

National 5 Straight Line

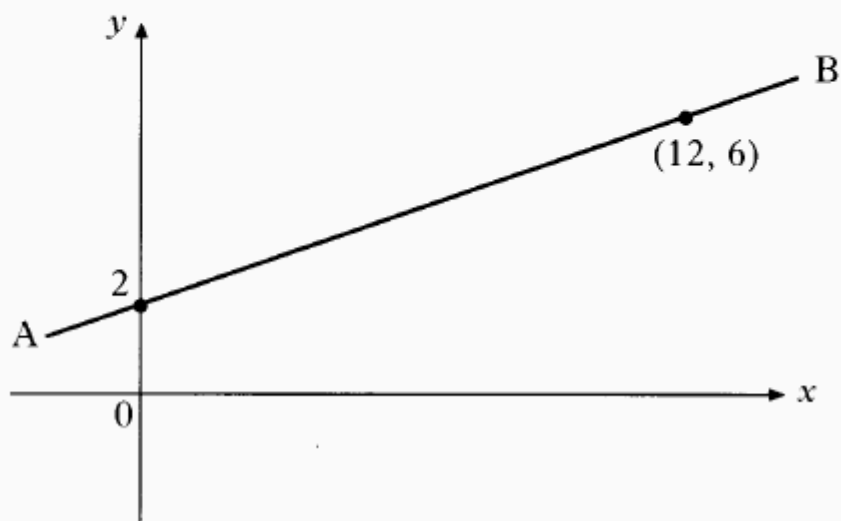
Solutions can be found from the school maths website

(<http://www.dunblanehighschool.org.uk/maths/course/national-5/nat-5-past-papers/>)

1.
01
P2

A water pipe runs between two buildings.

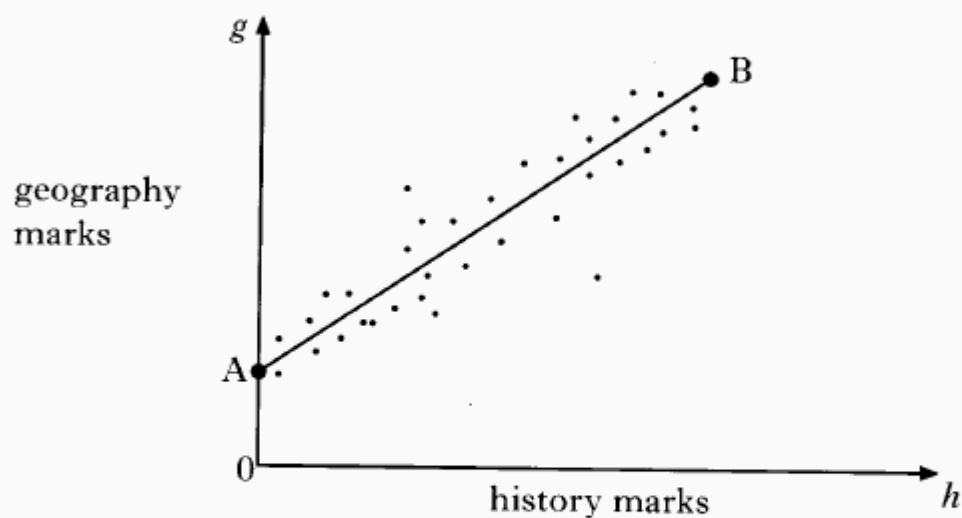
These are represented by the points A and B in the diagram below.



- (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 $4y + 5x = 46$.
- Calculate the coordinates of the point on the diagram at which the outlet pipe will cut across the main water pipe.

2.
02
P1

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.

