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CBSE Class 10 Maths Chapter 2 –Polynomials
Objective Questions

Basics Revisited

1. Write the coefficient of x^2 in each of the following?

(1) $2 + x^2 + x$
(2) $2 - x^2 + x^3$
(3) $\frac{\pi}{2}x^2 + x$
(4) $\sqrt{2}x - 1$

(A) 1, 1, 1, $\sqrt{2}$
(B) 1, -1, $\sqrt{2}$, $\frac{\pi}{2}$
(C) 1, -1, $\frac{\pi}{2}$, 0
(D) 1, -1, $\frac{\pi}{2}$, $\sqrt{2}$

Answer: 1, -1, $\frac{\pi}{2}$, 0

Solution: The constant multiplied to x^2 is the coefficient of x^2

(1) $2 + x^2 + x$ → coefficient of x^2 = 1

(2) $2 - x^2 + x^3$ → coefficient of x^2 = -1

(3) $\frac{\pi}{2}x^2 + x$ → coefficient of x^2 = $\frac{\pi}{2}$

(4) $\sqrt{2}x - 1$ → coefficient of x^2 = 0

2. The polynomial p(x)=x−323 is a___

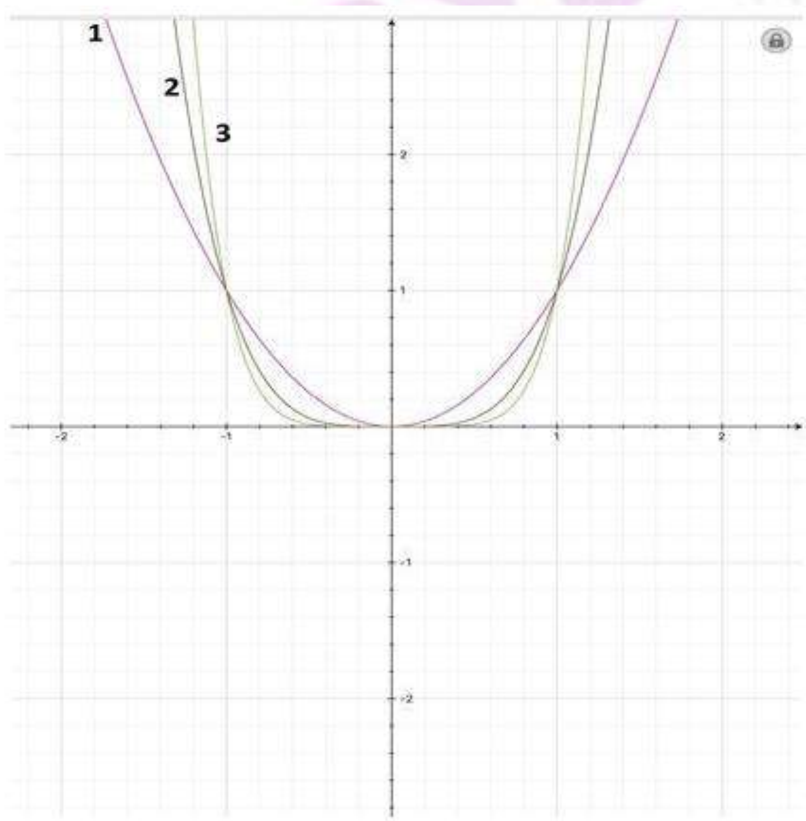
(A) Constant Polynomial
(B) Cubic Polynomial
(C) Quadratic Polynomial
(D) Linear Polynomial

Answer: (D) Linear Polynomial

Solution: Polynomial of degree one is called a linear polynomial.
Therefore, x−323 is a linear polynomial

Graphical Representations

3. Three curves i.e.
a) y=x^2
b) y=x^4
c) y=x^6
are depicted in the graph shown below. Which of the polynomials does the graph 3 represent?



(A) y=x^4
(B) y=x^6
(C) y=x^2
(D) Cannot be determined

Answer: (B) y=x^6

Solution: Consider the polynomial x^n where n is a positive even integer.

