

NMMS Gujarat Mathematics

Sample Paper – 2

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.

Q1. The value of $\frac{3}{4} + \frac{5}{6}$ is:

- (A) $\frac{17}{12}$
- (B) $\frac{19}{12}$
- (C) $\frac{7}{4}$
- (D) $\frac{11}{6}$

Q2. The area of a square field is 2916 cm^2 . What is the length of each side of the square?

- (A) 46 cm
- (B) 48 cm
- (C) 54 cm
- (D) 56 cm

Q3. The cube root of 5832 is:

- (A) 16
- (B) 17
- (C) 19



(D) 18

Q4. The value of $\frac{2^3 \times 2^4}{2^5}$ is:

(A) 4

(B) 8

(C) 16

(D) 2

Q5. When a certain number is increased by 12, the result is 31. What is the number?

(A) 17

(B) 19

(C) 21

(D) 23

Q6. The product of the monomial $3x$ and the binomial $(2x + 5)$ is:

(A) $5x^2 + 8x$

(B) $6x^2 + 8x$

(C) $6x^2 + 15x$

(D) $5x^2 + 15x$

Q7. If $a - b = 4$ and $ab = 5$, what is the value of $a^2 + b^2$?

(A) 20

(B) 22

(C) 24

(D) 26

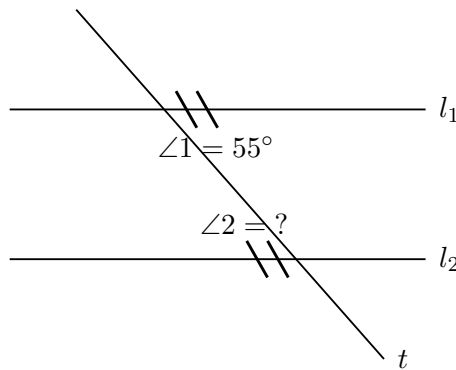
Q8. The correct factorisation of $a^2 - 9b^2$ is:

(A) $(a - 3b)(a + 3b)$



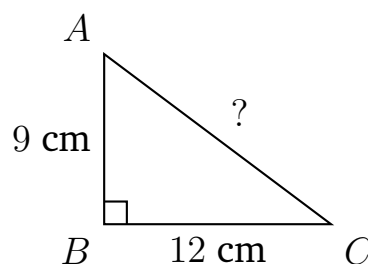
- (B) $(a - 3b)^2$
- (C) $(a + 3b)^2$
- (D) $(a + b)(a - 9b)$

Q9. In the figure below, $l_1 \parallel l_2$ and t is a transversal. If $\angle 1 = 55^\circ$, find $\angle 2$ (the alternate interior angle).



- (A) 125°
- (B) 55°
- (C) 35°
- (D) 115°

Q10. In the right triangle ABC shown below, $\angle B = 90^\circ$, $AB = 9$ cm and $BC = 12$ cm. Find the length of AC .



- (A) 13 cm
- (B) 14 cm
- (C) 15 cm
- (D) 16 cm



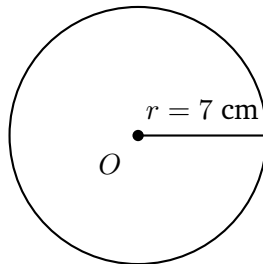
Q11. In $\triangle ABC$ and $\triangle PQR$, $\angle A = \angle P = 70^\circ$, $\angle B = \angle Q = 60^\circ$, and $AB = PQ = 7$ cm. The triangles are congruent by the **ASA** criterion. If $BC = 9$ cm, find QR .

- (A) 6 cm
- (B) 7 cm
- (C) 8 cm
- (D) 9 cm

Q12. A rectangle has length 8 cm and breadth 6 cm. Find the length of its diagonal.

