

NMMS Gujarat Mathematics

Sample Paper – 10

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. Which property is illustrated by the equation $\frac{2}{3} + \frac{1}{4} = \frac{1}{4} + \frac{2}{3}$?

- (A) Commutative property of addition
- (B) Associative property of addition
- (C) Distributive property
- (D) Closure property

Q2. How many perfect squares lie strictly between 100 and 200?

- (A) 2
- (B) 3
- (C) 5
- (D) 4

Q3. Find the value of $(-4)^3 + (-3)^3$.

- (A) -64
- (B) -91
- (C) 91
- (D) -27



Q4. Express 0.000345 in standard form.

(A) 3.45×10^{-3}

(B) 34.5×10^{-5}

(C) 3.45×10^{-4}

(D) 0.345×10^{-3}

Q5. A number is 5 more than 3 times another number. If the sum of both numbers is 29, find the larger number.

(A) 6

(B) 18

(C) 20

(D) 23

Q6. Simplify: $(x + 3)^2 - (x - 3)^2$

(A) $12x$

(B) $6x$

(C) $18x$

(D) $2x^2 + 18$

Q7. Factorize completely: $25x^2 - 64y^2$

(A) $(25x - 8y)(x + 8y)$

(B) $(5x - 8y)^2$

(C) $(5x - 8y)(5x + 8y)$

(D) $(5x + 8y)^2$

Q8. Simplify: $\frac{x^2 - 9}{x + 3}$ (where $x \neq -3$)

(A) $x + 3$

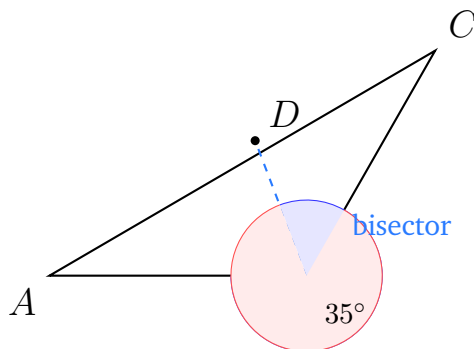
(B) $x - 3$



(C) $x^2 - 3$

(D) x

Q9. In triangle ABC , the bisector of $\angle ABC$ meets AC at D . If $\angle ABD = 35^\circ$, find $\angle ABC$.



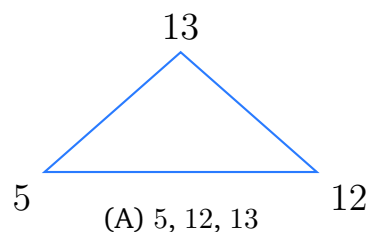
(A) 35°

(B) 45°

(C) 55°

(D) 70°

Q10. Which of the following sets of lengths can form a triangle?



(A) 5 cm, 12 cm, 13 cm

(B) 3 cm, 4 cm, 8 cm

(C) 2 cm, 3 cm, 6 cm

(D) 1 cm, 5 cm, 7 cm

Q11. In triangles ABC and DEF , $\angle B = \angle E$, $\angle C = \angle F$, and $BC = EF$. Which congruence criterion applies?

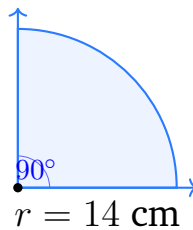


- (A) SSS (Side – Side – Side)
- (B) ASA (Angle – Side – Angle)
- (C) SAS (Side – Angle – Side)
- (D) RHS (Right angle – Hypotenuse – Side)

Q12. In a square $PQRS$, the diagonal $PR = 10\sqrt{2}$ cm. Find the side length of the square.