As the value of n increases, then the curve goes closer to the positive y-axis.

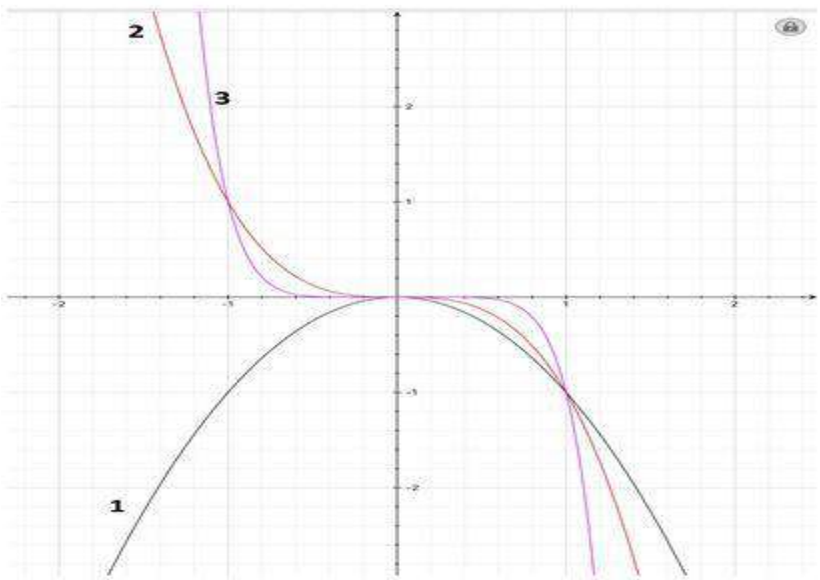
Thus, the graph 3 represents the polynomial x^6

4. Three curves i.e.

a) y=$-x^2$
b) y=$-x^3$
c) y=$-x^7$

are depicted in the following graph and are numbered from 1 to 3.

Identify the correct relation.



(A) (a)-(1) , (b)-(2), (c)-(3)

(B) (a)-(3) , (b)-(2), (c)-(1)
(C) (a)-(1) , (b)-(3), (c)-(2)
(D) (a)-(2) , (b)-(3), (c)-(1)

Answer: (A) (a)-(1), (b)-(2), (c)-(3)

Solutions: When a polynomial is of the form y=$-x^n$ the graph of the polynomial is the mirror image of the graph of the polynomial y=x^n.
Also, when the value of n increases, the graph draws closer to the y axis.
Thus, graph 1 represents y=$-x^2$, graph 2 represents y=$-x^3$ and graph 3 represents y=$-x^7$

Visualization of a polynomial

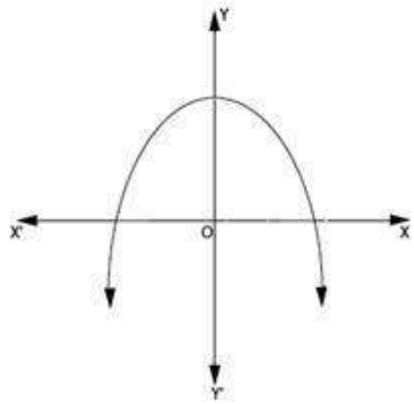
5. If x=2,y=−1, then the value of x^2+4xy+4y^2 is

(A) 2
(B) -1
(C) 1
(D) 0

Answer: (D) 0

Solution: Substituting the values,
x^2+4xy+4y^2
= $(2)^2 +$ 4(2) (-1) + 4$(-1)^2$
= 4−8+4=0

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



(A) Cannot be determined
(B) Zero
(C) Negative
(D) Positive

Answer: (C) Negative

Solution: 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 × negative=negative.

Zeroes of a polynomial

7. Number of polynomials having 3 and 7 as zeroes are?

(A) More than 3
(B) 3
(C) 2
(D) 1

Answer: (A) More than 3

Solution: $(x-3)^A(X-7)^B$.......here a and b can take any natural number values.

