4.2.7 - One Linear, One Quadratic Equation II

4.2 - Algebra - Solving Equations

Leaving Certificate Mathematics

Higher Level ONLY

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$5x + 3y = 15$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \end{aligned}$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \\ x &= 3 - \tfrac{3}{5}y \end{aligned}$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \\ x &= 3 - \tfrac{3}{5}y \end{aligned}$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \\ x &= 3 - \tfrac{3}{5}y \end{aligned}$$

Sub $(x = 3 - \frac{3}{5}y)$ into $x^2 + y^2 - 10y = 9$.

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \\ x &= 3 - \tfrac{3}{5}y \end{aligned}$$

Sub $(x = 3 - \frac{3}{5}y)$ into $x^2 + y^2 - 10y = 9$.

$$\left(3 - \tfrac{3}{5}y\right)^2 + y^2 - 10y = 9$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \\ x &= 3 - \tfrac{3}{5}y \end{aligned}$$

Sub $(x = 3 - \frac{3}{5}y)$ into $x^2 + y^2 - 10y = 9$.

$$\begin{aligned} \left(3 - \tfrac{3}{5}y\right)^2 + y^2 - 10y &= 9 \\ 9 - \tfrac{18}{5}y + \tfrac{9}{25}y^2 + y^2 - 10y &= 9 \end{aligned}$$

Example 1

Q. Find the intersection point(s) of the lines:

$$\begin{aligned} 5x + 3y &= 15 \\ x^2 + y^2 - 10y &= 9 \end{aligned}$$

Answer:

$$\begin{aligned} 5x + 3y &= 15 \\ 5x &= 15 - 3y \\ x &= 3 - \tfrac{3}{5}y \end{aligned}$$

Sub $(x = 3 - \frac{3}{5}y)$ into $x^2 + y^2 - 10y = 9$.

$$\begin{aligned} \left(3 - \tfrac{3}{5}y\right)^2 + y^2 - 10y &= 9 \\ 9 - \tfrac{18}{5}y + \tfrac{9}{25}y^2 + y^2 - 10y &= 9 \\ \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \end{aligned}$$

Example 1

Answer:

$$\frac{34}{25}y^2 - \frac{68}{5}y = 0$$

Example 1

Answer:

$$\begin{aligned} \frac{34}{25}y^2 - \frac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \frac{34}{25}y^2 - \frac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \frac{34}{25}y^2 - \frac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \frac{34}{25}y^2 - \frac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$y = 0$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$y - 10 = 0$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$\begin{aligned} y - 10 &= 0 \\ y &= 10 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$\begin{aligned} y - 10 &= 0 \\ y &= 10 \\ \therefore\ x &= 3 - \tfrac{3}{5}(10) \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$\begin{aligned} y - 10 &= 0 \\ y &= 10 \\ \therefore\ x &= 3 - \tfrac{3}{5}(10) \\ &= 3 - 6 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$\begin{aligned} y - 10 &= 0 \\ y &= 10 \\ \therefore\ x &= 3 - \tfrac{3}{5}(10) \\ &= 3 - 6 \\ &= -3 \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$\begin{aligned} y - 10 &= 0 \\ y &= 10 \\ \therefore\ x &= 3 - \tfrac{3}{5}(10) \\ &= 3 - 6 \\ &= -3 \\ \therefore\ (x,y) &= (-3,0) \end{aligned}$$

Example 1

Answer:

$$\begin{aligned} \tfrac{34}{25}y^2 - \tfrac{68}{5}y &= 0 \\ 34y^2 - 340y &= 0 \\ y^2 - 10y &= 0 \\ y(y-10) &= 0 \end{aligned}$$

$$\begin{aligned} y &= 0 \\ \therefore\ x &= 3 - \tfrac{3}{5}(0) \\ &= 3 \\ \therefore\ (x,y) &= (3,0) \end{aligned}$$

$$\begin{aligned} y - 10 &= 0 \\ y &= 10 \\ \therefore\ x &= 3 - \tfrac{3}{5}(10) \\ &= 3 - 6 \\ &= -3 \\ \therefore\ (x,y) &= (-3,0) \end{aligned}$$

$\therefore$ points of intersection: $(-3,0), (3,0)$