Maths Part- I
3. Polynomial
Extra

- Write the degree of the given polynomials. (1 mark)

Q.1). $x^5 - 3x^4 - 2x + 7$

Ans:- $x^5 - 3x^4 - 2x + 7$. Degree of the polynomial is 5. In case of a polynomial in one variable, the highest power of the variable is called the degree of the polynomial.

Q.2). $5x^2y^2 - 13x^2y + 16x^3y^3 + 21y$

Ans- $5x^2y^2 - 13x^2y + 16x^3y^3 + 21y$, as sum of powers 2+2 = 4, 2+1 = 3, 3+3 = 6, 1. Degree of polynomial is 6.

Q.3). $lmn - mn + n$

Ans:- Here, the sum of the powers of *l*, *m* and *n* in the term *lmn* is 1+1+1=3, which is the highest sum of powers in the given polynomial.

Degree of the polynomial = 3.

Q.4). $\sqrt{7}$

Ans:- $\sqrt{7} = \sqrt{7}x^0$ [$\therefore x^0=1$] $\therefore$ Degree of polynomial = 0

- State whether the given algebraic expressions are polynomials? Justify. (1 mark)

Q.5). $y^3 + 5y^2 + 6y - 1$

Ans:- Here all the powers of y are whole numbers.

$\therefore y^3 + 5y^2 + 6y - 1$ is a polynomial.

Q.6). $6\sqrt{m} + 3$

Ans:- $6\sqrt{m} + 3$

$6m^{\frac{1}{2}} + 3$ Here the power of m is $\frac{1}{2}$, which is not a whole number.

$\therefore 6\sqrt{m} + 3$ is not a polynomial.

Q.7) $x + \frac{1}{2x}$

Ans:- $x + \frac{1}{2x} \rightarrow x + 2x^{-1}$

Here, power x in the term $2x^{-1}$ $is -$
1, which is not a whole number.

$\therefore x + \frac{1}{2x}$ is not a polynomial.

Q.8). 12

Ans:- 12 $= 12x^0$ $[\because x^0 = 1]$

Here the power of x is a whole umber.

$\therefore$ 12 is a polynomial.

- Write the coefficient of x^7 in each of the given polynomial. (1 mark)

Q.9). $21x^7 - 15x + \frac{2}{3}$

Ans:- 21 is coefficient of x^7.

Q.10). $4x^2 + 2x - \sqrt{5}\,x^7$

Ans:- $-\sqrt{5}$ is the coefficient of x^7

Q.11). x^7

Ans- $x^7 = 1 \times x^7 \therefore 1$ is the coefficient of x^7

- Write the following polynomials in the standard form. (1Mark)

Q.12) $x - 5x^3 + 5 + x^6$

Ans- $x - 5x^3 + 5 + x^6$

Standard form of polynomial :-

$x^6 + 0x^5 + 0x^4 - 5x^3 + 0x^2 + x + 5$

$\therefore x^6 - 5x^3 + x + 5$

Q.13) $-m^2 - \frac{1}{3} + 7m + 2m^5 + 4m^3$

Ans- $-m^2 - \frac{1}{3} + 7m + 2m^5 + 4m^3$

Standard form of polynomial:-

$2m^5 + 0m^4 + 4m^3 - m^2 + 7m - \frac{1}{3}$

$\therefore 2m^5 + 4m^3 - m^2 + 7m - \frac{1}{3}$

- Write the polynomial in y using the given information

(1 mark)

Q.14). Monomial with degree 9.

Ans:- $5y^9$

Q.15) Binomial with degree 22.

Ans:- $8y^{22} + 3$

Q.16) Trinomial with the degree 10.

Ans:- $4y^{10} + 2y^5 + 3y$

- Write the following polynomials in coefficient form.

