More Notes, Books Visit Now: www.perfect24u.com

Unit 1

ALGEBRAIC FORMULAS AND APPLICATIONS

Algebraic Expressions

The expressions involving constants and variables connected by binary operations $(+, -, \times, \div)$ are called Algebraic expressions.

e.g $2x+3$, $12x$, $\frac{16}{x^2-1}$ etc

Rational expression :- The expression of the form $\frac{P(x)}{q(x)}$, where $q(x) \neq 0$ and both $P(x), q(x)$ are algebraic expressions are called rational expression.

e.g $\frac{3x+2}{x^2-1}$, $\frac{2x^2+5}{3}$ etc.

Polynomial :- The algebraic expression of the form $P(x) = a_0 + a_1 x + \cdots + a_n x^n$ is called polynomial of degree n if $a_n \neq 0$ and all exponents are positive integers.

e.g $2x^2 + 5x + 3$ is polynomial of degree 2.

$x^2 + x^{1/2} + 5$ is not a polynomial b/c exponent of 2nd term is $1/2$ which is not a positive integer.

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Ex# 1.1

(1) Which of the expression behaves like a rational number in the following expressions:

Soln:- (i) $x+1$

It is a rational expression because

$x+1 = \frac{x+1}{1} = \frac{P(x)}{Q(x)}$ form

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

Soln:- It is clearly in $\frac{P(x)}{Q(x)}$ form so it behaves like rational number.

(iii) $x^2+\frac{3}{x}$.

Soln:- It is not $\frac{P(x)}{Q(x)}$ form so not rational.

(iv) $\frac{x^2+2x+3}{x^2+2}$

Soln:- It is in $\frac{P(x)}{Q(x)}$ form so rational.

(v) $\frac{x^3+2x^2+3x}{x^2+4x+5}$

Soln:- It is rational as it is in $\frac{P(x)}{Q(x)}$ form.

(2) Which expressions are polynomials.

Soln:- (i) $\sqrt{x+1}$ .. It is not a polynomial as the exponent is $1/2$

(ii) x^2+2x+3: It is a polynomial.

(iii) $x^2+\frac{1}{x}+1$: It is not a polynomial as in $\frac{1}{x} = x^{-1}$, the exponent is negative.

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iv) $8x^2y + 5xy$: It is a polynomial.

(v) $x^3 - \frac{1}{2x^2} + 3/4$: It is not a polynomial because exponent of $\frac{1}{2x^2}$ is -2.

(3) Which of the following are rational expressions?

Soln:-

(i) $\frac{x^2+x+3}{x^3+1}$: It is rational expression

(ii) $\frac{x^3+4/x+2}{x^2+1}$: It is in $\frac{P(x)}{q(x)}$ form but $P(x) = x^3 + 4/x + 2$ is not polynomial so it is not rational.

(iii) $\sqrt{x+3} - 1$: It is not rational.

(iv) $\frac{1}{x}$: Rational as it is in $\frac{P(x)}{q(x)}$ form.

(v) 2 : Rational as $2 = \frac{2}{1} = \frac{P(x)}{q(x)}$ form.

(vi) $\frac{3}{x^3-1}$: Rational as it is in $\frac{P(x)}{q(x)}$ form.

(4) Find the degrees of polynomials:

Soln:

(i) $x^3 + 2x^2 + 3x + 4$ degree = 3.

(ii) $x^2 + 2x + 3$ degree = 2

(iii) $\frac{1}{3}x + 4$ degree = 1

(iv) $5 = 5x^0$ degree = 0

(v) $-2x^2 + \frac{5}{3}x + 4$ degree = 2

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Reduction of rational expression into lowest form

Let $\frac{P(x)}{q(x)}$ be rational expression. Then if $P(x)$ and $q(x)$ can't be factorized then $\frac{P(x)}{q(x)}$ is said into lowest form.

Expl: $\frac{x^2+1}{x+1}$ is in simplest form. Here $P(x)=x^2+1$ and $q(x)=x+1$ can't be factorized.

Expl 1: Reduce $\frac{x^2-1}{x+1}$ into lowest form.

Soln: $\frac{x^2-1}{x+1} = \frac{(x)^2-(1)^2}{x+1} = \frac{(x+1)(x-1)}{(x+1)} = x-1$

Expl 2: Reduce $\frac{x^2-5x+6}{x^2-9}$ into lowest form

Soln: To convert it into lowest form we will factorize $P(x)=x^2-5x+6$ and $q(x)=x^2-9$

Now; $P(x)=x^2-5x+6$
$= x^2-2x-3x+6$
$= x(x-2)-3(x-2)$
$= (x-2)(x-3)$

$q(x)=x^2-9$
$=(x)^2-(3)^2$
$=(x+3)(x-3)$

Therefore, $\frac{x^2-5x+6}{x^2-9} = \frac{(x-2)(x-3)}{(x+3)(x-3)} = \frac{x-2}{x+3}$

Ex # 1.2

1. Which of the following expressions are in lowest form

(i) $\frac{x+1}{2x-1}$ (ii) $\frac{3x^2+3}{9x+27}$ (iii) $\frac{x^2+3x+2}{x+2}$ (iv) $\frac{x^2-4}{x+2}$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(v) $\frac{4x+8}{2}$ (vi) $\frac{4x^2+3}{x+3}$

Soln:- The expressions (i) and (vi) are in Lowest form while (ii), (iii), (iv) and (v) are not in Lowest

2. Reduce the following rational algebraic expression in their Lowest form.

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

Soln:- $P(x) = x^2-x+6$

$\Rightarrow P(x) = x^2-3x+2x-6$

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

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

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

$= x-3$

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

Soln:-

$x^3+1 = (x)^3+(1)^3$

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

$\because a^3+b^3 = (a+b)(a^2-ab+b^2)$

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

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

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

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

(iii) $\frac{x^2y+xy}{xy^2-xy}$

Soln:-

$x^2y+xy = xy(x+1)$

$xy^2-xy = xy(y-1)$

$\therefore \frac{x^2y+xy}{xy^2-xy} = \frac{xy(x+1)}{xy(y-1)}$

$= \frac{x+1}{y-1}$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iv) $\frac{x^4+2x^2+1}{x^4-1}$

