CBSE Class 10 Mathematics
Important Questions
Chapter 2
Polynomails

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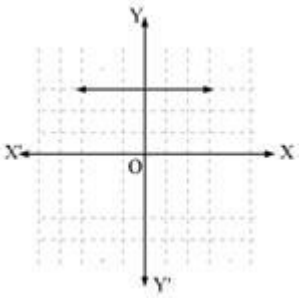
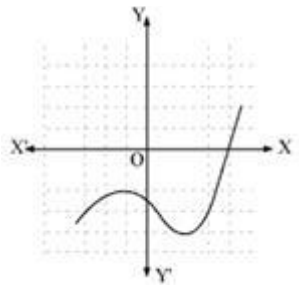
1 Marks Questions

1. The graphs of y=p(x) are given to us, for some polynomials p(x). Find the number of zeroes of p(x), in each case.

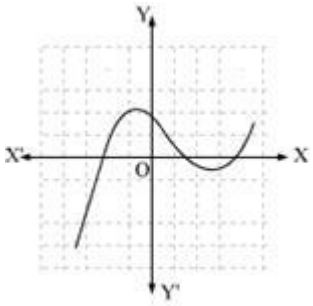
(i)



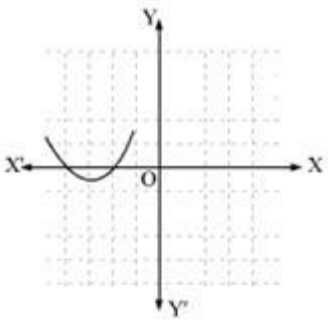
(ii)



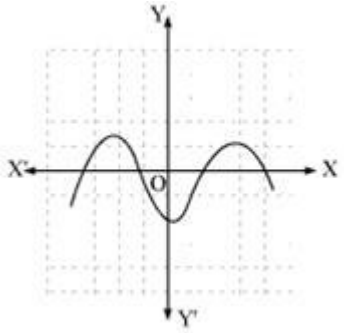
(iii)



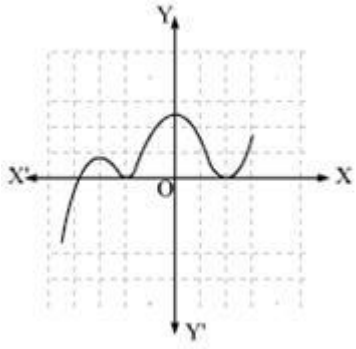
(iv)



(v)



(vi)



Ans. (i) The graph does not meets x-axis at all. Hence, it does not have any zero.

(ii) Graph meets x-axis 1 time. It means this polynomial has 1 zero.

(iii) Graph meets x-axis 3 times. Therefore, it has 3 zeroes.

(iv) Graph meets x-axis 2 times. Therefore, it has 2 zeroes.

(v) Graph meets x-axis 4 times. It means it has 4 zeroes.

(vi) Graph meets x-axis 3 times. It means it has 3 zeroes

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2. Which of the following is polynomial?

(a) $x^2-6\sqrt{x}+2$

(b) $\sqrt{x}+\frac{1}{\sqrt{x}}$

(c) $\frac{5}{x^2-3x+1}$

(d) none of these

Ans. (d) none of these

3. Polynomial $2x^4+3x^3-5x^2-5x^2+9x+1$ is a

(a) linear polynomial

(b) quadratic polynomial

(c) cubic polynomial

(d) bi-quadratic polynomial

Ans. (d) bi-quadratic polynomial

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4. If α and β are zeros of x^2+5x+8, then the value of $(\alpha+\beta)$ is

(a) 5

(b) -5

(c) 8

(d) -8

Ans. (b) -5

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5. The sum and product of the zeros of a quadratic polynomial are 2 and -15 respectively. The quadratic polynomial is

(a) $x^2-2x+15$

(b) $x^2-2x-15$

(c) $x^2+2x-15$

(d) $x^2+2x+15$

Ans. (b) $x^2-2x-15$

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6. If p (x) = $2x^2$ – 3x + 5, 3x + 5, then P(-1) is equal to

(a) 7

(b) 8

(c) 9

(d) 10

Ans. (d) 10

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7. Zeros of p (x) = x^2 – 2x - 3 are

