

TALLENTEX Mathematics

Sample Paper – 8

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. Simplify: $5^{1/2} \times 5^{3/2}$.

- (A) 5
- (B) 10
- (C) 15
- (D) 25

Q2. Which of the following is a Pythagorean triplet?

- (A) (5, 12, 13)
- (B) (6, 7, 8)
- (C) (3, 5, 6)
- (D) (4, 6, 9)

Q3. Five taps can fill a tank in 24 hours. How many hours will 8 taps take to fill the same tank?

- (A) 12 hours
- (B) 15 hours
- (C) 16 hours
- (D) 18 hours



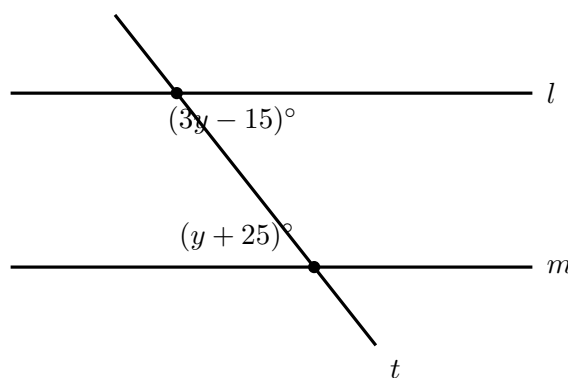
Q4. Rs. 5000 is invested for 2 years at 10% per annum. Find the difference between compound interest and simple interest.

- (A) Rs. 30
- (B) Rs. 40
- (C) Rs. 50
- (D) Rs. 60

Q5. Expand $(2x + 3)^3$ using $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.

- (A) $8x^3 + 12x^2 + 18x + 27$
- (B) $8x^3 + 24x^2 + 36x + 27$
- (C) $8x^3 + 18x^2 + 27x + 27$
- (D) $8x^3 + 36x^2 + 54x + 27$

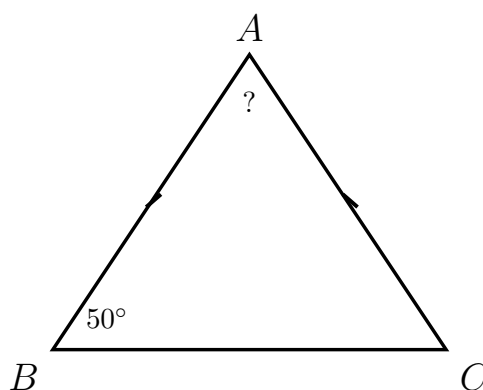
Q6. In the figure, lines $l \parallel m$ are cut by transversal t . A pair of alternate interior angles are $(3y - 15)^\circ$ and $(y + 25)^\circ$. Find y .



- (A) 20
- (B) 25
- (C) 30
- (D) 35

Q7. In the figure, $\triangle ABC$ is isosceles with $AB = AC$. If $\angle ABC = 50^\circ$, find $\angle BAC$.



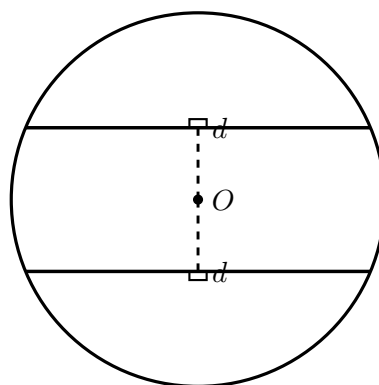


- (A) 60°
- (B) 80°
- (C) 90°
- (D) 100°

Q8. In trapezium $ABCD$, $AB \parallel DC$. If $\angle DAB = 70^\circ$ and $\angle CBA = 65^\circ$, find $\angle ADC$.

- (A) 95°
- (B) 100°
- (C) 110°
- (D) 120°

Q9. In a circle of radius 13 cm, two equal chords are at equal distances from the centre. If one chord has length 24 cm, find the distance of each chord from the centre.