Soln:- x^4+2x^2+1

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

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

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

$\because x^4-1 = (x^2)^2-(1)^2$

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

$\therefore \frac{x^4+2x^2+1}{x^4-1} = \frac{(x^2+1)(x^2+1)}{(x^2+1)(x^2-1)}$

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

(v) $\frac{x^4+4}{x^2-2x+2}$

Soln:-

$x^4+4 = (x^2)^2+(2)^2$

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

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

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

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

$\therefore \frac{x^4+4}{x^2-2x+2} = \frac{(x^2+2x+2)(x^2-2x+2)}{(x^2-2x+2)} = x^2+2x+2$

(vi) $\frac{z^3-1}{z^2+z+1}$

Soln:- As,

$z^3-1 = (z)^3-(1)^3$

$= (z-1)(z^2+z+1)$

$\because a^3-b^3 = (a-b)(a^2+ab+b^2)$

$\therefore \frac{z^3-1}{z^2+z+1} = \frac{(z-1)(z^2+z+1)}{(z^2+z+1)}$

$= z-1$

which is the required Lowest form

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Sum, Difference and Product of rational Expressions.

Expl 1: Find the sum of $\frac{x+1}{x-1}$ and $\frac{2x-1}{x-1}$

Soln: $\frac{x+1}{x-1} + \frac{2x-1}{x-1}$

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

Expl 2: Simplify the rational expression

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

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

$= \frac{2}{x+1} + \frac{5}{x-1} + \frac{1}{(x+1)(x-1)}$ $\because x^2-1=(x+1)(x-1)$

$= \frac{2(x-1)+5(x-1)+1}{(x+1)(x-1)}$ $\because$ Taking L.C.M

$= \frac{2x-2+5x-5+1}{(x+1)(x-1)} = \frac{7x-6}{x^2-1}$

Expl 3: Find the product of $\frac{x^2-y^2}{2y^2}$ and $\frac{3y}{x+y}$.

Soln: $\frac{x^2-y^2}{2y^2} \times \frac{3y}{x+y}$

$= \frac{(x+y)(x-y)}{2y^2} \times \frac{3y}{x+y}$ $\because x^2-y^2 = (x+y)(x-y)$

$= \frac{3(x-y)}{2y}$ Ans.

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Ex # 1.3

(1). Find the sum of the following rational expressions

(i) $\frac{3x-1}{2x-2}$, $\frac{2}{x-1}$

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

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

$= \frac{3x-1+4}{2(x-1)} = \frac{3x+3}{2x-2}$

(ii) $\frac{2x+y}{xy}$, $\frac{3y}{x}$

Soln: $\frac{2x+y}{xy} + \frac{3y}{x} = \frac{2x+y+y(3y)}{xy}$ by Taking the L.C.M.

$= \frac{2x+y+3y^2}{xy}$

(iii) $\frac{1}{y-1}$, $\frac{1}{y+1}$

Soln: $\frac{1}{y-1} + \frac{1}{y+1} = \frac{y+x+y\cdot x}{(y-1)(y+1)} = \frac{2y}{(y)^2-(1)^2} = \frac{2y}{y^2-1}$

(iv) $\frac{2y}{y^2+1}$, $\frac{4y}{y^2-1}$

Soln: $\frac{2y}{y^2+1} + \frac{4y}{y^2-1} = \frac{2y(y^2-1)+4y(y^2+1)}{(y^2+1)(y^2-1)}$

$= \frac{2y^3-2y+4y^3+4y}{(y^2)^2-(1)^2}$

$= \frac{6y^3+2y}{y^4-1}$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(v) $\frac{xy^2+y}{x+3}$, $\frac{x^2y+x}{x+3}$

Soln:- $\frac{xy^2+y}{x+3} + \frac{x^2y+x}{x+3} = \frac{xy^2+y+x^2y+x}{x+3}$

$= \frac{xy^2+x^2y+x+y}{x+3} = \frac{xy(x+y)+1(x+y)}{xy}$

$= \frac{(x+y)(xy+1)}{xy}$

2. Subtract 1st expression from 2nd.

(i) $\frac{15}{4y-3}$, $\frac{16}{4y+3}$

Soln:- $\frac{16}{4y+3} - \frac{15}{4y-3}$

$= \frac{16(4y-3)-15(4y+3)}{(4y+3)(4y-3)} = \frac{64y-48-60y-45}{(4y)^2-(3)^2}$

$= \frac{64y-60y-48-45}{16y^2-9} = \frac{4y-93}{16y^2-9}$

(ii) $\frac{1}{a+b}$, $\frac{1}{a-b}$

Soln:- $\frac{1}{a-b} - \frac{1}{a+b} = \frac{a+b-(a-b)}{(a-b)(a+b)}$

$= \frac{a+b-a+b}{(a)^2-(b)^2} = \frac{2b}{a^2-b^2}$

(iii) $\frac{x+y}{y}$, $\frac{x^2-y^2}{xy}$

Soln:- $\frac{x^2-y^2}{xy} - \frac{x+y}{y} = \frac{x^2-y^2-x(x+y)}{xy}$

$= \frac{x^2-y^2-x^2-xy}{xy} = \frac{-y(x+y)}{xy} = -\frac{(x+y)}{x}$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iv) $\frac{2x+1}{x+1}$, $\frac{2x-1}{x-1}$

Soln: $\frac{2x-1}{x-1} - \frac{2x+1}{x+1}$

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

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

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

$= \frac{4x-2x}{x^2-1} = \frac{2x}{x^2-1}$ Ans

3). Find the product of the following expressions.

