

SHRESHTA NETS Mathematics

Sample Paper – 9

Duration: 54 Minutes

Maximum Marks: 120

Instructions

- This paper contains **30** Multiple Choice Questions (Single Correct Answer), modelled on the Mathematics portion of **SHRESHTA NETS** entrance.
- Each correct answer carries **+4 marks**. There is **no negative marking** for incorrect or unattempted answers.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **NCERT Class 8 Mathematics (Ganita Prakash, 2024 edition)** — all 13 chapters.
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Mathematics — Questions

Q1. Which equation correctly demonstrates the **distributive property** of multiplication over addition for rational numbers?

- (A) $\frac{2}{3} \times \frac{1}{4} = \frac{1}{4} \times \frac{2}{3}$
- (B) $\left(\frac{1}{2} \times \frac{1}{3}\right) \times \frac{3}{4} = \frac{1}{2} \times \left(\frac{1}{3} \times \frac{3}{4}\right)$
- (C) $\left(\frac{2}{3} \times \frac{1}{4}\right) \times \frac{3}{4} = \frac{2}{3} \times \left(\frac{1}{4} \times \frac{3}{4}\right)$
- (D) $\frac{2}{3} \times \left(\frac{1}{4} + \frac{3}{4}\right) = \frac{2}{3} \times \frac{1}{4} + \frac{2}{3} \times \frac{3}{4}$

Q2. Find the rational number that lies **exactly halfway** between $-\frac{1}{4}$ and $\frac{3}{4}$.

- (A) $\frac{1}{4}$



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

(C) $-\frac{1}{8}$

(D) $\frac{1}{8}$

Q3. The tens digit of a two-digit number is 3 more than the units digit. The sum of its digits is 7. Find the **original number**.

(A) 41

(B) 52

(C) 63

(D) 74

Q4. The length of a rectangle is 7 cm more than its width. If the **perimeter** is 54 cm, find the **width**.

(A) 7 cm

(B) 17 cm

(C) 10 cm

(D) 12 cm

Q5. Adding 3 to both the numerator and denominator of a fraction gives $\frac{5}{8}$. Find the **original fraction**.

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

(B) $\frac{3}{7}$

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

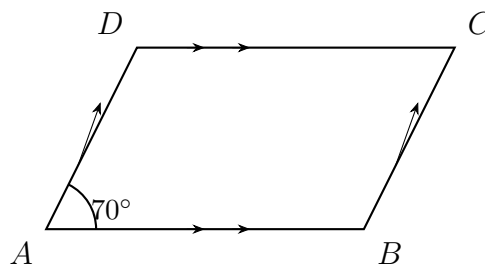
(D) $\frac{2}{5}$



Q6. The diagonals of a rhombus are 10 cm and 24 cm. Find the **perimeter** of the rhombus.

- (A) 52 cm
- (B) 48 cm
- (C) 60 cm
- (D) 56 cm

Q7. In the parallelogram $ABCD$ shown below, $\angle A = 70^\circ$. Find $\angle B$ and $\angle D$.
(TikZ)



- (A) $\angle B = 70^\circ$, $\angle D = 70^\circ$
- (B) $\angle B = 110^\circ$, $\angle D = 110^\circ$
- (C) $\angle B = 90^\circ$, $\angle D = 90^\circ$
- (D) $\angle B = 110^\circ$, $\angle D = 70^\circ$

Q8. Which of the following is equal to **196**?

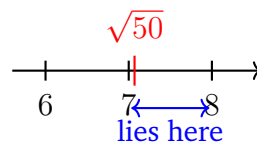
- (A) Sum of the first 12 odd natural numbers
- (B) Sum of the first 16 odd natural numbers
- (C) Sum of the first 14 odd natural numbers
- (D) Sum of the first 15 odd natural numbers

Q9. What is the **smallest number** by which 252 must be **divided** to make it a perfect square?



- (A) 2
- (B) 3
- (C) 4
- (D) 7

Q10. The number line below shows $\sqrt{50}$ marked between two consecutive integers. Between which two consecutive integers does $\sqrt{50}$ lie? (TikZ)



- (A) 7 and 8
- (B) 6 and 7
- (C) 8 and 9
- (D) 5 and 6

Q11. What is the **smallest natural number** by which 500 must be **multiplied** to make it a perfect cube?

- (A) 4
- (B) 2
- (C) 5
- (D) 10

Q12. Find $\sqrt[3]{-729}$.

- (A) 9
- (B) -27
- (C) -9
- (D) -3



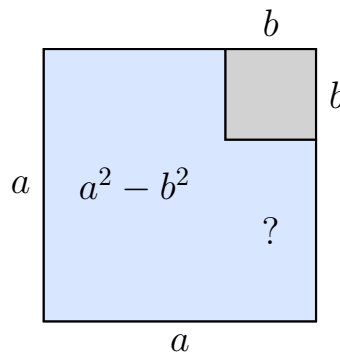
- Q13.** Principal = Rs 5000, Rate = 8% p.a., Time = 2 years. Find the **difference** between Compound Interest and Simple Interest (CI – SI).
- (A) Rs 64
(B) Rs 40
(C) Rs 80
(D) Rs 32
- Q14.** A shirt has a marked price of Rs 800. A **discount of 15%** is offered. Find the **selling price**.
- (A) Rs 680
(B) Rs 720
(C) Rs 700
(D) Rs 640
- Q15.** An item costs Rs 2000 (excluding GST). If **12% GST** is applied, what is the **total amount paid**?
- (A) Rs 2120
(B) Rs 2240
(C) Rs 2400
(D) Rs 2200
- Q16.** Find the product: $3xy^2 \times 2x^2y \times (-2)$.
- (A) $12x^3y^3$
(B) $-6x^3y^3$
(C) $-12x^3y^3$
(D) $-12x^2y^2$



Q17. Using the identity $(a - b)^2 = a^2 - 2ab + b^2$, find 97^2 .