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

Q13. Find the area of the circle shown below. (Use $\pi = \frac{22}{7}$)



- (A) 144 cm^2
- (B) 154 cm^2
- (C) 164 cm^2
- (D) 174 cm^2

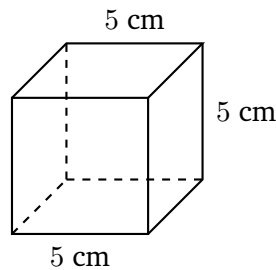
Q14. Find the circumference of a circle with diameter 14 cm. (Use $\pi = \frac{22}{7}$)

- (A) 40 cm
- (B) 42 cm



- (C) 44 cm
- (D) 48 cm

Q15. The figure shows a cube with side 5 cm. Find its total surface area.



- (A) 120 cm^2
- (B) 130 cm^2
- (C) 140 cm^2
- (D) 150 cm^2

Q16. The marked price of a book is Rs. 800 and its selling price is Rs. 640. Find the discount percentage.

- (A) 20%
- (B) 15%
- (C) 25%
- (D) 30%

Q17. A shopkeeper sold an article for Rs. 540 at a loss of 10%. Find the cost price of the article.

- (A) Rs. 580
- (B) Rs. 600
- (C) Rs. 620
- (D) Rs. 640

Q18. Find the compound interest on Rs. 5,000 at the rate of 10% per annum for 1 year, compounded annually.



- (A) Rs. 400
- (B) Rs. 450
- (C) Rs. 500
- (D) Rs. 550

Q19. Find the median of the following data:

12, 15, 18, 22, 25, 28, 30

- (A) 18
- (B) 20
- (C) 21
- (D) 22

Q20. A line graph shows the maximum daily temperature of a city for five days: Monday = 28°C , Tuesday = 32°C , Wednesday = 35°C , Thursday = 30°C , Friday = 27°C . On which day was the highest temperature recorded?

- (A) Wednesday
- (B) Tuesday
- (C) Thursday
- (D) Monday



Detailed Solutions

Q1.

Solution

Concept — Addition of Rational Numbers: To add fractions with unlike denominators, convert them to a common denominator using the LCM, then add the numerators.

Step 1 — Find the LCM of 4 and 6: $\text{LCM}(4, 6) = 12$.

Step 2 — Convert and add:

$$\frac{3}{4} + \frac{5}{6} = \frac{3 \times 3}{12} + \frac{5 \times 2}{12} = \frac{9}{12} + \frac{10}{12} = \frac{19}{12}$$

Why other options are wrong:

- Option A ($\frac{17}{12}$): Uses $9 + 8 = 17$ in the numerator – incorrect conversion of $\frac{5}{6}$ to twelfths (should be 10, not 8).
- Option C ($\frac{7}{4}$): Equals $\frac{21}{12}$; overcounts by one in the numerator.
- Option D ($\frac{11}{6}$): Equals $\frac{22}{12}$; arises from adding denominators ($4 + 6 = 10$) or other incorrect manipulation.

Final Answer: $\frac{3}{4} + \frac{5}{6} = \frac{19}{12} \Rightarrow \boxed{\text{B}}$

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

Q2.

Solution

Concept — Square Root of a Perfect Square: The side of a square with area A is $\sqrt{A}$. Use prime factorisation to find the square root.

Step 1 — Prime factorisation of 2916:

$$2916 = 4 \times 729 = 2^2 \times 3^6$$

Step 2 — Find the square root:

$$\sqrt{2916} = \sqrt{2^2 \times 3^6} = 2 \times 3^3 = 2 \times 27 = 54 \text{ cm}$$

Verification: $54^2 = (50 + 4)^2 = 2500 + 400 + 16 = 2916$. ✓



Why other options are wrong:

- Option A (46 cm): $46^2 = 2116 \neq 2916$.
- Option B (48 cm): $48^2 = 2304 \neq 2916$.
- Option D (56 cm): $56^2 = 3136 \neq 2916$.

Final Answer: Side = 54 cm $\Rightarrow$ C

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

Q3.

