for each question.
- Syllabus: **NCERT Class 8 and Class 9 Mathematics**.
- **No** mobile phones, calculators, or electronic gadgets are allowed in the examination hall.

Q1. Which of the following is an irrational number?

- (A) $\sqrt{2}$
- (B) $0.\overline{12}$
- (C) $\sqrt{4}$
- (D) $\frac{22}{7}$

Q2. If $p(x) = x^2 - 5x + 6$, what are the zeroes of $p(x)$?

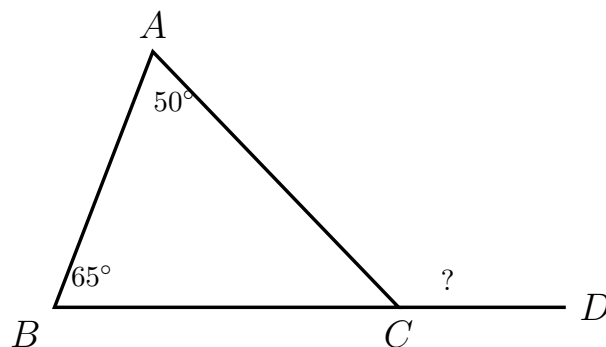
- (A) 2 and 4
- (B) 2 and 3
- (C) 3 and 4
- (D) 1 and 6

Q3. On a map, 1 cm represents 250 km. Two cities are 6.4 cm apart on the map. What is the actual distance between the cities?

- (A) 1400 km
- (B) 1500 km
- (C) 1600 km
- (D) 1750 km



- Q4.** A shopkeeper marks an article at Rs. 600 and offers a discount of 15%. What is the selling price?
- (A) Rs. 480
(B) Rs. 495
(C) Rs. 500
(D) Rs. 510
- Q5.** The sum of two numbers is 45 and their difference is 9. What is the smaller number?
- (A) 18
(B) 24
(C) 27
(D) 36
- Q6.** In the figure, $\angle ACD$ is an exterior angle of $\triangle ABC$. If $\angle A = 50^\circ$ and $\angle B = 65^\circ$, find $\angle ACD$.



- (A) 100°
(B) 115°
(C) 125°
(D) 130°
- Q7.** Which of the following sets of lengths CANNOT form a triangle?
- (A) 5 cm, 7 cm, 10 cm

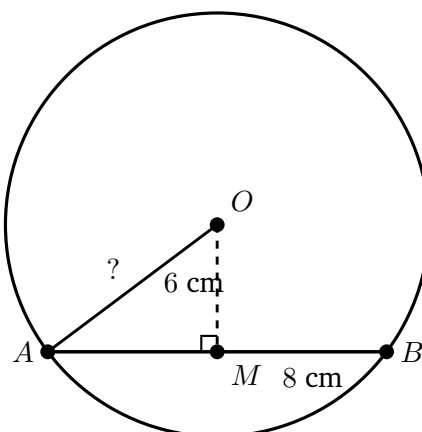


- (B) 3 cm, 4 cm, 5 cm
- (C) 2 cm, 3 cm, 6 cm
- (D) 6 cm, 8 cm, 9 cm

Q8. In rectangle $ABCD$, the diagonal $BD = 13$ cm and side $AB = 5$ cm. What is the perimeter of the rectangle?

- (A) 28 cm
- (B) 30 cm
- (C) 32 cm
- (D) 34 cm

Q9. In the figure, O is the centre of a circle. A chord AB of length 16 cm is at a perpendicular distance of 6 cm from O . Find the radius of the circle.



- (A) 10 cm
- (B) 11 cm
- (C) 12 cm
- (D) 14 cm

Q10. Find the area of an equilateral triangle of side 8 cm.

- (A) $12\sqrt{3}$ cm²
- (B) $16\sqrt{3}$ cm²



(C) $20\sqrt{3} \text{ cm}^2$

(D) $24\sqrt{3} \text{ cm}^2$

Q11. Find the volume of a sphere of radius 7 cm. (Use $\pi = \frac{22}{7}$.)