(i) $\frac{49x^2-4y^2}{x^2-9}$, $\frac{x-3}{7x-2y}$

Soln: $\frac{49x^2-4y^2}{x^2-9} \times \frac{x-3}{7x-2y}$

$= \frac{(7x)^2-(2y)^2}{(x)^2-(3)^2} \times \frac{x-3}{7x-2y}$

$= \frac{(7x+2y)(7x-2y)}{(x+3)(x-3)} \times \frac{(x-3)}{(7x-2y)}$ by using $a^2-b^2=(a+b)(a-b)$

$= \frac{7x+2y}{x+3}$

(ii) $\frac{x^3-y^3}{x^2+2xy+y^2}$, $\frac{x+y}{x^2+xy+y^2}$

Soln: $\frac{x^3-y^3}{x^2+2xy+y^2} \times \frac{x+y}{x^2+xy+y^2}$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

$$= \frac{(x-y)(x^2+xy+y^2)}{(x+y)x} \times \frac{(x+y)}{(x^2+xy+y^2)} \quad \because a^3-b^3 = (a-b)(a^2+ab+b^2)$$

$$= \frac{x-y}{x+y} \quad \text{Ans.}$$

(iii) $\frac{4x^2+12xy+9y^2}{2x^2+5xy+3y^2}$, $\frac{3x+3}{x^2-1}$

Soln:- $\frac{4x^2+12xy+9y^2}{2x^2+5xy+3y^2} \times \frac{3x+3}{x^2-1}$

$$= \frac{4x^2+6xy+6xy+9y^2}{2x^2+3xy+2xy+3y^2} \times \frac{3(x+1)}{(x)^2-(1)^2}$$

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

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

$$= \frac{3(2x+3y)}{(x+y)(x-1)} \quad \text{Ans}$$

Note :- Instead of $5xy$, $15xy$ is given. The ans in the book is also wrong.

(iv) $\frac{x^3+a^3}{x+a}$, $\frac{x+a}{x^3-a^3}$

Soln:- $\frac{x^3+a^3}{x+a} \times \frac{x+a}{x^3-a^3} = \frac{x^3+a^3}{x^3-a^3}$.

4) Divide the following rational expressions:

(i) $\frac{2x^2+13x+15}{4x^2-1}$ by $\frac{2x^2+11x+5}{4x^2-1}$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Soln:- $\frac{2x^2+13x+15}{4x^2-1} \div \frac{2x^2+11x+5}{4x^2-1}$

$= \frac{2x^2+10x+5x+15}{4x^2-1} \div \frac{2x^2+10x+x+5}{4x^2-1}$

$= \frac{2x(x+5)+3(x+5)}{4x^2-1} \div \frac{2x(x+5)+1(x+5)}{4x^2-1}$

$= \frac{(x+5)(2x+3)}{4x^2-1} \div \frac{(x+5)(2x+1)}{4x^2-1}$

$= \frac{(x+5)(2x+3)}{(4x^2-1)} \times \frac{(4x^2-1)}{(x+5)(2x+1)} = \frac{2x+3}{2x+1}$

(ii) $a+\frac{2}{x^2}$ by $\frac{a+2}{x^2}$

Soln:- $\frac{a}{1}+\frac{2}{x^2} \div \frac{a+2}{x^2}$

$= \frac{ax^2+2}{x^2} \div \frac{a+2}{x^2} = \frac{ax^2+2}{x^2} \times \frac{x^2}{a+2}$

$= \frac{ax^2+2}{a+2}$

(iii) $\frac{4-x^2}{x^2-9}$ by $\frac{12+6x}{x^2-6x+9}$

Soln:- $\frac{4-x^2}{x^2-9} \div \frac{12+6x}{x^2-6x+9}$

$= \frac{(2)^2-(x)^2}{(x)^2-(3)^2} \div \frac{6(2+x)}{x^2-3x-3x+9}$

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

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

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iv) $\frac{x^8-1}{4x^2-4}$ by $\frac{x^4-1}{x-2}$

Soln:- $\frac{x^8-1}{4x^2-4} \div \frac{x^4-1}{x-2}$

$= \frac{(x^4)^2-(1)^2}{4(x^2-1)} \times \frac{(x-2)}{x^4-1} = \frac{(x^4+1)(x^4-1)}{4(x^2-1)} \times \frac{x-2}{(x^4-1)}$

$= \frac{(x-2)(x^4+1)}{4(x^2-1)}$

5) Simplify the following expressions.

(i) $\frac{1}{a+b} - \frac{1}{a-b} + \frac{2a}{a^2-b^2}$

Soln:- $\frac{1}{a+b} - \frac{1}{a-b} + \frac{2a}{a^2-b^2} = \frac{a-b-(a-b)+2a}{(a+b)(a-b)}$

$= \frac{a-b-a+b+2a}{a^2-b^2} = \frac{2a}{a^2-b^2}$

(ii) Soln:- $\frac{x^2-x-20}{x^2-25} \times \frac{x^2-x-2}{x^2+2x-8} \div \frac{x+1}{x^2+25}$

$= \frac{x^2-5x+4x-20}{(x)^2-(5)^2} \times \frac{x^2-2x+x-2}{x^2+4x-2x-8} \div \frac{x+1}{x^2+25}$

$= \frac{x(x-5)+4(x-5)}{(x+5)(x-5)} \times \frac{x(x-2)+1(x-2)}{x(x+4)-2(x+4)} \div \frac{x+1}{x^2+25}$

$= \frac{(x-5)(x+4)}{(x+5)(x-5)} \times \frac{(x+1)(x-2)}{(x-2)(x+4)} \times \frac{x^2+25}{(x+1)}$

$= \frac{x^2+25}{x+5}$ Ans.

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iii) $\frac{2x^2+9x+9}{x^2-9} \times \frac{4x^2+8x+3}{x-3} \div \frac{2x+3}{3x-9}$

Soln: $\frac{2x^2+9x+9}{x^2-9} \times \frac{4x^2+8x+3}{x-3} \div \frac{2x+3}{3(x-3)}$

$= \frac{2x^2+6x+3x+9}{(x)^2-(3)^2} \times \frac{4x^2+6x+2x+3}{x-3} \div \frac{2x+3}{3(x-3)}$

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

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

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

Ex # 1.4

(1) Find the value of $5x+3$ at $x=\frac{1}{3}$ and $x=-1$

Soln:- For $x=\frac{1}{3}$:

$5x+3 = 5(\frac{1}{3})+3 = \frac{5}{3}+\frac{3}{1} = \frac{5+9}{3} = \frac{14}{3}$

For $x=-1$

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

(2) Find the value of $x^3+y^3+z^3$ at $x=3, y=1$ and $z=4$

Soln:- $x^3+y^3+z^3 = (3)^3+(1)^3+(4)^3$

$= 27+1+64$

$= 92$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

3. Find the value of $H = \frac{2ab}{a+b}$ at $a=4, b=2$

Soln:- $H = \frac{2ab}{a+b}$ Putting the values of a and b

$= \frac{2(4)(2)}{4+2} = \frac{8\,16}{6_3} = \frac{8}{3}$

4. $f(x) = x^3 - 2x^2 + x - 1$. Find $f(-\frac{1}{2})$

Soln:- Putting the value $x = -\frac{1}{2}$ in $f(x)$

$f(-\frac{1}{2}) = (-\frac{1}{2})^3 - 2(-\frac{1}{2})^2 - \frac{1}{2} - 1$

$= -\frac{1}{8} - 2(\frac{1}{4}) - \frac{1}{2} - 1$

$= \frac{-1}{8} - \frac{2}{4} - \frac{1}{2} - \frac{1}{1} = \frac{-1-4-4-8}{8} = \frac{-17}{8}$

5. Find the value of expression:

$\frac{x^4}{2} + \frac{y^4}{3} - \frac{z^4}{4}$ at $x=2, y=3, z=-2$.