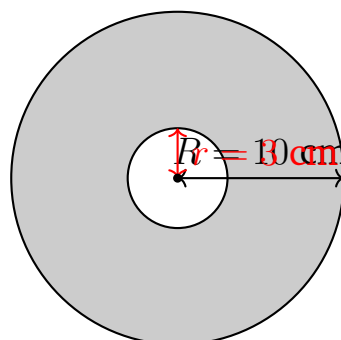
- (A) 9300
- (B) 9801
- (C) 9200
- (D) 9409

Q18. The figure below shows a large square of side a with a small square of side b (shaded) removed from one corner, and the remaining L-shaped region rearranged. What does the **shaded L-shaped region** in the figure represent? (TikZ)



- (A) $a^2 - b^2$
- (B) $(a - b)^2$
- (C) $2ab$
- (D) $a^2 + b^2$

Q19. Find the area of the **ring (annulus)** shown below, with outer radius $R = 10$ cm and inner radius $r = 3$ cm. Use $\pi = \frac{22}{7}$. (TikZ)



- (A) 314 cm^2
- (B) 286 cm^2
- (C) 264 cm^2
- (D) 308 cm^2

Q20. A hollow cylindrical pipe has outer radius 5 cm, inner radius 3 cm, and length 14 cm. Find its **volume**. Use $\pi = \frac{22}{7}$.

- (A) 1540 cm^3
- (B) 396 cm^3
- (C) 704 cm^3
- (D) 352 cm^3

Q21. Find the **total surface area** of a sphere with radius 14 cm. Use $\pi = \frac{22}{7}$.

- (A) 616 cm^2
- (B) 1232 cm^2
- (C) 1848 cm^2
- (D) 2464 cm^2

Q22. Simplify: $(2^{-3} \times 4^2) \div 8^{-1}$.

- (A) 16
- (B) 2
- (C) 8
- (D) 32

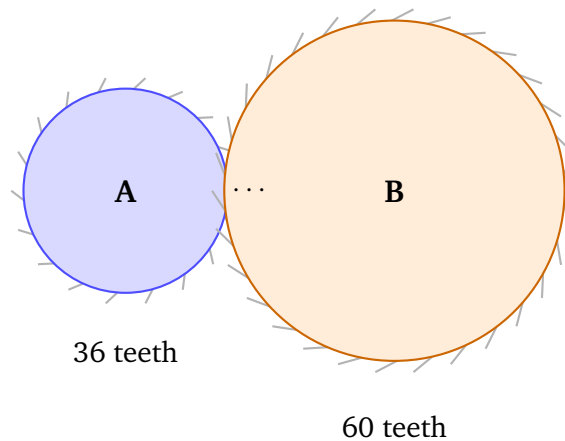
Q23. Express 0.00000385 in **standard form** (scientific notation).

- (A) 3.85×10^{-5}



- (B) 3.85×10^{-6}
- (C) 38.5×10^{-7}
- (D) 0.385×10^{-5}

Q24. Two meshing gear wheels are shown below. Gear A has **36 teeth** and makes **25 complete rotations**. Gear B has **60 teeth**. How many rotations does Gear B make? (*TikZ*)



- (A) 25 rotations
 - (B) 10 rotations
 - (C) 15 rotations
 - (D) 20 rotations
- Q25.** A recipe uses 3 cups of flour to make 24 biscuits. How many cups of flour are needed to make **56 biscuits**?
- (A) 6 cups
 - (B) 8 cups
 - (C) 5 cups
 - (D) 7 cups
- Q26.** Factorise: $16x^2 - 25y^2$.
- (A) $(4x + 5y)(4x - 5y)$



- (B) $(4x - 5y)^2$
(C) $(4x + 5y)^2$
(D) $4(4x^2 - 25y^2)$

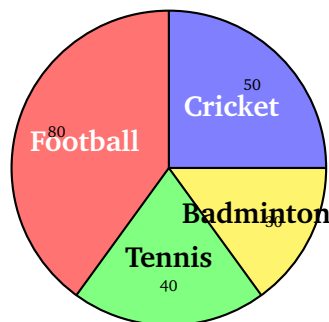
Q27. Factorise: $x^2 + 8x + 15$.

- (A) $(x + 1)(x + 15)$
(B) $(x + 3)(x + 5)$
(C) $(x + 3)(x + 4)$
(D) $(x + 5)(x + 2)$

Q28. Divide: $(8x^3 - 4x^2 + 2x) \div 2x$.