Solution

Concept — Cube Root by Prime Factorisation: Express the number as a product of prime factors. Group them into triples and take one factor from each triple.

Step 1 — Prime factorisation of 5832:

$$5832 = 8 \times 729 = 2^3 \times 3^6$$

Step 2 — Find the cube root:

$$\sqrt[3]{5832} = \sqrt[3]{2^3 \times 3^6} = 2^1 \times 3^2 = 2 \times 9 = 18$$

Why other options are wrong:

- Option A (16): $16^3 = 4096 \neq 5832$.
- Option B (17): $17^3 = 4913 \neq 5832$.
- Option C (19): $19^3 = 6859 \neq 5832$.

Final Answer: $\sqrt[3]{5832} = 18 \Rightarrow$ D

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



Q4.

Solution

Concept — Laws of Exponents: $a^m \times a^n = a^{m+n}$ and $\frac{a^m}{a^n} = a^{m-n}$.

Step 1 — Simplify the numerator:

$$2^3 \times 2^4 = 2^{3+4} = 2^7$$

Step 2 — Divide:

$$\frac{2^7}{2^5} = 2^{7-5} = 2^2 = 4$$

Why other options are wrong:

- Option B (8): Arises from evaluating $2^3 = 8$ alone and ignoring 2^4 in the numerator.
- Option C (16): Arises from computing $2^{3+4-3} = 2^4 = 16$; error in subtracting the exponent of the denominator.
- Option D (2): Arises from computing the exponent as $3 - 4 + 5 - 3 = 1$, giving $2^1 = 2$.

Final Answer: $\frac{2^3 \times 2^4}{2^5} = 2^2 = 4 \Rightarrow \boxed{A}$

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

Q5.

Solution

Concept — Linear Equations in One Variable: Represent the unknown by a variable, form an equation from the condition, and solve.

Step 1 — Form the equation: Let the number be x . The condition gives:

$$x + 12 = 31$$

Step 2 — Solve:

$$x = 31 - 12 = 19$$

Why other options are wrong:

- Option A (17): $17 + 12 = 29 \neq 31$.
- Option C (21): $21 + 12 = 33 \neq 31$.



- Option D (23): $23 + 12 = 35 \neq 31$.

Final Answer: The number is 19 $\Rightarrow$ B

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

Q6.

Solution

Concept — Monomial $\times$ Binomial: Use the distributive law: $a(b + c) = ab + ac$.

Step 1 — Distribute $3x$ over the binomial:

$$3x \times (2x + 5) = 3x \cdot 2x + 3x \cdot 5$$

Step 2 — Simplify each term:

$$= 6x^2 + 15x$$

Why other options are wrong:

- Option A ($5x^2 + 8x$): Both terms wrong; coefficient of x^2 should be $3 \times 2 = 6$ (not $3 + 2 = 5$), and coefficient of x should be $3 \times 5 = 15$ (not $3 + 5 = 8$).
- Option B ($6x^2 + 8x$): First term correct, but $3 \times 5 = 15 \neq 8$.
- Option D ($5x^2 + 15x$): Second term correct, but $3 \times 2 = 6 \neq 5$.

Final Answer: $3x(2x + 5) = 6x^2 + 15x \Rightarrow$ C

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

Q7.

Solution

Concept — Algebraic Identity: $(a - b)^2 = a^2 - 2ab + b^2$, rearranged gives $a^2 + b^2 = (a - b)^2 + 2ab$.

Step 1 — Compute $(a - b)^2$:

$$(a - b)^2 = 4^2 = 16$$



Step 2 — Apply the rearranged identity:

$$a^2 + b^2 = (a - b)^2 + 2ab = 16 + 2 \times 5 = 16 + 10 = 26$$

Why other options are wrong:

- Option A (20): Uses $a^2 + b^2 = (a - b)^2 + (a - b) = 16 + 4 = 20$ – substitutes $(a - b)$ for $2ab$.
- Option B (22): Computes $2ab$ incorrectly as 6 (perhaps misreads $ab = 3$): $16 + 6 = 22$.
- Option C (24): Uses $a^2 + b^2 = (a - b)^2 + 2(a - b) = 16 + 8 = 24$ – confuses ab with $(a - b)$ in the formula.

