Polynomials

Assertion & Reason Type Questions

In the following questions, a statement of Assertion (A) is followed by a statement of 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

Q 1.

Assertion (A): $f(x) = 2x^3 - \frac{3}{x} + 7$ **is a polynomial** in the variable x of degree 3.

Reason (R): The highest power of x in a polynomial f(x) is called the degree of the polynomial f(x).

Answer : (d) **Assertion (A):** $f(x) = 2x^3 - \frac{3}{x} + 7 = 2x^3 - 3x^{-1} + 7$ is not a polynomial as one of the term is $-3x^{-1}$ in which the power of x is negative. So, Assertion (A) is false.

Reason (R): It is true to say that the highest power of x in a polynomial f(x) is the degree of the polynomial f(x). Hence, Assertion (A) is false but Reason (R) is true.

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

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

Answer : (d) **Assertion (A):** We have,

$p(x) = x^2+3x+3$

For finding zeroes, put

$p(x)=0 \Rightarrow x^2+3x+3=0$

Compare with $ax^2 + bx + c = 0$, we get

$a=1, b=3, c=3$

.. Discriminant $(D)=b^2-4ac$

$(3)^2$-4x1x3=9-12=-3<0
⇒ p(x) has no real zero.
So, Assertion (A) is false.
Reason (R): It is true to say that a quadratic polynomial has atmost 2 zeroes.
Hence, Assertion (A) is false but Reason (R) is true.

Q 3. Assertion (A): Polynomial $x^2 + 4x$ has two real zeroes.
Reason (R): Zeroes of the polynomial $x^2 + ax$ (a = 0) are 0 and a.

Answer : (c) **Assertion (A):** Let polynomial $p(x) = x^2+4x = x(x+4)$
For the zeroes of p(x), put
x(x+4)=0
x=0 or x+4=0
x=0, -4.
So, x^2+4x has two real zeroes.
Thus, Assertion (A) is true.
Reason (R): Let polynomial $f(x) = x^2 + ax$, (a = 0)
= x(x+a)
For the zeroes of f(x), put
x(x+a) = 0
x=0 or x+a=0
x = 0, -a
So, x^2+ax has two zeroes 0 and -a.
Thus, Reason (R) is false.
Hence, Assertion (A) is true but Reason (R) is false.

Q 4. Assertion (A): If the sum and product of zeroes of a quadratic polynomial is 3 and -2 respectively, then the quadratic polynomial is x^2 - 3x-2.
Reason (R): If S is the sum of zeroes and P is the product of zeroes of a quadratic polynomial, then the quadratic polynomial is given by x^2 - Sx + P.

Answer : (a) **Assertion (A):** Let a and ß be the zeroes of quadratic polynomial.
Now, given a +B=3=5 and aß=-2=P
= 5=3 and P=-2
The required quadratic polynomial
= x^2-(5)x+P=x^2-3x-2

Therefore, 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).

Q 5. Assertion (A): If two zeroes of the polynomial $f(x)=x^3-2x^2-3x+6$ are $\sqrt{3}$ and $-\sqrt{3}$, then its third zero is 4.

Reason (R): If a, ß and y are the zeroes of the polynomial $f(x) = ax^3 + bx^2 + cx + d$. Then,

$$\text{Sum of the zeroes} = -(1)\cdot\frac{\text{Coefficient of } x^2}{\text{Coefficient of } x^3}$$

Answer : (d) **Assertion (A):** Let $a=\sqrt{3}$. $B=-\sqrt{3}$ be the zeroes of the polynomial $f(x) = x^3-2x^2-3x+6$ and y be its third zero.

Then, $\alpha+\beta+\gamma = -\left(\frac{-2}{1}\right)$

$\Rightarrow$ $\sqrt{3}-\sqrt{3}+\gamma=2 \Rightarrow \gamma=2$

Therefore, Assertion (A) is false.

Reason (R): It is also true.

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

Q.6. Assertion (A) : $x^2+7x+12$ has no real zeroes.

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

Answer : (d)

Q.7. Assertion (A) : If the sum of the zeroes of the quadratic polynomial $x^2-2kx+8$ is 2 then value of k is 1.

Reason (R) : Sum of zeroes of a quadratic polynomial ax^2+bx+c is $-b/a$

Answer : (a)

Q.8. Assertion (A) : $P(x) = 4x^3-x^2+5x^4+3x-2$ is a polynomial of degree 3.

Reason (R) : The highest power of x in the polynomial P(x) is the degree of the polynomial.

Answer : (d)

Q.9. Assertion (A) : x^3+x has only one real zero.

Reason (R) : A polynomial of nth degree must have n real zeroes.

Answer : (c)

Q.10. Assertion (A) : If one zero of polynomial $p(x) = (k^2+4)x^2+13x+4k$ is reciprocal of the other, then k=2.

Reason (R) : If (x-a) is a factor of p(x), then p(a) = 0 i.e., a is a zero of p(x).

Answer : (b)

Q.11. Assertion (A) : x^2+4x+5 has two zeroes.

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

Answer : (d)

Q.12. Assertion (A) : Degree of aa zero polynomial is not defined.

Reason (R) : Degree of a non-zero constant polynomial is 0.

Answer : (b)

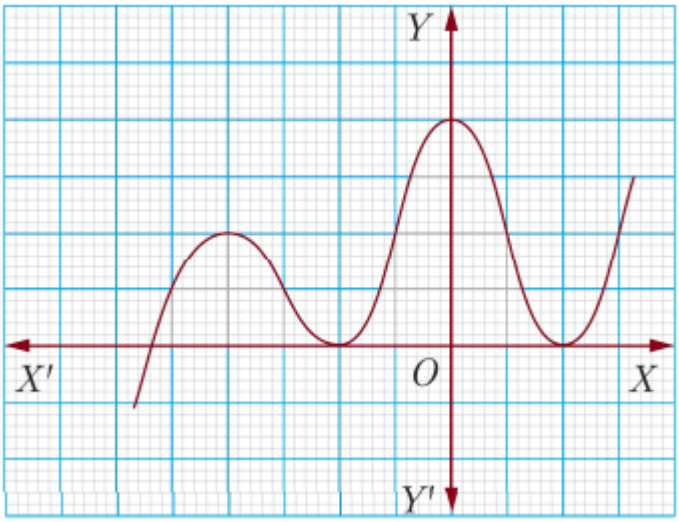
Q.13. Assertion (A) : If the product of the zeroes of the quadratic polynomial $x^2+3x+5k$ is -10 then value of k is -2.

Reason (R) : Sum of zeroes of a quadratic polynomial ax^2+bx+c is $-b/a$

Answer : (b)

Q.14. Assertion (A) : The graph y=f(x) is shown in figure, for the polynomial f(x). The number of zeroes of f(x) is 3.

Reason (R) : The number of zero of the polynomial f(x) is the number of point of which f(x) cuts or touches the axes.



Answer : (c)

Q.15. Assertion (A) : $3-2\sqrt{5}$ is one zero of the quadratic polynomial then other zero will be $3+2\sqrt{5}$.

Reason (R) : Irrational zeros (roots) always occurs in pairs.

Answer : (a)