(2 mark)

Q.17) $5m^6 + 6m^3 - 4m + 8$

Ans:- $5m^6 + 6m^3 - 4m + 8$

Standard form-

$5m^6 + 0m^5 + 0m^4 + 6m^3 + 0m^2 - 4m + 8$

∴ Coefficient form of polynomials = (5,0,0,6,0,-4,8)

Q.18.) $x^4 - 3x + 1$

Ans:- $x^4 - 3x + 1$

Standard form $x^4 + 0x^3 + 0x^2 - 3x + 1$

∴ Coefficient form of polynomials = (1,0,0,-3,1)

- Write the polynomials in index form. (2 mark)

Q.19) (5,0,-2,1,0,-7)

Ans:- Number of coefficients =6

∴ Degree = 6 – 1 = 5

[∵ Numbers of power of polynomials = degree of polynomial + 1]

∴ Index form = $5m^5 + 0m^4 - 2m^3 + m^2 + 0m - 7$

Q.20). (6,0,0,0,-3)

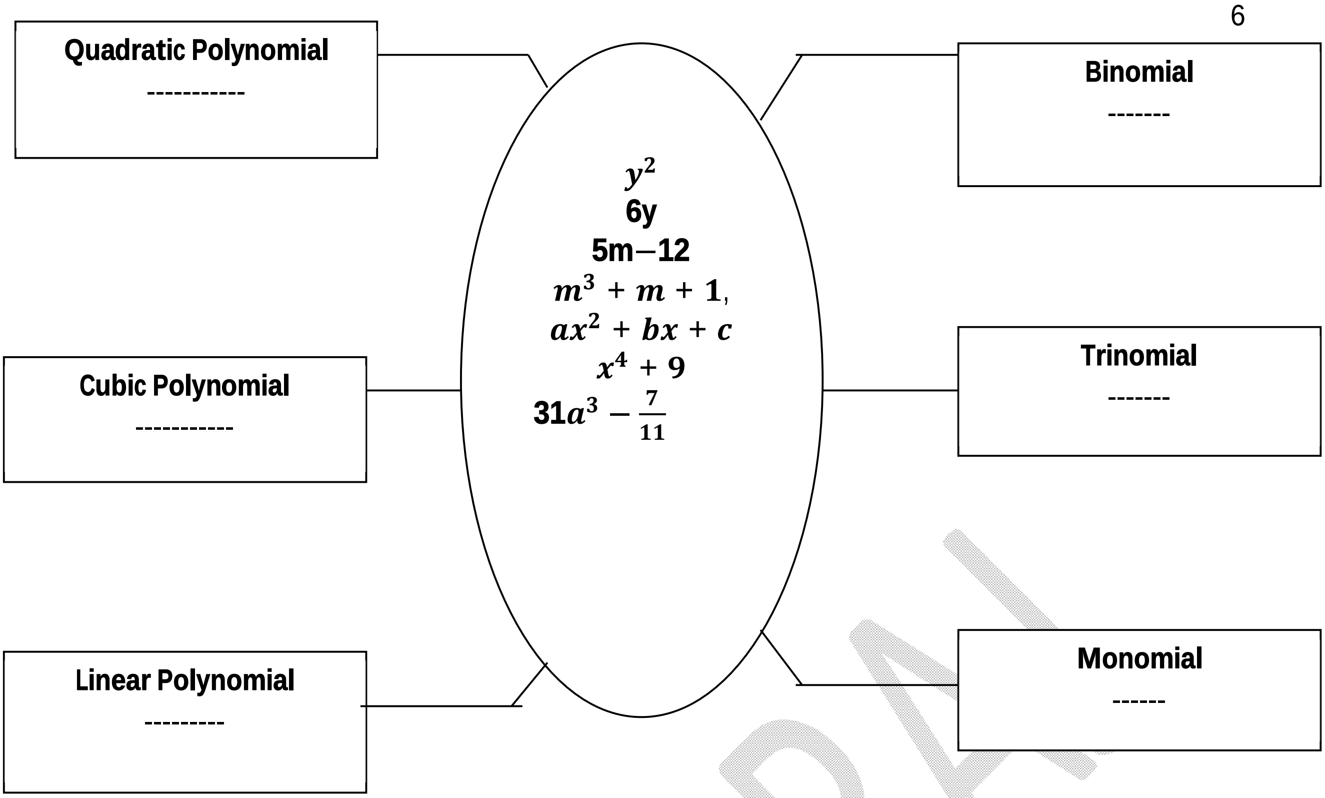
Ans:- Number of coefficient = 5

∴ Degree = 5 – 1 = 4

∴ Index form = $6m^4 + 0m^3 + 0m^2 + 0m - 3$

∴ $6m^4 - 3$

Q.21) Write the appropriate polynomials in the boxes. (4M)