Soln:- $\frac{x^4}{2} + \frac{y^4}{3} - \frac{z^4}{4} = \frac{(2)^4}{2} + \frac{(3)^4}{3} - \frac{(-2)^4}{4}$

$= \frac{8\,16}{2_1} + \frac{27\,81}{3} - \frac{4\,16}{4} = 8 + 27 - 4 = 31$

6. Find the value of $x^3 + 2xyz + z^3$ at $x=2, y=4, z=3$.

Soln:- $x^3 + 2xyz + z^3 = (2)^3 + 2(2)(4)(3) + (3)^3$

$= 8 + 48 + 27 = 83$

7. Find the value of $\frac{xyz + 3xy^2}{x+y}$ at $x=1, y=1, z=1$

Soln:- $\frac{xyz + 3xy^2}{x+y} = \frac{1(1)(1) + 3(1)(1)^2}{1+1} = \frac{1+3}{2}$

$= \frac{4}{2} = 2$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

ALGEBRAIC FORMULAE

(i) $(a+b)^2 = a^2+b^2+2ab$

(ii) $(a-b)^2 = a^2+b^2-2ab$

(iii) $(a+b)^2+(a-b)^2 = 2(a^2+b^2)$

(iv) $(a+b)^2-(a-b)^2 = 4ab$.

Exp1 Find the value of a^2+b^2, if $a+b=4$, $a-b=2$

Soln:- We know that $(a+b)^2+(a-b)^2 = 2(a^2+b^2)$ —(i)

Putting the values in Eq(i) we get

$$2(a^2+b^2) = (4)^2+(2)^2 = 16+4 = 20$$

$$\Rightarrow \frac{\cancel{2}(a^2+b^2)}{\cancel{2}} = \frac{\overset{10}{\cancel{20}}}{\cancel{2}_1} \Rightarrow a^2+b^2 = 10$$

Exp2 Find the value of ab when $a+b=6$ and $a-b=2$

Soln:- As we know that;

$$4ab = (a+b)^2-(a-b)^2 \text{ —— (i)}$$

Putting $a+b=6$ and $a-b=2$ in Eq(i)

$$4ab = (6)^2-(2)^2$$

$$4ab = 36-4$$

$$4ab = 32$$

÷ing both sides by 4.

$$\frac{\cancel{4}ab}{\cancel{4}} = \frac{\overset{8}{\cancel{32}}}{\cancel{4}} \Rightarrow ab = 8$$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Ex # 1.5

Simplify with the help of formulae

(i) $(x+y)^2+(x-y)^2$

Soln:- $(x+y)^2+(x-y)^2$

$= x^2+y^2+2xy+x^2+y^2-2xy = 2x^2+2y^2$

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

Soln:- $(2x^2+3y^2)^2+(2x^2-3y^2)^2$

Using the formula $(a+b)^2+(a-b)^2=2(a^2+b^2)$ —①

Putting $a=2x^2$ and $b=3y^2$ in ①

$(2x^2+3y^2)^2+(2x^2-3y^2)^2 = 2[(2x^2)^2+(3y^2)^2]$

$= 2(4x^4+9y^4)$

(iii) $(x+4y^2)^2-(x-4y^2)^2$

Soln:- As we know that

$(a+b)^2-(a-b)^2 = 4ab$ —— (i)

Putting $a=x$, $b=4y^2$ in (i) we get

$(x+4y^2)^2-(x-4y^2)^2 = 4(x)(4y^2)=16xy^2$

(iv) $(3x+9y^2)^2-(3x-9y^2)^2$

$\because (a+b)^2-(a-b)^2 = 4ab$ —(i)

Putting $a=3x$ and $b=9y^2$ in (i) we get

$(3x+9y^2)^2-(3x-9y^2)^2 = 4(3x)(9y^2)$

$= 108xy^2$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(v) $(4x^2+y)^2+(4x^2-y)^2$

Soln:- $\because (a+b)^2+(a-b)^2 = 2(a^2+b^2)$ —①

Putting $a=4x^2$ and $b=y$ in Eq① we get

$(4x^2+y)^2+(4x^2-y)^2 = 2[(4x^2)^2-(y)^2]$

$= 2(16x^4-y^2)$

(vi) $(5x+2y)^2-(5x-2y)^2$

Soln:- As we know that

$(a+b)^2-(a-b)^2 = 4ab$ —(i)

Putting $a=5x$ and $b=2y$ in (i).

$(5x+2y)^2-(5x-2y)^2 = 4(5x)(2y) = 40xy$

2. Find the values of a^2+b^2 when,

(i) $a+b=2$, $a-b=1$

Soln We know that

$2(a^2+b^2) = (a+b)^2+(a-b)^2$ —(i)

Putting $a+b=2$ and $a-b=1$ in ① we get

$2(a^2+b^2) = (2)^2+(1)^2$

$2(a^2+b^2) = 4+1$

$\Rightarrow a^2+b^2 = \frac{5}{2}$ dividing by 2.