- (A) $4x^2 - 4x + 2$
(B) $4x^2 - 2x$
(C) $4x^2 - 2x + 1$
(D) $8x^2 - 4x + 1$

Q29. The pie chart below shows the favourite sports of 200 students. What is the **central angle** for the **Cricket** sector? (*TikZ*)



- (A) 144°
(B) 72°
(C) 54°



(D) 90°

Q30. A bag contains 5 red, 3 blue, and 7 green balls. One ball is drawn at random. Find the probability that the ball drawn is **NOT red**.

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

(B) $\frac{1}{3}$

(C) $\frac{7}{15}$

(D) $\frac{3}{5}$



Detailed Solutions

Q1.

Solution

Concept — Rational Numbers: Distributive Property of Multiplication over Addition

Step 1 — Identify the distributive law: The distributive property states $a \times (b + c) = a \times b + a \times c$ for any rational numbers a, b, c .

Step 2 — Verify option (D):

$$\frac{2}{3} \times \left(\frac{1}{4} + \frac{3}{4} \right) = \frac{2}{3} \times \frac{1}{4} + \frac{2}{3} \times \frac{3}{4}$$

$$\text{LHS} = \frac{2}{3} \times 1 = \frac{2}{3}. \quad \text{RHS} = \frac{2}{12} + \frac{6}{12} = \frac{8}{12} = \frac{2}{3}. \quad \text{LHS} = \text{RHS}. \checkmark$$

Why other options are wrong:

- Option (A): Shows the *commutative* property ($a \times b = b \times a$), not distributive.
- Option (B): Shows the *associative* property ($(a \times b) \times c = a \times (b \times c)$), not distributive.
- Option (C): Shows the *associative* property ($(a \times b) \times c = a \times (b \times c)$), not distributive — same property as option (B).

Final Answer: Option (D) correctly states $a \times (b + c) = a \times b + a \times c$ with specific fractions. $\Rightarrow$ D

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

Q2.

Solution

Concept — Rational Numbers: Mean of Two Rational Numbers

Step 1 — Apply the midpoint formula: The number exactly halfway between two numbers p and q is $\frac{p+q}{2}$.

Step 2 — Compute:

$$\text{Midpoint} = \frac{-\frac{1}{4} + \frac{3}{4}}{2} = \frac{\frac{2}{4}}{2} = \frac{\frac{1}{2}}{2} = \frac{1}{4}$$

Verification: Distance from $-\frac{1}{4}$ to $\frac{1}{4}$ is $\frac{1}{2}$; distance from $\frac{1}{4}$ to $\frac{3}{4}$ is $\frac{1}{2}$. Equal. $\checkmark$



Why other options are wrong:

- Option (B): $\frac{1}{2}$ is closer to $\frac{3}{4}$ than to $-\frac{1}{4}$.
- Option (C): $-\frac{1}{8}$ is not the midpoint; midpoint formula gives $\frac{1}{4}$.
- Option (D): $\frac{1}{8}$ is not the midpoint either.

Final Answer: The rational number exactly halfway is $\frac{1}{4} \Rightarrow \boxed{A}$

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

Q3.

Solution

Concept — Linear Equations in One Variable: Setting Up Equations from Number Problems

Step 1 — Set up variables: Let units digit = x . Then tens digit = $x + 3$. Original number = $10(x + 3) + x = 11x + 30$.

Step 2 — Use the digit-sum condition: Digit sum = $(x + 3) + x = 2x + 3 = 7 \Rightarrow x = 2$.

Units digit = 2, Tens digit = 5, Number = 52.

Verification: Tens digit – units digit = $5 - 2 = 3 \checkmark$ Digit sum = $5 + 2 = 7 \checkmark$

Why other options are wrong:

- Option (A): 41 — digit sum = $4 + 1 = 5 \neq 7$. $\times$
- Option (C): 63 — digit sum = $6 + 3 = 9 \neq 7$. $\times$
- Option (D): 74 — digit sum = $7 + 4 = 11 \neq 7$. $\times$

Final Answer: Original number = 52 $\Rightarrow \boxed{B}$

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



Q4.

Solution**Concept — Linear Equations in One Variable: Perimeter of a Rectangle****Step 1 — Set up variables:** Let width = w cm. Then length = $w + 7$ cm.**Step 2 — Apply the perimeter formula:**

$$2(\ell + w) = 54 \implies 2(w + 7 + w) = 54 \implies 2(2w + 7) = 54$$

$$4w + 14 = 54 \implies 4w = 40 \implies w = 10 \text{ cm}$$

Verification: Width = 10 cm, Length = 17 cm. Perimeter = $2(10+17) = 2 \times 27 = 54$ cm. ✓**Why other options are wrong:**

- Option (A): $w = 7$ cm gives perimeter = $2(7 + 14) = 42 \neq 54$.
- Option (B): $w = 17$ cm is the *length*, not the width.
- Option (D): $w = 12$ cm gives perimeter = $2(12 + 19) = 62 \neq 54$.

Final Answer: Width = 10 cm $\Rightarrow$ CAnswer: (C) [Go Back to Q4](#)

Q5.