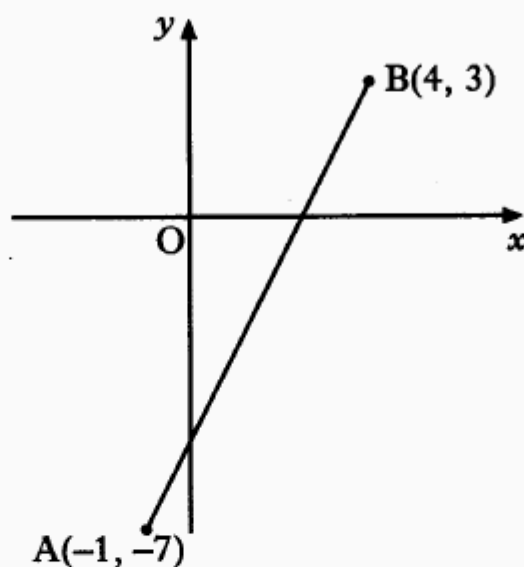
Point A represents 0 marks for history and 12 marks for geography.

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 .

3.
03
P1

In the diagram below, A is the point $(-1, -7)$ and B is the point $(4, 3)$.



(a) Find the gradient of the line AB.

(b) AB cuts the y -axis at the point $(0, -5)$.

Write down the equation of the line AB.

(c) The point $(3k, k)$ lies on AB.

Find the value of k .

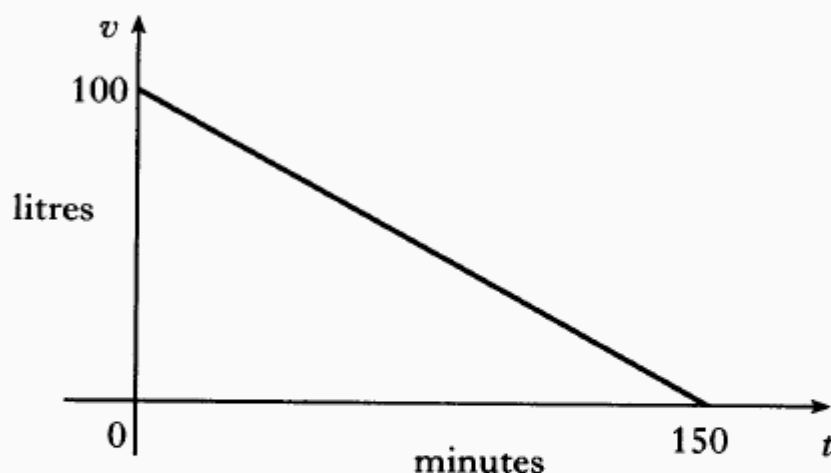
4.
04
P1

Two variables x and y are connected by the relationship $y = ax + b$.

Sketch a possible graph of y against x to illustrate this relationship when a and b are each less than zero.

5.
04
P2

A tank which holds 100 litres of water has a leak.
After 150 minutes, there is no water left in the tank.



The above graph represents the volume of water (v litres) against time (t minutes).

- (a) Find the equation of the line in terms of v and t .
- (b) How many minutes does it take for the container to lose 30 litres of water?

6.
05
P1

In an experiment involving two variables, the following values for x and y were recorded.

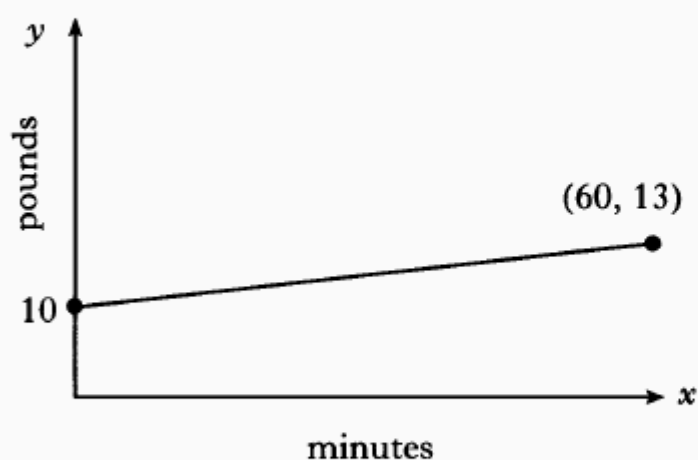
| | | | | | |
|-----|---|---|---|---|----|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 6 | 4 | 2 | 0 | -2 |

The results were plotted, and a straight line was drawn through the points.
Find the gradient of the line **and** write down its equation.

