Practice Questions - Term I

Date: 11/11/2021

Subject: Mathematics

Topic : Polynomials

Class: X

1. Identify the cubic polynomials among the following.

1. $2x^3 + 3x^2 + 2x + 1$

2. $x^3 + 2x + 3$

3. $\sqrt{3}x + 5$

4. $y + \sqrt{2}$

A. 1,2 and 3

B. 3 and 4

C. 2 and 3

D. 1 and 2

For a cubic polynomial, the degree of the variable in the polynomial should be 3.

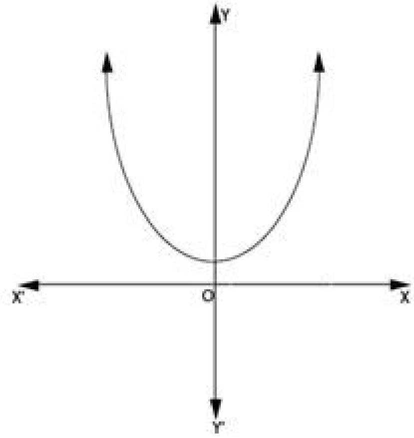
1. $2x^3 + 3x^2 + 2x + 1$ – Degree of x is 3. So, cubic polynomial

2. $x^3 + 2x + 3$ – Degree of x is 3. So, cubic polynomial.

3. $\sqrt{3}x + 5$ – Degree of x is 1 – Linear polynomial.

4. $y + \sqrt{2}$ – Degree of y is 1 – Linear polynomial.

2. The graph of a polynomial P(x) is as shown. The number of zeroes is/are



A. 2

B. 1

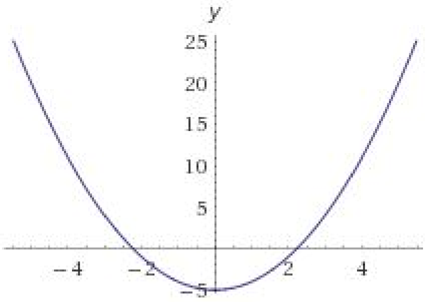
C. 0

D. 3

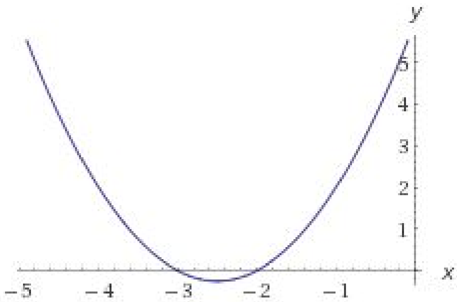
Zero of a polynomial is that value of x for which the value of the polynomial becomes zero. The maximum number of zeroes of a polynomial is equal to the degree of the polynomial. The zeroes may be real (equal or unequal) or unreal.
In this question, the graph is not intersecting the x-axis. So, the polynomial has no zeros.

3. Which of the following graph represents the quadratic polynomial $-x^2 + 5x - 6$?

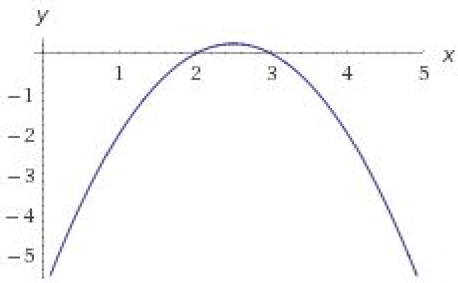
A.



B.



C.



D. Cannot be represented on a graph.

One way of solving this question is to find the zeroes of given polynomial by conventional factorization. But we will solve it in a smart way. We just find the sum of zeroes from polynomial and compare it from the graphs, which satisfies the sum of zeroes.

From polynomial,
Sum of zeroes = $\frac{-b}{a}$ = $\frac{-5}{-1}$ = 5
From the graphs given , we look for graph whose sum of zeroes is 5. Thus graph having 2,3 as zeroes is the required graph.

