Lesson 5

GCSE Mathematics

Simultaneous Equations III

5.1 Examination Style Questions

The Question: Solve the simultaneous equations

$y = x^2$ This a quadratic curve

$y = 2x + 3$ This is a straight line

The Solution: Using *the method of substitution.*

$$x^2 = 2x + 3$$

- Rearranging equations into the form $f(x) = 0$

$$x^2 - 2x - 3 = 0$$

- Factorising quadratics

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

- Solving quadratic equations

$$\text{Either } x + 2 = 0 \text{ or } x - 3 = 0$$

$$x = -1 \text{ or } x = 3$$

But this is not the final answer !

The final answer is the points where the straight line intersects the quadratic curve.

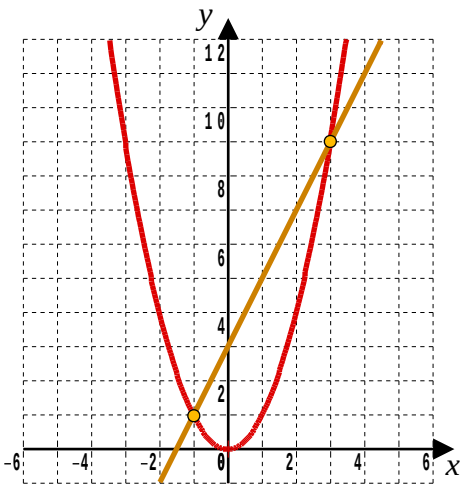
Use the equation of the line $y = 2x + 3$ with x is 2 and then with x is 3 to get,

$$\text{The Final Solutions} : (-1, 1) \text{ or } (3, 9)$$

5.2 Understanding What Has Been Achieved

On the graph below, the quadratic curve $y = x^2$ has been plotted.

So too, has the straight line, $y = 2x + 3$



The line meets the curve at $(-1, 1)$ and also at $(3, 9)$.

(Thus verifying, geometrically, the answers previously obtained algebraically)

5.3 Exercise

Question 1

Use the method of substitution to obtain a quadratic equation in the single variable, x. Solve your equation, and find the possible pairs of values for x and y.

(i) $y = x^2$

$y = 8x - 12$

(ii) $y = x^2$

$y = 11x - 28$

(iii) $y = x^2$

$y = 2x + 24$

(iv) $y = x^2 + 10$

$y = 4 - 7x$

(v) $y = x^2 - 14$

$y = 2x + 21$

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

$y = 30 - 6x$

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

$y = 5x + 28$

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

$y = 7x - 8$

(ix) $y = x^2 + 3x - 10$

$y = 4x + 20$

(x) $y = x^2$

$y = 7x - 12$

5.4 Examination Question

GCSE, November 2006, paper 3H, Q18

Solve the simultaneous equations

$$y = x^2$$

$$y = 2x + 15$$

[5 marks]