Ans-1.Quadratic Polynomial – $y^2, ax^2, bx + c$

2. Cubic Polynomial - $m^3 + m + 1, 31a^3 - \frac{7}{11}$
3. Linear Polynomial – $6y, 5m - 12, x^4 + 9, y^2$
4. Binomial – $5m - 12, 31a^3 - \frac{7}{11}, x^4 + 9$
5. Trinomial - $m^3 + m + 1, ax^2 + bx + c$
6. Monomial - y^2, 6y, 5m – 12

Add the given polynomials (3 mark)

Q.22) $5m + 11n + 35; 4m + 5n - 30$

Ans- $(5m + 11n + 35) + (4m + 5n - 30)$

$= 5m + 11n + 35 + 4m + 5n - 30$

$= \underline{5m + 4m} + \underline{11n + 5n} + \underline{35 - 30}$

……..(Like terms are arranged)

= 9m +16n +5 ----------(Like terms are added)

Q.23) $xyz^2 - 2x^2yz - 4y^2zx$; $-6xyz^2 + 2x^2\,yz + 4y^2zx$

Ans- $(xyz^2 - 2x^2yz - 4y^2zx) + (6xyz^2 + 2x^2\,yz + 4y^2zx)$

$= xyz^2 - 2x^2yz - 4y^2zx - 6xyz^2 + 2x^2\,yz + 4y^2zx$

$= \underline{xyz^2 - 6xyz^2} - \underline{2x^2yz + 2x^2\,yz} - \underline{4y^2zx + 4y^2zx}$

---- (like terms arranged)

$=-5xyz^2 - 0 - 0$ ----(like terms are added)

$=-5xyz^2$

Q.24). $\sqrt{3x} - \sqrt{2y} + 3$; $3\sqrt{3x}+2\sqrt{2y} + 4$

Ans-($\sqrt{3x} - \sqrt{2y} + 3$) + ($3\sqrt{3x}+2\sqrt{2y} + 4$)

$\sqrt{3x} - \sqrt{2y} + 3 + 3\sqrt{3x}+2\sqrt{2y} + 4$

$= \underline{\sqrt{3x} + 3\sqrt{3x}}\ \underline{-\sqrt{2y} + 2\sqrt{2y}} + \underline{3+4}$

---------- (like terms are arranged)

$= 4\sqrt{3x} - \sqrt{2y} + 7$………(like terms are added)

- Subtract the second polynomial from the first . (3M)

Q.25).$(2ab^2 + 3a^2b - 4ab) - (3ab - 8ab^2 + 2a^2b)$

Ans- $= 2ab^2 + 3a^2b - 4ab - 3ab + 8ab^2 - 2a^2b$

$= 3a^2b - 2a^2b - 4ab - 3ab + 2ab^2 - 8ab^2$

$= a^2b - 7ab + 10\,ab^2$

Q.26) Subtract the second polynomial from the first:

(i) $5x^2 - 2y + 9$; $3x^2 + 5y - 7$

(ii) $2x^2 + 3x + 5$; $x^2 - 2x + 3$

Ans- (i) $(5x^2 - 2y + 9) - (3x^2 + 5y - 7)$

$= 5x^2 - 2y + 9 - 3x^2 - 5y + 7$ …(Removing brackets)

$= 5x^2 - 3x^2 - 2y - 5y + 9 + 7$ ….(Collecting like terms)

$= 2x^2 + 7y + 16$

(ii) $(2x^2 + 3x + 5) - (x^2 - 2x + 3)$

$= 2x^2 + 3x + 5 - x^2 + 2x - 3$ …(Removing brackets)