Practice Questions - Term I

4. The zeros of the polynomial $x^2 - \sqrt{2}x - 12$ are _____

A. $\sqrt{2}, -\sqrt{2}$

B. $3\sqrt{2}, -2\sqrt{2}$

C. $3 - \sqrt{2}, 2\sqrt{2}$

D. $3\sqrt{2}, 2\sqrt{2}$

Given, $x^2 - \sqrt{2}x - 12$

Let's factorise using formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 1; \ \ b = -\sqrt{2}; \ \ c = -12$

$$x = \frac{-(-\sqrt{2}) \pm \sqrt{(-\sqrt{2})^2 - 4 \times 1 \times (-12)}}{2 \times 1}$$

$$= \frac{\sqrt{2} \pm \sqrt{2+48}}{2} = \frac{\sqrt{2} \pm \sqrt{50}}{2}$$

$$= \frac{\sqrt{2} \pm \sqrt{2 \times 5 \times 5}}{2} = \frac{\sqrt{2} \pm 5\sqrt{2}}{2}$$

$$x = \frac{\sqrt{2} + 5\sqrt{2}}{2}; \ \ \frac{\sqrt{2} - 5\sqrt{2}}{2}$$

$$= \frac{6\sqrt{2}}{2}; \ \ \frac{-4\sqrt{2}}{2}$$

$x = 3\sqrt{2}; \ \ -2\sqrt{2}$

Zeroes are $3\sqrt{2}$ & $-2\sqrt{2}$

5. If a and b are the zeroes of a polynomial $px^2 - 5x + q$, then find the values of p and q, if a + b = ab = 10.

A. 5 and $\frac{1}{2}$

B. 5 and 2

C. $\frac{1}{2}$ and 5

D. 10 and 1

We know that, for a quadratic equation $ax^2 + bx + c = 0$,
Sum of roots $= \alpha + \beta$
and product of roots $= \alpha\beta$
where α and β are the roots of the equation.

Also, $\alpha + \beta = \frac{-b}{a}$ and $\alpha\beta = \frac{c}{a}$

So,
$a + b = \frac{5}{p}$ and $ab = \frac{q}{p}$.

It is given that a + b = ab = 10

$\Rightarrow\ 10 = \frac{5}{p}$
Hence, $p\ = \frac{1}{2}$

Also, $ab = \frac{q}{p}$
$\Rightarrow 10 = \frac{q}{p}$
$\Rightarrow q = 10p$
$\Rightarrow q = 10 \times \frac{1}{2}$
$\Rightarrow q = 5$

Practice Questions - Term I

6. What is the maximum number of times the graph of the polynomial $y = px^3 + qx^2 + rx + s$ intersects the x axis?

A. 1

B. 2

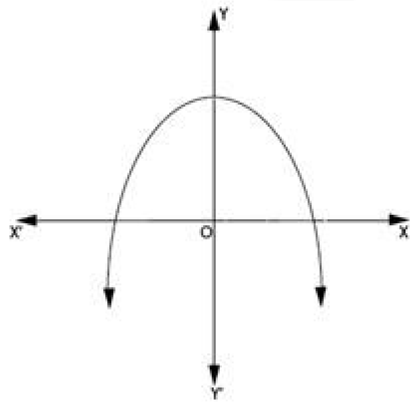
C. 4

D. 3

The graph of a polynomial of degree 'n' can cut the x-axis at a maximum of 'n' values.

Since the given polynomial has a degree 3, it can cut the x axis at most 3 times.

