# Edexcel AS Mathematics Equations and inequalities "integral"

## **Section 1: Simultaneous equations**

## Notes and Examples

These notes contain subsections on

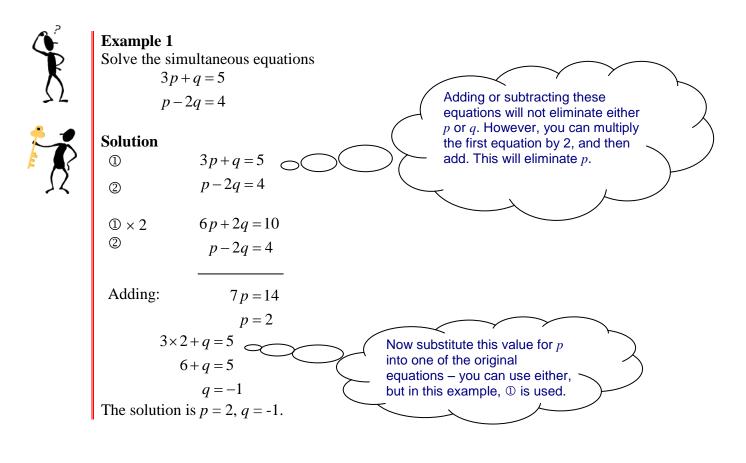
- Linear simultaneous equations using elimination
- Linear simultaneous equations using substitution
- One linear and one quadratic equation
- <u>The intersection of a line and a curve</u>

## Linear simultaneous equations using elimination

This work is revision of GCSE. You need to make sure that you can solve linear simultaneous equations confidently before you move on to the work on one linear and one quadratic equation, which will probably be new to you.

Simultaneous equations involve more than one equation and more than one unknown. To solve them you need the same number of equations as there are unknowns.

One method of solving simultaneous equations involves adding or subtracting multiples of the two equations so that one unknown disappears. This method is called *elimination*, and is shown in the next example.





# **Edexcel AS Maths Equations 1 Notes & Examples**

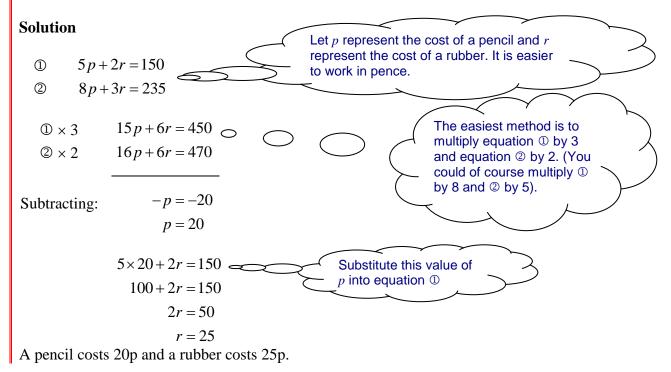
Notice that, in Example 1, you could have multiplied equation <sup>(2)</sup> by 3 and then subtracted. This would give the same answer.

Sometimes you need to multiply each equation by a different number before you can add or subtract. This is the case in the next example.



#### Example 2

5 pencils and 2 rubbers cost £1.50 8 pencils and 3 rubbers cost £2.35 Find the cost of a pencil and the cost of a rubber.



## Linear simultaneous equations using substitution

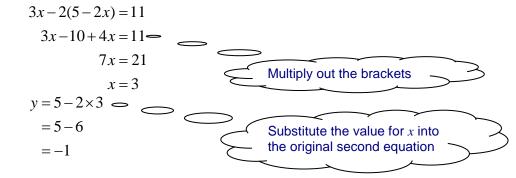
An alternative method of solving simultaneous equations is called substitution. This can be the easier method to use in cases where one equation gives one of the variables in terms of the other. This is shown in the next example.



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Example 3
Solve the simultaneous equations
3x-2y=11
y=5-2x
Solution
Substitute the expression for y
given in the second equation, into
the first equation.
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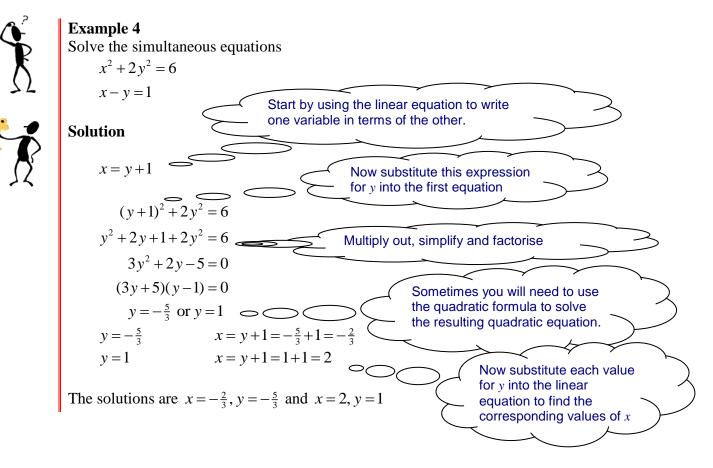
# **Edexcel AS Maths Equations 1 Notes & Examples**



The solution is x = 3, y = -1

## One linear and one quadratic equation

When you need to solve a pair of simultaneous equations, one of which is linear and one of which is quadratic, you need to substitute the linear equation into the quadratic equation.



#### The intersection of a line and a curve

Just as the point of intersection of two straight lines can be found by solving the equations of the two lines simultaneously, the point(s) of intersection of a line and a curve can be found by solving their equations simultaneously.

# **Edexcel AS Maths Equations 1 Notes & Examples**

In many cases, the equations of both the line and the curve are given as an expression for y in terms of x. When this is the case, a sensible first step is to equate the expressions for y, as this leads to an equation in x only.

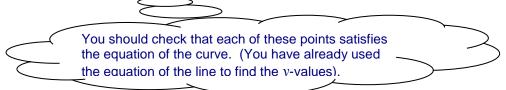
#### Example 5

Find the coordinates of the points where the line y = x + 2 meets the curve  $y = x^2 + 3x + 5$ .



Solution  $x^{2}-3x+5=x+2$ Equate the expressions for y to give an equation in x only (x-3)(x-1) = 0 x = 3 or x = 1
Substitute the x values into the equation of the line

The points where the line meets the curve are (3, 5) and (1, 3).



Notice that this problem involved solving a quadratic equation, which in this case had two solutions, showing that the line crossed the curve twice. However, the quadratic equation could have had no solutions, which would indicate that the line did not meet the curve at all, or one repeated solution, which would indicate that the line touches the curve.