(a) 3 and 1

(b) 3 and -1

(c) -3 and -1

(d) 1 and -3

Ans. (b) 3 and -1

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8. If α and β are the zeros of $2x^2$ + 5x - 10 , then the value of $\alpha\beta$ is

(a) $-\frac{5}{2}$

(b) 5

(c) -5

(d) $\frac{2}{5}$

Ans. (c)-5

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9. A quadratic polynomial, the sum and product of whose zeros are 0 and $\sqrt{5}$ respectively is

(a) $x^2+\sqrt{5}$

(b) $x^2-\sqrt{5}$

(c) $x^2 – 5$

(d) None of these

Ans. a) $x^2+\sqrt{5}$

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10. Which of the following is polynomial?

(a) $x^2-6\sqrt{x}+2$

(b) $\sqrt{x}+\frac{1}{\sqrt{x}}$

(c) $\frac{5}{x^2-3x+1}$

(d) none of these

Ans. (d) none of these

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11. Polynomial $2x^4+3x^3-5x^2-5x^2+9x+1$ **is a**

(a) linear polynomial

(b) quadratic polynomial

(c) cubic polynomial

(d) bi-quadratic polynomial

Ans. (d) bi-quadratic polynomial

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12. If α **and** β **are zeros of** x^2+5x+8**, then the value of** $(\alpha+\beta)$ **is**

(a) 5

(b) -5

(c) 8

(d) -8

Ans. (b) -5

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13. The sum and product of the zeros of a quadratic polynomial are 2 and -15 respectively.

The quadratic polynomial is

(a) $x^2-2x+15$

(b) $x^2-2x-15$

(c) $x^2+2x-15$

(d) $x^2+2x+15$

Ans. (b) $x^2-2x-15$

2/3 Marks Questions

1. Find the quadratic polynomial where sum and product of the zeros are *a* and $\frac{1}{a}$.

Ans. Polynomial $x^2-9x+\frac{1}{9}$ i.e. $\frac{1}{9}\left[9x^2-9^2x+1\right]$

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2. If α and β are the zeros of the quadratic polynomial $f(x)=x^2-x-4$, find the value of $\frac{1}{\alpha}+\frac{1}{\beta}-\alpha\beta$.

Ans. $f(x)=x^2-x-4$ i.e.

If α and β are the zeroes

$\therefore\ \alpha+\beta=\frac{1}{1}=1$

$\alpha.\beta=\frac{-4}{1}=-4$

So,

$\frac{1}{\alpha}+\frac{1}{\beta}-\alpha\beta=\frac{\alpha+\beta}{\alpha\beta}-\alpha\beta$

$=\frac{1}{-4}-(-4)$

$=-\frac{1}{4}+4$

$=\frac{15}{4}$

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3. If the square of the difference of the zeros of the quadratic polynomial f(x) = x^2+ px +45 is equal to 144, find the value of *p*.

$\alpha+\beta=-p$

Ans. $\alpha\beta=45$

$(\alpha-\beta)^2=144$

$\Rightarrow \alpha^2+\beta^2-2\alpha\beta$

$\Rightarrow (\alpha+\beta)^2-4\alpha\beta=144$

$\Rightarrow (-p)^2-4\times45=144$

$\Rightarrow p^2=144+180$

$\Rightarrow p=\pm18$

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5. Find the value of 'k' such that the quadratic polynomial x^2 - (k + 6) x + 2 (2k +1) has sum of the zeros is half of their product.

Ans. Sum of the zeros = $\frac{1}{2}$ product of the zeros

$\Rightarrow (k+6)=\frac{1}{2}\left[2(2k+1)\right]$

$\Rightarrow k+6=2k+1$

$\Rightarrow k=5$

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6. If α and β are the zeros of the quadratic polynomial f(x) = x^2 – p (x + 1) – c, show that

(α +1) (β+1) = 1 – c.

Ans.

$f(x)=x^2-p(x+1)-c$

$=x^2-px-(p+c)$

$\therefore\ \alpha+\beta=p \text{ and } \alpha\beta=-(p+c)$

$Now\ (\alpha+1)(\beta+1)=\alpha\beta+(\alpha+\beta)+1$

$=-p-c+p+1$

$=1-c$

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7. If the sum of the zeros of the quadratic polynomial f (t) = kt^2 + 2t + 3k is equal to their product, find the value of 'k'.