7.
05
P2

The monthly bill for a mobile phone is made up of a fixed rental plus call charges. Call charges vary as the time used.

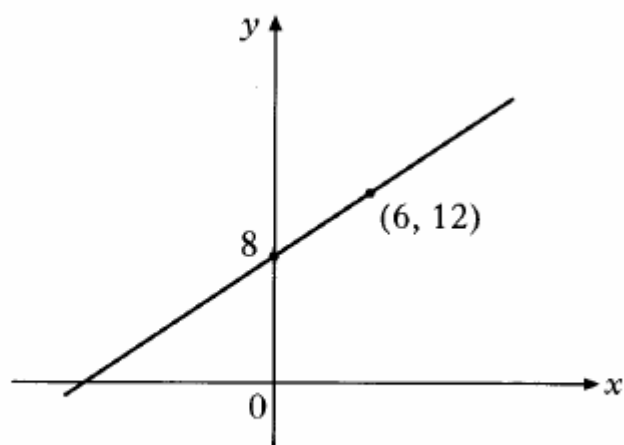
The relationship between the monthly bill, y (pounds), and the time used, x (minutes) is represented in the graph below.



(a) Write down the fixed rental.

(b) Find the call charge per minute.

8.
06
P1

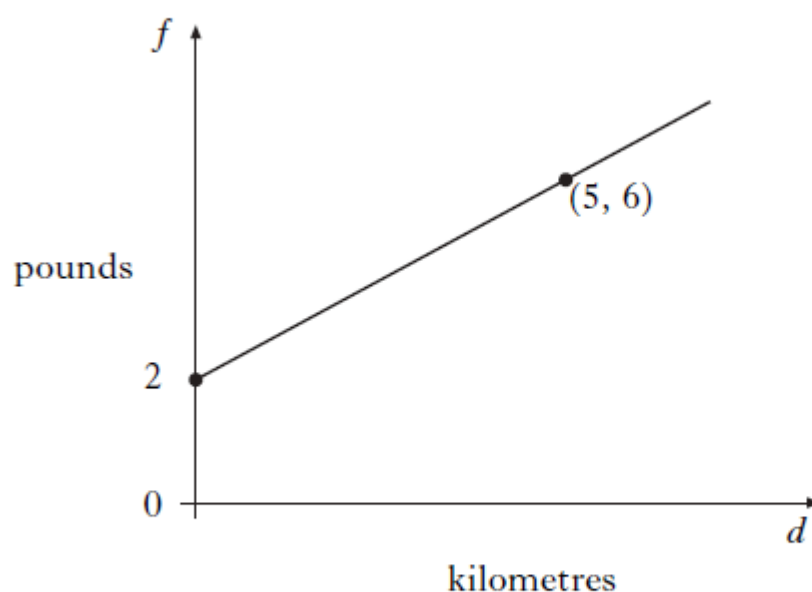


Find the equation of the given straight line.

9.
07
P1

A taxi fare consists of a £2 “call-out” charge **plus** a fixed amount per kilometre.

The graph shows the fare, f pounds for a journey of d kilometres.

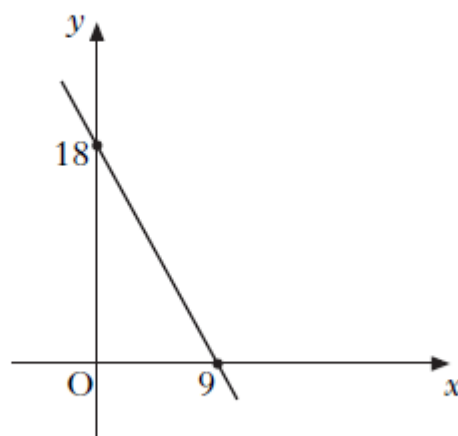


The taxi fare for a 5 kilometre journey is £6.