- (A) 5 cm
- (B) $5\sqrt{2}$ cm
- (C) 10 cm
- (D) 20 cm

Q13. Find the area of a sector of a circle with radius 14 cm and central angle 90° . $\left(\pi = \frac{22}{7}\right)$



- (A) 154 cm^2
- (B) 44 cm^2
- (C) 616 cm^2
- (D) 308 cm^2

Q14. Find the curved surface area (lateral surface area) of a cylinder with radius 5 cm and height 14 cm. $\left(\pi = \frac{22}{7}\right)$

- (A) 110 cm^2
- (B) 220 cm^2



(C) 330 cm^2

(D) 440 cm^2

Q15. A conical tent has base radius 7 m and slant height 25 m. Find the area of canvas required to make it (curved surface area). $\left(\pi = \frac{22}{7}\right)$

(A) 154 m^2

(B) 385 m^2

(C) 550 m^2

(D) 1100 m^2

Q16. A shopkeeper buys goods worth Rs. 2500 and pays 18% GST on them. What is the total amount paid?

(A) Rs. 2500

(B) Rs. 2950

(C) Rs. 3000

(D) Rs. 3250

Q17. An article is sold for Rs. 693 at a loss of 10%. Find the cost price.

(A) Rs. 770

(B) Rs. 693

(C) Rs. 750

(D) Rs. 800

Q18. Find the compound interest on Rs. 10000 at 10% per annum for 2 years, compounded annually.

(A) Rs. 1000

(B) Rs. 1500

(C) Rs. 2000

(D) Rs. 2100



Q19. The mean of 8 observations is 25. If one observation is removed, the new mean becomes 24. Find the removed observation.

(A) 25

(B) 28

(C) 32

(D) 36

Q20. A fair die is thrown once. What is the probability of getting a prime number?

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

(B) $\frac{1}{2}$

(C) $\frac{2}{3}$

(D) $\frac{5}{6}$



Detailed Solutions

Q1.

Solution

Concept — Commutative Property of Addition: A property is commutative if changing the order of operands does not change the result: $a + b = b + a$.

Step 1 — Identify the pattern: The equation $\frac{2}{3} + \frac{1}{4} = \frac{1}{4} + \frac{2}{3}$ shows the same two numbers added in different orders giving the same sum.

Why other options are wrong:

- Option B (Associative): involves three numbers and regrouping — $a + (b + c) = (a + b) + c$. Only two numbers are shown here.
- Option C (Distributive): relates multiplication over addition — $a(b + c) = ab + ac$. No multiplication is shown.
- Option D (Closure): states the result stays in the same number set; it does not relate to order of addition.

Final Answer: Commutative property of addition $\Rightarrow$ A

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

Q2.

Solution

Concept — Perfect Squares Lying Strictly Between Two Values: List all integers n such that $100 < n^2 < 200$.

Step 1 — Check consecutive squares:

$$10^2 = 100 \quad (\text{not strictly between}), \quad 11^2 = 121 \checkmark, \quad 12^2 = 144 \checkmark$$

$$13^2 = 169 \checkmark, \quad 14^2 = 196 \checkmark, \quad 15^2 = 225 \quad (\text{exceeds } 200)$$

Step 2 — Count the valid perfect squares: 121, 144, 169, 196 — exactly 4 perfect squares.

Why other options are wrong:

- Option A: 2 — misses two of the four perfect squares.
- Option B: 3 — misses one (likely $196 = 14^2$).
- Option C: 5 — includes 100 or 225, which are not *strictly* between 100 and



200.

Final Answer: 4 perfect squares lie strictly between 100 and 200 $\Rightarrow$ **D**

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

Q3.

Solution

Concept — Cube of a Negative Number: $(-n)^3 = -n^3$ (cube of a negative number is negative).

Step 1 — Compute each cube:

$$(-4)^3 = -(4^3) = -64$$

$$(-3)^3 = -(3^3) = -27$$

Step 2 — Add:

$$(-4)^3 + (-3)^3 = -64 + (-27) = -64 - 27 = -91$$

Why other options are wrong:

- Option A: $-64 = (-4)^3$ alone — ignores $(-3)^3$.
- Option C: 91 — correct magnitude but wrong sign.
- Option D: $-27 = (-3)^3$ alone — ignores $(-4)^3$.

