Polynomials

Assertion & Reason Type Questions

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

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

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

c. Assertion (A) is true but Reason (R) is false.

d. Assertion (A) is false but Reason (R) is true.

1. Assertion (A): The expression $3x^4 - 4x^{3/2} + x^2 = 2$ is not a polynomial because the term $-4x^{3/2}$ contains a rational power of x.

Reason (R): The highest exponent in various terms of an algebraic expression in one variable is called its degree.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

2. Assertion (A): The degree of the polynomial (x-2) (x-3) (x + 4) is 4.

Reason (R): The number of zeroes of a polynomial is the degree of that polynomial.

Answer : (d) Assertion (A): $p(x) = (x - 2)(x - 3)(x + 4)$

$= (x - 2)[x^2 + 4x - 3x - 12]$

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

$= x^2 + x^2 - 12x - 2x^2 - 2x + 24$

$p(x) = x^3 - x^2 - 14x + 24$

So, degree of p (x) = 3.

Hence, Assertion (A) is false, but Reason (R) is true.

3. Assertion (A): If $p(x) = x^2 - 4x + 3$, then 3 and 1 are the zeroes of the polynomial p(x).

Reason (R): Number of zeroes of a polynomial cannot exceed its degree.

Answer :

(b) Assertion (A): Given, $p(x) = x^2 - 4x + 3$

$\Rightarrow p(x) = x^2 - (3 + 1)x + 3$

$= x^2 - 3x - x + 3$

$= x(x - 3) - 1(x - 3)$

$= (x - 1)(x - 3)$

For finding the zeroes, put $p(x) = 0$

$\therefore (x - 1)(x - 3) = 0 \Rightarrow x = 1, 3$

So, Assertion (A) is true.

Reason (R): It is true to say that the number of zeroes of a polynomial cannot exceed its degree.

Hence, both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

4. Assertion (A): The remainder when $p(x) = x^3 - 2x^2 + 3x$ is divided by (2x-1) is $\frac{9}{8}$.

Reason (R): If a polynomial p(x) is divided by ax – b, the remainder is the value of p(x) at $x = \frac{b}{a}$.

Answer : (a) Assertion (A): When $p(x) = x^3 - 2x^2 + 3x$ is divided by (2x - 1), then remainder is $p\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^3 - 2\left(\frac{1}{2}\right)^2 + 3\left(\frac{1}{2}\right)$

$$= \frac{1}{8} - \frac{1}{2} + \frac{3}{2}$$

$$= \frac{1}{8} + \frac{2}{2} = \frac{1}{8} + 1$$

$$= \frac{9}{8}$$

So, Assertion (A) is true.

Reason (R): It is also true.

Hence, both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

5. Assertion (A): Factorisation of the polynomial $\sqrt{3}x^2 + 11x + 6\sqrt{3}$ is $(\sqrt{3}x + 2)(x + \sqrt{3})$.

Reason (R): Factorisation of the polynomial $35y^2 + 13y - 12$ is $(7y - 3)(5y + 4)$.

Answer : (d) Assertion (A): $\sqrt{3}x^2 + 11x + 6\sqrt{3} = (\sqrt{3}x^2 + 9x + 2x + 6\sqrt{3})$

$= \sqrt{3}x(x + 3\sqrt{3}) + 2(x + 3\sqrt{3})$

$= (x + 3\sqrt{3})(\sqrt{3}x + 2)$.

So, Assertion (A) is false.

Reason (R): $(35y^2 + 13y - 12) = 35y^2 + 28y - 15y - 12$

$= 7y(5y + 4) - 3(5y + 4)$

$= (5y + 4)(7y - 3)$

So, Reason (R) is true.