Pair of Linear Equations in Two varibles Ex 3.4 Q17

Answer :

GIVEN:

$(a+2b)x\ +(2a-b)y=2$

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

To find: The solution of the systems of equation by the method of cross-multiplication:

Here we have the pair of simultaneous equation

$(a+2b)x\ +(2a-b)y-2=0$

$(a-2b)x\ +(2a+b)y-3=0$

By cross multiplication method we get

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

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

$$\frac{x}{(-6a+3b)-(-4a-2b)}=\frac{-y}{(-3a-6b)-(-2a+4b)}$$

$$=\frac{1}{(2a^2+4ab+ab+2b^2)-(2a^2-4ab-ab+2b^2)}$$

$$\frac{x}{(-2a+5b)}=\frac{-y}{(-a-10b)}=\frac{1}{10ab}$$

$$\frac{x}{(-2a+5b)}=\frac{y}{(a+10b)}=\frac{1}{10ab}$$

$$\Rightarrow\frac{x}{(-2a+5b)}=\frac{1}{10ab}$$

$$\Rightarrow x=\frac{(5b-2a)}{10ab}$$

And

$$\frac{-y}{(-a-10b)}=\frac{1}{10ab}$$

$$\Rightarrow\frac{y}{(a+10b)}=\frac{1}{10ab}$$

$$\Rightarrow y=\frac{(a+10b)}{10ab}$$

Hence we get the value of $\boxed{x=\frac{5b-2a}{10ab}}$ and $\boxed{y=\frac{a+10b}{10ab}}$

Pair of Linear Equations in Two varibles Ex 3.4 Q18

Answer :

GIVEN:

$$x\left(\left(a-b\right)+\frac{ab}{a-b}\right)=y\left(\left(a+b\right)-\frac{ab}{a+b}\right)$$

$$x+y=2a^2$$

To find: The solution of the systems of equation by the method of cross-multiplication:

Here we have the pair of simultaneous equation

$$x\left(\left(a-b\right)+\frac{ab}{a-b}\right)-y\left(\left(a+b\right)-\frac{ab}{a+b}\right)=0$$

$$x+y-2a^2=0$$

By cross multiplication method we get

$$\frac{x}{\left(\left(-2a^2\right)\times-\left(\left(a+b\right)-\frac{ab}{a+b}\right)\right)-0}=\frac{-y}{\left(-2a^2\right)\times\left(\left(a-b\right)+\frac{ab}{a-b}\right)-0}$$

$$=\frac{1}{\left(\left(a-b\right)+\frac{ab}{a-b}\right)-\left(-\left(\left(a+b\right)-\frac{ab}{a+b}\right)\right)}$$

$$\frac{x}{\left(\left(-2a^2\right)\times-\left(\frac{\left(a+b\right)^2-ab}{a+b}\right)\right)}=\frac{-y}{\left(-2a^2\right)\times\left(\frac{\left(a-b\right)^2+ab}{a-b}\right)}$$

$$=\frac{1}{\left(\frac{\left(a-b\right)^2+ab}{a-b}\right)-\left(-\left(\frac{\left(a+b\right)^2-ab}{a+b}\right)\right)}$$

$$\frac{x}{\left(\left(-2a^2\right)\times-\left(\frac{\left(a^2+b^2+2ab\right)-ab}{a+b}\right)\right)}=\frac{-y}{\left(-2a^2\right)\times\left(\frac{\left(a^2+b^2-2ab\right)+ab}{a-b}\right)}$$

$$=\frac{1}{\left(\frac{\left(a^2+b^2-2ab\right)+ab}{a-b}\right)-\left(-\left(\frac{\left(a^2+b^2+2ab\right)-ab}{a+b}\right)\right)}$$

$$\frac{x}{\left(\left(-2a^2\right)\times-\left(\frac{\left(a^2+b^2+ab\right)}{a+b}\right)\right)}=\frac{-y}{\left(-2a^2\right)\times\left(\frac{\left(a^2+b^2-ab\right)}{a-b}\right)}$$

$$=\frac{1}{\left(\frac{\left(a^2+b^2-ab\right)}{a-b}\right)-\left(-\left(\frac{\left(a^2+b^2+ab\right)}{a+b}\right)\right)}$$

$$\frac{x}{\frac{\left(2a^4+2a^2b^2+2a^3b\right)}{a+b}}=\frac{y}{\frac{\left(2a^4+2a^2b^2-2a^3b\right)}{a-b}}$$

$$= \frac{1}{\left(\frac{(a^2+b^2-ab)(a+b)+(a^2+b^2+ab)(a-b)}{(a-b)(a+b)}\right)}$$

$$\frac{x}{\frac{(2a^4+2a^2b^2+2a^3b)}{a+b}} = \frac{y}{\frac{(2a^4+2a^2b^2-2a^3b)}{a-b}} = \frac{1}{\left(\frac{(a^3+b^3+a^3-b^3)}{(a-b)(a+b)}\right)}$$

$$\frac{x}{\frac{(2a^4+2a^2b^2+2a^3b)}{a+b}} = \frac{y}{\frac{(2a^4+2a^2b^2-2a^3b)}{a-b}} = \frac{1}{\left(\frac{2a^3}{(a-b)(a+b)}\right)}$$

Consider the following for x

$$\frac{x}{\frac{(2a^4+2a^2b^2+2a^3b)}{a+b}} = \frac{1}{\left(\frac{2a^3}{(a-b)(a+b)}\right)}$$

$$\frac{x}{\frac{(a^2+b^2+ab)}{a+b}} = \frac{1}{\left(\frac{a}{(a-b)(a+b)}\right)}$$

$$x\left(\frac{a}{(a-b)(a+b)}\right) = \frac{(a^2+b^2+ab)}{a+b}$$

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

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

$$x = \frac{(a^3+ab^2+a^2b-b^3-ab^2-a^2b)}{a}$$

$$x = \frac{(a^3-b^3)}{a}$$

And

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

$$\frac{y}{\frac{(a^2+b^2-ab)}{a-b}} = \frac{1}{\left(\frac{a}{(a-b)(a+b)}\right)}$$

$$\frac{y}{\frac{(a^2+b^2-ab)}{a-b}} = \frac{1}{\left(\frac{a}{(a-b)(a+b)}\right)}$$

$$y\left(\frac{a}{(a-b)(a+b)}\right) = \frac{(a^2+b^2-ab)}{a-b}$$

$$y = \frac{\left(a^2 + b^2 - ab\right)\left(a + b\right)}{a}$$

$$y = \frac{\left(a^3 + b^3\right)}{a}$$

Hence we get the value of $\boxed{x = \frac{a^3 - b^3}{a}}$ and $\boxed{y = \frac{a^3 + b^3}{a}}$

*********** END **********