Final Answer: $(-4)^3 + (-3)^3 = -91 \Rightarrow$ **B**

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

Q4.

Solution

Concept — Standard Form (Scientific Notation): Write as $a \times 10^n$ where $1 \leq a < 10$ and n is an integer. For numbers less than 1, n is negative.

Step 1 — Move the decimal point: 0.000345: the decimal point moves 4 places to the right to get 3.45.

$$0.000345 = 3.45 \times 10^{-4}$$



Why other options are wrong:

- Option A: $3.45 \times 10^{-3} = 0.00345$ — off by a factor of 10 (only 3 decimal places).
- Option B: $34.5 \times 10^{-5} = 0.000345$ — numerically correct but $34.5 \geq 10$; this is not standard form.
- Option D: $0.345 \times 10^{-3} = 0.000345$ — numerically correct but $0.345 < 1$; not standard form.

Final Answer: $0.000345 = 3.45 \times 10^{-4} \Rightarrow \boxed{\text{C}}$

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

Q5.

Solution

Concept — Forming and Solving a Pair of Linear Equations from a Word Problem: Let the smaller number be x ; then the larger is $3x + 5$.

Step 1 — Set up the equation:

$$x + (3x + 5) = 29 \implies 4x + 5 = 29 \implies 4x = 24 \implies x = 6$$

Step 2 — Find the larger number:

$$\text{Larger number} = 3(6) + 5 = 18 + 5 = 23$$

Verify: $6 + 23 = 29 \checkmark$; $23 = 3(6) + 5 \checkmark$

Why other options are wrong:

- Option A: 6 — this is the *smaller* number, not the larger.
- Option B: $18 = 3 \times 6$ — this is $3x$ without adding 5.
- Option C: $20 = 3(5) + 5 = 20$; but if $x = 5$, $\text{sum} = 5 + 20 = 25 \neq 29$.

Final Answer: Larger number = 23 $\Rightarrow \boxed{\text{D}}$

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



Q6.

Solution

Concept — Difference of Squares Applied to Expansions: Using $(a + b)^2 - (a - b)^2 = 4ab$.

Step 1 — Expand using the identity: Here $a = x$ and $b = 3$.

$$(x + 3)^2 - (x - 3)^2 = 4 \times x \times 3 = 12x$$

Alternative (expand directly):

$$(x^2 + 6x + 9) - (x^2 - 6x + 9) = x^2 + 6x + 9 - x^2 + 6x - 9 = 12x$$

Why other options are wrong:

- Option B: $6x$ — would result from $(x + 3)^2 - (x - 3)^2$ if the middle terms added to $6x$ each; but $6x + 6x = 12x$, not $6x$.
- Option C: $18x$ — incorrect application of the identity.
- Option D: $2x^2 + 18$ — result of $(x + 3)^2 + (x - 3)^2$, not the difference.

Final Answer: $(x + 3)^2 - (x - 3)^2 = 12x \Rightarrow \boxed{A}$

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

Q7.

Solution

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

Step 1 — Identify a and b : $25x^2 = (5x)^2$ and $64y^2 = (8y)^2$.

Step 2 — Apply the identity:

$$25x^2 - 64y^2 = (5x)^2 - (8y)^2 = (5x - 8y)(5x + 8y)$$

Why other options are wrong:

- Option A: $(25x - 8y)(x + 8y) = 25x^2 + 200xy - 8xy - 64y^2$ — cross term present; not equivalent.
- Option B: $(5x - 8y)^2 = 25x^2 - 80xy + 64y^2$ — middle term present, plus sign on $64y^2$.
- Option D: $(5x + 8y)^2 = 25x^2 + 80xy + 64y^2$ — positive $64y^2$, not negative.



Final Answer: $(5x - 8y)(5x + 8y) \Rightarrow \boxed{\text{C}}$

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

Q8.