Ans

(ii) $a+b=8$, $a-b=2$

Soln:- As we know that

$2(a^2+b^2) = (a+b)^2+(a-b)^2$ —(i)

Putting $a+b=8$ and $a-b=2$ in (i)

$2(a^2+b^2) = (8)^2+(2)^2$

$2(a^2+b^2) = 64+4$

$2(a^2+b^2) = 68$

$\Rightarrow \frac{2(a^2+b^2)}{2} = \frac{68}{2}34$

$a^2+b^2 = 34$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

3. Find the value of ab when;

(i) $a+b=50$, $a-b=16$

Soln:- We know that

$4ab=(a+b)^2-(a-b)^2$

Putting the values we get

$4ab=(50)^2-(16)^2$

$4ab=2500-256$

$4ab=2244$

÷ing b.s by 4

$\frac{4ab}{4}=\frac{2244}{4}^{561}$

$ab=561$

(ii) $a+b=60$, $a-b=16$

Soln:-

As we know that

$4ab=(a+b)^2-(a-b)^2$

Putting the values

$4ab=(60)^2-(20)^2$

$4ab=3600-400$

$4ab=3200$

÷ing b.s by 4

$\frac{4ab}{4}=\frac{3200}{4}^{800}$

$ab=800$

(iii) $a+b=40$, $a-b=12$

Soln:-

$\because 4ab=(a+b)^2-(a-b)^2$

Putting the values

$4ab=(40)^2-(12)^2$

$4ab=1600-144$

$4ab=1556$

$\frac{4ab}{4}=\frac{1556}{4}^{389}$

$ab=389$

(iv) $a+b=6$, $a-b=2$

Soln:-

$\because 4ab=(a+b)^2-(a-b)^2$

Putting the values

$4ab=(6)^2-(2)^2$

$4ab=36-4$

$4ab=32$

÷ing b.s by 4

$\frac{4ab}{4}=\frac{32}{4}^{8}$

$ab=8$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Formula 3 $(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$

$= a^2+b^2+c^2+2(ab+bc+ca)$

Note:- The formula contains three types of terms i.e $a^2+b^2+c^2$, $ab+bc+ca$ and $a+b+c$ If any two of them are given the 3rd can be find easily.

Ex# 1.6

1. Find the value of $a^2+b^2+c^2$ when:

(i) $ab+bc+ca=2$, $a+b+c=3$.

Soln Squaring both sides of $a+b+c=3$. i.e

$(a+b+c)^2 = 3^2$

$\Rightarrow a^2+b^2+c^2+2ab+2bc+2ca = 9$

$\Rightarrow a^2+b^2+c^2+2(ab+bc+ca)=9$

$\Rightarrow a^2+b^2+c^2+2(2)=9 \Rightarrow a^2+b^2+c^2+4=9$

$\Rightarrow a^2+b^2+c^2=9-4=5$

(ii) $ab+bc+ca=8$, $a+b+c=4$.

Soln:- Squaring both sides of $a+b+c=4$.

$(a+b+c)^2 = 4^2$

$\Rightarrow a^2+b^2+c^2+2(ab+bc+ca)=16$

or $a^2+b^2+c^2+2(8)=16$ $\because ab+bc+ca=8$

$\Rightarrow a^2+b^2+c^2+16=16$

$\Rightarrow a^2+b^2+c^2=16-16$

$\Rightarrow a^2+b^2+c^2=0$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iii) $ab+bc+ca=8$ —① $a+b+c=6$ —(ii)

Soln:- Squaring both sides of eq(ii) we have

$(a+b+c)^2 = 6^2$

$\Rightarrow a^2+b^2+c^2+2(ab+bc+ca)=36$

Putting the value of $ab+bc+ca=8$ we get.

$a^2+b^2+c^2+2(8)=36$

$\Rightarrow a^2+b^2+c^2+16=36$

$\Rightarrow a^2+b^2+c^2=36-16=20$

2. Find the values $a+b+c$ when:

(i) $ab+bc+ca=3$; $a^2+b^2+c^2=6$

Soln:- As we know that

$(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$

$(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$ —(i)

Putting the values of $ab+bc+ca=3$, $a^2+b^2+c^2=6$ in (i)

$(a+b+c)^2 = 6+2(3) = 6+6=12$

Taking square root on both sides we get

$\sqrt{(a+b+c)^2} = \sqrt{12} = \sqrt{4\times3} = \pm 2\sqrt{3}$

$\Rightarrow a+b+c = \pm 2\sqrt{3}$

(ii) $ab+bc+ca=5$, $a^2+b^2+c^2=2$

Soln:- $\because (a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

Putting $ab+bc+ca=5$ and $a^2+b^2+c^2=$ we get

$(a+b+c)^2 = 2+2(5) = 2+10=12$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Taking a square root we get

$$a+b+c = \sqrt{12} = \sqrt{4\times3} = \pm 2\sqrt{3}$$

(iii) $ab+bc+ca = 7$, $a^2+b^2+c^2 = 4$.

Soln:- $\because (a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$ —(i)

Putting the given values in (1) we get

$$(a+b+c)^2 = 4 + 2(7) = 4+14 = 18$$

Taking square root on both sides

$$\sqrt{(a+b+c)^2} = \sqrt{18} = \sqrt{9\times2} = \pm 3\sqrt{2}$$

$$\Rightarrow a+b+c = \pm 3\sqrt{2}$$

3. Find the value of $ab+bc+ca$ when:

(i) $a+b+c=6$ —(i), $a^2+b^2+c^2=2$ —(ii)

Soln:- Taking square on both sides of (1)

$$(a+b+c)^2 = 6^2$$

$$\Rightarrow a^2+b^2+c^2+2ab+2bc+2ca = 36$$

$$a^2+b^2+c^2+2(ab+bc+ca) = 36$$

$$\Rightarrow 2+2(ab+bc+ca) = 36 \quad \because a^2+b^2+c^2 = 2$$

$$\Rightarrow 2(ab+bc+ca) = 36-2$$

$$\Rightarrow 2(ab+bc+ca) = 34$$

$$\Rightarrow ab+bc+ca = \frac{34}{2} = 17 \quad \div \text{ing by } 2$$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(ii) $a+b+c=9$ —(i) $a^2+b^2+c^2=13$ —(ii)

Soln:- Squaring both sides of Eq (i) we have

$$(a+b+c)^2 = 9^2$$

$$\Rightarrow a^2+b^2+c^2+2(ab+bc+ca) = 81$$

Putting $a^2+b^2+c^2=13$ we get

$$13+2(ab+bc+ca)=81$$

$$\Rightarrow 2(ab+bc+ca)=81-13=68$$

÷ing b.sides by 2

$$ab+bc+ca=\frac{68}{2}=34$$

So $ab+bc+ca=34$

(iii) $a+b+c=7$ —(i), $a^2+b^2+c^2=67$ —(ii)