(A) 1236 cm^3

(B) 1338 cm^3

(C) $1437\frac{1}{3} \text{ cm}^3$

(D) 1540 cm^3

Q12. Find the mode of the data set: 4, 7, 3, 9, 7, 2, 7, 4, 3, 7.

(A) 3

(B) 4

(C) 5

(D) 7

Q13. Two fair dice are thrown simultaneously. What is the probability of getting a sum of 7?

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

(B) $\frac{1}{9}$

(C) $\frac{5}{36}$

(D) $\frac{7}{36}$

Q14. Find the midpoint of the line segment joining $A(-3, 4)$ and $B(5, -2)$.

(A) (1, 2)

(B) (1, 1)

(C) (2, 1)

(D) (4, -1)



Q15. Evaluate $(101)^2$ using the identity $(a + b)^2 = a^2 + 2ab + b^2$.

(A) 10100

(B) 10101

(C) 10201

(D) 10301



Detailed Solutions

Q1.

Solution

Concept — Number Systems: A number is *irrational* if it cannot be written as $\frac{p}{q}$ where p and q are integers with $q \neq 0$. Its decimal expansion is non-terminating and non-repeating.

Step 1 — Check each option.

- Option B: $0.\overline{12} = \frac{12}{99} = \frac{4}{33}$ (rational).
- Option C: $\sqrt{4} = 2$ (rational; a perfect square).
- Option D: $\frac{22}{7}$ is rational by definition (ratio of two integers).

Step 2 — Identify the irrational number. $\sqrt{2}$ cannot be expressed as a ratio of two integers. Its decimal expansion $1.41421\dots$ is non-terminating and non-repeating. Hence $\sqrt{2}$ is irrational.

Why other options are wrong:

- Option B: $0.\overline{12}$ is rational ($= \frac{4}{33}$).
- Option C: $\sqrt{4} = 2$ is rational.
- Option D: $\frac{22}{7}$ is rational.

Final Answer: $\sqrt{2}$ is irrational $\Rightarrow$ A

Answer: (A) [Go Back to Q 1](#)

Q2.

Solution

Concept — Polynomials (Zeroes): The zeroes of a polynomial $p(x)$ are the values of x for which $p(x) = 0$.

Step 1 — Factorise $p(x) = x^2 - 5x + 6$. Find two numbers whose product is 6 and whose sum is 5: they are 2 and 3.

$$p(x) = (x - 2)(x - 3).$$



Step 2 — Set each factor to zero.

$$x - 2 = 0 \implies x = 2, \quad x - 3 = 0 \implies x = 3.$$

Verify: $p(2) = 4 - 10 + 6 = 0 \checkmark$; $p(3) = 9 - 15 + 6 = 0 \checkmark$.

Why other options are wrong:

- Option A: 2 and 4 give the polynomial $x^2 - 6x + 8 \neq p(x)$.
- Option C: 3 and 4 give $x^2 - 7x + 12 \neq p(x)$.
- Option D: 1 and 6 give $x^2 - 7x + 6 \neq p(x)$.

Final Answer: Zeroes are 2 and 3 $\Rightarrow$ B

Answer: (B) [Go Back to Q 2](#)

Q3.

Solution

Concept — Direct Proportion: In direct proportion, $\frac{x_1}{y_1} = \frac{x_2}{y_2}$, i.e., map distance is proportional to actual distance.

Step 1 — Set up the proportion. Let actual distance = d km.

$$\frac{1 \text{ cm}}{250 \text{ km}} = \frac{6.4 \text{ cm}}{d \text{ km}}.$$

Step 2 — Solve for d .

$$d = 6.4 \times 250 = 1600 \text{ km}.$$

Why other options are wrong:

- Option A: $1400 = 5.6 \times 250$ (uses map distance 5.6 cm, not 6.4 cm).
- Option B: $1500 = 6.0 \times 250$ (uses map distance 6.0 cm, not 6.4 cm).
- Option D: $1750 = 7.0 \times 250$ (uses map distance 7.0 cm, not 6.4 cm).