Solution

Concept — Simplification of a Rational Algebraic Expression by Factorisation:

Step 1 — Factorise the numerator using difference of squares:

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

Step 2 — Cancel the common factor $(x + 3)$:

$$\frac{x^2 - 9}{x + 3} = \frac{(x - 3)(x + 3)}{(x + 3)} = x - 3 \quad (x \neq -3)$$

Why other options are wrong:

- Option A: $x + 3$ — this is the factor that was cancelled, not the result.
- Option C: $x^2 - 3$ — fails to properly factor the numerator.
- Option D: x — ignores the constant term in $(x - 3)$.

Final Answer: $\frac{x^2 - 9}{x + 3} = x - 3 \Rightarrow \boxed{\text{B}}$

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

Q9.

Solution

Concept — Angle Bisector: An angle bisector divides an angle into two equal halves. If BD bisects $\angle ABC$, then $\angle ABD = \angle DBC$.

Step 1 — Set up the equation:

$$\angle ABC = \angle ABD + \angle DBC = 35^\circ + 35^\circ = 70^\circ$$

Why other options are wrong:

- Option A: 35° — this is just one half of $\angle ABC$ ($\angle ABD$ alone).
- Option B: 45° — would imply each half is 22.5° , not 35° .



- Option C: 55° — would imply each half is 27.5° , not 35° .

Final Answer: $\angle ABC = 70^\circ \Rightarrow \boxed{D}$

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

Q10.

Solution

Concept — Triangle Inequality Theorem: A triangle can be formed only if the sum of any two sides is *greater than* the third side.

Step 1 — Test each option:

- Option A: 5, 12, 13: $5 + 12 = 17 > 13 \checkmark$; $5 + 13 = 18 > 12 \checkmark$; $12 + 13 = 25 > 5 \checkmark$. **Valid triangle.**
- Option B: 3, 4, 8: $3 + 4 = 7 < 8$. **Not a valid triangle.**
- Option C: 2, 3, 6: $2 + 3 = 5 < 6$. **Not a valid triangle.**
- Option D: 1, 5, 7: $1 + 5 = 6 < 7$. **Not a valid triangle.**

Additional note: (5, 12, 13) is a Pythagorean triple ($5^2 + 12^2 = 25 + 144 = 169 = 13^2$), so it forms a right-angled triangle.

Final Answer: 5 cm, 12 cm, 13 cm can form a triangle $\Rightarrow \boxed{A}$

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

Q11.

Solution

Concept — ASA (Angle – Side – Angle) Congruence Criterion: Two triangles are congruent if two angles and the *included* side of one are equal to the corresponding parts of the other.

Step 1 — Identify given conditions:

- $\angle B = \angle E$ (first angle)
- $BC = EF$ (side between $\angle B$ and $\angle C$, and between $\angle E$ and $\angle F$ respectively)
- $\angle C = \angle F$ (second angle)

The side BC is the included side between $\angle B$ and $\angle C$ in $\triangle ABC$; likewise EF is included between $\angle E$ and $\angle F$ in $\triangle DEF$.

Step 2 — Match to criterion: Two angles and the included side are equal $\Rightarrow$ **ASA**.



Why other options are wrong:

- Option A (SSS): requires all three pairs of sides; only one side is given.
- Option C (SAS): requires two sides and the included angle; two angles and one side are given.
- Option D (RHS): requires a right angle; no right angle is specified.

Final Answer: ASA (Angle – Side – Angle) $\Rightarrow$ B

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

Q12.

Solution

Concept — Diagonal of a Square: In a square with side a , the diagonal $d = a\sqrt{2}$.

Step 1 — Set up the equation:

$$d = a\sqrt{2} \implies a = \frac{d}{\sqrt{2}} = \frac{10\sqrt{2}}{\sqrt{2}} = 10 \text{ cm}$$

Why other options are wrong:

- Option A: 5 cm — $5\sqrt{2} = 7.07 \neq 10\sqrt{2}$.
- Option B: $5\sqrt{2}$ cm — $5\sqrt{2} \times \sqrt{2} = 10$, so the diagonal would be 10 cm, not $10\sqrt{2}$.
- Option D: 20 cm — $20\sqrt{2} \approx 28.3 \neq 10\sqrt{2}$.