Squaring both sides of (i)

$$(a+b+c)^2 = 7^2$$

$$\Rightarrow a^2+b^2+c^2+2(ab+bc+ca)=49$$

$$\Rightarrow 67+2(ab+bc+ca)=49 \quad \because a^2+b^2+c^2=67$$

$$\Rightarrow 2(ab+bc+ca)=49-67$$

$$\Rightarrow 2(ab+bc+ca)=-18$$

÷ing b.s by 2

$$\frac{2}{2}(ab+bc+ca) = -\frac{18}{2}$$

$$\boxed{ab+bc+ca=-9} \text{ Ans}$$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Formulas 4, 5, 6 and 7

$$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$$

OR

$$(a+b)^3 = a^3+b^3+3ab(a+b)$$

$$(a-b)^3 = a^3-b^3-3ab(a-b)$$

OR $(a-b)^3 = a^3-3a^2b+3ab^2-b^3$

$(a+b)(a^2-ab+b^2) = a^3+b^3$ and

$(a-b)(a^2+ab+b^2) = a^3-b^3$

Expl 1 Find the values of a^3-b^3 when $a-b=8$

$ab=2$, $a+b=4$

Soln:- Given that $a-b=8$

Taking cube on both sides we have

$$(a-b)^3 = 8^3$$

$$\Rightarrow a^3-b^3-3ab(a-b) = 512$$

Putting the values $ab=2$ and $a-b=8$

$$a^3-b^3-3(2)(8) = 512$$

$$a^3-b^3-48 = 512$$

$$\Rightarrow a^3-b^3 = 512+48$$

$$a^3-b^3 = 560$$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Exp: Find the continued product of

$(a+b)(a-b)(a^2+ab+b^2)(a^2-ab+b^2)$

Soln:- $(a+b)(a-b)(a^2+ab+b^2)(a^2-ab+b^2)$

$= (a+b)(a^2-ab+b^2)(a-b)(a^2+ab+b^2)$

$= (a^3+b^3)(a^3-b^3)$

$= (a^3)^2-(b^3)^2 \quad \because (x+y)(x-y)=x^2-y^2$

$= a^6-b^6$

Exp! Find the continued product of:

$(2x+3y)(2x-3y)(4x^2+12xy+9y^2)(4x^2-12xy+9y^2)$

Soln:- $(2x+3y)(2x-3y)(4x^2+12xy+9y^2)(4x^2-12xy+9y^2)$

$= (2x+3y)(4x^2+12xy+9y^2)(2x-3y)(4x^2-12xy+9y^2)$

$= \left[(2x)^3+(3y)^3\right]\left[(2x)^3-(3y)^3\right]$

$= (8x^3+27y^3)(8x^3-27y^3)$

$= (8x^3)^2-(27y^3)^2$ using $(a+b)(a-b)=a^2-b^2$

$= 64x^6-729y^6$

Ex # 1.7

1. Expand with the help of formulas:

(i) $(x+y)^3$

Soln:- $(x+y)^3 = (x)^3+(y)^3+3xy(x+y)$

$= x^3+y^3+3x^2y+3xy^2$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(ii) $(2x-3y)^3$

Soln:- $(2x-3y)^3 = (2x)^3 - (3y)^3 - 3(2x)(3y)(2x-3y)$

$= 8x^3 - 27y^3 - 18xy(2x-3y)$

$= 8x^3 - 27y^3 - 36x^2y + 54xy^2$

$= 8x^3 - 36x^2y + 54xy^2 - 27y^3$

(iii) $\left(\frac{1}{x} + \frac{2}{3}y\right)^3$

Soln:- $\left(\frac{1}{x} + \frac{2}{3}y\right)^3 = \left(\frac{1}{x}\right)^3 + \left(\frac{2}{3}y\right)^3 + 3\left(\frac{1}{x}\right)\left(\frac{2}{3}y\right)\left(\frac{1}{x} + \frac{2}{3}y\right)$

$= \frac{1}{x^3} + \frac{8}{27}y^3 + 2\frac{y}{x}\left(\frac{1}{x} + \frac{2}{3}y\right)$

$= \frac{1}{x^3} + \frac{8}{27}y^3 + 2\frac{y}{x^2} + \frac{4}{3}\frac{y^2}{x}$.

2. Reduce each of the following into $(x \pm y)^3$.

(i) $x^3 + 6xy(x+2y) + 8y^3$

Soln:- $x^3 + 6xy(x+2y) + 8y^3$

$= (x)^3 + 3(x)(2y)(x+2y) + (2y)^3 = (x+2y)^3$

(ii) $x^3 - 6x^2y - 12xy^2 - 8y^3$

Soln:- $x^3 - 6x^2y - 12xy^2 - 8y^3$

$= x^3 - 6xy(x+2y) - 8y^3$

$= (x)^3 - 3(x)(2y)(x+2y) - (2y)^3$

$= (x-2y)^3$

3. Find the value of $a^3 + b^3$ when $a+b=6$, $ab=4$

Soln:- Taking cube of $a+b=6$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

$(a+b)^3 = 6^3$

$\Rightarrow a^3+b^3+3ab(a+b) = 216$ —(i)

Putting $a+b=6$ and $ab=4$ in (i) we get

$a^3+b^3+3(4)(6) = 216$

$a^3+b^3+72 = 216$

$\Rightarrow a^3+b^3 = 216-72 = 144$

4) Evaluate x^3-y^3, when $x-y=2$ and $xy=12$

Soln:- Taking cube on b.s of $x-y=2$

$\therefore (x-y)^3 = 2^3$

$\Rightarrow x^3-y^3-3xy(x-y) = 8$ —(i)

Putting $x-y=2$ and $xy=12$ in (i)

$x^3-y^3-3(12)(2) = 8$

$x^3-y^3-72 = 8 \Rightarrow x^3-y^3 = 8+72 = 80$

5. Find the continued product.

(i) $(x+2y)(x-2y)(x^2+4y^2+2xy)(x^2+4y^2-2xy)$

Soln:- $(x+2y)(x-2y)(x^2+4y^2+2xy)(x^2+4y^2-2xy)$

$= (x+2y)(x^2+4y^2-2xy)(x-2y)(x^2+4y^2+2xy)$

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

$= (x^3+8y^3)(x^3-8y^3)$

$= (x^3)^2-(8y^3)^2 \quad \because (a+b)(a-b) = a^2-b^2$

$= x^6-64y^6$

www.Perfect24u.com

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(ii) Soln

$(2a+3b)(2a-3b)(4a^2+6ab+9b^2)(4a^2-6ab+9b^2)$

$= (2a+3b)(4a^2-6ab+9b^2)(2a-3b)(4a^2+6ab+9b^2)$

$= [(2a)^3+(3b)^3][(2a)^3-(3b)^3]$

$= (8a^3+27b^3)(8a^3-27b^3)$

$= (8a^3)^2-(27b^3)^2 = 64a^6-729b^6$

6. Find the values of a^3+b^3 when

(i) $a+b=3$, $a-b=5$, $ab=4$

Soln:- As $a^3+b^3=(a+b)(a^2+b^2-ab)$ ——(i)

Now we will find the value of a^2+b^2

$\because 2(a^2+b^2)=(a+b)^2+(a-b)^2=3^2+5^2$

$2(a^2+b^2)=9+25=34$

$\Rightarrow a^2+b^2=\frac{34}{2}=17$.