- (A) 2 cm



- (B) 3 cm
- (C) 4 cm
- (D) 5 cm

Q10. A quadrilateral $ABCD$ has a diagonal $AC = 12$ cm. The perpendicular distances from B and D to AC are 4 cm and 5 cm respectively. Find the area of $ABCD$.

- (A) 54 cm^2
- (B) 60 cm^2
- (C) 66 cm^2
- (D) 72 cm^2

Q11. A solid consists of a cylinder of radius 7 cm and height 10 cm, with a hemisphere of the same radius placed on one end. Find the total volume.

(Use $\pi = \frac{22}{7}$.)

- (A) $2156\frac{2}{3} \text{ cm}^3$
- (B) $2258\frac{2}{3} \text{ cm}^3$
- (C) 2360 cm^3
- (D) 2464 cm^3

Q12. The cumulative frequency data is: marks < 20 : 5; marks < 40 : 15; marks < 60 : 35; marks < 80 : 50. How many students scored marks in the range $[40, 60)$?

- (A) 15
- (B) 18
- (C) 20
- (D) 25

Q13. Cards numbered 1 to 20 are placed in a box. One card is drawn at random. What is the probability that the number on the card is divisible by both 3 and 4?



- (A) $\frac{1}{10}$
- (B) $\frac{1}{12}$
- (C) $\frac{1}{15}$
- (D) $\frac{1}{20}$

Q14. If the points $P(k, 3)$, $Q(6, -1)$, and $R(3, 1)$ are collinear, find the value of k .

- (A) 0
- (B) 1
- (C) 2
- (D) 3

Q15. Factorise: $x^2 + 5x + 6$.

- (A) $(x + 1)(x + 6)$
- (B) $(x + 2)(x + 3)$
- (C) $(x + 3)(x + 4)$
- (D) $(x + 4)(x + 5)$



Detailed Solutions

Q1.

Solution

Concept — Number Systems (Laws of Exponents): When multiplying powers with the same base, add the exponents: $a^m \times a^n = a^{m+n}$.

Step 1 — Add the exponents.

$$5^{1/2} \times 5^{3/2} = 5^{1/2 + 3/2} = 5^{4/2} = 5^2 = 25.$$

Why other options are wrong:

- Option A: $5 = 5^1$ would require the exponent sum to equal 1; here the sum is 2.
- Option B: 10 is not a power of 5.
- Option C: 15 is not a power of 5.

Final Answer: $5^{1/2} \times 5^{3/2} = 25 \Rightarrow \boxed{\text{D}}$

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

Q2.

Solution

Concept — Squares and Square Roots (Pythagorean Triplet): A Pythagorean triplet (a, b, c) satisfies $a^2 + b^2 = c^2$.

Step 1 — Test option A.

$$5^2 + 12^2 = 25 + 144 = 169 = 13^2. \quad \checkmark$$

Step 2 — Verify the other options are not triplets.

- Option B: $6^2 + 7^2 = 36 + 49 = 85 \neq 64 = 8^2$.
- Option C: $3^2 + 5^2 = 9 + 25 = 34 \neq 36 = 6^2$.
- Option D: $4^2 + 6^2 = 16 + 36 = 52 \neq 81 = 9^2$.

Final Answer: $(5, 12, 13)$ is a Pythagorean triplet $\Rightarrow \boxed{\text{A}}$

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



Q3.

Solution

Concept — Inverse Proportion: More taps take less time to fill the same tank. If n_1 taps take t_1 hours and n_2 taps take t_2 hours, then $n_1 t_1 = n_2 t_2$.

Step 1 — Set up and solve.

$$5 \times 24 = 8 \times t \implies t = \frac{120}{8} = 15 \text{ hours.}$$

Why other options are wrong:

- Option A: $8 \times 12 = 96 \neq 120$.
- Option C: $8 \times 16 = 128 \neq 120$.
- Option D: $8 \times 18 = 144 \neq 120$.

Final Answer: 8 taps take 15 hours $\Rightarrow$ **B**

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

Q4.