7. According to the graph below, the product of the zeroes of the polynomial will be



A. positive

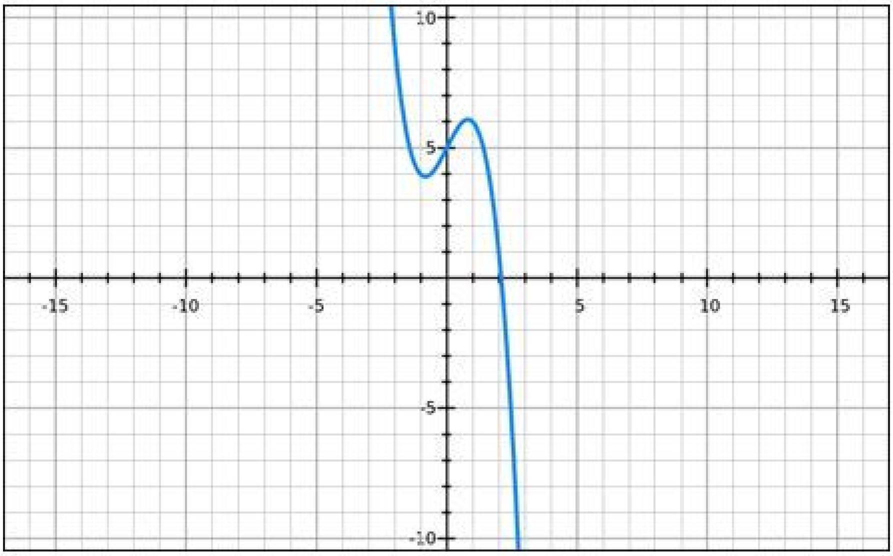
B. negative

C. zero

D. cannot be determined

One of the zeros of the polynomial lies on the positive x-axis. Thus, the abscissa or the x -coordinate, which is the corresponding zero, is positive. The other zero lies on the negative x-axis. Thus the abscissa or x - coordinate which is the corresponding zero, is negative.
Thus, the product of zeroes is going to be $positive \times negative = negative$

8. The graph of y = p(x) is given. The number of zeroes of y = p(x) is___.



A. 0

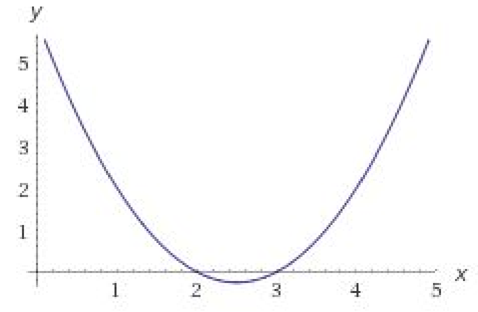
B. 1

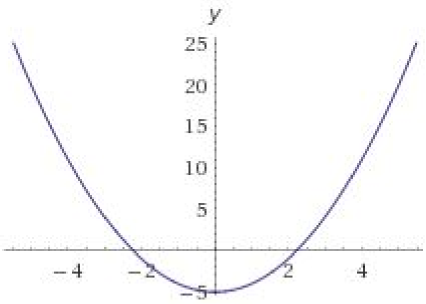
C. 2

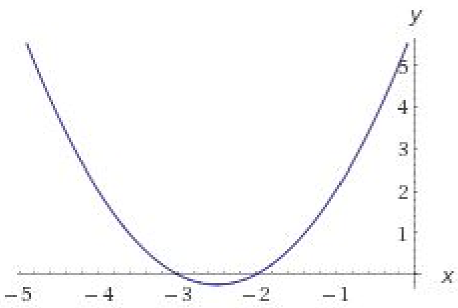
D. 3

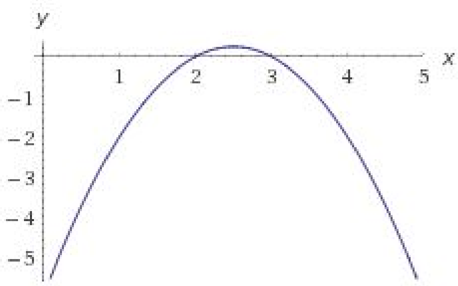
In the graph, the polynomial curve intersects the X – axis at 1 point. So number of zeroes is 1

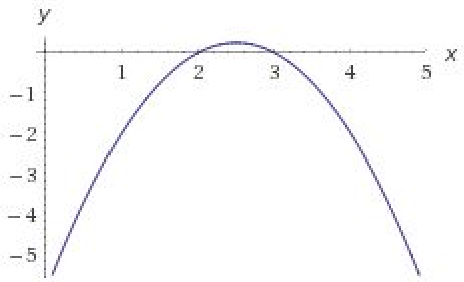
9. Which of the following graph represents the quadratic polynomial $-x^2 + 5x - 6$?

