As outcomes, Year 8 pupils should, for example:

As outcomes, Year 9 pupils should, for example:

Solve a pair of simultaneous linear equations by eliminating one variable.

Know that **simultaneous equations** are true at the same time and are satisfied by the same values of the unknowns involved, and that linear simultaneous equations may be solved in a variety of ways.

Substitute from one equation into another.
For example:

- x and y satisfy the equation $5x + y = 49$.
  They also satisfy the equation $y = 2x$.
  Find x and y.
  Write down another equation satisfied by x and y.

  Method
  From the second equation, $y = 2x$.
  Substituting into the first equation gives
  $5x + 2x = 49$
  So $x = 7$ and $y = 14$.
  Other equations might be $x + y = 21$, $y = x + 7$.

- Solve the equations:
  a. $5p - q = 30$, $q = 3p$ b. $3x - 5y = 22$, $x = 3y + 2$

Extend the substitution method to examples where one equation must be rearranged before the substitution can be made. For example:

- Solve the equations: $x - 2y = 5$, $2x + 5y = 100$

From the first equation, $x = 5 + 2y$.
Substituting into the second equation gives
$2(5 + 2y) + 5y = 100$

Add or subtract equations. For example:

- Solve the equations:
  $x + 3y = 56$
  $x + 6y = 101$

  Method $x + 3y = 56$, $x + 6y = 101$
  Compare the two equations and deduce that
  $3y = 45$ so $y = 15$.
  Substituting into the first equation gives $x = 11$.

- Solve the equations:
  a. $4x + y = 44$, $x + y = 20$ b. $5x + y = 17$, $5x - y = 3$

Extend to adding or subtracting equations in order to eliminate one variable. For example:

- $2x + y = 17$, $3x + 2y = 28$ Multiply by 2: $4x + 2y = 34$
  Subtract: $3x + 2y = 28$, $x = 6$

Pupils should be taught to:	As outcomes, Year 7 pupils should, for example:
Solve a pair of simultaneous linear equations (continued)	

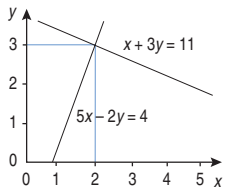
As outcomes, Year 8 pupils should, for example:

As outcomes, Year 9 pupils should, for example:

Use a graphical method and check algebraically.

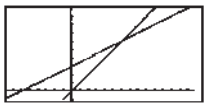
Use pencil and paper or a **graph plotter** or **graphical calculator** to draw the graph of each equation.

- Solve:
  $x + 3y = 11$
  $5x - 2y = 4$



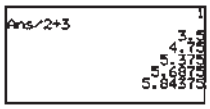
The intersection of the two lines, the point (2, 3), gives an approximate solution to the equations.

- $y = x$
  $y = \frac{x}{2} + 3$



Link the solution x = 6, y = 6 of this pair of equations to finding the limit of the sequence 'divide by 2, add 3', starting with 1, represented as

$x \rightarrow \frac{x}{2} + 3$



Recognise that:

- The point at which the graphs of two equations intersect lies on both lines; its coordinates give the simultaneous solution of the two equations.
- Equations such as x + y = 7 and 3x + 3y = 21 have an infinite number of solutions, since they are represented by the same graph.
- Equations such as y = 4x + 5 and y = 4x + 10 have no simultaneous solution, since their graphs are parallel lines which never meet.
- If the graphs of three (or more) equations in two unknowns pass through a common point then the equations have a common solution, given by the coordinates of the point. If the graphs are not coincident then the equations they represent have no common solution.

Form and solve linear simultaneous equations to solve problems. For example:

- In five years' time, Ravi's father will be twice as old as Ravi. In 13 years' time, the sum of their ages will be 100. How old is Ravi now?
- A nursery was asked to plant a number of trees in a number of days. If the nursery plants 240 trees per day, then 400 fewer trees than planned will be planted. If it plants 280 trees daily, it will plant 200 more than planned.
  How many trees should the nursery plant?
  How many days will it take?
- Find x and y when x + 3y = 10 and 2x + y = 5.
  Invent a problem that could give rise to these two simultaneous equations.