

NMMS Gujarat Mathematics

Sample Paper – 7

Duration: 20 Minutes

Maximum Marks: 20

Instructions

- This paper contains **20** Multiple Choice Questions (Single Correct Answer), modelled on the Mathematics portion of **NMMS Gujarat** (National Means-cum-Merit Scholarship).
- Each correct answer carries **+1 mark**. There is **no negative marking** for incorrect or unattempted answers.
- Only **one** option is correct per question.
- Syllabus level: **Class 7 & 8 Mathematics — NCERT / GSEB curriculum**.
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited during the examination.

Q1. Subtract $\frac{-3}{4}$ from $\frac{1}{2}$.

(A) $\frac{-5}{4}$

(B) $\frac{1}{4}$

(C) $\frac{5}{4}$

(D) $\frac{7}{4}$

Q2. Find the square root of 2025 using prime factorisation.

(A) 45

(B) 42

(C) 48

(D) 50

Q3. Which of the following is a perfect cube?

(A) 196

(B) 250

(C) 300



(D) 343

Q4. Simplify: $3^{-2} \times 3^4$

(A) 3

(B) 9

(C) 27

(D) 81

Q5. The sum of two consecutive integers is 43. Find the smaller integer.

(A) 21

(B) 22

(C) 20

(D) 23

Q6. Expand using the appropriate identity: $(3x + 2y)^2$

(A) $9x^2 + 4y^2$

(B) $9x^2 + 6xy + 4y^2$

(C) $9x^2 + 12xy + 4y^2$

(D) $3x^2 + 12xy + 2y^2$

Q7. If $p = 3$ and $q = -2$, find the value of $2p^2 - 3pq + q^2$.

(A) 4

(B) 22

(C) 32

(D) 40

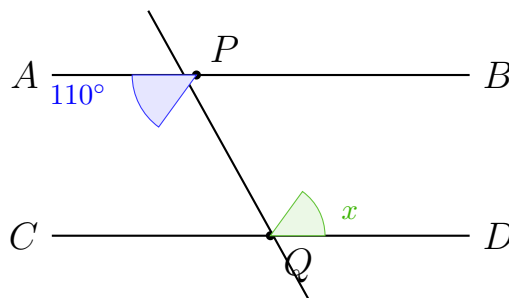
Q8. Factorize completely: $4x^2 - 9y^2$

(A) $(4x - 9y)(x + y)$

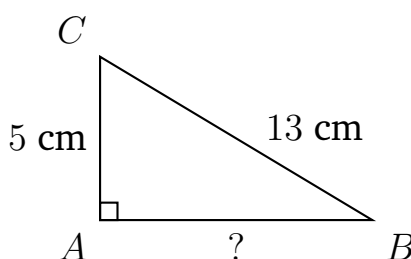


- (B) $(2x - 3y)(2x + 3y)$
(C) $(2x - 3y)^2$
(D) $(4x - 3y)(x + 3y)$

Q9. In the figure, $AB \parallel CD$. A transversal crosses AB at P and CD at Q . If $\angle APQ = 110^\circ$, find the co-interior angle $\angle CQP$.



- (A) 70°
(B) 110°
(C) 55°
(D) 90°
- Q10.** An equilateral triangle has each side equal to 6 cm. Find its perimeter.
- (A) 12 cm
(B) 15 cm
(C) 18 cm
(D) 24 cm
- Q11.** In the right-angled triangle shown, one leg is 5 cm and the hypotenuse is 13 cm. Find the length of the other leg.

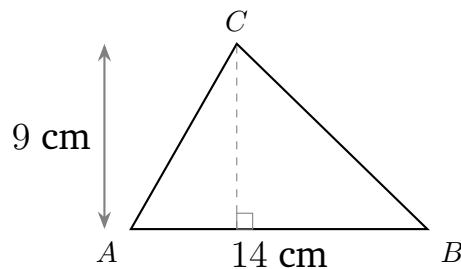


- (A) 8 cm
- (B) 12 cm
- (C) 10 cm
- (D) 14 cm

Q12. The length of a rectangle is 3 times its width. If the perimeter is 48 cm, find the length.

- (A) 6 cm
- (B) 12 cm
- (C) 15 cm
- (D) 18 cm

Q13. Find the area of the triangle shown below with base 14 cm and height 9 cm.