A. 

B. 

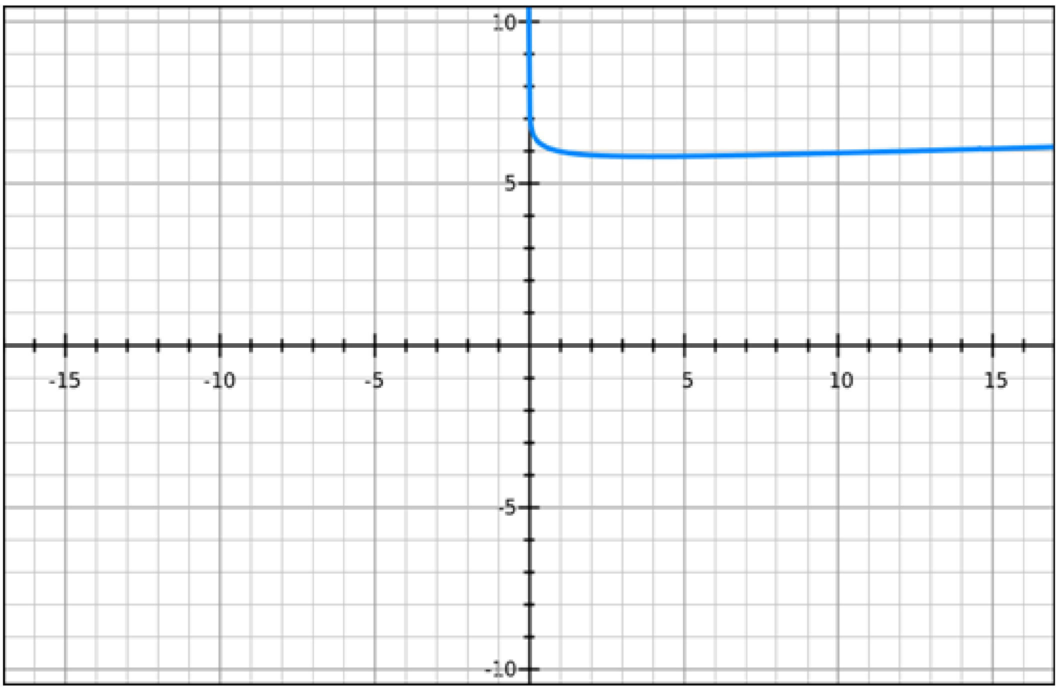
C. 

D. 



In a quadratic polynomial, if the coefficient of 'a' is negative, then the graph is upside down, i.e., the two hands of the graph point downwards.

10. The graph of y = p(x) is given. How many zeroes can exist? Assume that the p(x) is always increasing beyond x = 10.



A. 0

B. 1

C. 2

D. 3

In the graph, the line intersects the X – axis at no point. So number of zeroes is 0

11. If x = 2 and x = 1 are the zeroes of the quadratic polynomial $ax^2 - 3x + b$, then find the value of a - b.

- A. 0
- B. 1
- C. - 1
- D. 2

Let $f(x) = ax^2 - 3x + b$.
Since x = 2 is a zero of f(x), f(2) = 0.
$\Rightarrow 4a - 6 + b = 0.......(i)$

Also, since x = 1 is a zero f(x), f(1) = 0,
$\Rightarrow a - 3 + b = 0.......(ii)$

$(i) - (ii) \Rightarrow 3a = 3$
$\Rightarrow a = 1$
Thus, (ii) $\Rightarrow b = 2$

Hence, (a-b) = 1 - 2 = - 1.