Solution**Concept — Linear Equations in One Variable: Fraction Problems****Step 1 — Set up the equation:** Let the fraction be $\frac{n}{d}$.

$$\frac{n+3}{d+3} = \frac{5}{8}$$

Cross-multiplying: $8(n+3) = 5(d+3) \implies 8n + 24 = 5d + 15 \implies 8n - 5d = -9$.**Step 2 — Test option (D):** $n = 2, d = 5$:

$$8(2) - 5(5) = 16 - 25 = -9 \quad \checkmark$$

Check: $\frac{2+3}{5+3} = \frac{5}{8} \quad \checkmark$ **Why other options are wrong:**

- Option (A): $\frac{1}{4} : \frac{1+3}{4+3} = \frac{4}{7} \neq \frac{5}{8}$.
- Option (B): $\frac{3}{7} : \frac{3+3}{7+3} = \frac{6}{10} = \frac{3}{5} \neq \frac{5}{8}$.
- Option (C): $\frac{1}{2} : \frac{1+3}{2+3} = \frac{4}{5} \neq \frac{5}{8}$.

Final Answer: Original fraction = $\frac{2}{5} \Rightarrow \boxed{D}$

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

Q6.

Solution

Concept — Understanding Quadrilaterals: Properties of a Rhombus

Step 1 — Find the side using the diagonals: The diagonals of a rhombus bisect each other at right angles. Half-diagonals: $\frac{10}{2} = 5$ cm and $\frac{24}{2} = 12$ cm.

$$\text{Side} = \sqrt{5^2 + 12^2} = \sqrt{25 + 144} = \sqrt{169} = 13 \text{ cm}$$

Step 2 — Find the perimeter:

$$P = 4 \times \text{side} = 4 \times 13 = 52 \text{ cm}$$

Why other options are wrong:

- Option (B): 48 cm $\Rightarrow$ side = 12 cm, but $\sqrt{5^2 + 12^2} = 13 \neq 12$.
- Option (C): 60 cm $\Rightarrow$ side = 15 cm, not obtained from these diagonals.
- Option (D): 56 cm $\Rightarrow$ side = 14 cm, incorrect.

Final Answer: Perimeter = 52 cm $\Rightarrow \boxed{A}$

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

Q7.

Solution

Concept — Understanding Quadrilaterals: Angles in a Parallelogram

Step 1 — Co-interior angles: In a parallelogram, consecutive (co-interior) angles are supplementary:

$$\angle A + \angle B = 180^\circ \Rightarrow 70^\circ + \angle B = 180^\circ \Rightarrow \angle B = 110^\circ$$



Step 2 — Opposite angles: Opposite angles in a parallelogram are equal:

$$\angle D = \angle B = 110^\circ$$

(Also: $\angle C = \angle A = 70^\circ$ as a check.)

Why other options are wrong:

- Option (A): $70^\circ, 70^\circ$ — would make all angles 70° , $\text{sum} = 280^\circ \neq 360^\circ$.
- Option (C): $90^\circ, 90^\circ$ — that is a rectangle; $\angle A$ would also be 90° , not 70° .
- Option (D): $110^\circ, 70^\circ$ — $\angle D$ is opposite to $\angle B$, so both must be 110° .

Final Answer: $\angle B = 110^\circ$ and $\angle D = 110^\circ \Rightarrow \boxed{B}$

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

Q8.

Solution

Concept — Squares and Square Roots: Sum of First n Odd Numbers

Step 1 — Recall the key property: The sum of the first n odd natural numbers equals n^2 .

$$1 + 3 + 5 + \dots + (2n - 1) = n^2$$

Step 2 — Find which n gives 196:

$$n^2 = 196 \implies n = \sqrt{196} = 14$$

So the sum of the first 14 odd natural numbers $= 14^2 = 196$.

Verification: $1 + 3 + 5 + \dots + 27 = 14^2 = 196$. ✓

Why other options are wrong:

- Option (A): First 12 odd numbers $= 12^2 = 144 \neq 196$.
- Option (B): First 16 odd numbers $= 16^2 = 256 \neq 196$.
- Option (D): First 15 odd numbers $= 15^2 = 225 \neq 196$.

Final Answer: Sum of first 14 odd natural numbers $= 196 \Rightarrow \boxed{C}$

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



Q9.

Solution

Concept — Squares and Square Roots: Prime Factorisation to Find Smallest Divisor

Step 1 — Prime factorise 252:

$$252 = 2 \times 126 = 2 \times 2 \times 63 = 2^2 \times 3^2 \times 7$$

Step 2 — Identify the unpaired factor: For a perfect square, every prime must appear an *even* number of times. 2^2 and 3^2 are already paired; 7^1 is unpaired. Dividing by 7: $\frac{252}{7} = 36 = 6^2$. ✓

Why other options are wrong:

- Option (A): $252 \div 2 = 126 = 2 \times 3^2 \times 7$ — not a perfect square.
- Option (B): $252 \div 3 = 84 = 2^2 \times 3 \times 7$ — not a perfect square.
- Option (C): $252 \div 4 = 63 = 3^2 \times 7$ — not a perfect square.

Final Answer: Divide by 7 to get the perfect square 36 $\Rightarrow$ D

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

Q10.

Solution

Concept — Squares and Square Roots: Estimating Square Roots on a Number Line

Step 1 — Find perfect squares around 50:

$$7^2 = 49 < 50 < 64 = 8^2$$

Therefore $7 < \sqrt{50} < 8$.