Hence infinite possibilities

8. If α,β and γ are the zeros of the polynomial f(x) =ax^3+bx^2+cx +d, then $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}$ is:

(A) $-\frac{b}{a}$

(B) $-\frac{c}{d}$

(C) $\frac{a}{d}$

(D) $\frac{c}{d}$

Answer: (B) $-\frac{c}{d}$

Solutions: If α, β and γ are the zeros of the polynomial f(x) $=ax^3 + bx^2$+cx +d, then

$\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=\frac{(\beta\gamma+\alpha\beta+\alpha\beta)}{\alpha\beta\gamma}=\frac{(\frac{c}{a})}{(-\frac{d}{a})}= -\frac{c}{d}$

9. If α,β are the zeros of the polynomial, $x^2 - px$ +36 and

$\alpha^2 + \beta^2 = 9$, then what is the value of p?

(A) 6
(B) 3
(C) 9
(D) 8

Answer: (C) 9

Solution: Here a = 1, b = -p, c = 36.

$\alpha+\beta=\frac{-b}{a}=p$
$\alpha\beta = \frac{c}{a}=36$
$\alpha^2 + \beta^2 = (\alpha+\beta)^2-2\alpha\beta$
$\Rightarrow 9=p^2-2\times36$ $[\because (\alpha^2+\beta^2 = 9]$

$\Rightarrow 81=p^2$
$\Rightarrow p=9 \text{or} -9$

Factorization of polynomials

10. What is the factorization of $2x^2-7x-15$?

(A) (x+5) (2x-3)
(B) (x+3) (2x-5)
(C) (x-5) (2x+3)
(D) (x-3) (2x-5)

Answer: (C) (x-5) (2x+3)

Solution: Find two numbers such that their product is -30 and sum is -7.

P(x) = $2x^2-7x-15$

= $2x^2-10x+3x-15$

= 2x(x-5) + 3(x-5)

= (x-5) (2x+3)

11. What is the factorization of x^2-5x+6?

(A) (x+5) (x-3)
(B) (x-6) (x+1)
(C) (x-1) (x+5)
(D) (x-2) (x-3)

Answer: (D) (x-2) (x-3)

Solution: x^2-5x+6

= $x^2-2x-3x+6$

= x(x-2) - 3(x-2)

= (x-2) (x-3)

12. Which among the options is one of the factors of $x^2+\frac{x}{6}-\frac{1}{6}$.

(A) 3x +1
(B) 2x + 1
(C) X - $\frac{1}{5}$
(D) X- $\frac{1}{2}$

Answer: (B) 2x +1

Solution: $x^2 + \frac{x}{6} - \frac{1}{5}$

Now, we will factorize the above polynomial.

$\frac{1}{6}(6x^2 + x - 1)$

$= \frac{1}{6}(6x^2 + 3x - 2x - 1)$

$= \frac{1}{6}(3\times(2x+1) - 1(2x+1))$

$= \frac{1}{6}(3x-1)(2x+1)$

Therefore, the factors of

$= x^2 + \frac{x}{6} - \frac{1}{5}$

are $\frac{1}{6}$, (3x-1) and (2x +1)

Relationship between zeroes and coefficient

13. Find the sum and product of roots for the given polynomial :

$2x^2+x-5=0$

(A) $-\frac{1}{2}, -\frac{5}{2}$

(B) $-\frac{1}{2}, \frac{5}{2}$

(C) $\frac{1}{2}, \frac{5}{2}$

(D) 2,5

Answer: $-\frac{1}{2}, -\frac{5}{2}$

Solution: We know that, for a quadratic equation

$ax^2+bx+c=0$ sum of roots = α+β & product of roots = αβ

$\Rightarrow \alpha+\beta=-\frac{b}{a}$ & $\alpha\beta=\frac{c}{a}$

Comparing $2x^2+x-5=0$ with $ax^2+bx+c=0$, we have a=2,b=1,c=−5

$\Rightarrow \alpha+\beta=-\frac{1}{2}$

$\Rightarrow \alpha\beta=-\frac{5}{2}$

14. If p, q & r are the zeroes of a cubic polynomial ax^3+bx^2+cx+d, then what will be p+q+r?

(A) $\frac{c}{a}$
(B) $\frac{b}{a}$
(C) $-\frac{c}{a}$
(D) $-\frac{b}{a}$

Answer: (D) $-\frac{b}{a}$

Solution: We know that for a cubic polynomial ax^3+bx^2+cx+d

Sum of zeroes = $-\frac{b}{a}$

Therefore, p+q+r= $-\frac{b}{a}$

Division algorithm

15. In division algorithm when should one stop the division process?

1. When the remainder is zero.
2. When the degree of the remainder is less than the degree of the divisor.
3. When the degree of the quotient is less than the degree of the divisor.