12. If the sum of the zeroes of the polynomial $9x^2 - kx + 2$ is $\frac{11}{9}$ find the value of k.

- A. -1
- B. 1
- C. -4
- D. 4

Given polynomial: $9x^2 - kx + 2$
On dividing the poynomial by 9, we get $x^2 - \frac{k}{9} + \frac{2}{9}$.

We know that, the general quadratic equation can be written as
$x^2 - (\text{Sum of zeroes})x + (\text{Product of zeroes})$

The sum of the zeroes is given as $\frac{11}{9}$.
$\Rightarrow \frac{k}{9} = \frac{11}{9}$
$\Rightarrow k = 11$

13. Find a cubic polynomial whose zeroes are 2, - 3 and 4.

A. $x^3 - 3x^2 - 10x + 24$

B. $x^3 - x^2 - x + 2$

C. $x^3 + x^2 + x$

D. $2x^3 + x^2 + 1$

If a, b and c are the zeroes of a cubic polynomial f(x), then
$f(x) = x^3 - (a + b + c)x^2 + (ab + bc + ca)x - (abc)$
Thus, the required polynomial is:
$x^3 - (3)x^2 + (-10)x - (-24)$
$= x^3 - 3x^2 - 10x + 24$

14. Find the quadratic polynomial whose sum of its zeroes (roots) is $-\frac{8}{5}$ and the product of the zeroes (roots) is $\frac{7}{5}$.

A. $14x^2 + 7x + 5$

B. $5x^2 + 8x + 7$

C. $2x^2 - 8x + 7$

D. $5x^2 - 8x + 7$

Given that,

Sum of zeroes = $\frac{-8}{5}$

Product of zeroes = $\frac{7}{5}$

Required quadratic polynomial is,

$f(x) = [(x^2 - (sum\ of\ roots)x + (product\ of\ roots)]$

Substituting the given values we get,

$f(x) = [x^2 - \frac{(-8)}{5}x + \frac{7}{5}]$

$f(x) = [x^2 + \frac{8}{5}x + \frac{7}{5}]$

multiplying by 5 we get

$f(x) = 5x^2 + 8x + 7$

$\therefore$ Required polynomial is $5x^2 + 8x + 7$.

15. If α, β and γ are the zeros of the polynomial $2x^3 - 6x^2 - 4x + 30$, then the value of $(\alpha\beta + \beta\gamma + \gamma\alpha)$ is