Final Answer: Side = 10 cm $\Rightarrow$ C

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

Q13.

Solution

Concept — Area of a Sector:

$$\text{Area of sector} = \frac{\theta}{360^\circ} \times \pi r^2$$



Step 1 — Substitute $\theta = 90^\circ$, $r = 14$ cm, $\pi = \frac{22}{7}$:

$$\text{Area} = \frac{90}{360} \times \frac{22}{7} \times 14^2 = \frac{1}{4} \times \frac{22}{7} \times 196 = \frac{1}{4} \times 22 \times 28 = \frac{616}{4} = 154 \text{ cm}^2$$

Why other options are wrong:

- Option B: 44 cm^2 — this is the arc length (circumference formula), not area.
- Option C: $616 \text{ cm}^2 = \pi r^2$ — area of the full circle, without the $\frac{1}{4}$ sector fraction.
- Option D: $308 \text{ cm}^2 = \frac{1}{2} \times \pi r^2$ — area of a semicircle (180° sector), not 90° .

Final Answer: Area of sector = $154 \text{ cm}^2 \Rightarrow \boxed{\text{A}}$

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

Q14.

Solution

Concept — Curved Surface Area (CSA) of a Cylinder:

$$\text{CSA} = 2\pi rh$$

Step 1 — Substitute $r = 5$ cm, $h = 14$ cm, $\pi = \frac{22}{7}$:

$$\text{CSA} = 2 \times \frac{22}{7} \times 5 \times 14 = 2 \times \frac{22 \times 5 \times 14}{7} = 2 \times 22 \times 5 \times 2 = 2 \times 220 = 440 \text{ cm}^2$$

Why other options are wrong:

- Option A: $110 \text{ cm}^2 = \pi rh$ — forgets to multiply by 2.
- Option B: $220 \text{ cm}^2 = 2\pi rh/2$ — half the correct CSA.
- Option C: 330 cm^2 — arithmetic error.

Final Answer: CSA = $440 \text{ cm}^2 \Rightarrow \boxed{\text{D}}$

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



Q15.

Solution**Concept — Curved Surface Area of a Cone:**

$$CSA = \pi r l$$

where r is the base radius and l is the slant height.

Step 1 — Substitute $r = 7 \text{ m}$, $l = 25 \text{ m}$, $\pi = \frac{22}{7}$:

$$CSA = \frac{22}{7} \times 7 \times 25 = 22 \times 25 = 550 \text{ m}^2$$

Why other options are wrong:

- Option A: $154 \text{ m}^2 = \pi r^2$ — this is the base area of the cone, not the CSA.
- Option B: 385 m^2 — uses an incorrect value of l or r .
- Option D: $1100 \text{ m}^2 = 2\pi r l$ — doubles the CSA needlessly.

Final Answer: Canvas area = $550 \text{ m}^2 \Rightarrow \boxed{\text{C}}$

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

Q16.

Solution**Concept — Goods and Services Tax (GST):**

$$\text{Total amount} = \text{Cost price} + \text{GST amount}$$

$$\text{GST amount} = \frac{\text{GST}\%}{100} \times \text{Cost price}$$

Step 1 — Calculate GST:

$$\text{GST} = \frac{18}{100} \times 2500 = \frac{45000}{100} = \text{Rs. } 450$$

Step 2 — Total amount paid:

$$\text{Total} = 2500 + 450 = \text{Rs. } 2950$$

Why other options are wrong:

- Option A: Rs. 2500 — this is the original cost, before GST.
- Option C: Rs. 3000 — GST would be Rs. 500 = 20%, not 18%.
- Option D: Rs. 3250 — GST would be Rs. 750 = 30%, not 18%.