Step 2 — Confirm the position: $\sqrt{50} \approx 7.07$, which lies between 7 and 8 on the number line, very close to 7. ✓

Why other options are wrong:

- Option (B): 6 and 7 — $6^2 = 36 < 50$ but $7^2 = 49 < 50$, so 50 is beyond 7.
- Option (C): 8 and 9 — $8^2 = 64 > 50$, so $\sqrt{50} < 8$.
- Option (D): 5 and 6 — $5^2 = 25, 6^2 = 36$, both less than 50, so $\sqrt{50} > 6$.



Final Answer: $\sqrt{50}$ lies between 7 and 8 $\Rightarrow$ A

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

Q11.

Solution

Concept — Cubes and Cube Roots: Prime Factorisation to Find Smallest Multiplier

Step 1 — Prime factorise 500:

$$500 = 4 \times 125 = 2^2 \times 5^3$$

Step 2 — Identify missing factors for a perfect cube: For a perfect cube, every prime must appear a multiple of 3 times. 5^3 is already complete; 2^2 needs one more 2 to become 2^3 .

$$500 \times 2 = 1000 = 10^3 \quad \checkmark$$

Why other options are wrong:

- Option (A): $500 \times 4 = 2000 = 2^4 \times 5^3$; 2^4 is not a multiple of 3 in exponent.
- Option (C): $500 \times 5 = 2500 = 2^2 \times 5^4$; neither 2^2 nor 5^4 has exponent divisible by 3.
- Option (D): $500 \times 10 = 5000 = 2^3 \times 5^4$; 5^4 fails.

Final Answer: Multiply by 2 to get $1000 = 10^3 \Rightarrow$ B

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

Q12.

Solution

Concept — Cubes and Cube Roots: Cube Root of a Negative Number

Step 1 — Recall the rule: $\sqrt[3]{-a} = -\sqrt[3]{a}$ for any positive real a .

Step 2 — Compute:

$$\sqrt[3]{729} : 9^3 = 729 \implies \sqrt[3]{729} = 9$$

$$\therefore \sqrt[3]{-729} = -9$$



Verification: $(-9)^3 = -729 \checkmark$

Why other options are wrong:

- Option (A): 9 is positive; cube root of a negative number must be negative.
- Option (B): -27 would mean $(-27)^3 = -19683 \neq -729$.
- Option (D): -3 would mean $(-3)^3 = -27 \neq -729$.

Final Answer: $\sqrt[3]{-729} = -9 \Rightarrow \boxed{C}$

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

Q13.

Solution

Concept — Comparing Quantities: Difference between CI and SI

Step 1 — Compute Simple Interest (SI):

$$SI = \frac{P \times R \times T}{100} = \frac{5000 \times 8 \times 2}{100} = \text{Rs } 800$$

Step 2 — Compute Compound Interest (CI):

$$A = P \left(1 + \frac{R}{100} \right)^T = 5000 \times (1.08)^2 = 5000 \times 1.1664 = \text{Rs } 5832$$

$$CI = 5832 - 5000 = \text{Rs } 832$$

Step 3 — Find the difference:

$$CI - SI = 832 - 800 = \text{Rs } 32$$

$$\text{(Alternatively: } CI - SI = P \left(\frac{R}{100} \right)^2 = 5000 \times \frac{64}{10000} = \text{Rs } 32)$$

Why other options are wrong:

- Option (A): Rs 64 — result of $5000 \times (0.08)^2 \times 2$; incorrect formula.
- Option (B): Rs 40 — not obtained from the correct formula.
- Option (C): Rs 80 — this would be $CI - SI$ for $T = 1$ year, not 2.

Final Answer: $CI - SI = \text{Rs } 32 \Rightarrow \boxed{D}$

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



Q14.

Solution**Concept — Comparing Quantities: Discount and Selling Price****Step 1 — Compute the discount amount:**

$$\text{Discount} = 15\% \text{ of } 800 = \frac{15}{100} \times 800 = \text{Rs } 120$$

Step 2 — Compute the selling price:

$$\text{SP} = \text{MP} - \text{Discount} = 800 - 120 = \text{Rs } 680$$

(Alternatively: $\text{SP} = 800 \times 0.85 = 680$)**Why other options are wrong:**

- Option (B): Rs 720 corresponds to a 10% discount ($800 \times 0.90 = 720$).
- Option (C): Rs 700 corresponds to a 12.5% discount.
- Option (D): Rs 640 corresponds to a 20% discount ($800 \times 0.80 = 640$).

Final Answer: Selling price = Rs 680 $\Rightarrow$ AAnswer: (A) [Go Back to Q14](#)

Q15.

Solution**Concept — Comparing Quantities: Goods and Services Tax (GST)****Step 1 — Compute the GST amount:**

$$\text{GST} = 12\% \text{ of } 2000 = \frac{12}{100} \times 2000 = \text{Rs } 240$$

Step 2 — Compute the total amount:

$$\text{Total} = \text{Cost} + \text{GST} = 2000 + 240 = \text{Rs } 2240$$

(Alternatively: $\text{Total} = 2000 \times 1.12 = 2240$)**Why other options are wrong:**

- Option (A): Rs 2120 corresponds to a 6% GST ($2000 \times 1.06 = 2120$).
- Option (C): Rs 2400 corresponds to a 20% GST.



