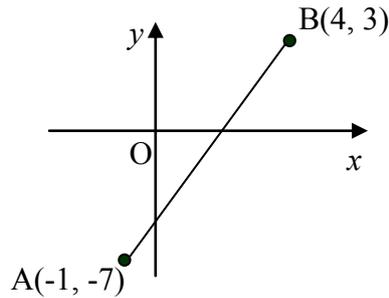


10. Gradients & The Straight Line

Finding Equations

1. In the diagram, A is the point $(-1, 7)$ and B is the point $(4, 3)$.
- Find the gradient of the line AB.
 - AB cuts the y-axis at the point $(0, -5)$. Write down the equation of the line AB.
 - The point $(3k, k)$ lies on AB. Find the value of k .



1 KU

1 KU

2 RE

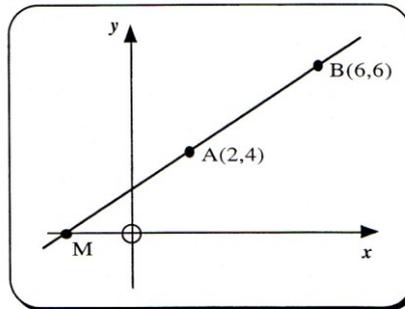
2. A is the point (a^2, a)
 T is the point (t^2, t) $a \neq t$
 Find the gradient of the line AT
 Give your answer in its simplest form.

3 KU

3. The straight line through the points $A(2, 4)$ and $B(6, 6)$ is shown in the diagram.

The point M is where the line AB cuts the x-axis.

- Find the equation of the straight line AB. 4 KU
- Use this equation to find the coordinates of the point M.

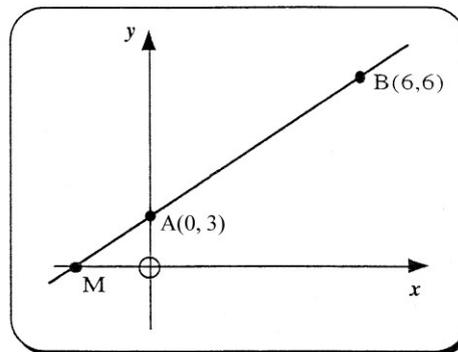


2 RE

4. The straight line through the points $A(0, 3)$ and $B(6, 6)$ is shown in the diagram.

The point M is where the line AB cuts the x-axis.

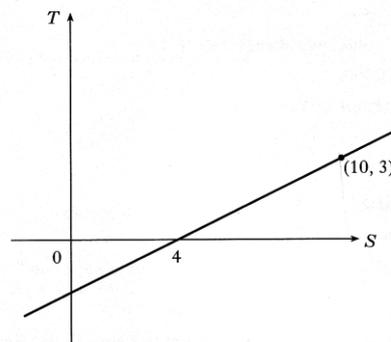
- Find the equation of the straight line AB. 4 KU
- Use this equation to find the coordinates of the point M. 2 RE



4 KU

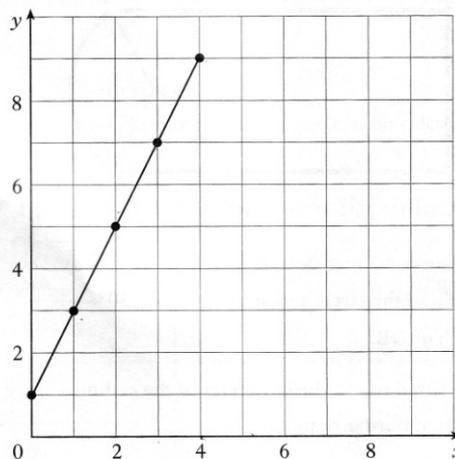
2 RE

5. Find the equation of the given straight line in terms of S and T.



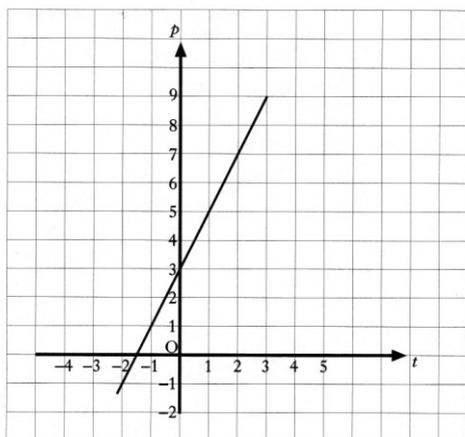
4 KU

6. Find the equation of the straight line.



3 KU

- 7.