Final Answer: $a^2 + b^2 = 26 \Rightarrow \boxed{D}$

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

Q8.

Solution

Concept — Difference of Two Squares: $x^2 - y^2 = (x - y)(x + y)$.

Step 1 — Rewrite in the standard form:

$$a^2 - 9b^2 = a^2 - (3b)^2$$

Step 2 — Apply the identity with $x = a$, $y = 3b$:

$$a^2 - (3b)^2 = (a - 3b)(a + 3b)$$

Why other options are wrong:

- Option B $((a - 3b)^2)$: Expands to $a^2 - 6ab + 9b^2$, which has a middle term $-6ab$ not present in the original expression.
- Option C $((a + 3b)^2)$: Expands to $a^2 + 6ab + 9b^2$; all terms are positive.
- Option D $((a + b)(a - 9b))$: Expands to $a^2 - 9ab + ab - 9b^2 = a^2 - 8ab - 9b^2 \neq a^2 - 9b^2$.

Final Answer: $a^2 - 9b^2 = (a - 3b)(a + 3b) \Rightarrow \boxed{A}$

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



Q9.

Solution

Concept — Alternate Interior Angles: When two parallel lines are cut by a transversal, alternate interior angles (between the parallel lines, on opposite sides of the transversal) are equal.

Step 1 — Identify the angle pair: $\angle 1$ and $\angle 2$ lie between l_1 and l_2 , on opposite sides of transversal t . They are alternate interior angles.

Step 2 — Apply the theorem: Since $l_1 \parallel l_2$:

$$\angle 2 = \angle 1 = 55^\circ$$

Why other options are wrong:

- Option A (125°): This is the co-interior (same-side interior) angle of $\angle 1$: $55^\circ + 125^\circ = 180^\circ$.
- Option C (35°): No standard angle relationship with this transversal configuration produces 35° from 55° .
- Option D (115°): This is the supplement of 65° ; based on a wrongly assumed angle value.

Final Answer: $\angle 2 = 55^\circ \Rightarrow$ B

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

Q10.

Solution

Concept — Pythagoras Theorem: In a right triangle, $(\text{hypotenuse})^2 = (\text{leg}_1)^2 + (\text{leg}_2)^2$.

Step 1 — Identify the sides: $AB = 9$ cm and $BC = 12$ cm are the two legs; AC is the hypotenuse.

Step 2 — Apply the theorem:

$$AC^2 = AB^2 + BC^2 = 9^2 + 12^2 = 81 + 144 = 225$$

$$AC = \sqrt{225} = 15 \text{ cm}$$

Note: (9, 12, 15) is the (3, 4, 5) Pythagorean triple scaled by 3.

Why other options are wrong:



- Option A (13 cm): $9^2 + 12^2 = 225 \neq 169 = 13^2$. The (5, 12, 13) triple is a different family.
- Option B (14 cm): $14^2 = 196 \neq 225$.
- Option D (16 cm): $16^2 = 256 \neq 225$.

Final Answer: $AC = 15 \text{ cm} \Rightarrow \boxed{\text{C}}$

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

Q11.

Solution

Concept — ASA Congruence Criterion: If two angles and the included side of one triangle equal the corresponding parts of another triangle, the triangles are congruent.

Step 1 — Match corresponding elements:

- $\angle A = \angle P = 70^\circ$
- $AB = PQ = 7 \text{ cm}$ (side included between $\angle A$ and $\angle B$)
- $\angle B = \angle Q = 60^\circ$

By ASA: $\triangle ABC \cong \triangle PQR$.

