Chapter 3: SIMULTANEOUS EQUATIONS

An example of a pair of simultaneous equations is $3x + 2y = 8$ ①
$5x + y = 11$ ②

In these equations, x and y stand for two numbers. We can solve these equations in order to find the values of x and y by eliminating one of the letters from the equations.

In these equations it is simplest to eliminate y. We do this by making the coefficients of y the same in both equations. This can be achieved by multiplying equation ② by 2, so that both equations contain $2y$:

$3x + 2y = 8$ ①
$10x + 2y = 22$ 2×② = ③

To eliminate the y terms, we subtract equation ③ from equation ①. We get: $7x = 14$
i.e. $x = 2$

To find y, we substitute $x = 2$ into one of the original equations. For example if we put it into ②:

$10 + y = 11$
$y = 1$

Therefore the solution is $x = 2$, $y = 1$.

Remember: You can check your solutions by substituting both x and y into the original equations.

Example: Solve $2x + 5y = 16$ ①
$3x – 4y = 1$ ②

Solution: We begin by getting the same number of x or y appearing in both equation. We can get $20y$ in both equations if we multiply the top equation by 4 and the bottom equation by 5:

$8x + 20y = 64$ ③
$15x – 20y = 5$ ④

As the SIGNS in front of $20y$ are DIFFERENT, we can eliminate the y terms from the equations by ADDING:

$23x = 69$ ③+④
i.e. $x = 3$

Substituting this into equation ① gives:

$6 + 5y = 16$
$5y = 10$
So… $y = 2$
The solution is $x = 3$, $y = 2$.

If you need **more help** on solving simultaneous equations, you can use the following website: http://www.mymaths.co.uk/tasks/library/loadLesson.asp?title=simultaneous/simEquMovieHard&taskID=1174

Exercise:

Solve the pairs of simultaneous equations in the following questions:

1) $x + 2y = 7$
$3x + 2y = 9$

2) $x + 3y = 0$
$3x + 2y = -7$

3) $3x - 2y = 4$
$2x + 3y = -6$

4) $9x - 2y = 25$
$4x - 5y = 7$

5) $4a + 3b = 22$
$5a - 4b = 43$

6) $3p + 3q = 15$
$2p + 5q = 14$

CHALLENGE QUESTIONS:

Question 1

Karen has three times the number of cherries that Lionel has, and twice the number of cherries that Michael has. Michael has seven more cherries than Lionel. How many cherries do Karen, Lionel and Michael have altogether?

…… cherries

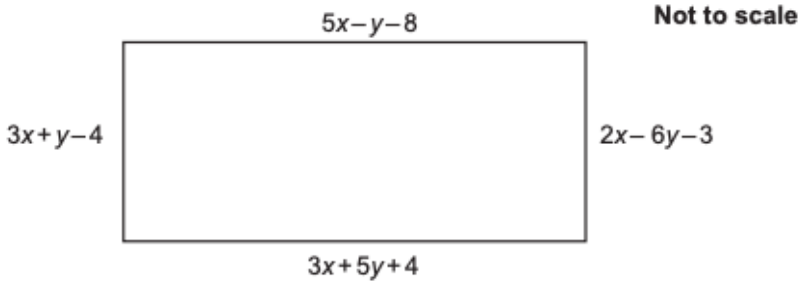
Question 2

The sum of two positive integers is 97 and their difference is 37.
What is their product?

……

Question 3

The dimensions, in centimetres, of this rectangle are shown as algebraic expressions.



Work out the length and width of the rectangle.

length = ... cm

width = ... cm

(6 marks)

Question 4

Brachycephalus frogs are tiny - less than 1cm long - and have three toes on each foot and two fingers on each 'hand', whereas the common frog has five toes on each foot and four fingers on each 'hand'.

Some *Brachycephalus* and common frogs are in a bucket. Each frog has all its fingers and toes. Between them they have 122 toes and 92 fingers.

How many frogs are in the bucket?

..... frogs

Question 5

In the table shown, the sum of each row is shown to the right of the row and the sum of each column is shown below the column.

J	K	J	5
K	K	L	13
L	J	L	15
11	7	15	

What is the value of L?

L = ...