$= 2x^2 - x^2 + 3x + 2x + 5 - 3$ …(Collecting like terms)

$= x^2 + 5x + 2$

- Multiply the given polynomials. (3 mark)

Q.27) $(5a - 3) \times (6a^2 + a - 7)$

Ans- $(5a - 3) \times (6a^2 + a - 7)$

$= 5a(6a^2 + a - 7) - 3\,(6a^2 + a - 7)$

(∵ Each term of the polynomials is multiplied by each term of the first polynomial)

$= 5a \times 6a^2 + 5a \times a - 5a \times 7 - 3 \times 6a^2 - 3 \times a - 3 - 7$

$= 30a^3 + 5a^2 - 35a - 18a^2 - 3a + 21$

$= 30a^3 + \underline{5a^2 - 18a^2} - \underline{35a - 3a} + 21$

-- like terms taken together

$= 30a^3 - 13a^2 - 38a + 21$

Q.28) $(2a^2 - 3a)(4a + 1)$

Ans- $(2a^2 - 3a) \times (4a + 1)$

$= 2a^2\ (4a + 1) - 3a\ (4a + 1)$

$= \underline{2a^2 \times 4a} + \underline{2a^2 \times 1} - \underline{3a \times 4a} - 3a \times 1$

…. (Each term of the second polynomial is multiplied by each term of first polynomial)

$= 8a^3 + \underline{2a^2 - 12a^2} - 3a = 8a^3 - 10a^2 - 3a$

- Divide the first polynomial by second polynomial and write the answer in the form. (3 mark)

'Dividend = Divisor × Quotient + Remainder

Q.29) $y^3 - 2y^2 + 3y - 18 \div y - 3$

Ans-

$$
\begin{array}{r|l}
 & y^2 + y - 6 \\
\hline
y - 3 & y^3 - 2y^2 + 3y - 18 \\
 & y^3 - 3y^2 \\
 & - \quad + \\
\hline
 & y^2 + 3y \\
 & y - 3y \\
 & - \quad + \\
\hline
 & 6y - 18 \\
 & 6y - 18 \\
 & - \quad + \\
\hline
 & 0
\end{array}
$$

P(y) = Dividend = $y^3 - 2y^2 + 3y - 18$

s(y) = Quotient = $y^2 + y - 6$

q(y) = divisor = y-3

Remainder = 0 =r(y)

'Dividend = Divisor × Quotient + Remainder

$y^3 - 2y^2 + 3y - 18 = (y-3)(y^2 + y + 6) + 0$

$P(y) = q(y) \times s(y) + r(y)$

Q.30.) $4x + 2x^2 - 3 \div x + 1$

Ans- $4x + 2x^2 - 3 \rightarrow 2x^2 + 4x - 3$

$$\begin{array}{r|l} & \quad 2x + 2 \\ \hline x + 1 & 2x^2 + 4x - 3 \\ & 2x^2 + 2x \\ & - \quad - \\ \hline & \qquad 2x - 3 \\ & \qquad 2x + 2 \\ & \qquad - \quad - \\ \hline & \qquad\quad -5 \end{array}$$

$p(x)$ = dividend = $2x^2 + 4x - 3$

$s(x)$ = quotient = $2x + 2$

$q(x)$ = divisor = $x + 1$

$r(x)$ = remainder = -5

∴ dividend = divisor × quotient + remainder

∴ $p(x) = q(x) \times s(x) + r(x)$

∴ $2x^2 + 4x - 3 = (x + 1) \times (2x + 2) + (-5)$

Q.31) If the sides of a triangle are $b - 3a + 2c$, $a + 3b - 3c$ and $2a - b + c$, then find its perimeter. (3 mark)

Ans- Perimeter of triangle = sum of three sides of triangles.