Solution

Concept — Comparing Quantities (SI and CI):

$$SI = \frac{PRT}{100}, \quad CI = P \left[\left(1 + \frac{r}{100} \right)^n - 1 \right].$$

Step 1 — Compute SI.

$$SI = \frac{5000 \times 10 \times 2}{100} = \text{Rs. } 1000.$$

Step 2 — Compute CI.

$$CI = 5000[(1.1)^2 - 1] = 5000 \times 0.21 = \text{Rs. } 1050.$$

Step 3 — Difference.

$$CI - SI = 1050 - 1000 = \text{Rs. } 50.$$

Quick check: For $n = 2$, $CI - SI = P \left(\frac{r}{100} \right)^2 = 5000 \times 0.01 = 50. \checkmark$

Why other options are wrong: Rs. 30, Rs. 40, and Rs. 60 all arise from arithmetic



errors in the computation above.

Final Answer: Difference = Rs. 50 $\Rightarrow$ C

Answer: (C) [Go Back to Q 4](#)

Q5.

Solution

Concept — Algebraic Identities: $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.

Step 1 — Identify a and b . Here $a = 2x$ and $b = 3$.

Step 2 — Expand term by term.

$$a^3 = (2x)^3 = 8x^3, \quad 3a^2b = 3 \cdot (4x^2) \cdot 3 = 36x^2, \quad 3ab^2 = 3 \cdot (2x) \cdot 9 = 54x, \quad b^3 = 27.$$

Step 3 — Combine.

$$(2x + 3)^3 = 8x^3 + 36x^2 + 54x + 27.$$

Why other options are wrong:

- Option A: $12x^2$ treats $3a^2b$ as $3 \cdot (2x^2) \cdot 3$, forgetting to square the coefficient 2.
- Option B: $24x^2$ treats $a = 2$ (not $2x$) in the $3a^2b$ term.
- Option C: Middle terms $18x^2$ and $27x$ are both incorrect.

Final Answer: $(2x + 3)^3 = 8x^3 + 36x^2 + 54x + 27 \Rightarrow$ D

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

Q6.

Solution

Concept — Lines and Angles: Alternate interior angles formed when a transversal cuts two parallel lines are equal.

Step 1 — Set the angles equal.

$$(3y - 15)^\circ = (y + 25)^\circ.$$



Step 2 — Solve for y .

$$3y - 15 = y + 25 \implies 2y = 40 \implies y = 20.$$

Step 3 — Verify. $(3 \times 20 - 15)^\circ = 45^\circ$ and $(20 + 25)^\circ = 45^\circ$. ✓

Why other options are wrong:

- Option B: $y = 25$ gives $60^\circ \neq 50^\circ$.
- Option C: $y = 30$ gives $75^\circ \neq 55^\circ$.
- Option D: $y = 35$ gives $90^\circ \neq 60^\circ$.

Final Answer: $y = 20 \Rightarrow$ A

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

Q7.

Solution

Concept — Triangles (Isosceles Triangle): In an isosceles triangle, the base angles (the angles opposite the equal sides) are equal.

Step 1 — Identify base angles. $AB = AC \Rightarrow$ the angles opposite these sides are equal: $\angle ACB = \angle ABC = 50^\circ$.

Step 2 — Apply angle sum property.

$$\angle BAC = 180^\circ - \angle ABC - \angle ACB = 180^\circ - 50^\circ - 50^\circ = 80^\circ.$$

Why other options are wrong:

- Option A: 60° would require an equilateral triangle (all angles 60°).
- Option C: 90° would require base angles of 45° each.
- Option D: 100° gives a total of $200^\circ > 180^\circ$, which is impossible.

Final Answer: $\angle BAC = 80^\circ \Rightarrow$ B

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



Q8.

Solution

Concept — Quadrilaterals (Trapezium): In a trapezium with $AB \parallel DC$, the co-interior (same-side interior) angles are supplementary: $\angle DAB + \angle ADC = 180^\circ$.