Find the equation of the straight line in terms of d and f .

10.
08
P1

A straight line cuts the x -axis at the point $(9, 0)$ and the y -axis at the point $(0, 18)$ as shown.

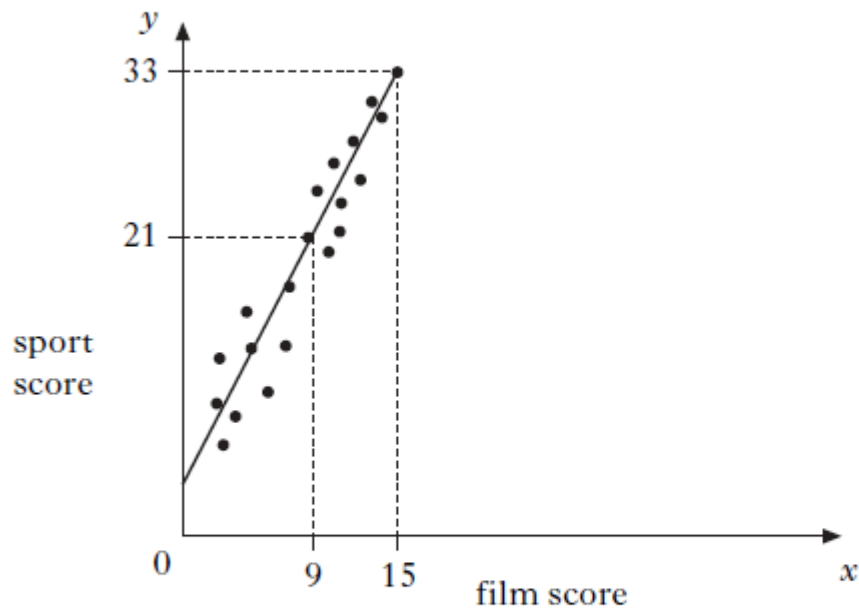


Find the equation of this line.

11.
09
P2

Teams in a quiz answer questions on film and sport.

This scatter graph shows the scores of some of the teams.



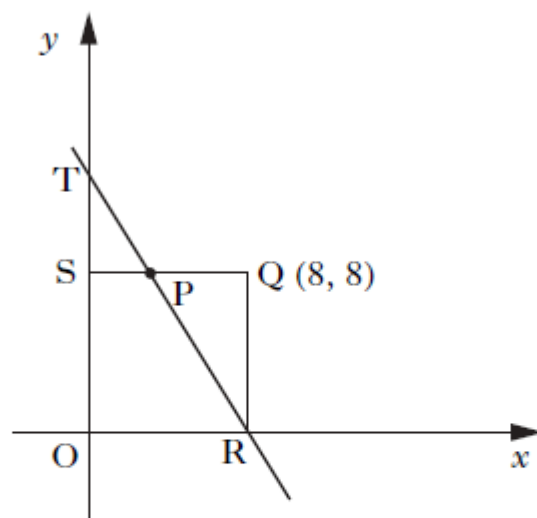
A line of best fit is drawn as shown above.

- (a) Find the equation of this straight line.
- (b) Use this equation to estimate the sport score for a team with a film score of 20.

12
11
P1

A square, OSQR, is shown below.

Q is the point (8, 8).



The straight line TR cuts the y -axis at T (0, 12) and the x -axis at R.

(a) Find the equation of the line TR.

The line TR also cuts SQ at P.