∴ Perimeter of triangle = $(b - 3a + 2c) + (a + 3b - 3c) + (2a - b + c)$

$= b - 3a + 2c + a + 3b - 3c + 2a - b + c$

$= \underline{b + 3b - b} - \underline{3a + 2a + a} + \underline{2c - 3c + c}$ ……. (like terms are arranged)

$= 4b - b - a + a - c + c$

$= 3b - 0 - 0$

$= 3b$

∴ Perimeter of triangle = 3b

Q.32) Factorize the following polynomial. (3 mark)

$(x^2\text{-}x) - 8\,(x^2\text{-}x) + 12$

Ans:

$(x^2\text{-}x) - 8\,(x^2\text{-}x) + 12$

Let $x^2\text{-}x = m$

$\therefore (x^2\text{-}x) - 8\,(x^2\text{-}x) + 12 = m^2 - 8m + 12$

$= m^2 - 6m - 2m + 12$

$= m\,(m-6) - 2(m - 6)$

$= (m-6)\,(m-2)$

Resubstituting the value of m we get

$(x^2\text{-}x) - 8\,(x^2\text{-}x) + 12 = (x^2 - x - 6)\,(x^2 - x - 2)$

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

$=\ \ [x(x\text{-}3) +2(x\text{-}3)]\ [(x\ (x\text{-}2\ ) + 1(x\text{-}2)\ ]$

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

➢ Divide each of the following polynomials by synthetic division method and also by linear division method. Write the quotient and the remainder. (4 mark)

Q.33) $y^3 - 125\ \div (y-5)$

Ans- Synthetic division method-

Dividend = $y^3 - 125$

Divisor = $(y-5)\ \therefore y = 5$ [$\because$ $Comparing\ with\ y - a\ \ \therefore a = 5$]

$y^3 - 125$

Standard form - $y^3\ +\ 0y^2 + 0y - 125$

$\therefore$ Coefficient of this polynomial $= (1, 0, 0, -125)$

$$\begin{array}{c|cccc} 5 & 1 & 0 & 0 & -125 \\ & & 5 & 25 & 125 \\ \hline & 1 & 5 & 25 & 0 \end{array}$$

Coefficient form of quotient (1, 5, 25)

$\therefore$ Quotient = $y^2\ + 5y\ + 25$, Remainder = 0

$\therefore y^3 - 125 = (y-5)(y^2 + 5y + 25) + 0$

Linear division method –

$\therefore y^3 - 125$

$= y^2(y-5) + \ 5y^2 - 125$

$= \ y^2(y-5) + \ 5y(y-5) + 25y - 125$

$= \ y^2(y-5) + \ 5y(y-5) + 25(y-5) + 125 - 125$

$= \ (y-5) - y^2 + 5y + 25 + 0$

$\therefore$ Quotient = $y^2 + 5y + 25$, Remainder = 0

Q.34) Find the value of polynomials. (4 mark)

$p(y) = y^3 - 5y - 2y^2 + 3$ when, $y = 2, y = -2$ *and*

$p(2) - p(-2) = ?$

Ans- Polynomial $p(y) = y^3 - 5y - 2y^2 + 3$

Put y=2 in polynomial

$\therefore p(2) = 2^3 - 5(2) - 2(2)^2 + 3$

$= 8 - 10 - 2 \times 4 + 3$

$= 8 - 10 - 8 + 3$

$= -10 + 3$

$\therefore p(2) = -7$

Similarly, $\mathrm{y} = \ -2$ in polynomial

$\therefore p(-2) = (-2)^3 - 5(-2) - \ 2(-2)^2 + 3$

$= -8 + 10 - 2 \times 4 + 3$

$= -8 + 10 - 8 + 3$

$= -16 + 13$

$\therefore p(-2) = -3$

$\therefore p(2) = -7$ and $p(-2) = -3$

$Now, p(2) - p(-2) = -7 - (-3) = -7 + 3 = -4$

$\therefore p(2) - p(-2) = -4$

$Q.35)$ Find the value of the polynomials $2x^4 - x^3 + 3x^2 - 5$ When $x = 0, x = 1, x = -1$ and $x = -2$. Complete the following activity. (4 mark)