- (A) 126 cm^2
- (B) 49 cm^2
- (C) 63 cm^2
- (D) 27 cm^2

Q14. Find the circumference of a circle with diameter 14 cm. $\left(\pi = \frac{22}{7}\right)$

- (A) 44 cm
- (B) 88 cm
- (C) 22 cm
- (D) 154 cm



- Q15.** Find the volume of a cylinder with radius 7 cm and height 10 cm. $\left(\pi = \frac{22}{7}\right)$
- (A) 440 cm^3
(B) 700 cm^3
(C) 1100 cm^3
(D) 1540 cm^3
- Q16.** A man buys a watch for Rs. 800 and sells it for Rs. 920. Find his profit percentage.
- (A) 10%
(B) 15%
(C) 12%
(D) 20%
- Q17.** An article costs Rs. 1200. If it is sold at a profit of 25%, find the profit earned.
- (A) Rs. 200
(B) Rs. 250
(C) Rs. 300
(D) Rs. 400
- Q18.** Find the Simple Interest on Rs. 4500 at 6% p.a. for 4 years.
- (A) Rs. 1080
(B) Rs. 1200
(C) Rs. 900
(D) Rs. 720
- Q19.** Find the mode of the following data: 8, 5, 7, 8, 3, 7, 8, 5, 2
- (A) 5



- (B) 7
- (C) 2
- (D) 8

Q20. The marks obtained by five students are given below. Find the mean marks.

Student	Anil	Bina	Charu	Dev	Esha
Marks	72	85	68	90	75

- (A) 75
- (B) 78
- (C) 80
- (D) 85



Detailed Solutions

Q1.

Solution

Concept — Subtracting Rational Numbers: “Subtract A from B ” means $B - A$.

So we compute $\frac{1}{2} - \left(\frac{-3}{4}\right) = \frac{1}{2} + \frac{3}{4}$.

Step 1 — Make the denominators the same (LCM of 2 and 4 is 4):

$$\frac{1}{2} = \frac{2}{4}$$

Step 2 — Add:

$$\frac{2}{4} + \frac{3}{4} = \frac{5}{4}$$

Why other options are wrong:

- Option A: $\frac{-5}{4}$ — sign error; subtracting a negative gives a positive sum.
- Option B: $\frac{1}{4}$ — incorrect result; $\frac{2}{4} - \frac{3}{4} = -\frac{1}{4}$, not a match.
- Option D: $\frac{7}{4}$ — arithmetic error; $\frac{3}{2} + \frac{1}{4} = \frac{7}{4}$ but both terms are wrong.

Final Answer: $\frac{1}{2} - \left(\frac{-3}{4}\right) = \frac{5}{4} \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q1](#)

Q2.

Solution

Concept — Square Root by Prime Factorisation: Express the number as a product of prime pairs, then take one from each pair.

Step 1 — Prime factorise 2025:

$$2025 = 5^2 \times 81 = 5^2 \times 3^4$$

Step 2 — Take the square root:

$$\sqrt{2025} = \sqrt{5^2 \times 3^4} = 5 \times 3^2 = 5 \times 9 = 45$$

Verification: $45^2 = 2025 \checkmark$

Why other options are wrong:



- Option B: $42^2 = 1764 \neq 2025$.
- Option C: $48^2 = 2304 \neq 2025$.
- Option D: $50^2 = 2500 \neq 2025$.

Final Answer: $\sqrt{2025} = 45 \Rightarrow \boxed{A}$

Answer: (A) [Go Back to Q2](#)

Q3.

Solution

Concept — Identifying Perfect Cubes: A number is a perfect cube if it equals n^3 for some integer n .

Step 1 — Check each option:

- $196 = 14^2$ (perfect square, not a cube).
- $250 = 2 \times 125 = 2 \times 5^3$ — not a perfect cube (extra factor of 2).
- $300 = 4 \times 75 = 2^2 \times 3 \times 5^2$ — not a perfect cube.
- $343 = 7^3$ ✓

Step 2 — Verify: $7 \times 7 = 49$; $49 \times 7 = 343$ ✓

Final Answer: $343 = 7^3$ is a perfect cube $\Rightarrow \boxed{D}$

Answer: (D) [Go Back to Q3](#)

Q4.

Solution

Concept — Laws of Exponents (Product Rule): $a^m \times a^n = a^{m+n}$.

Step 1 — Apply the product rule:

$$3^{-2} \times 3^4 = 3^{-2+4} = 3^2 = 9$$

Why other options are wrong:

- Option A: $3 = 3^1$ — requires exponent $-2 + 3 = 1$, not $-2 + 4 = 2$.
- Option C: $27 = 3^3$ — requires exponent $-2 + 5 = 3$.
- Option D: $81 = 3^4$ — ignores the 3^{-2} factor.

