

SECTION A

$20 \times 1 = 20$ marks

This section has 18 multiple-choice questions and 2 assertion–reason questions of 1 mark each. For questions 19 and 20, choose the correct option (A), (B), (C) or (D) given below each question.

1. If $\text{HCF}(456, 96) = 24$ and $\text{LCM}(456, 96) = 4 \times k$, then the value of k is:

- A 456
- B 912
- C 457
- D 10944

2. If α and β are the zeroes of the polynomial $3x^2 + 6x - 4$, the value of $(\alpha - \beta)^2$ is:

- A $\frac{28}{3}$
- B 4
- C $-\frac{4}{3}$
- D $\frac{20}{3}$

3. For what value of k does the pair of linear equations $3x + ky + 2 = 0$ and $x + 3y + 2 = 0$ have a unique solution?

- A $k = 9$ only
- B $k \neq 9$
- C $k = 10$ only
- D $k \neq 10$

THE WORKED ANSWERS TO THOSE 3 QUESTIONS

1. If $\text{HCF}(456, 96) = 24$ and $\text{LCM}(456, 96) = 4 \times k$, then the value of k is: [Real numbers]

Correct answer: A — 456

- $\text{HCF} \times \text{LCM} = \text{product of the two numbers}$, so $\text{LCM} = \frac{456 \times 96}{24} = 1824$.
- $1824 = 4 \times k$, so $k = 1824 \div 4 = 456$.
- Why the other options are wrong:
- B (912): The LCM was doubled by mistake.
- C (457): A slip when dividing the LCM.
- D (10944): That uses $\text{HCF} \times k$, but the relation is $\text{HCF} \times \text{LCM} = \text{product of the numbers}$.

LOS: Number Systems

KEY TAKEAWAY

The product of two numbers equals the product of their HCF and LCM.

2. If α and β are the zeroes of the polynomial $3x^2 + 6x - 4$, the value of $(\alpha - \beta)^2$ is: [Polynomials]

Correct answer: A — $\frac{28}{3}$

- $\alpha + \beta = -2$ and $\alpha\beta = -\frac{4}{3}$.
- $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta = 4 - \frac{-16}{3} = \frac{28}{3}$.
- Why the other options are wrong:
- B (4): That is $(\alpha + \beta)^2$ only.
- C ($-\frac{4}{3}$): The sign is wrong: $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$.
- D ($\frac{20}{3}$): That is $\alpha^2 + \beta^2$.

LOS: Algebra

KEY TAKEAWAY

$(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$.

3. For what value of k does the pair of linear equations $3x + ky + 2 = 0$ and $x + 3y + 2 = 0$ have a unique solution? [Pair of linear equations]

Correct answer: B — $k \neq 9$

- A unique solution needs $a_1/a_2 \neq b_1/b_2$.
- $\frac{3}{1} \neq \frac{k}{3}$, so $k \neq 3 \times \frac{3}{1} = 9$.
- Why the other options are wrong:
- A ($k = 9$ only): $k = 9$ makes the lines parallel or coincident, giving no unique solution.
- C ($k = 10$ only): Compare a_1/a_2 with b_1/b_2 to find the value of k to avoid.
- D ($k \neq 10$): The value to avoid is 9, not 10.

LOS: Algebra

KEY TAKEAWAY

A pair has a unique solution when $a_1/a_2 \neq b_1/b_2$.