$$\therefore p(x) = 2x^4 - x^3 + 3x^2 - 5$$

Put $x = 0$

P(0) = $\boxed{\quad}$

P(0) = -5,

Put x=1,

$\therefore p(1) = 2(1)^4 - (1)^3 + 3(1)^2 - 5$

$=$ $\boxed{\quad}$

= 1+3-5

= $\boxed{\quad}$

Put x= $\boxed{\quad}$

$\therefore p(-1) = 2(-1)^4 - (-1)^3 + 3(-1)^2 - 5$

$= 2(1) - (-1) + 3(1) - 5$

$\boxed{\quad}$

=

= 6 – 5

=

Put x=-2

P ( ) =

$= 2 \times 16 — (-8) + 3 \times 4 - 5$

$= 32 + 8 + 12 - 5$

=

=

Ans- $\therefore p(x) = 2x^4 - x^3 + 3x^2 - 5$

Put x = 0,

P(0) = $\boxed{2(0)^4 - (0)^3 + 3(0)^3 - 5}$

P(0) = -5,

Put x=1,

$\therefore p(1) = 2(1)^4 - (1)^3 + 3(1)^2 - 5$

= $\boxed{\mathbf{2\text{-}1\text{+}3\text{-}5}}$

= 1+3-5

= $\boxed{\mathbf{4\text{-}5}}$

Put x= $\boxed{\mathbf{-1}}$

$\therefore p(-1) = 2(-1)^4 - (-1)^3 + 3(-1)^2 - 5$

$= 2 \times 1 - (-1) + 3 - 5$

$= \boxed{2+1+3-5}$

$= 6 - 5$

$= \boxed{1}$

Put x=-2

$P(\boxed{-2}) = \boxed{2(-2)^4 - (-2)^3 + 3(-2)^2 - 5}$

$= 2 \times 16 - (-8) + 3 \times 4 - 5$

$= 32 + 8 + 12 - 5$

$= \boxed{52-5}$

$= 47$

Q.36) The value of polynomial $ax^2 + 5x + 6\ for\ x = 1$ is 13, find a. Complete the following activity. (3 mark)

$p(x) = ax^2 + 5x + 6$

$x = \boxed{}$

$a(1)^2 + 5(1) + 6$

$\boxed{}$

$a + 11 = 13$

$\boxed{}$

$\therefore a = 2$

Ans- $p(x) = ax^2 + 5x + 6 = 13$

$x = \boxed{1}$

$a(1)^2 + 5(1) + 6 = 13$

$\boxed{a + 5 + 6 = 13}$

$a + 11 = 13$

$\boxed{a = 13 - 11}$

$\therefore a = 2$

- Find the remainder using Remainder theorem. (3 mark)

Q.37) If x -1 is a factor of the polynomial $3x^2 + mx$, then the value of m is …….

Ans- [By remainder theorem,

$3x^2 + mx = 3(1)^2 + m(1) = 3 + m = 0$ ∴ m = -3]

Q.38) When $3x^3 - 4x^2 + 4x - 2$ is divided by x+2

Ans- P(x) = $3x^3 - 4x^2 + 4x - 2$

Divisor = x+2

By remainder theorem, remainder = P(-2)

Put $x = -2$, in $P(x)$

$\therefore P(-2) = 3(-2)^3 - 4(-2)^2 + 4(-2) - 2$

$= 3 \times -8 - 4 \times 4 - 8 - 2$

$= -24 - 16 - 8 - 2$

$= -24 - 26$

Remainder = -50

Q.39). Determine whether (x-3) is a factor of

$x^3 - 3x^2 + 4x - 4$, by using factor theorem. (3 mark)

Ans- $p(x) = x^3 - 3x^2 + 4x - 4$

Divisor = $x - 3$

$\therefore x = 3$

$\therefore p(3) = 3^3 - 3(3)^2 + 4(3) - 4$

$= 27 - 3 \times 9 + 12 - 4$

$= 27 - 27 + 12 - 4$

$= 8$

Remainder = p (3) = 8 $\neq 0$

∴By factor theorem, $x - 3$ is not factor of

$x^3 - 3x^2 + 4x - 4$

Q.40). Use the factor theorem to determine whether (x+1) is a factor of $2x^3 + 4x + 6$ or not. (3 mark)

Ans- $P(x) = 2x^3 + 4x + 6$

Divisor = $x + 1$ $\therefore x = -1$

$P(-1) = 2(-1)^3 + 4(-1) + 6$

$= -2 - 4 + 6$

$= -6 + 6$

$= 0$

$\therefore$ Remainder $= 0$, By factor theorem, x+1 is a factor of $2x^3 + 4x + 6$.