Step 2 — Use corresponding sides: Since BC corresponds to QR under the congruence:

$$QR = BC = 9 \text{ cm}$$

Why other options are wrong:

- Option A (6 cm): No given measurement supports this value.
- Option B (7 cm): This is the length of $AB = PQ$, not of QR .
- Option C (8 cm): Incorrect; the ASA congruence forces $QR = BC = 9 \text{ cm}$.

Final Answer: $QR = 9 \text{ cm} \Rightarrow \boxed{\text{D}}$

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



Q12.

Solution

Concept — Diagonal of a Rectangle: The diagonal forms a right triangle with the two sides. By Pythagoras: $d = \sqrt{l^2 + b^2}$.

Step 1 — Identify dimensions: Length $l = 8$ cm, breadth $b = 6$ cm.

Step 2 — Calculate the diagonal:

$$d = \sqrt{8^2 + 6^2} = \sqrt{64 + 36} = \sqrt{100} = 10 \text{ cm}$$

Why other options are wrong:

- Option B (12 cm): $12^2 = 144 \neq 100$; no basis in the calculation.
- Option C (8 cm): This is just the length l , not the diagonal.
- Option D (14 cm): Results from $l + b = 8 + 6 = 14$; adding sides instead of applying Pythagoras.

Final Answer: Diagonal = 10 cm $\Rightarrow$ **A**

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

Q13.

Solution

Concept — Area of a Circle: Area = πr^2 .

Step 1 — Identify the given values: $r = 7$ cm and $\pi = \frac{22}{7}$.

Step 2 — Compute the area:

$$\text{Area} = \frac{22}{7} \times 7^2 = \frac{22}{7} \times 49 = 22 \times 7 = 154 \text{ cm}^2$$

Why other options are wrong:

- Option A (144 cm²): $144 = 12^2$; possibly the formula πr was used instead of πr^2 , or r was taken as 12.
- Option C (164 cm²): Off by 10 from the correct answer; arithmetic slip.
- Option D (174 cm²): Off by 20; another arithmetic error.

Final Answer: Area = 154 cm² $\Rightarrow$ **B**

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



Q14.

Solution

Concept — Circumference of a Circle: Circumference = πd , where d is the diameter.

Step 1 — Identify the given values: $d = 14$ cm and $\pi = \frac{22}{7}$.

Step 2 — Compute the circumference:

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

Why other options are wrong:

- Option A (40 cm): Uses an incorrect value of π (approximately 2.86).
- Option B (42 cm): Possibly uses $\pi \approx 3$ giving $3 \times 14 = 42$.
- Option D (48 cm): Results from computing $\pi r^2/r$ with an error, or using $\pi \approx 3.43$.

Final Answer: Circumference = 44 cm $\Rightarrow$ **C**

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

Q15.

Solution

Concept — Total Surface Area of a Cube: A cube has 6 congruent square faces. TSA = $6s^2$.

Step 1 — Identify the side length: $s = 5$ cm.

Step 2 — Compute the TSA:

$$\text{TSA} = 6 \times s^2 = 6 \times 5^2 = 6 \times 25 = 150 \text{ cm}^2$$

Why other options are wrong:

- Option A (120 cm²): Results from $6 \times 20 = 120$; uses $s^2 = 20$ (wrong) or considers only $s = 4$ cm.
- Option B (130 cm²): No standard formula yields this for $s = 5$ cm.
- Option C (140 cm²): Possibly counts only 4 lateral faces: $4 \times 25 + 2 \times 20 = 140$ using wrong area for top/bottom.

Final Answer: TSA = 150 cm² $\Rightarrow$ **D**



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

Q16.