✗ **A.** 2

✓ **B.** -2

✗ **C.** 1

✗ **D.** 3

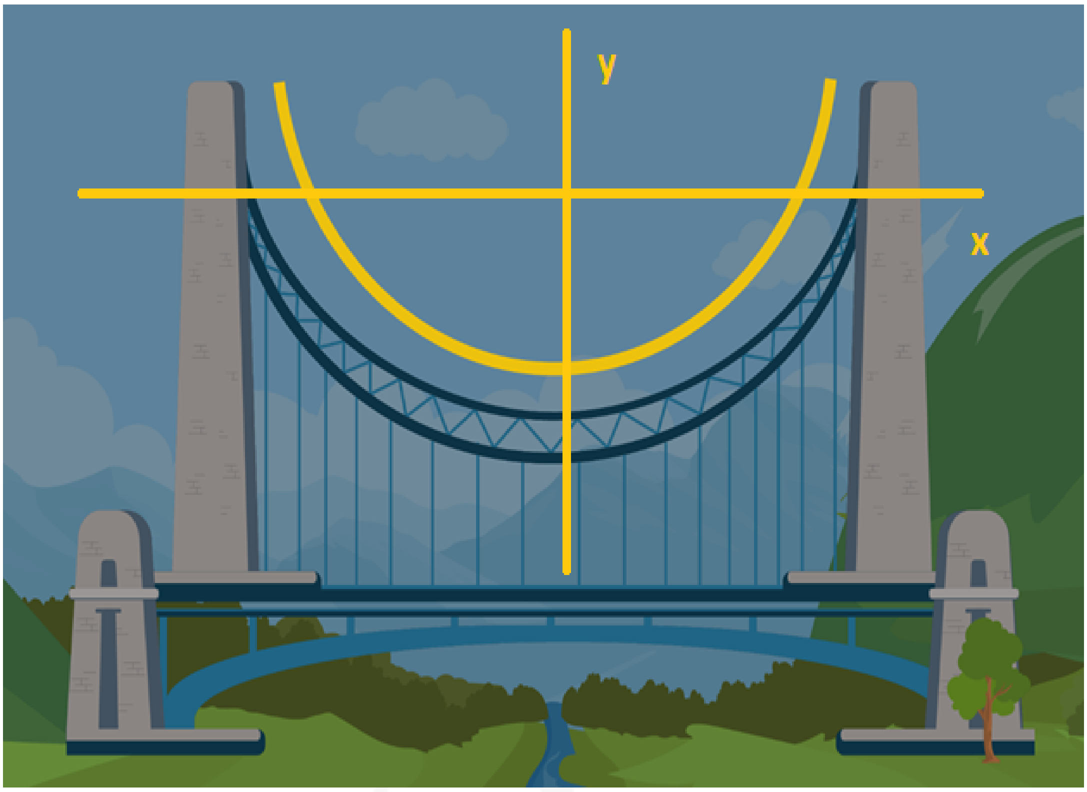
Practice Questions - Term I

16. 

Polynomials are everywhere. It is found in the slope of a hill, the curve of a bridge or the continuity of a mountain range.

Based on the given information, answer the following question.

If the equation of the bridge is prepersented by the following graph $y = p(x)$, then name the type of the polynomial it traces.