Q.41) When $mx^2 + 7x + 12$ is divided by $x - 3$ the remainder is 51. Find m. Complete the following activity.

(3 mark)

P(x) = $mx^2 + 7x + 12$, divisor = x-3.

$\therefore Put\ x = \boxed{}$ in p(x)

By remainder theorem,

$\boxed{}$

$51 = 9m + 21 + 12$

$\boxed{}$

$18 = 9m$

$m = \boxed{}$

$\therefore m = 2$

Ans- P(x) = $mx^2 + 7x + 12$, divisor = x-3.

$\therefore Put\ x = \boxed{3}$ in p(x)

By remainder theorem,

$\boxed{\text{Remainder p (3)} = m(3)^2 + 7(3) + 12}$

$51 = 9m + 21 + 12$

$\boxed{51 = 9m + 33}$

$51 - 33 = 9m$

$18 = 9m$

$m = \boxed{\frac{18}{9}}$

$\therefore m = 2$

Q.42) If the value of the polynomial $x^4 + 2x^3 - 3x^2 + ax - 1$ is 21 when $x = -3$. Then find a. (3 mark)

Ans- $P(x) = x^4 + 2x^3 - 3x^2 + ax - 1$

$x = -3$ ..... (given)

$P(-3) = (-3)^4 + 2(-3)^3 - 3(-3)^2 + (-3)a - 1$

$21 = 81 + 2(-27) - 3(9) - 3a - 1$

$21 = 81 - 54 - 27 - 3a - 1$

$21 = 81 - 81 - 3a - 1$

$21 = -3a - 1$

$21 + 1 = -3a$

$22 = -3a$

$\therefore a = \frac{-22}{3}$

Find the factors of the polynomials given below.

Q.43) Find the factor of polynomial (3 mark)

$(x^2 + x)(x^3 + x - 3) - 28$

Ans- Let $x^2 + x$ = m in the given polynomial.

$\therefore (x^2 + x)(x^2 + x - 3) - 28$

$= m(m - 3) - 28$

$= m^2 - 3m - 28$

$= m^2 - 7m + 4m - 28$

$= m(m - 7) + 4(m - 7)$

$= (m - 7)(m + 4)$ -------- (Replace m with $x^2 + x$)

$= (x^2 + x - 7)\ (x^2 + x + 4)$

Q.44) $(x + 4)(x - 2)^2(x - 8) - 37$

Ans- $(x + 4)(x - 8)(x - 2)^2 - 37$

$(x^2 - 8x + 4x - 32)\ (x^2 - 4x + 4) - 37.$

$[\because (a - b^2) = a^2 - 2ab + b^2]$

$(x^2 - 4x - 32)\ (x^2 - 4x + 4) - 37$

Let $x^2 - 4x$ = m

$\therefore (m - 32)(m + 4) - 37$

$\therefore m^2 + 4m - 32m - 128 - 37$

$\therefore m^2 - 28m - 165$

$\therefore m^2 - 33m + 5m - 165$

$\therefore m(m - 33) + 5(m - 33)$

$\therefore (m - 33)(m + 5)$

$\therefore (x^2 - 4x - 33)(x^2 - 4x + 5)$

--------------(replace m with $x^2 - 4x$)