Putting the values in Eq① we get

$a^3+b^3=3[17-4]=3(13)=39$

(ii) $a+b=2$, $a-b=8$, $ab=16$

Soln:- As $a^3+b^3=(a+b)(a^2+b^2-ab)$ ——①

But, $2(a^2+b^2)=(a+b)^2+(a-b)^2=2^2+8^2$

$2(a^2+b^2)=4+64=68 \Rightarrow a^2+b^2=\frac{68}{2}=34$

Putting $a^2+b^2=34$ and $ab=16$ in (1)

$a^3+b^3=2(34-16)=2(18)=36$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iii) $a+b=1$, $a-b=4$, $ab=12$.

Soln- As $a^3+b^3=(a+b)(a^2+b^2-ab)$ ——(i)

But $2(a^2+b^2)=(a+b)^2+(a-b)^2$ ——(ii)

but $a+b=1$ and $a-b=4$ so (ii) becomes

$2(a^2+b^2)=1^2+4^2=1+16=17$

÷ing b.s by 2 we get

$a^2+b^2=17/2$

Putting $a^2+b^2=\frac{17}{2}$ and $ab=12$ in Eq(i)

$a^3+b^3=1\left(\frac{17}{2}-12\right)=\frac{17-24}{2}=\frac{-7}{2}$

Note The ans of Q6 in the books are wrong This ans can be obtaind by taking the cube of $a+b$ directly. But the given data will not allow us.

7. Find the value of a^3-b^3 when

(i) $a+b=6$, $a-b=10$, $ab=3$

Soln:- As we know that $a^3-b^3=(a-b)(a^2+b^2+ab)$ —(i)

But $2(a^2+b^2)=(a+b)^2+(a-b)^2$

$\Rightarrow 2(a^2+b^2)=6^2+10^2=36+100=136$

$\Rightarrow \frac{2}{2}(a^2+b^2)=\frac{136^{68}}{2_1} \Rightarrow a^2+b^2=68$

Putting $a^2+b^2=68$ and $ab=3$ in eq(i)

$a^3-b^3=10(68+3)=10(71)=710$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(ii) $a+b=6,\ a-b=10,\ ab=3$

Soln:- $\because\ a^3-b^3=(a-b)(a^2+b^2+ab)$ — (i)

But $2(a^2+b^2)=(a+b)^2+(a-b)^2$

Putting $a+b=6$ and $a-b=10$

$2(a^2+b^2)=6^2+10^2=36+100=136$

$\Rightarrow a^2+b^2=\frac{136}{2}=66$

Putting these values in Eq (i) we get

$a^3-b^3=10(66+3)=10(69)=690$

(iii) $a+b=1,\ a-b=1,\ ab=1$

Soln $\because\ a^3-b^3=(a-b)(a^2+b^2+ab)$ — (i)

and $2(a^2+b^2)=(a+b)^2+(a-b)^2$

$2(a^2+b^2)=1^2+1^2=1+1=2$

$\Rightarrow a^2+b^2=\frac{2}{2}=1$

Putting $a^2+b^2=1$ and $ab=1$ in Eq(i) we get

$a^3-b^3=1(1+1)=1(2)=2$

Surds:- Any number of the form $\sqrt[n]{a}$ which can't be expressed as a fraction of two integer is called surd e.g $\sqrt{2}, \sqrt{3}, \sqrt{2}+\sqrt{3}$ etc.

Surds of Second order:- A surd of the type $\sqrt{a}\pm\sqrt{b}$ where a and b are +ve real numbers.

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Conjugate Surds:- If $a+\sqrt{b}$ is a surd then $a-\sqrt{b}$ is called its conjugate.

Exp1 Evaluate : $\frac{1}{\sqrt{2}+1}$

Soln:- Multiplying numerator and denominator by $\sqrt{2}-1$ we have

$$\frac{1}{\sqrt{2}+1} = \frac{1}{\sqrt{2}+1}\cdot\frac{\sqrt{2}-1}{\sqrt{2}-1} = \frac{\sqrt{2}-1}{(\sqrt{2}+1)(\sqrt{2}-1)}$$

$$= \frac{\sqrt{2}-1}{(\sqrt{2})^2-(1)^2} = \frac{\sqrt{2}-1}{2-1} = \frac{\sqrt{2}-1}{1}$$

Exp2 Rationalize $\frac{3}{2\sqrt{3}+1}$

Soln:- $\frac{3}{2\sqrt{3}+1} = \frac{3}{2\sqrt{3}+1} \times \frac{2\sqrt{3}-1}{2\sqrt{3}-1}$

$$= \frac{3(2\sqrt{3}-1)}{(2\sqrt{3})^2-(1)^2} \quad \because a^2-b^2 = (a+b)(a-b)$$

$$= \frac{3(2\sqrt{3}-1)}{12-1} \quad \because (2\sqrt{3})^2 \; 2^2\cdot(\sqrt{3})^2 \; 4\cdot 3 = 12$$

$$= \frac{3(2\sqrt{3}-1)}{11}$$

Exp1 Simplify $\frac{1}{\sqrt{5}-\sqrt{3}}$

Soln:- $\frac{1}{\sqrt{5}-\sqrt{3}} = \frac{1}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

$$= \frac{\sqrt{5}+\sqrt{3}}{(\sqrt{5})^2-(\sqrt{3})^2} = \frac{\sqrt{5}+\sqrt{3}}{5-3}$$

$$= \frac{\sqrt{5}+\sqrt{3}}{2}$$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Ex # 1.8

1. Which of the following are surds.

(i) 3 (ii) $\sqrt{4}$ (iii) $\sqrt{2}$ (iv) $3\sqrt{2}$ (v) $\sqrt{16}$

vi) $\sqrt{\frac{9}{4}}$ (vii) $\frac{1}{\sqrt{5}}$ (viii) $2+\sqrt{3}$ (ix) $2-\sqrt{3}$

x) $\sqrt{\frac{17}{4}}$

Soln :- The surds are: (iii), (iv), (vii), (viii), (ix) and x.