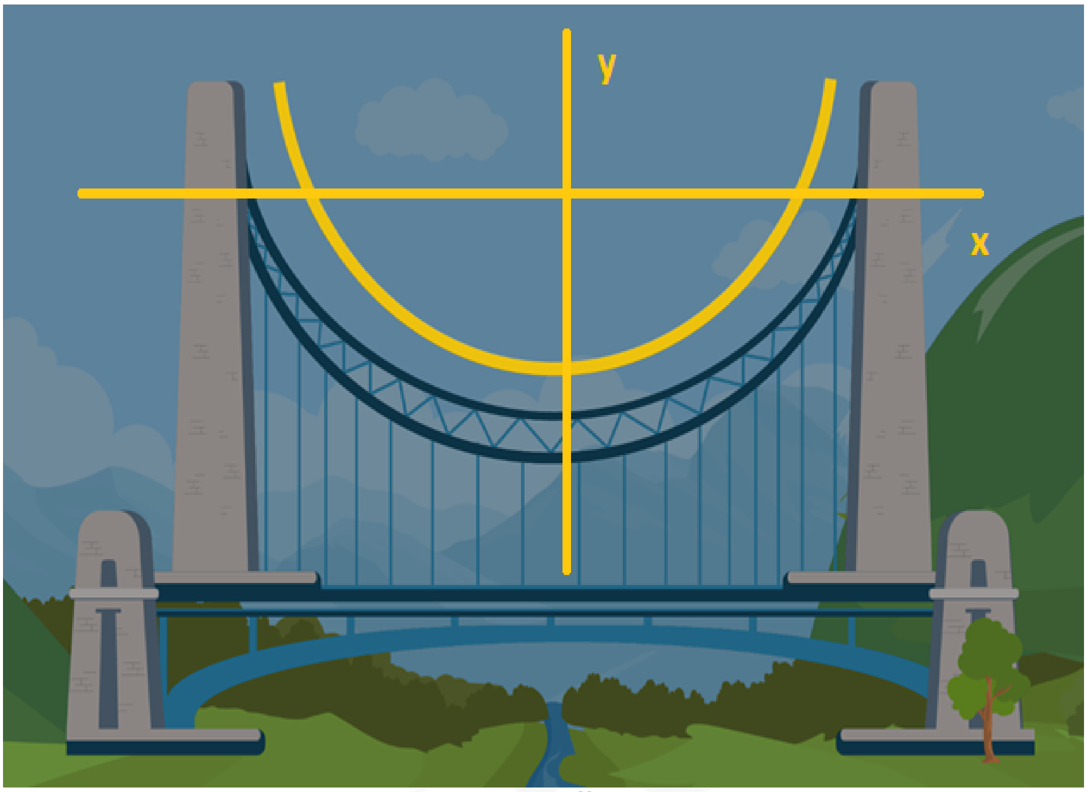
A. Linear

B. Quadratic

C. Cubic

D. Bi-quadratic

Practice Questions - Term I



The graph here, cuts the x-axis at two different points.
Hence, the number of zeroes for the given graph is 2.

We know that, the degree of the polynomial indicates the maximum number of zeroes it can have.

Here, the maximum number of zeroes is 2.
Thus, $y = p(x)$ has to be a quadratic equation.

Practice Questions - Term I

17.

Polynomials are everywhere. It is found in the slope of a hill, the curve of a bridge or the continuity of a mountain range.

Based on the given information, answer the following question.

If the hills are represented by the cubic polynomial $t(x) = px^3 + qx^2 + rx + s$, then which of the following is always true?

A. $s \neq 0$

B. $r \neq 0$

C. $q \neq 0$

D. $p \neq 0$

Given: Hills are represented by the cubic polynomial
$t(x) = px^3 + qx^2 + rx + s.$

If $s = 0, \text{ then } t(x) = px^3 + qx^2 + rx$
$r = 0, \text{ then } t(x) = px^3 + qx^2 + s$
$q = 0, \text{ then } t(x) = px^3 + rx + s$
All these are cubic polynomials since the highest degree is 3.

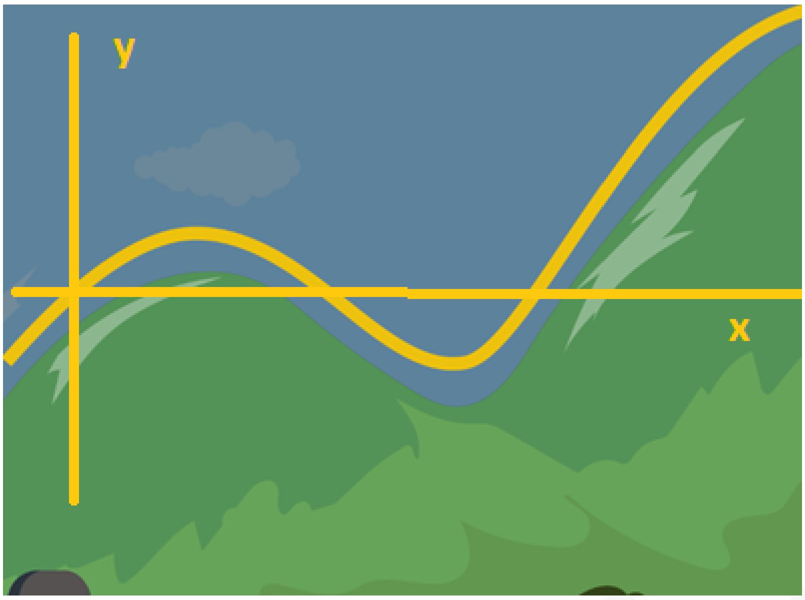
But when $p = 0, \text{ then } t(x) = qx^2 + rx + s$ which is a quadratic equation.
Hence, p cannot be equal to 0.