Q.45) (x- 3) (x – 4)^2 (x – 5) -6

Ans- = [(x – 3) (x – 5)] (x -4)^2 – 6

= [x(x – 5) – 3 (x – 5)] $(x^2 - 8x + 16) - 6$

= [$x^2 - 5x - 3x + 15$] $(x^2 - 8x + 16) - 6$

= ($x^2 - 8x + 15$] $(x^2 - 8x + 16) - 6$

= $(m + 15)(m + 16) - 6 \ldots\ldots (let\ x^2 - 8x = m)$

= m(m + 16) + 15 (m + 16) – 6

= $m^2 + 16m + 15m + 240 - 6$

= $m^2 + 31m + 234$

= $m^2 + 18m + 13m + 234$

= $m(m + 18) + 13(m + 18)$

= $(m + 18)(m + 13)$

= $(x^2 - 8x + 18)\ (x^2 - 8x + 13)$ …….. [m = $x^2 - 8x$]

Ans :- $(x^2 - 8x + 18)\ (x^2 - 8x + 13)$

Q.46) Complete the following activity. (3 marks)

$\sqrt{2x^2 + 3x + \sqrt{2}}$ $\boxed{\qquad\qquad}$

$\sqrt{2x}$ $\boxed{\qquad\qquad}$ $+1(x + \sqrt{2})$

$\boxed{\qquad\qquad\qquad\qquad\qquad}$

Ans- $\sqrt{2x^2 + 3x + \sqrt{2}}$

$\boxed{\sqrt{\mathbf{2x^2 + 2x + 1x + \sqrt{2}}}}$

$\sqrt{2}x$ $\boxed{(x+\sqrt{2})}$ $+1\,(x+\sqrt{2})$

$$\boxed{(\sqrt{2x+1})(x+\sqrt{2})}$$

Q.47) Which polynomial is to be subtracted from $x^2+13x+7$ to get the polynomial $3x^2+5x-4$? (3 marks)

Ans : Let the polynomial p(x) be subtracted.

Then $(x^2+13x+7)-p(x) = 3x^2+5x-4$

$\therefore (x^2+13x+7)-(3x^2+5x-4) = p(x)$

$= x^2+13x+7-3x^2-5x+4$……(Removing brackets)

$= x^2-3x^2+13x-5x+7+4$……..(collecting like terms)

$= -2x^2+8x+11$

The required polynomial is $-2x^2+8x+11$.

Q.48) Let A and B be the remainders when polynomials $x^3+2x^2-5ax-7$ and $x^3+ax^2-12x+6$ are divided by x+1 and x-2 respectively and 2A + B = 6. Find the value of a. (4 marks)

Ans- $f(x) = x^3+2x^2-5ax-7$ is divided by $x+1$, Put $x = -1$

$$\therefore f(-1) = (-1)^3 + 2(-1)^2 - 5a(-1) - 7$$

$$= -1 + 2 + 5a - 7$$

$$\therefore A = 5a - 6$$

Similarly,

$p(x) = x^3 + ax^2 - 12x + 6$ is divided by $x - 2$

Put x=2,

$$\therefore p(2) = 2^3 + a(2)^2 - 12(2) + 6$$

$= 8 + 4a - 24 + 6$

$\therefore B = 4a - 10$

Now, 2A+B=6

$2(5a - 6) + (4a - 10) = 6$

($\because$ Putting the values of A and B)

$\therefore 10a - 12 + 4a - 10 = 6$

$\therefore 14a - 22 = 6$

$\therefore 14a = 6 + 22$

$\therefore 14a = 28$

$\therefore a = \frac{28}{14}$

$\therefore a = 2$

Q.49) $x^3 - 2x^2 - x + 2$ (3marks)

$\therefore x^3 - x - 2x^2 + 2$

$\therefore x(x^2 - 1) - 2(x^2 - 1)$

$\therefore (x^2 - 1)(x - 2)$

$\therefore [x^2 - (1)^2](x - 2)$

$= (x - 1)(x + 1)(x - 2)$

$[\because a^2 - b^2 = (a - b)(a + b)]$

Q.50) Find the value of k, if $x - 1$ is a factor of $kx^2 - 3x + k$ (3 marks)

Ans- $p(x) = kx^2 - 3x + k$

$x - 1$ is factor of p (x)

$\therefore x = 1$

$\therefore p(1) = k(1)^2 - 3(1) + k = 0$

$\therefore k - 3 + k = 0$

$\therefore 2k - 3 = 0$

$$\therefore k = \frac{3}{2}$$

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