Step 1 — Find $\angle ADC$.

$$\angle ADC = 180^\circ - \angle DAB = 180^\circ - 70^\circ = 110^\circ.$$

Step 2 — Verify the angle sum. Similarly, $\angle BCD = 180^\circ - \angle CBA = 180^\circ - 65^\circ = 115^\circ$. Sum: $70^\circ + 65^\circ + 110^\circ + 115^\circ = 360^\circ$. ✓

Why other options are wrong:

- Option A: $70^\circ + 95^\circ = 165^\circ \neq 180^\circ$.
- Option B: $70^\circ + 100^\circ = 170^\circ \neq 180^\circ$.
- Option D: $70^\circ + 120^\circ = 190^\circ \neq 180^\circ$.

Final Answer: $\angle ADC = 110^\circ \Rightarrow \boxed{\text{C}}$

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

Q9.

Solution

Concept — Circles (Equal Chords): Equal chords of a circle are equidistant from the centre. The perpendicular from the centre to a chord bisects it. By Pythagoras:

$$d = \sqrt{r^2 - \left(\frac{\text{chord}}{2}\right)^2}.$$

Step 1 — Find the half-chord length.

$$\text{Half-chord} = \frac{24}{2} = 12 \text{ cm.}$$

Step 2 — Apply Pythagoras.

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

Why other options are wrong:

- Option A: $d = 2$ gives half-chord $= \sqrt{13^2 - 4} = \sqrt{165} \neq 12$.



- Option B: $d = 3$ gives half-chord $= \sqrt{169 - 9} = \sqrt{160} \neq 12$.
- Option C: $d = 4$ gives half-chord $= \sqrt{169 - 16} = \sqrt{153} \neq 12$.

Final Answer: Distance from centre $= 5 \text{ cm} \Rightarrow \boxed{\text{D}}$

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

Q10.

Solution

Concept — Mensuration (Area of Quadrilateral): Area of a quadrilateral using a diagonal d and perpendicular heights h_1, h_2 from opposite vertices:

$$\text{Area} = \frac{1}{2} \times d \times (h_1 + h_2).$$

Step 1 — Substitute the values.

$$\text{Area} = \frac{1}{2} \times AC \times (h_B + h_D) = \frac{1}{2} \times 12 \times (4 + 5) = \frac{1}{2} \times 12 \times 9 = 54 \text{ cm}^2.$$

Why other options are wrong:

- Option B: $60 = \frac{1}{2} \times 12 \times 10$ uses an incorrect height sum of 10.
- Option C: $66 = \frac{1}{2} \times 12 \times 11$ uses an incorrect height sum of 11.
- Option D: $72 = \frac{1}{2} \times 12 \times 12$ uses an incorrect height sum of 12.

Final Answer: Area of $ABCD = 54 \text{ cm}^2 \Rightarrow \boxed{\text{A}}$

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

Q11.

Solution

Concept — Surface Areas and Volumes: Total volume = Volume of cylinder + Volume of hemisphere.

$$V_{\text{cyl}} = \pi r^2 h, \quad V_{\text{hemi}} = \frac{2}{3} \pi r^3.$$

Step 1 — Volume of cylinder.

$$V_{\text{cyl}} = \frac{22}{7} \times 49 \times 10 = 22 \times 7 \times 10 = 1540 \text{ cm}^3.$$



Step 2 — Volume of hemisphere.

$$V_{\text{hemi}} = \frac{2}{3} \times \frac{22}{7} \times 343 = \frac{2}{3} \times 22 \times 49 = \frac{2}{3} \times 1078 = \frac{2156}{3} \text{ cm}^3.$$

Step 3 — Total volume.

$$V = 1540 + \frac{2156}{3} = \frac{4620 + 2156}{3} = \frac{6776}{3} = 2258\frac{2}{3} \text{ cm}^3.$$

Why other options are wrong:

- Option A: $2156\frac{2}{3} \text{ cm}^3$ is the hemisphere volume alone (cylinder omitted).
- Option C: 2360 cm^3 is an arithmetic error.
- Option D: 2464 cm^3 is an arithmetic error.