- Option (D): Rs 2200 corresponds to a 10% GST.

Final Answer: Total amount paid = Rs 2240 $\Rightarrow$ B

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

Q16.

Solution

Concept — Algebraic Expressions and Identities: Multiplication of Monomials

Step 1 — Multiply the coefficients:

$$3 \times 2 \times (-2) = -12$$

Step 2 — Multiply the variable parts:

$$x \cdot x^2 = x^{1+2} = x^3 \quad y^2 \cdot y = y^{2+1} = y^3$$

Step 3 — Combine:

$$3xy^2 \times 2x^2y \times (-2) = -12x^3y^3$$

Why other options are wrong:

- Option (A): $12x^3y^3$ — positive sign; two negatives give positive, but there is only one negative factor.
- Option (B): $-6x^3y^3$ — coefficient error; $3 \times 2 \times 2 = 12$, not 6.
- Option (D): $-12x^2y^2$ — exponent error; the exponents should be 3 for both.

Final Answer: Product = $-12x^3y^3 \Rightarrow$ C

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



Q17.

Solution**Concept — Algebraic Expressions and Identities: Using** $(a - b)^2 = a^2 - 2ab + b^2$ **Step 1 — Express 97 conveniently:**

$$97 = 100 - 3 \implies a = 100, \quad b = 3$$

Step 2 — Apply the identity:

$$\begin{aligned} 97^2 &= (100 - 3)^2 = 100^2 - 2 \times 100 \times 3 + 3^2 \\ &= 10000 - 600 + 9 = 9409 \end{aligned}$$

Why other options are wrong:

- Option (A): 9300 — forgetting to add $b^2 = 9$.
- Option (B): 9801 — this is $99^2 = (100 - 1)^2$, not 97^2 .
- Option (C): 9200 — incorrect; not produced by any correct application of the identity.

Final Answer: $97^2 = 9409 \Rightarrow \boxed{D}$ **Answer: (D)** [Go Back to Q17](#)

Q18.

Solution**Concept — Algebraic Expressions and Identities: Geometric Proof of** $(a + b)(a - b) = a^2 - b^2$ **Step 1 — Interpret the figure:** A large square of side a has area a^2 . A small square of side b is removed from one corner (shaded), with area b^2 . The remaining L-shaped region has area:

$$a^2 - b^2$$

Step 2 — Connect to the identity: The L-shaped region can be rearranged into a rectangle of dimensions $(a + b)$ by $(a - b)$, confirming $a^2 - b^2 = (a + b)(a - b)$. The L-shaped region itself represents $a^2 - b^2$.**Why other options are wrong:**

- Option (B): $(a - b)^2$ is a *small* square of side $(a - b)$, not the L-shape.



- Option (C): $2ab$ is the cross-term in $(a + b)^2 = a^2 + 2ab + b^2$; not the L-shape.
- Option (D): $a^2 + b^2$ includes the removed square; the L-shape excludes it.

Final Answer: The shaded L-shaped region represents $a^2 - b^2 \Rightarrow \boxed{A}$

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

Q19.

Solution

Concept — Mensuration: Area of an Annulus (Ring)

Step 1 — Apply the annulus area formula:

$$\text{Area} = \pi(R^2 - r^2)$$

where $R = 10$ cm (outer radius), $r = 3$ cm (inner radius).

Step 2 — Compute:

$$\begin{aligned} R^2 - r^2 &= 100 - 9 = 91 \text{ cm}^2 \\ \text{Area} &= \frac{22}{7} \times 91 = 22 \times 13 = 286 \text{ cm}^2 \end{aligned}$$

Why other options are wrong:

- Option (A): $314 \approx \pi \times 100$; uses only the outer circle, forgetting to subtract the inner.
- Option (C): $264 = \frac{22}{7} \times 84$; uses $R^2 - r^2 = 84$ incorrectly (perhaps $10^2 - 4^2$).
- Option (D): $308 = \frac{22}{7} \times 98$; uses wrong value for $R^2 - r^2$.

Final Answer: Area of ring = $286 \text{ cm}^2 \Rightarrow \boxed{B}$

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

Q20.

Solution

Concept — Mensuration: Volume of a Hollow Cylinder

Step 1 — Apply the hollow cylinder volume formula:

$$V = \pi(R^2 - r^2)h$$

where $R = 5$ cm, $r = 3$ cm, $h = 14$ cm.



Step 2 — Compute:

$$R^2 - r^2 = 25 - 9 = 16 \text{ cm}^2$$

$$V = \frac{22}{7} \times 16 \times 14 = \frac{22 \times 16 \times 14}{7} = 22 \times 32 = 704 \text{ cm}^3$$

Why other options are wrong:

- Option (A): $1540 = \frac{22}{7} \times 25 \times 14$; uses only the outer cylinder (ignores hollow).
- Option (B): $396 = \frac{22}{7} \times 9 \times 14$; uses only the inner cylinder.
- Option (D): $352 = 704/2$; halves the correct answer without reason.