Solution

Concept — Discount Percentage:

$$\text{Discount\%} = \frac{\text{Marked Price} - \text{Selling Price}}{\text{Marked Price}} \times 100$$

Step 1 — Find the discount amount:

$$\text{Discount} = \text{Rs. } 800 - \text{Rs. } 640 = \text{Rs. } 160$$

Step 2 — Find the percentage:

$$\text{Discount\%} = \frac{160}{800} \times 100 = 20\%$$

Why other options are wrong:

- Option B (15%): 15% of Rs. 800 = Rs. 120; gives SP = Rs. 680 $\neq$ Rs. 640.
- Option C (25%): 25% of Rs. 800 = Rs. 200; gives SP = Rs. 600 $\neq$ Rs. 640.
- Option D (30%): 30% of Rs. 800 = Rs. 240; gives SP = Rs. 560 $\neq$ Rs. 640.

Final Answer: Discount = 20% $\Rightarrow$ **A**

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

Q17.

Solution

Concept — Finding Cost Price from Loss:

$$\text{CP} = \frac{\text{SP} \times 100}{100 - \text{Loss\%}}$$

Step 1 — Set up the formula: SP = Rs. 540, Loss = 10%.

$$\text{CP} = \frac{540 \times 100}{100 - 10} = \frac{54000}{90}$$



Step 2 — Calculate:

$$CP = \text{Rs. } 600$$

$$\text{Check: Loss} = 600 - 540 = \text{Rs. } 60; \text{ Loss\%} = \frac{60}{600} \times 100 = 10\%. \checkmark$$

Why other options are wrong:

- Option A (Rs. 580): $580 \times 0.9 = 522 \neq 540$.
- Option C (Rs. 620): $620 \times 0.9 = 558 \neq 540$.
- Option D (Rs. 640): $640 \times 0.9 = 576 \neq 540$.

Final Answer: $CP = \text{Rs. } 600 \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q17](#)

Q18.

Solution

Concept — Compound Interest: $A = P\left(1 + \frac{r}{100}\right)^t$ and $CI = A - P$.

Step 1 — Identify values: $P = \text{Rs. } 5000$, $r = 10\%$, $t = 1$ year.

Step 2 — Calculate Amount and CI:

$$A = 5000 \times \left(1 + \frac{10}{100}\right)^1 = 5000 \times \frac{11}{10} = \text{Rs. } 5500$$

$$CI = A - P = 5500 - 5000 = \text{Rs. } 500$$

Why other options are wrong:

- Option A (Rs. 400): Corresponds to simple interest at 8% per annum on Rs. 5000 for 1 year.
- Option B (Rs. 450): Corresponds to simple interest at 9% per annum.
- Option D (Rs. 550): Confuses the Amount (Rs. 5500) with the CI; 11% of Rs. 5000 = Rs. 550.

Final Answer: $CI = \text{Rs. } 500 \Rightarrow \boxed{\text{C}}$

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



Q19.

Solution

Concept — Median of Ungrouped Data: For n observations arranged in ascending order, when n is odd, the median is the $\frac{n+1}{2}$ -th value.

Step 1 — Count and confirm order: Data: 12, 15, 18, 22, 25, 28, 30. There are $n = 7$ values, already in ascending order.

Step 2 — Find the median position and value:

$$\text{Median position} = \frac{7+1}{2} = 4^{\text{th}} \text{ term}$$

The 4th value in the ordered list is 22.

Why other options are wrong:

- Option A (18): This is the 3rd observation, not the 4th.
- Option B (20): This value does not appear in the data set at all.
- Option C (21): This value also does not appear in the data set.

Final Answer: Median = 22 $\Rightarrow$ D

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

Q20.

Solution

Concept — Reading a Line Graph: The day at the highest point on the graph corresponds to the maximum recorded value.

Step 1 — List the data from the graph:

Day	Mon	Tue	Wed	Thu	Fri
Temp (°C)	28	32	35	30	27

Step 2 — Identify the maximum: The highest temperature is 35°C, recorded on Wednesday.

Why other options are wrong:

- Option B (Tuesday): 32°C < 35°C.
- Option C (Thursday): 30°C < 35°C.
- Option D (Monday): 28°C < 35°C.



Final Answer: Wednesday $\Rightarrow$ A

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



Answer Key

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