Final Answer: $3^{-2} \times 3^4 = 9 \Rightarrow \boxed{B}$



Answer: (B) [Go Back to Q4](#)

Q5.

Solution

Concept — Setting up and Solving a Linear Equation from a Word Problem:

Let the smaller integer be n ; then the next consecutive integer is $n + 1$.

Step 1 — Form the equation:

$$n + (n + 1) = 43 \implies 2n + 1 = 43 \implies 2n = 42 \implies n = 21$$

Step 2 — Identify the two integers: Smaller = 21, larger = 22. Sum = $21 + 22 = 43$ ✓

Why other options are wrong:

- Option B: 22 — this is the *larger* integer, not the smaller.
- Option C: $20 + 21 = 41 \neq 43$.
- Option D: $23 + 24 = 47 \neq 43$.

Final Answer: Smaller integer = 21 $\Rightarrow$ **A**

Answer: (A) [Go Back to Q5](#)

Q6.

Solution

Concept — Identity $(a + b)^2 = a^2 + 2ab + b^2$: Here $a = 3x$ and $b = 2y$.

Step 1 — Compute each term:

$$a^2 = (3x)^2 = 9x^2, \quad b^2 = (2y)^2 = 4y^2, \quad 2ab = 2(3x)(2y) = 12xy$$

Step 2 — Combine:

$$(3x + 2y)^2 = 9x^2 + 12xy + 4y^2$$

Why other options are wrong:

- Option A: $9x^2 + 4y^2$ — missing the middle term $2ab = 12xy$.
- Option B: $9x^2 + 6xy + 4y^2$ — $2ab = 12xy$, not $6xy$.
- Option D: $3x^2 + 12xy + 2y^2$ — fails to square $3x$ and $2y$ correctly.



Final Answer: $(3x + 2y)^2 = 9x^2 + 12xy + 4y^2 \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q6](#)

Q7.

Solution

Concept — Substituting Negative Values into an Expression: $p = 3, q = -2$.

Step 1 — Compute each term:

$$2p^2 = 2(3)^2 = 2 \times 9 = 18$$

$$-3pq = -3(3)(-2) = +18$$

$$q^2 = (-2)^2 = 4$$

Step 2 — Add:

$$2p^2 - 3pq + q^2 = 18 + 18 + 4 = 40$$

Why other options are wrong:

- Option A: $4 = q^2$ alone — ignores the other two terms.
- Option B: $22 = 18 + 4$ — forgets the $-3pq$ term.
- Option C: $32 = 18 + 10 + 4$ — incorrect calculation of $-3pq$.

Final Answer: $2p^2 - 3pq + q^2 = 40 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q7](#)

Q8.

Solution

Concept — Difference of Two Squares Identity: $a^2 - b^2 = (a - b)(a + b)$.

Step 1 — Identify a and b : $4x^2 = (2x)^2$ and $9y^2 = (3y)^2$.

Step 2 — Apply the identity:

$$4x^2 - 9y^2 = (2x)^2 - (3y)^2 = (2x - 3y)(2x + 3y)$$

Why other options are wrong:

- Option A: $(4x - 9y)(x + y) = 4x^2 + 4xy - 9xy - 9y^2 = 4x^2 - 5xy - 9y^2$ —



middle term present, wrong.

- Option C: $(2x - 3y)^2 = 4x^2 - 12xy + 9y^2$ — middle term, plus sign on $9y^2$.
- Option D: $(4x - 3y)(x + 3y) = 4x^2 + 12xy - 3xy - 9y^2$ — cross term present.

Final Answer: $(2x - 3y)(2x + 3y) \Rightarrow$ B

Answer: (B) [Go Back to Q8](#)

Q9.

Solution

Concept — Co-interior Angles (Same-Side Interior Angles): When $AB \parallel CD$ are cut by a transversal, co-interior angles on the same side are supplementary: they add up to 180° .

Step 1 — Set up the equation: $\angle APQ$ and $\angle CQP$ are co-interior angles (both between the parallels, on the left side of the transversal).

$$\angle APQ + \angle CQP = 180^\circ$$

Step 2 — Solve:

$$110^\circ + \angle CQP = 180^\circ \implies \angle CQP = 70^\circ$$

Why other options are wrong:

- Option B: 110° — this is the corresponding angle or alternate exterior angle, not the co-interior.
- Option C: 55° — $110 + 55 = 165 \neq 180$.
- Option D: 90° — $110 + 90 = 200 \neq 180$.

Final Answer: $\angle CQP = 70^\circ \Rightarrow$ A

Answer: (A) [Go Back to Q9](#)



Q10.

