Note Title 09/02/2009

SIMULTANEOUS EQUATIONS - ONE LINEAR, ONE QUADRATIC

Example

$$x + 2y = 4 \quad \leftarrow \text{LINEAR}$$
$$x^2 + 6y + y^2 = 31 \quad \leftarrow \text{QUADRATIC}$$

The steps are as follows

- With the linear equation, make one letter the subject

$$x + 2y = 4$$
$$(-2y) \quad (-2y)$$
$$x = 4 - 2y$$

- Substitute this into the quadratic equation.

$$(4-2y)^2 + 6y + y^2 = 31$$

- Simplify by multiplying out brackets etc.

$$(4-2y)(4-2y) = 16 - 8y - 8y + 4y^2$$
$$= 16 - 16y + 4y^2$$

$$16 - 16y + 4y^2 + 6y + y^2 = 31$$
$$5y^2 - 10y - 15 = 0$$
$$\div 5 \qquad \div 5$$
$$y^2 - 2y - 3 = 0$$

- Solve the quadratic equation

$$(y+1)(y-3)=0$$

Either $y+1=0$ or $y-3=0$

$y=-1$ or $y=3$

- Use the linear equation to find the corresponding values for the other variable.

If $y=-1$, then $x=4-2(-1)=6$

If $y=3$ then $x=4-2\times 3=-2$

Two solutions: $y=-1, x=6$ and $y=3, x=-2$