18. 

Polynomials are everywhere. It is found in the slope of a hill, the curve of a bridge or the continuity of a mountain range.

Based on the given information, answer the following question.

If the path traced by the hills is represented by the graph $y = p(x)$ below, find the number of zeroes.

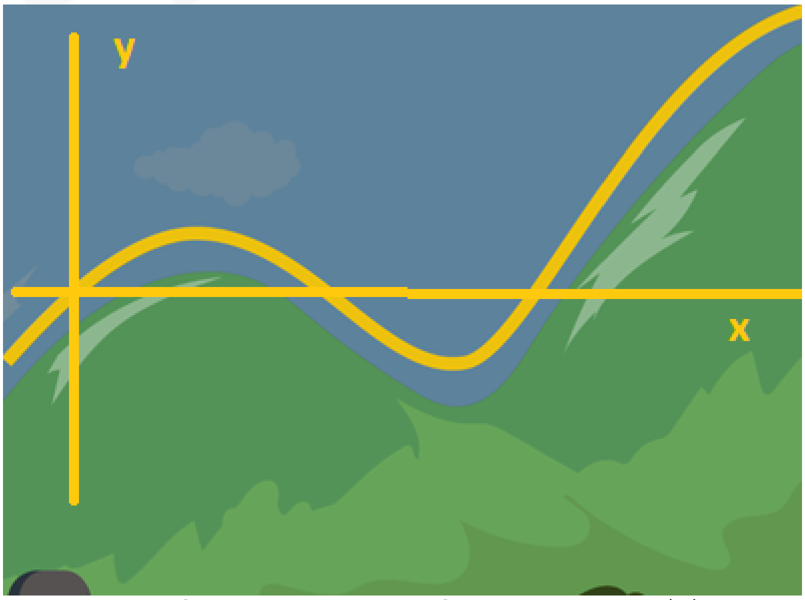


A. 0

B. 1

C. 2

D. 3



In the given figure, the graph of a polynomial $p(x)$ cuts the x-axis at three distinct points. i.e the value of polynomial is equal to zero at these three points.

$\therefore$ The number of zeroes of $p(x) = 3$

19. 

Polynomials are everywhere. It is found in the slope of a hill, the curve of a bridge or the continuity of a mountain range.

Based on the given information, answer the following question.

Find a quadratic polynomial for the bridge if 6 is the sum and 8 is the product of its zeroes.

A. $x^2 + 6x + 8$

B. $x^2 - 6x + 8$

C. $x^2 + 6x - 8$

D. $x^2 - 6x - 8$

To find: A quadratic polynomial whose sum is6 and the product is 8.

We know that, the general quadratic equation can be written as
$x^2 - (\text{Sum of zeroes})x + (\text{Product of zeroes})$

Given: Sum of zeroes = 6
Product of zeroes = 8

Hence, the required polynomial $= x^2 - 6x + 8$

20.

Polynomials are everywhere. It is found in the slope of a hill, the curve of a bridge or the continuity of a mountain range.

Based on the given information, answer the following question.

If the hills are prepresented by the cubic polynomial $t(x) = 2x^3 + 8x^2 + 9x + 16$, then the product of the zeroes is:

A. -4

B. $\frac{9}{2}$

C. -8

D. 8

To find: The product of the zeroes of the polynomial
$t(x) = 2x^3 + 8x^2 + 9x + 16$

We know that, a general cubic polynomial can be written in the form of
$x^3 - (\alpha + \beta + \gamma)x^2 + (\alpha\beta + \beta\gamma + \gamma\alpha)x - \alpha\beta\gamma$ where α, β, γ are the zeroes of the polynomial.

On comparing the given polynomial to its general form,
$t(x) = x^3 + 4x^2 + \frac{9}{2}x + 8$
Here, the negative of the constant term will be the product of the zeroes.
Hence, the required answer is -8.