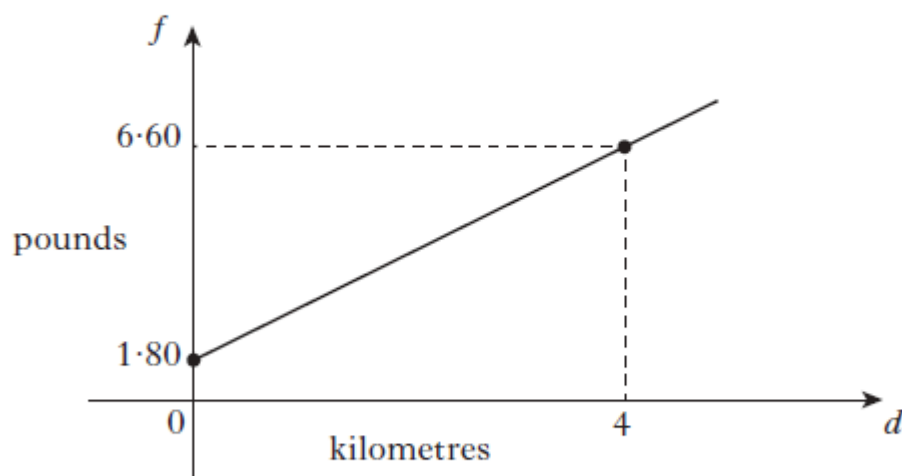
(b) Find the coordinates of P.

13.
12
P2

A taxi fare consists of a call-out charge of £1.80 **plus** a fixed cost per kilometre.

A journey of 4 kilometres costs £6.60.

The straight line graph shows the fare, f pounds, for a journey of d kilometres.

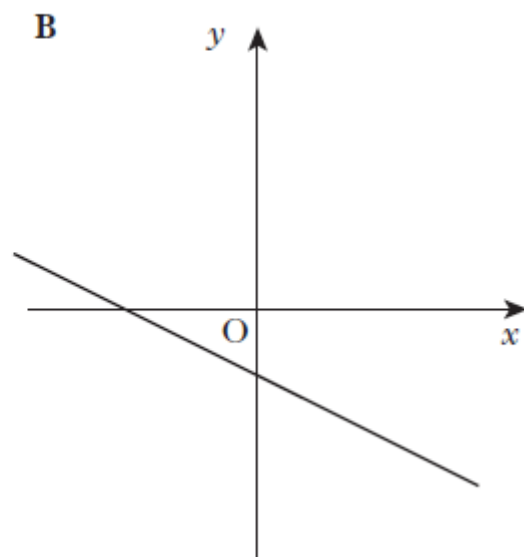
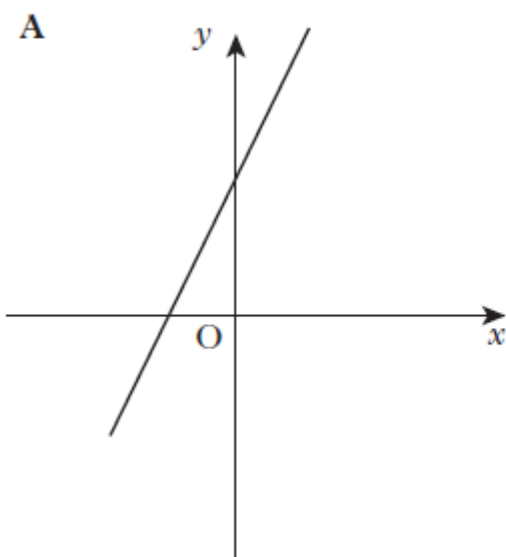


(a) Find the equation of the straight line.

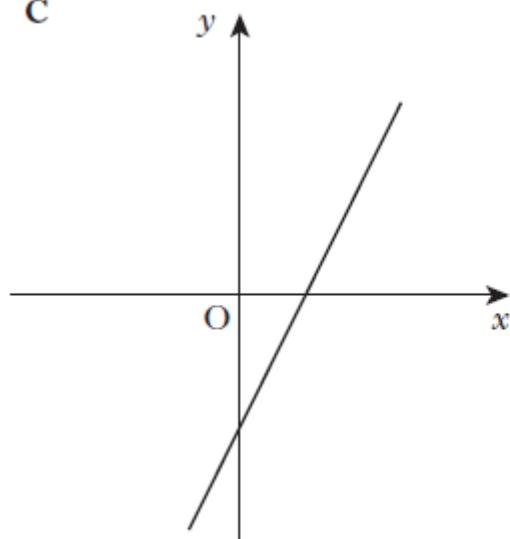
(b) Calculate the fare for a journey of 7 kilometres.