Final Answer: Total amount = Rs. 2950 $\Rightarrow$ B

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

Q17.

Solution

Concept — Finding Cost Price from Selling Price and Loss%:

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

Step 1 — Substitute SP = 693 and Loss% = 10:

$$CP = \frac{693 \times 100}{100 - 10} = \frac{69300}{90} = \text{Rs. } 770$$

Step 2 — Verify: Loss = 10% of 770 = 77; SP = 770 - 77 = 693 ✓

Why other options are wrong:

- Option B: Rs. 693 — this is the SP itself, not the CP.
- Option C: Rs. 750 — Loss = 750 - 693 = 57; Loss% = $57/750 \times 100 = 7.6\% \neq 10\%$.
- Option D: Rs. 800 — Loss = 800 - 693 = 107; Loss% = $107/800 \times 100 = 13.4\% \neq 10\%$.

Final Answer: CP = Rs. 770 $\Rightarrow$ A

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



Q18.

Solution**Concept — Compound Interest (Compounded Annually):**

$$A = P \left(1 + \frac{r}{100}\right)^n$$

where A is the amount, P is the principal, r is the rate, and n is the number of years. $CI = A - P$.

Step 1 — Compute A : $P = 10000$, $r = 10\%$, $n = 2$.

$$A = 10000 \times \left(1 + \frac{10}{100}\right)^2 = 10000 \times (1.1)^2 = 10000 \times 1.21 = \text{Rs. } 12100$$

Step 2 — Compute CI:

$$CI = A - P = 12100 - 10000 = \text{Rs. } 2100$$

Why other options are wrong:

- Option A: Rs. 1000 — this is the simple interest for just 1 year at 10%.
- Option B: Rs. 1500 — incorrect; 10% SI for 2 years = 2000, not 1500.
- Option C: Rs. 2000 — this is the simple interest for 2 years; CI exceeds SI due to compounding.

Final Answer: Compound Interest = Rs. 2100 $\Rightarrow$ DAnswer: (D) [Go Back to Q18](#)

Q19.

Solution**Concept — Effect of Removing an Observation on the Mean:**

$$\text{Sum of observations} = \text{Mean} \times \text{Number of observations}$$

Step 1 — Find the original sum:

$$\text{Sum of 8 observations} = 25 \times 8 = 200$$



Step 2 — Find the sum after removal:

$$\text{Sum of 7 observations} = 24 \times 7 = 168$$

Step 3 — Find the removed observation:

$$\text{Removed observation} = 200 - 168 = 32$$

Why other options are wrong:

- Option A: 25 — this is the original mean value, not the removed observation.
- Option B: 28: remaining sum = $200 - 28 = 172$; new mean = $172/7 \approx 24.6 \neq 24$.
- Option D: 36: remaining sum = $200 - 36 = 164$; new mean = $164/7 \approx 23.4 \neq 24$.

Final Answer: Removed observation = 32 $\Rightarrow$ C

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

Q20.

Solution**Concept — Basic Probability:**

$$P(\text{event}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

A fair die has 6 faces: $\{1, 2, 3, 4, 5, 6\}$.

Step 1 — Identify prime numbers on a die: Prime numbers: $\{2, 3, 5\}$ — there are 3 primes.

Step 2 — Calculate probability:

$$P(\text{prime}) = \frac{3}{6} = \frac{1}{2}$$

Why other options are wrong:

- Option A: $\frac{1}{6}$ — probability of getting a specific single face.
- Option C: $\frac{2}{3}$ — would require 4 prime outcomes; but 4 is not prime.
- Option D: $\frac{5}{6}$ — only 1 is non-prime on a die, so $P(\text{non-prime}) = \frac{1}{6}$, not $P(\text{prime}) = \frac{5}{6}$.



Final Answer: $P(\text{prime}) = \frac{1}{2} \Rightarrow \boxed{\text{B}}$

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



Answer Key

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