Solution

Concept — Perimeter of an Equilateral Triangle: All three sides of an equilateral triangle are equal, so $\text{Perimeter} = 3 \times \text{side}$.

Step 1 — Apply the formula:

$$\text{Perimeter} = 3 \times 6 = 18 \text{ cm}$$

Why other options are wrong:

- Option A: $12 \text{ cm} = 2 \times 6$ — perimeter of 2 sides only.
- Option B: 15 cm — uses 2.5 sides.
- Option D: $24 \text{ cm} = 4 \times 6$ — perimeter of a square with side 6.

Final Answer: $\text{Perimeter} = 18 \text{ cm} \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q10](#)

Q11.

Solution

Concept — Pythagoras' Theorem (finding a leg):

$$\text{leg}^2 = \text{hypotenuse}^2 - \text{other leg}^2$$

Step 1 — Substitute:

$$\text{leg}^2 = 13^2 - 5^2 = 169 - 25 = 144$$

Step 2 — Take the square root:

$$\text{leg} = \sqrt{144} = 12 \text{ cm}$$

Note: (5, 12, 13) is a Pythagorean triple.

Why other options are wrong:

- Option A: $8^2 = 64$; $64 + 25 = 89 \neq 169$.
- Option C: $10^2 = 100$; $100 + 25 = 125 \neq 169$.
- Option D: $14^2 = 196$; $196 + 25 = 221 \neq 169$.



Final Answer: Other leg = 12 cm $\Rightarrow$ **B**

Answer: (B) [Go Back to Q11](#)

Q12.

Solution

Concept — Perimeter of a Rectangle and Setting up Equations: Perimeter = $2(l + w)$; given $l = 3w$.

Step 1 — Write the perimeter equation:

$$2(l + w) = 48 \implies l + w = 24$$

Step 2 — Substitute $l = 3w$:

$$3w + w = 24 \implies 4w = 24 \implies w = 6 \text{ cm}$$

$$l = 3 \times 6 = 18 \text{ cm}$$

Verify: $2(18 + 6) = 2 \times 24 = 48 \text{ cm} \checkmark$

Why other options are wrong:

- Option A: 6 cm — this is the width, not the length.
- Option B: 12 cm — $l = 12$, then $w = 4$; $2(12 + 4) = 32 \neq 48$.
- Option C: 15 cm — $l = 15$, $w = 5$; $2(20) = 40 \neq 48$.

Final Answer: Length = 18 cm $\Rightarrow$ **D**

Answer: (D) [Go Back to Q12](#)

Q13.

Solution

Concept — Area of a Triangle:

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

Step 1 — Substitute base = 14 cm and height = 9 cm:

$$\text{Area} = \frac{1}{2} \times 14 \times 9 = 7 \times 9 = 63 \text{ cm}^2$$



Why other options are wrong:

- Option A: $126 \text{ cm}^2 = 14 \times 9$ — forgets to multiply by $\frac{1}{2}$.
- Option B: $49 \text{ cm}^2 = 7^2$ — incorrect formula.
- Option D: $27 \text{ cm}^2 = \frac{1}{2} \times 9 \times 6$ — uses wrong base or height.

Final Answer: Area = $63 \text{ cm}^2 \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q13](#)

Q14.

Solution

Concept — Circumference of a Circle:

$$\text{Circumference} = \pi d \quad (\text{or } 2\pi r)$$

Step 1 — Substitute $d = 14 \text{ cm}$ and $\pi = \frac{22}{7}$:

$$C = \frac{22}{7} \times 14 = 22 \times 2 = 44 \text{ cm}$$

Why other options are wrong:

- Option B: $88 \text{ cm} = \pi \times 28$ — uses diameter 28 (i.e. $2d$) instead of $d = 14$.
- Option C: $22 \text{ cm} = \pi \times 7$ — uses radius 7 instead of diameter 14.
- Option D: $154 \text{ cm}^2 = \pi r^2$ — this is the *area*, not the circumference.

Final Answer: Circumference = $44 \text{ cm} \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q14](#)

Q15.

Solution

Concept — Volume of a Cylinder:

$$V = \pi r^2 h$$



Step 1 — Substitute $r = 7$ cm, $h = 10$ cm, $\pi = \frac{22}{7}$:

$$V = \frac{22}{7} \times 7^2 \times 10 = \frac{22}{7} \times 49 \times 10 = 22 \times 7 \times 10 = 1540 \text{ cm}^3$$

Why other options are wrong:

- Option A: 440 cm^3 — uses $r = 7$ but forgets to square it ($\pi r h$ instead of $\pi r^2 h$).
- Option B: 700 cm^3 — arithmetic error.
- Option C: 1100 cm^3 — uses $\pi \approx \frac{22}{14}$ (halved incorrectly).