Final Answer: Actual distance = 1600 km $\Rightarrow$ C

Answer: (C) [Go Back to Q 3](#)



Q4.

Solution**Concept — Discount and Selling Price:**

$$\text{Selling Price} = \text{Marked Price} \times \left(1 - \frac{\text{Discount}\%}{100}\right).$$

Step 1 — Substitute the values.

$$\text{SP} = 600 \times \left(1 - \frac{15}{100}\right) = 600 \times \frac{85}{100} = 600 \times 0.85 = 510.$$

Why other options are wrong:

- Option A: Rs. 480 = 600×0.80 corresponds to a 20% discount, not 15%.
- Option B: Rs. 495 is an arithmetic error (e.g., $600 - 105$, but 15% of 600 = 90, not 105).
- Option C: Rs. 500 corresponds to a discount of Rs. 100, i.e., 16. $\bar{6}$ %, not 15%.

Final Answer: Selling price = Rs. 510 $\Rightarrow$ DAnswer: (D) [Go Back to Q4](#)

Q5.

Solution**Concept — Linear Equations:** Translate the word problem into a system of equations and solve.**Step 1 — Set up equations.** Let the larger number be x and the smaller number be y .

$$x + y = 45 \quad \text{and} \quad x - y = 9.$$

Step 2 — Solve the system. Adding both equations: $2x = 54 \Rightarrow x = 27$.Subtracting the second from the first: $2y = 36 \Rightarrow y = 18$.**Step 3 — Verify.** $27 + 18 = 45 \checkmark$; $27 - 18 = 9 \checkmark$.**Why other options are wrong:**

- Option B: 24 is the arithmetic mean of the two numbers, not the smaller one.
- Option C: 27 is the *larger* number, not the smaller.
- Option D: 36 is $2y$ before dividing by 2, an intermediate result.



Final Answer: Smaller number = 18 $\Rightarrow$ **A**

Answer: (A) [Go Back to Q 5](#)

Q6.

Solution

Concept — Exterior Angle Theorem: An exterior angle of a triangle is equal to the sum of the two non-adjacent interior angles.

Step 1 — Apply the Exterior Angle Theorem.

$$\angle ACD = \angle A + \angle B = 50^\circ + 65^\circ = 115^\circ.$$

Step 2 — Verify using the interior angle at C. Interior angle $\angle BCA = 180^\circ - 50^\circ - 65^\circ = 65^\circ$.

Then $\angle ACD = 180^\circ - 65^\circ = 115^\circ$ (angles on a straight line). ✓

Why other options are wrong:

- Option A: 100° is an incorrect sum; $50 + 65 = 115$, not 100.
- Option C: 125° is 10° more than the correct answer; no valid reasoning leads here.
- Option D: 130° is 15° more than the correct answer.

Final Answer: $\angle ACD = 115^\circ \Rightarrow$ **B**

Answer: (B) [Go Back to Q 6](#)

Q7.

Solution

Concept — Triangle Inequality Theorem: For any three lengths to form a triangle, the sum of any two sides must be *strictly greater* than the third side.

Step 1 — Test each option.

- Option A: $5 + 7 = 12 > 10$; $5 + 10 = 15 > 7$; $7 + 10 = 17 > 5$. ✓ Forms a triangle.
- Option B: $3 + 4 = 7 > 5$; $3 + 5 = 8 > 4$; $4 + 5 = 9 > 3$. ✓ Forms a right triangle.
- Option C: $2 + 3 = 5$, which is NOT greater than 6. ✗ Cannot form a triangle.
- Option D: $6 + 8 = 14 > 9$; $6 + 9 = 15 > 8$; $8 + 9 = 17 > 6$. ✓ Forms a triangle.



Step 2 — Conclude. The set $\{2, 3, 6\}$ violates the triangle inequality since $2 + 3 = 5 < 6$.

Why other options are wrong:

- Options A, B, D: All satisfy the triangle inequality and therefore can form triangles.

Final Answer: 2 cm, 3 cm, 6 cm cannot form a triangle $\Rightarrow$ **C**

Answer: (C) [Go Back to Q 7](#)

Q8.