(A) Statement 1, 2 are correct
(B) Statement 2, 3 are correct
(C) Statement 3, 1 are correct
(D) Only 3 is correct

Answer: (A) Statement 1, 2 are correct

Solution: We stop the division process when either the remainder is zero or its degree is less than the degree of the divisor.

16. If the remainder when x^3+2x^2+kx+3 is divided by x-3 is 21, find the zeroes of x^3+2x^2+kx−18

(A) -2, 3, 3
(B) -3, 2, 3
(C) -3, -2,3
(D) -3,-3, 2

Answer: (C) -3, -2, 3

Solution: P (3) = 48 + 3k =21

⇒ K =-9

Hence, x^3+2x^2−9x+3= (x−3) x Quotient + 21

⇒x^3+2x^2−9x−18=9x−3) x Quotient

Quotient = $\frac{x^3+2x^2-9x-18}{x-3}$

$$
\begin{array}{r}
x^2+5x+6 \\
x-3\,\big)\,x^3+2x^2-9x-18 \\
\underline{x^3-2x^2} \\
5x^2-9x \\
\underline{5x^2-15x} \\
6x-18 \\
\underline{6x-18} \\
-5
\end{array}
$$

Factorizing the quotient, x^2+ 5x +6= x^2+ 3x + 2x +6 = x(x+3) +2(x+3) =(x+2) (x+3)

Hence, the factors of x^3+2x^2−9x−18 are x−3, x+2 and x+3
⇒ the zeroes are -3,-2, 3.

Algebraic identities

17. If x+x^{-1}=10, (x≠0) then evaluate :
x^2+x^{-2}

(A) 100
(B) 10
(C) 98
(D) 102

Answer: (c) 98

Solution: $(x + x^{-1})^2 = (10)^2$

Squaring both sides,

$x^2 + x^{-2} + 2(x)(x^{-1}) = 100$

$x^2 + x^{-2} + 2 = 100$

$x^2 + x^{-2} = 100 - 2$

$x^2 + x^{-2} = 98$

18. f α and β are the zeros of polynomial $x^2 + 3x - 2, find\ \frac{1}{\alpha^3} + \frac{1}{\beta^3}$

(A) $-\frac{45}{8}$

(B) $\frac{45}{8}$

(C) $\frac{-8}{45}$

(D) $\frac{8}{45}$

Answer: (B) $\frac{45}{8}$

Solution: Given polynomial is:

$x^2 + 3X - 2$

$\Rightarrow \alpha+\beta = \frac{-b}{a} = \frac{-3}{1} = -3$

$\Rightarrow \alpha\beta = \frac{c}{a} = \frac{-2}{1} = -2$

$\therefore \frac{1}{\alpha^3} + \frac{1}{\beta^3}$

$= \frac{(\alpha)^3 + (\beta)^3}{(\alpha\beta)^3}$

$= \frac{(\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta)}{(\alpha\beta)^3}$

$= \frac{(-3)^3 - 3(-2)(-3)}{(-2)^3}$

= [Substituting the values of α+β, αβ]

$= \frac{-27-18}{-8}$

$= \frac{45}{8}$

19. What term should be added to a^2+2ab to make it a perfect square?

(A) 2ab

(B) a^2

(C) b^2
(D) b

Answer: (C) b^2

Solution: To make (a^2+2ab) a perfect square, b^2 is to be added.
So that (a^2+2ab+b^2) will become a perfect square using the identity $(a+b)^2$ =(a^2+2ab+b^2).