Final Answer: Volume = $704 \text{ cm}^3 \Rightarrow \boxed{C}$

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

Q21.

Solution

Concept — Mensuration: Total Surface Area of a Sphere

Step 1 — Apply the TSA formula for a sphere:

$$\text{TSA} = 4\pi r^2$$

where $r = 14 \text{ cm}$.

Step 2 — Compute:

$$\text{TSA} = 4 \times \frac{22}{7} \times 14^2 = 4 \times \frac{22}{7} \times 196 = 4 \times 22 \times 28 = 2464 \text{ cm}^2$$

Why other options are wrong:

- Option (A): $616 = 4\pi r^2$ with $r = 7$; uses half the given radius.
- Option (B): $1232 = 2\pi r^2$ with $r = 14$; uses the formula for a hemisphere (curved part only).
- Option (C): $1848 = 3\pi r^2$ with $r = 14$; no standard formula gives this.

Final Answer: TSA = $2464 \text{ cm}^2 \Rightarrow \boxed{D}$

Answer: (D) [Go Back to Q21](#)



Q22.

Solution**Concept — Exponents and Powers: Laws of Exponents****Step 1 — Simplify the numerator:**

$$2^{-3} \times 4^2 = 2^{-3} \times (2^2)^2 = 2^{-3} \times 2^4 = 2^{-3+4} = 2^1 = 2$$

Step 2 — Simplify the denominator:

$$8^{-1} = (2^3)^{-1} = 2^{-3}$$

Step 3 — Divide:

$$2 \div 2^{-3} = 2^1 \times 2^3 = 2^4 = 16$$

Why other options are wrong:

- Option (B): 2 — only the numerator value, before dividing by 8^{-1} .
- Option (C): 8 — partial computation error.
- Option (D): $32 = 2^5$; an off-by-one exponent error.

Final Answer: Result = 16 $\Rightarrow$ AAnswer: (A) [Go Back to Q22](#)

Q23.

Solution**Concept — Exponents and Powers: Standard Form (Scientific Notation)****Step 1 — Count the decimal places:** 0.00000385 — move the decimal point 6 places to the right to get 3.85.

$$0.00000385 = 3.85 \times 10^{-6}$$

Step 2 — Verify the standard form: Standard form requires $1 \leq |m| < 10$ for $m \times 10^n$. Here $m = 3.85$ ✓ and $n = -6$.**Why other options are wrong:**

- Option (A): $3.85 \times 10^{-5} = 0.0000385$; only 5 decimal places — 10 times too large.



- Option (C): 38.5×10^{-7} — coefficient $38.5 \geq 10$; not in standard form.
- Option (D): 0.385×10^{-5} — coefficient < 1 ; not in standard form.

Final Answer: $0.00000385 = 3.85 \times 10^{-6} \Rightarrow \boxed{B}$

Answer: (B) [Go Back to Q23](#)

Q24.

Solution

Concept — Direct and Inverse Proportions: Inverse Proportion (Meshing Gears)

Step 1 — Identify the relationship: When two gears mesh, the number of teeth $\times$ number of rotations is constant (inverse proportion):

$$T_A \times N_A = T_B \times N_B$$

Step 2 — Substitute and solve:

$$36 \times 25 = 60 \times N_B \implies N_B = \frac{36 \times 25}{60} = \frac{900}{60} = 15$$

Why other options are wrong:

- Option (A): 25 rotations — same as Gear A; ignores the inverse relationship.
- Option (B): 10 rotations — result of $\frac{60 \times 10}{36} = \frac{600}{36} \neq 25$; incorrect.
- Option (D): 20 rotations — $36 \times 25 = 900 \neq 60 \times 20 = 1200$.

Final Answer: Gear B makes 15 rotations $\Rightarrow \boxed{C}$

Answer: (C) [Go Back to Q24](#)

Q25.

Solution

Concept — Direct and Inverse Proportions: Direct Proportion (Recipe)

Step 1 — Set up the direct proportion: Flour and biscuits are in direct proportion: more biscuits need more flour.

$$\frac{3}{24} = \frac{x}{56}$$



Step 2 — Solve for x :

$$x = \frac{3 \times 56}{24} = \frac{168}{24} = 7 \text{ cups}$$

Why other options are wrong:

- Option (A): 6 cups $\Rightarrow 6 : 24 \neq 3 : 24$ ratio; $6/24 = 1/4 \neq 3/24$.
- Option (B): 8 cups $\Rightarrow$ would produce $8 \times 8 = 64 \neq 56$ biscuits.
- Option (C): 5 cups $\Rightarrow 5/3 = x/24 \Rightarrow x = 40 \neq 56$.

Final Answer: 7 cups of flour are needed $\Rightarrow$ D

Answer: (D) [Go Back to Q25](#)

Q26.

Solution

Concept — Factorisation: Difference of Two Squares

Step 1 — Identify the form: $16x^2 - 25y^2 = (4x)^2 - (5y)^2$

Step 2 — Apply the identity $a^2 - b^2 = (a + b)(a - b)$:

$$(4x)^2 - (5y)^2 = (4x + 5y)(4x - 5y)$$

Why other options are wrong:

- Option (B): $(4x - 5y)^2 = 16x^2 - 40xy + 25y^2$; contains a middle term, not the original.
- Option (C): $(4x + 5y)^2 = 16x^2 + 40xy + 25y^2$; wrong sign and has a middle term.
- Option (D): $4(4x^2 - 25y^2)$; taking out a 4 changes the expression — $4 \times 4x^2 = 16x^2$ ✓ but $4 \times 25y^2 = 100y^2 \neq 25y^2$.