Solution

Concept — Rectangle and Pythagoras' Theorem: In a rectangle, the diagonal is the hypotenuse of the right triangle formed with two adjacent sides. All angles are 90° .

Step 1 — Find the unknown side using Pythagoras' Theorem.

$$BC = \sqrt{BD^2 - AB^2} = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12 \text{ cm.}$$

Step 2 — Calculate the perimeter.

$$\text{Perimeter} = 2(AB + BC) = 2(5 + 12) = 2 \times 17 = 34 \text{ cm.}$$

Why other options are wrong:

- Option A: $28 = 2(5 + 9)$ uses $BC = 9$, which does not satisfy the Pythagorean theorem.
- Option B: $30 = 2(5 + 10)$ uses $BC = 10$, giving diagonal $\sqrt{25 + 100} = \sqrt{125} \neq 13$.
- Option C: $32 = 2(5 + 11)$ uses $BC = 11$, giving diagonal $\sqrt{25 + 121} = \sqrt{146} \neq 13$.

Final Answer: Perimeter = 34 cm $\Rightarrow$ **D**

Answer: (D) [Go Back to Q 8](#)



Q9.

Solution

Concept — Chord and Perpendicular from Centre: The perpendicular from the centre of a circle to a chord bisects the chord. Use Pythagoras' Theorem: $r^2 = OM^2 + AM^2$.

Step 1 — Find half the chord length.

$$AM = \frac{AB}{2} = \frac{16}{2} = 8 \text{ cm.}$$

The perpendicular distance $OM = 6 \text{ cm}$ (given).

Step 2 — Apply Pythagoras' Theorem in $\triangle OMA$.

$$r = OA = \sqrt{OM^2 + AM^2} = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10 \text{ cm.}$$

Why other options are wrong:

- Option B: $r = 11$; $11^2 = 121 \neq 36 + 64 = 100$.
- Option C: $r = 12$; $12^2 = 144 \neq 100$.
- Option D: $r = 14$; $14^2 = 196 \neq 100$.

Final Answer: Radius = 10 cm $\Rightarrow$ A

Answer: (A) [Go Back to Q 9](#)

Q10.

Solution

Concept — Heron's Formula / Area of Equilateral Triangle: For a triangle with sides a, b, c and semi-perimeter $s = \frac{a+b+c}{2}$, Area = $\sqrt{s(s-a)(s-b)(s-c)}$.

Step 1 — Compute the semi-perimeter. $s = \frac{8+8+8}{2} = 12 \text{ cm.}$

Step 2 — Apply Heron's formula.

$$\text{Area} = \sqrt{12(12-8)(12-8)(12-8)} = \sqrt{12 \times 4 \times 4 \times 4} = \sqrt{768}.$$

$$\sqrt{768} = \sqrt{256 \times 3} = 16\sqrt{3} \text{ cm}^2.$$

Cross-check with formula: Area = $\frac{\sqrt{3}}{4} \times 8^2 = \frac{\sqrt{3}}{4} \times 64 = 16\sqrt{3} \text{ cm}^2. \checkmark$

Why other options are wrong:



- Option A: $12\sqrt{3}$ corresponds to side a where $\frac{\sqrt{3}}{4}a^2 = 12\sqrt{3} \Rightarrow a^2 = 48$, i.e., $a \neq 8$.
- Option C: $20\sqrt{3}$ and Option D: $24\sqrt{3}$ are both too large for side 8 cm.

Final Answer: Area = $16\sqrt{3} \text{ cm}^2 \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q 10](#)

Q11.

Solution

Concept — Volume of a Sphere: $V = \frac{4}{3}\pi r^3$.