Final Answer: Volume = $1540 \text{ cm}^3 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q15](#)

Q16.

Solution

Concept — Profit Percentage:

$$\text{Profit\%} = \frac{\text{Profit}}{\text{CP}} \times 100$$

Step 1 — Calculate profit:

$$\text{Profit} = \text{SP} - \text{CP} = 920 - 800 = \text{Rs. } 120$$

Step 2 — Calculate profit%:

$$\text{Profit\%} = \frac{120}{800} \times 100 = \frac{12000}{800} = 15\%$$

Why other options are wrong:

- Option A: $10\% \Rightarrow \text{profit} = 10\% \times 800 = 80$; SP would be $880 \neq 920$.
- Option C: $12\% \Rightarrow \text{profit} = 96$; SP = $896 \neq 920$.
- Option D: $20\% \Rightarrow \text{profit} = 160$; SP = $960 \neq 920$.

Final Answer: Profit% = $15\% \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q16](#)



Q17.

Solution**Concept — Calculating Profit Amount:**

$$\text{Profit} = \frac{\text{Profit}\%}{100} \times \text{CP}$$

Step 1 — Substitute values:

$$\text{Profit} = \frac{25}{100} \times 1200 = \frac{1}{4} \times 1200 = \text{Rs. } 300$$

Why other options are wrong:

- Option A: Rs. 200 $\Rightarrow$ profit% = $\frac{200}{1200} \times 100 \approx 16.7\%$, not 25%.
- Option B: Rs. 250 $\Rightarrow$ profit% $\approx 20.8\%$, not 25%.
- Option D: Rs. 400 $\Rightarrow$ profit% = $\frac{400}{1200} \times 100 \approx 33.3\%$, not 25%.

Final Answer: Profit = Rs. 300 $\Rightarrow$ CAnswer: (C) [Go Back to Q17](#)

Q18.

Solution**Concept — Simple Interest Formula:**

$$\text{SI} = \frac{P \times R \times T}{100}$$

Step 1 — Substitute $P = 4500$, $R = 6\%$, $T = 4$ years:

$$\text{SI} = \frac{4500 \times 6 \times 4}{100} = \frac{108000}{100} = \text{Rs. } 1080$$

Why other options are wrong:

- Option B: Rs. 1200 = $\frac{4500 \times 6 \times \frac{40}{9}}{100}$ — requires $T \approx 4.4$ years.
- Option C: Rs. 900 = $\frac{4500 \times 6 \times \frac{10}{3}}{100}$ — requires $T \approx 3.3$ years.
- Option D: Rs. 720 = $\frac{4500 \times 6 \times \frac{8}{3}}{100}$ — requires $T \approx 2.7$ years.

Final Answer: SI = Rs. 1080 $\Rightarrow$ A

Answer: (A) [Go Back to Q18](#)

Q19.

Solution

Concept — Mode of a Data Set: The mode is the value that appears most frequently.

Step 1 — Count the frequency of each value:

Value	Frequency
2	1
3	1
5	2
7	2
8	3

Step 2 — Identify the most frequent value: 8 appears 3 times, which is the highest frequency.

Why other options are wrong:

- Option A: 5 appears only 2 times.
- Option B: 7 appears only 2 times.
- Option C: 2 appears only 1 time.

Final Answer: Mode = 8 $\Rightarrow$ **D**

Answer: (D) [Go Back to Q19](#)

Q20.

Solution

Concept — Arithmetic Mean:

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

Step 1 — Find the sum:

$$72 + 85 + 68 + 90 + 75 = (72 + 68) + (85 + 75) + 90 = 140 + 160 + 90 = 390$$



Step 2 — Divide by the number of students (5):

$$\text{Mean} = \frac{390}{5} = 78$$

Why other options are wrong:

- Option A: 75 — this is one of the data values (Esha's marks), not the mean.
- Option C: 80 $\Rightarrow$ sum would be $400 \neq 390$.
- Option D: 85 — this is Bina's score (the highest), not the mean.

Final Answer: Mean = 78 $\Rightarrow$ B

Answer: (B) [Go Back to Q20](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	A	3	D	4	B	5	A
6	C	7	D	8	B	9	A	10	C
11	B	12	D	13	C	14	A	15	D
16	B	17	C	18	A	19	D	20	B

