

REVISION WORKSHEET

Polynomials

Multiple Choice Questions (MCQs)

1. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is?

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

2. A quadratic polynomial, whose zeroes are -3 and 4, is:

(A) $x^2 - x + 12$ (B) $x^2 + x + 12$ (C) $x^2/2 - x/2 - 6$ (D) $2x^2 + 2x - 24$

Assertion-Reasoning

Directions: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct option:

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is NOT the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

3. Assertion (A): The polynomial $p(x) = x^2 + 4x + 5$ has two real zeroes.

Reason (R): A quadratic polynomial can have at most two real zeroes.

Higher Order Thinking Skills (HOTS)

4. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - p(x + 1) - c$, show that $(\alpha + 1)(\beta + 1) = 1 - c$.

5. Find a quadratic polynomial whose zeroes are the reciprocals of the zeroes of the polynomial $3x^2 - 5x - 2$.

CASE STUDY:

A marine biologist is studying the biomechanics of a trained bottlenose dolphin at an aquatic research center. During a specific leap out of the pool, the trajectory of the dolphin's center of mass follows the graph of a quadratic polynomial.

Let the surface of the water represent the X-axis. The height of the dolphin's center of mass above the water, denoted by $p(x)$ in meters, at a horizontal distance x in meters from a fixed starting sensor, is modeled by the polynomial: **$p(x) = -x^2 + 14x - 33$**

Based on the above scenario, answer the following conceptual questions:

Q(i) what are the exact coordinates where the dolphin emerges from the water and where it re-enters?

(A) (3, 0) and (11, 0) (B) (-3, 0) and (-11, 0) (C) (0, 3) and (0, 11) (D) (5, 0) and (9, 0)

Q(ii) The research team wants to place a submerged acoustic tracking strip exactly between the exit and entry points of the leap. Assuming the strip spans this entire space, what is the exact horizontal distance of the dolphin's leap?

(A) 6 m (B) 8 m (C) 14 m (D) 33 m

Q(iii) To test the dolphin's agility, the trainers suspend a soft target hoop in the air. To ensure the dolphin passes exactly through the center of the hoop at the peak of its trajectory, at what maximum height above the water must the hoop be placed?

(A) 7 m (B) 14 m (C) 16 m (D) 33 m

Q(iv) A camera drone is programmed to film the jump. Its flight path is an inverted parabola swooping down toward the water, modeled by the polynomial $q(x) = x^2 - 16x + k$. If the drone is programmed to graze the surface of the water at exactly one single point before ascending, what must be the value of the constant k ?

(A) 12 (B) 24 (C) 36 (D) 64

Q(v) Let α and β be the zeroes of the original polynomial $p(x) = -x^2 + 14x - 33$. The biologist uses a specific mathematical ratio to compare different leaps, defined by the expression $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$. What is the value of this ratio?

(A) $-14/33$ (B) $130/1089$ (C) $33/321$ (D) $-33/14$

Quadratic Equations

Multiple Choice Questions (MCQs)

1. The roots of the quadratic equation $x^2 - 0.04 = 0$ are:

(A) ± 0.2 (B) ± 0.02 (C) 0.4 (D) 2

2. Values of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is:

(A) 0 only (B) 4 (C) 8 only (D) $0, 8$

Assertion-Reasoning

3. Assertion (A): The equation $(x-2)^2 + 1 = 2x - 3$ is a quadratic equation.

Reason (R): Any equation of the form $ax^2 + bx + c = 0$ where $a \neq 0$, is a quadratic equation.

Higher Order Thinking Skills (HOTS)

4. A motorboat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

5. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.