Step 1 — Substitute the values.

$$V = \frac{4}{3} \times \frac{22}{7} \times 7^3 = \frac{4}{3} \times \frac{22}{7} \times 343.$$

Step 2 — Simplify step by step.

$$\frac{22}{7} \times 343 = 22 \times 49 = 1078.$$

$$V = \frac{4}{3} \times 1078 = \frac{4312}{3} = 1437\frac{1}{3} \text{ cm}^3.$$

Why other options are wrong:

- Option A: 1236 cm^3 – arithmetic error in computing $\frac{4}{3}\pi r^3$.
- Option B: 1338 cm^3 – arithmetic error.
- Option D: 1540 cm^3 is the volume of a cylinder with $r = 7$, $h = 10$ (a different formula).

Final Answer: $V = 1437\frac{1}{3} \text{ cm}^3 \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q 11](#)



Q12.

Solution

Concept — Mode: The mode of a data set is the observation that occurs most frequently.

Step 1 — Tabulate the frequencies.

Data: 4, 7, 3, 9, 7, 2, 7, 4, 3, 7.

Value	Frequency
2	1
3	2
4	2
7	4
9	1

Step 2 — Identify the mode. The value 7 appears 4 times, which is the highest frequency. Hence Mode = 7.

Why other options are wrong:

- Option A: 3 appears only 2 times.
- Option B: 4 appears only 2 times.
- Option C: 5 does not appear in the data set at all.

Final Answer: Mode = 7 $\Rightarrow$ D

Answer: (D) [Go Back to Q 12](#)

Q13.

Solution

Concept — Probability: $P(\text{event}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$.

Step 1 — Count total outcomes. When two dice are thrown simultaneously, total outcomes = $6 \times 6 = 36$.

Step 2 — List favourable outcomes (sum = 7).

$$(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1) \Rightarrow 6 \text{ pairs.}$$



Step 3 — Calculate the probability.

$$P(\text{sum} = 7) = \frac{6}{36} = \frac{1}{6}.$$

Why other options are wrong:

- Option B: $\frac{1}{9} = \frac{4}{36}$ corresponds to only 4 favourable pairs, not 6.
- Option C: $\frac{5}{36}$ corresponds to 5 favourable pairs, not 6.
- Option D: $\frac{7}{36}$ corresponds to 7 favourable pairs, not 6.

Final Answer: $P(\text{sum} = 7) = \frac{1}{6} \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q 13](#)

Q14.

Solution

Concept — Midpoint Formula: The midpoint of the segment joining (x_1, y_1) and (x_2, y_2) is

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right).$$

Step 1 — Identify the coordinates. $A(-3, 4)$ and $B(5, -2)$.

Step 2 — Apply the midpoint formula.

$$x_M = \frac{-3 + 5}{2} = \frac{2}{2} = 1, \quad y_M = \frac{4 + (-2)}{2} = \frac{2}{2} = 1.$$

Midpoint = $(1, 1)$.

Why other options are wrong:

- Option A: $(1, 2)$ has the wrong y -coordinate; $\frac{4 + (-2)}{2} = 1$, not 2.
- Option C: $(2, 1)$ has the wrong x -coordinate; $\frac{-3 + 5}{2} = 1$, not 2.
- Option D: $(4, -1)$ is entirely incorrect.

Final Answer: Midpoint = $(1, 1) \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q 14](#)



Q15.

Solution**Concept — Algebraic Identity:** $(a + b)^2 = a^2 + 2ab + b^2$.**Step 1 — Write 101 as a sum.** $101 = 100 + 1$. So $a = 100$ and $b = 1$.**Step 2 — Expand using the identity.**

$$(101)^2 = (100 + 1)^2 = (100)^2 + 2(100)(1) + (1)^2 = 10000 + 200 + 1 = 10201.$$

Why other options are wrong:

- Option A: $10100 = 100^2 + 100$ omits the $b^2 = 1$ term.
- Option B: 10101 has no valid derivation from the standard expansion.
- Option D: $10301 = 10000 + 300 + 1$ uses $2ab = 2(100)(1.5) = 300$, which is wrong.

Final Answer: $(101)^2 = 10201 \Rightarrow \boxed{\text{C}}$ **Answer: (C)** [Go Back to Q 15](#)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	C	4	D	5	A
6	B	7	C	8	D	9	A	10	B
11	C	12	D	13	A	14	B	15	C