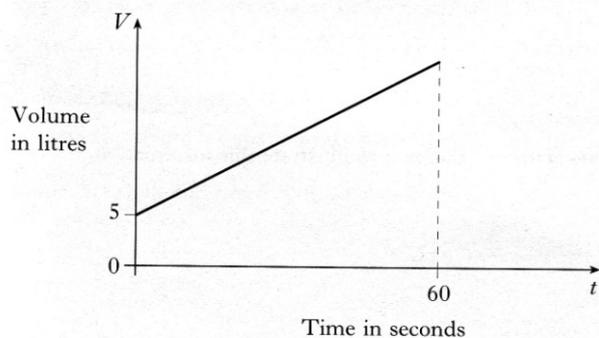


Find the equation of the straight line in terms of p and t .

4 KU

8. The tank of a car contains 5 litres of petrol.

The graph below shows how the volume of petrol in this tank changes as a further 45 litres of petrol is pumped in at a steady rate for 60 seconds.

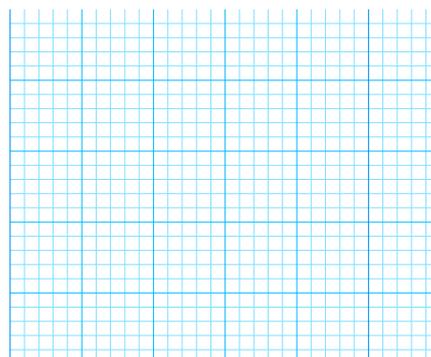


Find the equation of the straight line in terms of V and t .

4 KU

9. A tank contains 10 litres of water.
A further 30 litres of water is poured into the tank at a steady rate of 5 litres per minute.

a) On the 2mm square ruled graph paper provided, draw a graph of the volume, V litres, of water in the tank against the time, t minutes.



4 KU

b) Write down an equation connecting V and t .

2 KU

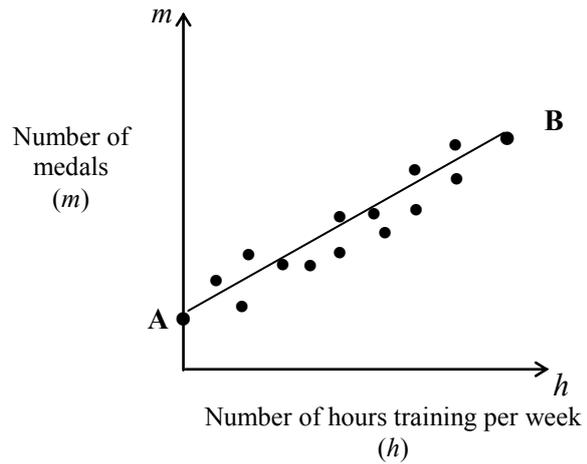
Applications of the Equation of a Straight Line

1. The graph shows the relationship between the number of hours (h) an athlete trains per week and the number of Championship medals (m) they have won.

A best fitting straight line AB has been drawn.

Athlete A does not train but has won 4 medals this year.

Athlete B who trains for 12 hours per week has won 40 medals this year.



- (a) Find the equation of the straight line AB in terms of m and h .
- (b) How many medals would you expect an athlete who trains 8 hours per week to have won ?

4 RE

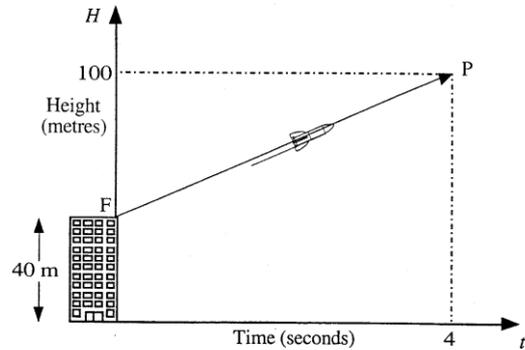
1 KU

2. A boy sets off a rocket from the top of a 40 metre high block of flats.

The diagram shows the path of the rocket over the first 4 seconds.

It is represented by the straight line in the graph.