2. Separate 2nd order surds from the following.

(i) $\sqrt{3}$ (ii) $3\sqrt{3}$ (iii) $2^{1/2}$ (iv) $\sqrt[4]{5}$ (v) $\sqrt{7}$

Soln (i), (iii) and (v) are 2nd order Sourds.

Note: $3\sqrt{3} = 3 \cdot 3^{1/2} = 3^{1+1/2} = 3^{3/2}$ = Not of 2nd order.

3. Rationalize the following numbers.

(i) $\frac{1}{\sqrt{2}+3}$

Soln :- Multiplying by $\frac{\sqrt{2}-3}{\sqrt{2}-3}$

$$\frac{1}{\sqrt{2}+3} = \frac{1}{\sqrt{2}+3} \times \frac{\sqrt{2}-3}{\sqrt{2}-3}$$

$$= \frac{1(\sqrt{2}-3)}{(\sqrt{2})^2-(3)^2}$$

$$= \frac{\sqrt{2}-3}{2-9}$$

$$= \frac{\sqrt{2}-3}{-7} \text{ Ans}$$

(ii) $\frac{1}{\sqrt{3}-1}$

Soln :- Multiplying numerator and denumerator by $\sqrt{3}+1$ we get

$$\frac{1}{\sqrt{3}-1} = \frac{1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$= \frac{\sqrt{3}+1}{(\sqrt{3}-1)(\sqrt{3}+1)}$$

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

$$= \frac{\sqrt{3}-1}{3-1} = \frac{\sqrt{3}-1}{2}$$

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

(iii) $\frac{1}{2\sqrt{3}-1}$.

Soln:- Multiplying num and denumerator by $2\sqrt{3}+1$

$$\frac{1}{2\sqrt{3}-1} = \frac{1}{2\sqrt{3}-1}\cdot\frac{2\sqrt{3}+1}{2\sqrt{3}+1} = \frac{2\sqrt{3}+1}{(2\sqrt{3}-1)(2\sqrt{3}+1)}$$

$$= \frac{2\sqrt{3}+1}{(2\sqrt{3})^2-(1)^2} = \frac{2\sqrt{3}+1}{12-1}$$

$(2\sqrt{3})^2 = 2^2(\sqrt{3})^2 = 4\cdot 3 = 12$

$$= \frac{2\sqrt{3}+1}{11}$$

(iv) $\frac{1}{\sqrt{5}-\sqrt{3}}$

Soln:- Multiplying numerator and denum by $\sqrt{5}+\sqrt{3}$

$$\frac{1}{\sqrt{5}-\sqrt{3}} = \frac{1}{\sqrt{5}-\sqrt{3}}\times\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}} = \frac{\sqrt{5}+\sqrt{3}}{(\sqrt{5}-\sqrt{3})(\sqrt{5}-\sqrt{3})}$$

$$= \frac{\sqrt{5}+\sqrt{3}}{(\sqrt{5})^2-(\sqrt{3})^2} = \frac{\sqrt{5}+\sqrt{3}}{5-3} = \frac{\sqrt{5}+\sqrt{3}}{2}$$

(v). $\frac{1}{\sqrt{7}+\sqrt{3}}$.

Soln:- $\frac{1}{\sqrt{7}+\sqrt{3}} = \frac{1}{\sqrt{7}+\sqrt{3}}\times\frac{\sqrt{7}-\sqrt{3}}{\sqrt{7}-\sqrt{3}}$

$$= \frac{\sqrt{7}-\sqrt{3}}{(\sqrt{7}+\sqrt{3})(\sqrt{7}-\sqrt{3})}$$

$$= \frac{\sqrt{7}-\sqrt{3}}{(\sqrt{7})^2-(\sqrt{3})^2} = \frac{\sqrt{7}-\sqrt{3}}{7-3}$$

$$= \frac{\sqrt{7}-\sqrt{3}}{4} \quad \text{Ans.}$$

www.Perfect24u.com

Perfect24u.com

More Notes, Books Visit Now: www.perfect24u.com

Ex# 1.9

1. Encircle 'T' for true and 'F' for false.

(i) x^2+3x+5 is a polynomial (T)

(ii) $\frac{x}{x^2+1}$ is a rational expression (T)

(iii) $\frac{x-1}{x^2-1}$ is in Lowest form. (F)

(iv) $\frac{1}{2}$ is not rational expression. (F)

(v) In $\frac{P(x)}{q(x)}$, $q(x)$ must be zero. (F)

2. Choose the correct option.

(i) The degree of x^3-4x^2+3 is

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

(ii) $(a+b)^2+(a-b)^2=$

a) $3(a^2+b^2)$ b) $2(a^2+b^2)$ c) a^2+b^2 d) $4ab$

(iii) $(a+b)^2-(a-b)^2=$

a) ab b) $4ab$ c) $2ab$ d) $-4ab$

(iv) $a^3+b^3+3a^2b+3ab^2=$

a) $(a-b)^3$ (b) $(a+b)^3$ (c) a^3+b^3 d) a^3

3. Write a suitable number/word in the blanks

(i) The rationalized form of $\frac{1}{\sqrt{2}-1}=\frac{\sqrt{2}+1}{\quad}$

(ii) The process in which surd appear in the numerator only is called rationalization

(iii) $(a-b)^3=a^3-b^3-3ab(a-b)$ $\quad (a-b)(a^2+b^2+ab)$

(iv) $(\sqrt{5})^3-(\sqrt{3})^3=(\sqrt{5}-\sqrt{3})(8+\sqrt{15})$ $\quad (\sqrt{5}-\sqrt{3})(5+3+\sqrt{3\cdot5})$ $\quad (\sqrt{5}-\sqrt{3})(8+\sqrt{15})$.

Perfect24u.com