Ans.

$f(t) = kt^2 + 2t + 3k$

Sum of the zeros = Product of the zeros

$$\Rightarrow \frac{-2}{k} = \frac{3k}{k}$$

$$\Rightarrow k = -\frac{2}{3}$$

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9. Find the zeros of the polynomial p(x) = $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ and verify the relationship between the zeros and its coefficients.

Ans. $p(x) = 4\sqrt{3}x^2 + 5x - 2\sqrt{3}$

$$= 4\sqrt{3}x^2 + 8x - 3x - 2\sqrt{3}$$
$$= 4x\left(\sqrt{3}x + 2\right) - \sqrt{3}\left(\sqrt{3}x + 2\right)$$
$$= \left(4x - \sqrt{3}\right)\left(\sqrt{3}x + 2\right)$$

$\therefore$ zeros are $4x - \sqrt{3} = 0$ and $\sqrt{3}x + 2 = 0$

$$\Rightarrow x = \frac{\sqrt{3}}{4} \text{ and } x = -\frac{2}{\sqrt{3}}$$

$$\text{Sum of zeros} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$
$$= \left[\frac{\sqrt{3}}{4} + \frac{(-2)}{\sqrt{3}}\right] = \frac{-5}{4\sqrt{3}}$$

$$\text{Product of zeros} = \frac{\text{Constant term}}{\text{Cofficient of } x^2}$$
$$= \frac{-2\sqrt{3}}{4\sqrt{3}} = \frac{-1}{2}$$

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10. Find the value of 'k' so that the zeros of the quadratic polynomial $3x^2 - kx + 14$ are in the ratio 7:6.

Ans. Let the zeros are 7p and 6p.

$$3x^2 - k + 14$$

$$\therefore 7p + 6p = \frac{-(-k)}{3} = \frac{k}{3}$$

$$\text{and } 7p \times 6p = \frac{14}{3}$$

$\Rightarrow 42p^2 = \frac{14}{3}$

$p = 3$

$\Rightarrow 39p = k$

$\therefore k = 39 \times 3$

$\therefore k = 117$

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11. If one zero of the quadratic polynomial f(x) = $4x^2 - 8kx - 9$ is negative of the other, find the value of 'k'.

Ans. $4x^2 - 8kx - 9$, if one zero is α then other is $-\alpha$

$\therefore$ Sum of the zero $= 0$

$\frac{8k}{4} = 0$

$\Rightarrow k = 0$

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11. Find the value of '*k*' for which the polynomial $x^4 + 10x^3 + 25x^2 + 15x + k$ is exactly divisible by (x + 7).

Ans. $p(x) = x^4 + 10x^3 + 25x^2 + 15x + k$

$\therefore (x+7)$ is the factor.

$\therefore p(-7) = 0$

or $(-7)^4 + 10(-7)^3 + 25(-7)^2 + 15(-7) + k = 0$

$2401 - 3430 + 1225 - 105 + k = 0$

$k = 91$

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12. If α and β are the zeros of the polynomial f (x) = $x^2 + px + q$, find polynomial whose zeros are $(\alpha + \beta)^2$ and $(\alpha - \beta)^2$.

Ans. $f(x) = x^2 + px + q$, if α and β are zeros

$\therefore \alpha + \beta = -p$ *and* $\alpha\beta = q$

If zeros are $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$

$(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta$

$= (-p)^2 - 4q$

$(\alpha-\beta)^2=-p^2-4q$

Now sum of zeros

$(\alpha+\beta)^2+(\alpha-\beta)^2=(-p)^2+(p^2-4q)$

$=2p^2-4q$

Pr oduct of zeros

$(\alpha+\beta)^2(\alpha-\beta)^2=(-p)^2+(p^2-4q)$

$=4p^4-4p^2q$

$\therefore$ required polynomial is

$x^2-(\text{sum of zeros})\,x+$ product of zeros

$=x^2-(2p^2-4q)x+4p^4-4p^2q$

$=x^2-2p^2x-4qx+p^4-4p^2q$