Exercise 3C

Question 7:
7x - 2y - 3 = 0
By cross multiplication, we have

$$\therefore \frac{x}{\left[(-2)(-8)-\left(\frac{-3}{2}\right)\times(-3)\right]} = \frac{y}{\left[(-3\times 11)-(-8\times 7)\right]}$$

$$= \frac{1}{\left[7\times\left(\frac{-3}{2}\right)-11\times(-2)\right]}$$

$$\Rightarrow \quad \frac{x}{16-\frac{9}{2}} = \frac{y}{-33+56} = \frac{1}{\frac{-21}{2}+22}$$

$$\Rightarrow \quad \frac{x}{\left(\frac{23}{2}\right)} = \frac{y}{23} = \frac{1}{\frac{23}{2}}$$

$$\Rightarrow \quad \frac{x}{\left(\frac{23}{2}\right)} = \frac{1}{\frac{23}{2}}, \frac{y}{23} = \frac{1}{\frac{23}{2}}$$

Hence x = 1, y = 2 is the solution

Question 8:

$$\frac{x}{6}+\frac{y}{15}-4=0$$

$$\frac{x}{3}-\frac{y}{12}-\frac{19}{4}=0$$

$$\therefore \frac{x}{\left[\frac{1}{15}\times\left(-\frac{19}{4}\right)-\left(-\frac{1}{12}\right)(-4)\right]}=\frac{y}{(-4)\left(\frac{1}{3}\right)-\left(\frac{1}{6}\right)\left(-\frac{19}{4}\right)}$$

$$=\frac{1}{\frac{1}{6}\times\left(-\frac{1}{12}\right)-\frac{1}{3}\times\frac{1}{15}}$$

$$\text{or} \quad \frac{x}{-\frac{19}{60}-\frac{1}{3}}=\frac{y}{-\frac{4}{3}+\frac{19}{24}}=\frac{1}{-\frac{1}{72}-\frac{1}{45}}$$

$$\text{or} \quad \frac{x}{-\frac{39}{60}}=\frac{y}{-\frac{13}{24}}=\frac{1}{-\frac{13}{360}}$$

$$\therefore\ x=-\frac{39}{60}\times\left(-\frac{360}{13}\right),\ y=\frac{-13}{24}\times\left(\frac{-360}{13}\right)$$

$x = 18, y = 15$ is the solution

Question 9:

$ax + by - (a - b) = 0$

$bx - ay - (a + b) = 0$

By cross multiplication, we have

$$\therefore \frac{x}{\left[b\times(-(a+b))-(-a)\times(-(a-b))\right]}=\frac{y}{\left[b\times(-(a-b))-a\times(-(a+b))\right]}$$

$$=\frac{1}{-a^2-b^2}$$

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

$$\Rightarrow \quad \frac{x}{-b^2-a^2}=\frac{y}{b^2+a^2}=\frac{1}{-a^2-b^2}$$

$$\Rightarrow \quad \frac{x}{-b^2-a^2}=\frac{1}{-\left(a^2+b^2\right)},\ \frac{y}{b^2+a^2}=\frac{1}{-\left(a^2+b^2\right)}$$

$$\therefore \quad x=\frac{-\left(b^2+a^2\right)}{-\left(a^2+b^2\right)},\ y=\frac{\left(b^2+a^2\right)}{-\left(a^2+b^2\right)}$$

$\therefore$ the solution is $x = 1, y = -1$

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