Final Answer: Total volume = $2258\frac{2}{3} \text{ cm}^3 \Rightarrow \boxed{\text{B}}$

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

Q12.

Solution

Concept — Statistics (Cumulative Frequency): In a cumulative frequency distribution, the frequency of any class $[a, b)$ equals the cumulative frequency up to b minus the cumulative frequency up to a .

Step 1 — Read the relevant cumulative frequencies. Cumulative frequency up to 60 = 35; cumulative frequency up to 40 = 15.

Step 2 — Find class frequency.

$$\text{Students in } [40, 60) = 35 - 15 = 20.$$

Why other options are wrong:

- Option A: 15 is the cumulative frequency up to 40, not the class frequency.
- Option B: 18 has no basis in the given data.
- Option D: 25 would require cumulative frequencies of $50 - 25$, which does not match the data.

Final Answer: Students in $[40, 60) = 20 \Rightarrow \boxed{\text{C}}$

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



Q13.

Solution

Concept — Probability: $P(\text{event}) = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$. A number divisible by both 3 and 4 must be divisible by $\text{lcm}(3, 4) = 12$.

Step 1 — Find favourable outcomes. Numbers from 1 to 20 divisible by 12: only 12. Favourable outcomes = 1.

Step 2 — Calculate probability.

$$P = \frac{1}{20}.$$

Why other options are wrong:

- Option A: $\frac{1}{10}$ would require 2 favourable outcomes; there is only 1.
- Option B: $\frac{1}{12}$ confuses the divisor 12 with the probability denominator.
- Option C: $\frac{1}{15}$ has no basis in this problem.

Final Answer: $P = \frac{1}{20} \Rightarrow \boxed{\text{D}}$

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

Q14.

Solution

Concept — Coordinate Geometry (Collinear Points): Three points are collinear if the area of the triangle they form is zero:

$$\text{Area} = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)| = 0.$$

Step 1 — Substitute $P(k, 3)$, $Q(6, -1)$, $R(3, 1)$.

$$\text{Area} = \frac{1}{2} |k(-1 - 1) + 6(1 - 3) + 3(3 - (-1))| = \frac{1}{2} |-2k - 12 + 12| = \frac{1}{2} |-2k| = |k|.$$

Step 2 — Set area to zero.

$$|k| = 0 \implies k = 0.$$



Step 3 — Verify. Slope $PQ = \frac{-1-3}{6-0} = -\frac{2}{3}$; slope $PR = \frac{1-3}{3-0} = -\frac{2}{3}$. ✓

Why other options are wrong:

- Option B: $k = 1$ gives $|k| = 1 \neq 0$.
- Option C: $k = 2$ gives $|k| = 2 \neq 0$.
- Option D: $k = 3$ gives $|k| = 3 \neq 0$.

Final Answer: $k = 0 \Rightarrow$ A

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

Q15.

Solution

Concept — Polynomials (Factorisation): To factorise $x^2 + bx + c$, find two numbers whose product is c and whose sum is b .

Step 1 — Identify the required numbers. Product = 6, Sum = 5. The numbers are 2 and 3 ($2 \times 3 = 6$, $2 + 3 = 5$).

Step 2 — Write the factorisation.

$$x^2 + 5x + 6 = (x + 2)(x + 3).$$

Verify: $(x + 2)(x + 3) = x^2 + 3x + 2x + 6 = x^2 + 5x + 6$. ✓

Why other options are wrong:

- Option A: $(x + 1)(x + 6) = x^2 + 7x + 6$ (sum $7 \neq 5$).
- Option C: $(x + 3)(x + 4) = x^2 + 7x + 12$ (product $12 \neq 6$, sum $7 \neq 5$).
- Option D: $(x + 4)(x + 5) = x^2 + 9x + 20$ (product $20 \neq 6$, sum $9 \neq 5$).

Final Answer: $x^2 + 5x + 6 = (x + 2)(x + 3) \Rightarrow$ B

Answer: (B) [Go Back to Q 15](#)



Answer Key

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