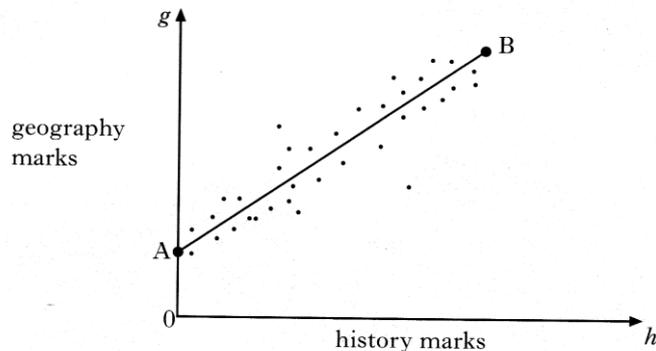
After 4 seconds, the rocket has reached a point 100 metres above the ground.



Find the equation of the straight line FP in terms of H and t .

4 RE

3. The graph below shows the relationship between the history and geography marks of a class of students



A best fitting straight line, AB has been drawn.

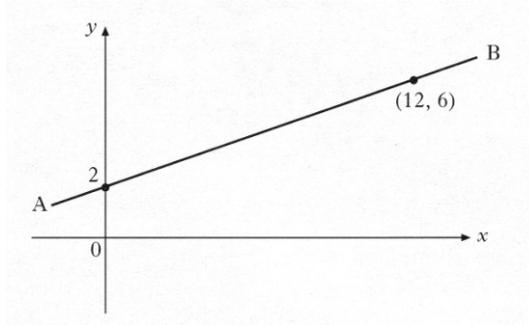
Point A represents 0 marks for history and 12 marks for geography.

Point B represents 90 marks for history and 82 marks for geography.

Find the equation of the straight line AB in terms of h and g .

4 RE

4. A water pipe runs between two buildings. These are represented by the points A and B in the diagram below.



- a) Using the information in the diagram, show that the equation of the line AB is $3y - x = 6$.
- b) An emergency outlet pipe has to be built across the main pipe. The line representing this outlet pipe has equation $4y + 5x = 46$

3 KU

Calculate the coordinates of the point on the diagram at which the outlet pipe will cut across the main water pipe.

4 RE

5. When a patient's blood pressure (B.P.), is taken, two measurements are made.

For example, in "160 over 70" (or $\frac{160}{70}$),

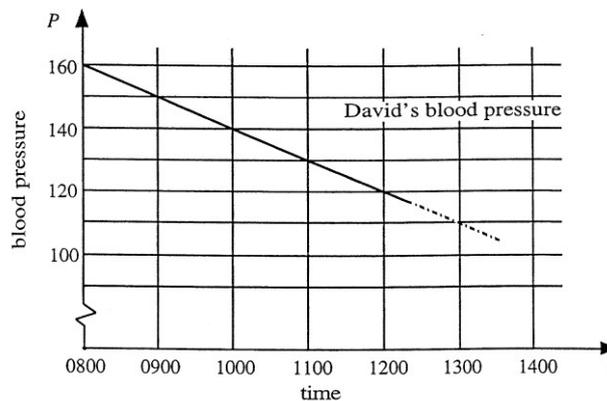
⇒ the 160 is the reading when the heart is pumping.

⇒ the 70 is the reading when the heart is at rest.



David has a heart problem, and has his blood pressure taken every hour.

The first number of these two measurements is monitored very carefully and the nurse plots a graph, showing the changes from 8 am.



- a) Find the gradient of the line shown above.
- b) Write down the equation of the line in the form $P = \dots\dots\dots$
- c) It is known that if the blood pressure drops below 70, the patient will be in danger of losing consciousness.

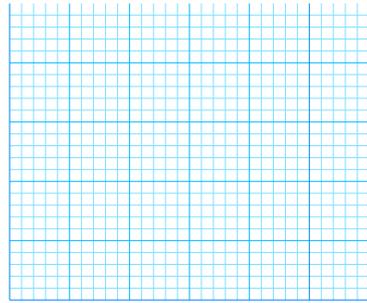
2 KU

2 KU

If David's blood pressure continues to drop in the way indicated, when might he be expected to become unconscious.

3 RE

6. A tank contains 240 litres of water.
 When the tap is opened, water flows from the tank at a steady rate of 20 litres per minute.



a) On the 2mm square-ruled paper provided, draw a graph of the volume V litres, of water in the tank against the time, t minutes.

3 KU

b) Write down an equation connecting V and t .

2 KU

7. The graph below shows the number of grams, s , of a substance that can be dissolved in a fixed quantity of water when the temperature of the water is $t^\circ\text{C}$.

Find the equation of this straight line in terms of s and t .

4 KU

