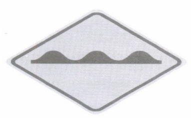
QB365 QUESTION BANK SOFTWARE

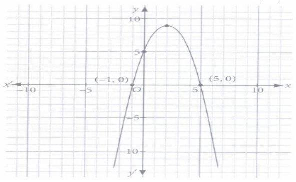
10th Maths Important Case Study Questions for Polynomials 2024

10th Standard

Section A 2 x 4 = 8

1) ABC construction company got the contract of making speed humps on roads. Speed humps are parabolic in shape and prevents overspeeding, mini mise accidents and gives a chance for pedestrians to cross the road. The mathematical representation of a speed hump is shown in the given graph.





Based on the above information, answer the following questions.

(i) The polynomial represented by the graph can be _______polynomial.

(a) Linear **(b) Quadratic**

(c) Cubic **(d) Zero**

(ii) The zeroes of the polynomial represented by the graph are

(a) 1,5 **(b) 1,-5**

(c) -1,5 **(d) -1,-5**

(iii) The sum of zeroes of the polynomial represented by the graph are

(a) 4 **(b) 5** **(c) 6** **(d) 7**

(iv) If a and β are the zeroes of the polynomial represented by the graph such that $\beta > \alpha, \text{ then } |8\alpha + \beta| =$

(a) 1 **(b) 2** **(c) 3** **(d) 4**

(v) The expression of the polynomial represented by the graph is

$\text{(a) } -x^2 - 4x - 5 (b) x^2 + 4x + 5 (c) x^2 + 4x - 5 (d) -x^2 + 4x + 5$

Answer : **(i) (b):** Since, the given graph is parabolic is shape, therefore it will represent a quadratic polynomial.

[∴ Graph of quadratic polynomial is parabolic in shape 1

(ii) (c): Since, the graph cuts the x-axis at -1, 5. So the polynomial has 2 zeroes i.e., -1 and 5.

(iii) (a) : Sum of zeroes = -1 + 5 = 4

(iv) (c): Since a and β are zeroes of the given polynomial and β > a

∴a = - 1 and β = 5.

$\therefore |8\alpha + \beta| = |8(-1) + 5| = |-8 + 5| = |-3| = 3.$

(v) (d): Since the zeroes of the given polynomial are - 1 and 5.

∴ Required polynomial p(x)

= k{ x^2 -(-1 + 5)x + (-1)(5)} = k(.x^2 - 4x - 5)

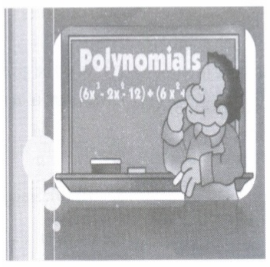
For k = -1, we get

p(x) = -.x^2 + 4x + 5, which is the required polynomial.

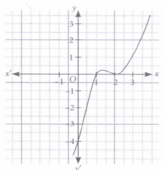
2) The tutor in a coaching centre was explaining the concept of cubic polynomial as - A cubic polynomial is of the form $ax^3 + bx^2 + cx + d, a \neq 0$ and it has maximum three real zeroes. The zeroes of a cubic polynomial are namely the x-coordinates of the points where the graph of the polynomial intersects the x-axis. If α, β and γ are the zeroes of a cubic polynomial $ax^3 + bx^2 + cx + d$ then the relation between their zeroes and their coefficients are $\alpha + \beta + \gamma = -b/a$

$\alpha\beta + \beta\gamma + \alpha\gamma = c/a$

$\alpha\beta\gamma = -d/a$



Based on-the above information, answer the following questions.
(i) Which of the following are the zeroes of the polynomial $x^3-4x^2-7x+10$?
(a) -3,1 and 3 (b) -1,2 and-3
(c) 2, -1 and 5 (d) -2,1 and 5
(ii) If $-\frac{1}{2}$ -2 and 5 are zeroes of a cubic polynomial, then the sum of product of zeroes taken two at a time is
$(a)\frac{23}{2}$ $(b)-\frac{1}{2}$
$(c)-23$ $(d)-\frac{23}{2}$
(iii) In which of the following polynomials the sum and product of zeroes are equal?
$(a)x^3-x^2+5x-1$ $(b)x^3-4x$
$(c)3x^3-5x^2-11x-3$ **(d) Both (a) and (b)**
(iv) The polynomial whose all the zeroes are same is
$(a)x^3+x^2+x-1$ $(b)x^3-3x^2+3x-1$
$(c)x^3-5x^2+6x-1 (d)3x^3+x^2+2x-1$
(v) The cubic polynomial, whose graph is as shown below, is



$(a)x^3-5x^2+8x-4 (b)x^3-7x^2+11x+9$
$(c)3x^3-4x^2+x-5\,(d)x^3-9$

Answer : (i) (d): For finding zeroes, check whether $x^3-4x^2-7x+10$ is 0 for given zeroes
Let p(x) = x^3 - $4x^2$ - 7x + 10. Then, Clearly p(-2) = p(1) = p(5) = 0 So, the zeroes are -2, 1 and 5.
(ii) (d): Here $\alpha=\frac{-1}{2},\beta=-2$ and $\gamma=5$
∴ Sum of product of zeroes taken two at a time
$=\alpha\beta+\beta\gamma+\gamma\alpha$
$=\left(\frac{-1}{2}\right)(-2)+(-2)(5)+(5)\left(\frac{-1}{2}\right)=1-10-\frac{5}{2}=\frac{-23}{2}$
(iii) (d): Consider x^3-x^2+5x-1
Sum of zeroes = 1 = Product of zeroes
Now, consider x^3 - 4x
Sum of zeroes = 0 = Product of zeroes.
(iv) (b): Let a, a, a, be the zeroes of the cubic polynomial. [∵ All zeroes are same]
Then, a3 = 1 = > a = 1 [Using given options]
So, the required polynomial is $(x-1)^3=x^3-3x^2+3x-1$
(v) (a): Clearly x = 1 and x = 2 are the zeroes of given polynomial, both of which satisfies x^3-5x^2+8x-4