Final Answer: $16x^2 - 25y^2 = (4x + 5y)(4x - 5y) \Rightarrow$ A

Answer: (A) [Go Back to Q26](#)



Q27.

Solution**Concept — Factorisation: Factorising a Trinomial** $x^2 + bx + c$ **Step 1 — Find two numbers whose product is 15 and sum is 8:**

$$3 \times 5 = 15 \quad \text{and} \quad 3 + 5 = 8 \quad \checkmark$$

Step 2 — Write the factorisation:

$$x^2 + 8x + 15 = (x + 3)(x + 5)$$

Verification: $(x + 3)(x + 5) = x^2 + 5x + 3x + 15 = x^2 + 8x + 15 \checkmark$ **Why other options are wrong:**

- Option (A): $(x + 1)(x + 15) = x^2 + 16x + 15$; sum of factors = $16 \neq 8$.
- Option (C): $(x + 3)(x + 4) = x^2 + 7x + 12$; product = $12 \neq 15$ and sum = $7 \neq 8$.
- Option (D): $(x + 5)(x + 2) = x^2 + 7x + 10$; product = $10 \neq 15$.

Final Answer: $x^2 + 8x + 15 = (x + 3)(x + 5) \Rightarrow \boxed{B}$ **Answer: (B)** [Go Back to Q27](#)

Q28.

Solution**Concept — Factorisation: Division of a Polynomial by a Monomial****Step 1 — Divide each term:**

$$\frac{8x^3 - 4x^2 + 2x}{2x} = \frac{8x^3}{2x} - \frac{4x^2}{2x} + \frac{2x}{2x}$$

Step 2 — Simplify each fraction:

$$= 4x^2 - 2x + 1$$

Verification: $(4x^2 - 2x + 1) \times 2x = 8x^3 - 4x^2 + 2x \checkmark$ **Why other options are wrong:**

- Option (A): $4x^2 - 4x + 2$ — coefficients 4 and 2 in last two terms; incorrect



division of $\frac{4x^2}{2x}$ and $\frac{2x}{2x}$.

- Option (B): $4x^2 - 2x$ — omits the constant term $+1$ from dividing $\frac{2x}{2x}$.
- Option (D): $8x^2 - 4x + 1$ — does not divide the first term by $2x$ correctly.

Final Answer: Quotient = $4x^2 - 2x + 1 \Rightarrow \boxed{C}$

Answer: (C) [Go Back to Q28](#)

Q29.

Solution

Concept — Data Handling: Central Angles in a Pie Chart

Step 1 — Identify Cricket's data: Total students = 200. Cricket = 50 students.

Step 2 — Compute the central angle:

$$\text{Central angle} = \frac{\text{Frequency}}{\text{Total}} \times 360^\circ = \frac{50}{200} \times 360^\circ = \frac{1}{4} \times 360^\circ = 90^\circ$$

Cross-check all sectors: Football: $\frac{80}{200} \times 360 = 144^\circ$; Tennis: $\frac{40}{200} \times 360 = 72^\circ$; Badminton: $\frac{30}{200} \times 360 = 54^\circ$. Sum: $90 + 144 + 72 + 54 = 360^\circ \checkmark$

Why other options are wrong:

- Option (A): 144° — central angle for *Football* (80 students), not Cricket.
- Option (B): 72° — central angle for *Tennis* (40 students).
- Option (C): 54° — central angle for *Badminton* (30 students).

Final Answer: Central angle for Cricket = $90^\circ \Rightarrow \boxed{D}$

Answer: (D) [Go Back to Q29](#)

Q30.

Solution

Concept — Data Handling: Basic Probability

Step 1 — Find total number of balls:

$$\text{Total} = 5(\text{red}) + 3(\text{blue}) + 7(\text{green}) = 15$$



Step 2 — Find $P(\text{not red})$:

$$\text{Not red} = \text{blue} + \text{green} = 3 + 7 = 10$$

$$P(\text{not red}) = \frac{10}{15} = \frac{2}{3}$$

Alternatively: $P(\text{red}) = \frac{5}{15} = \frac{1}{3}$, so $P(\text{not red}) = 1 - \frac{1}{3} = \frac{2}{3} \checkmark$

Why other options are wrong:

- Option (B): $\frac{1}{3}$ — this is $P(\text{red})$, not $P(\text{not red})$.
- Option (C): $\frac{7}{15}$ — probability of drawing only a *green* ball.
- Option (D): $\frac{3}{5}$ — not a valid probability for any event in this experiment (total is 15, and $3/5 = 9/15$, which does not correspond to any subset).

Final Answer: $P(\text{not red}) = \frac{2}{3} \Rightarrow \boxed{A}$

Answer: (A) [Go Back to Q30](#)



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
16	C	17	D	18	A	19	B	20	C
21	D	22	A	23	B	24	C	25	D
26	A	27	B	28	C	29	D	30	A