14.
13
P1

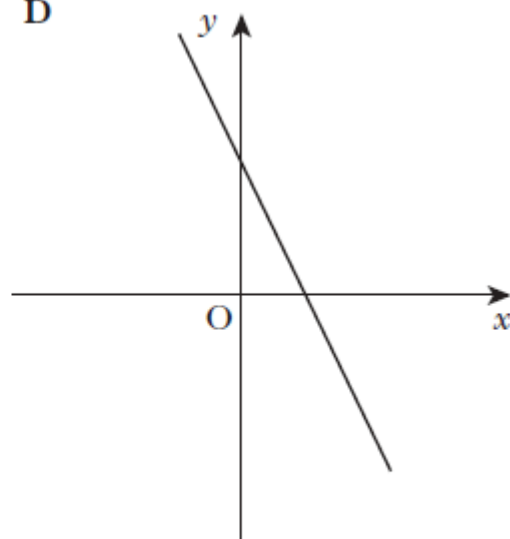
Four straight line graphs are shown below.



C



D



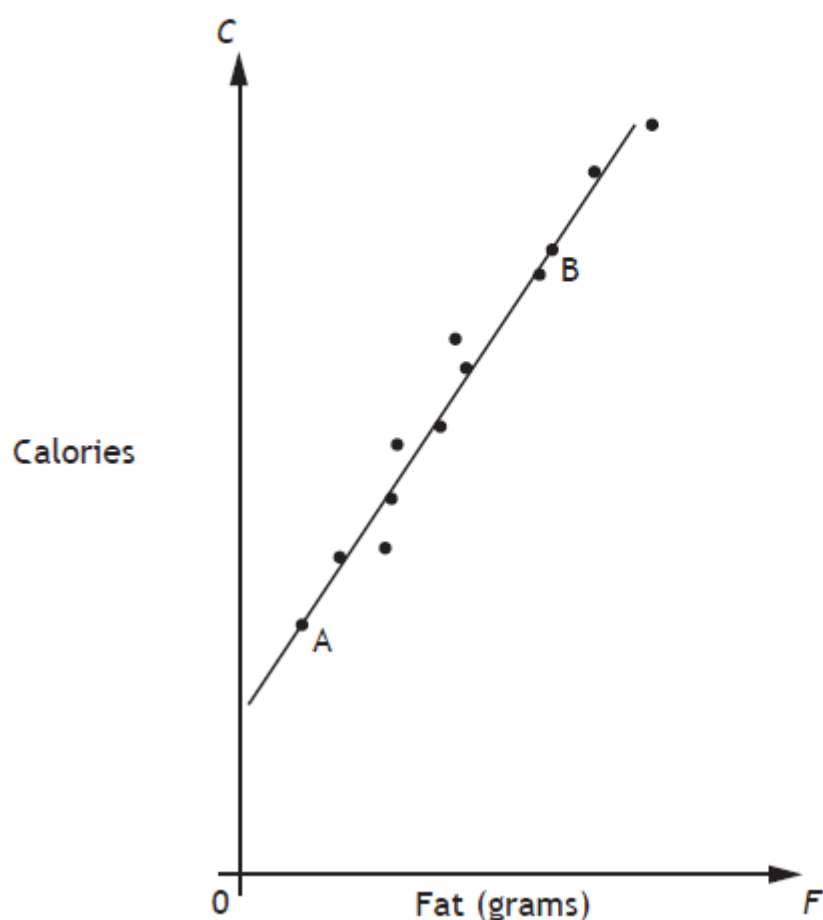
Which one of these above could represent the line with equation $2x + y = 3$?

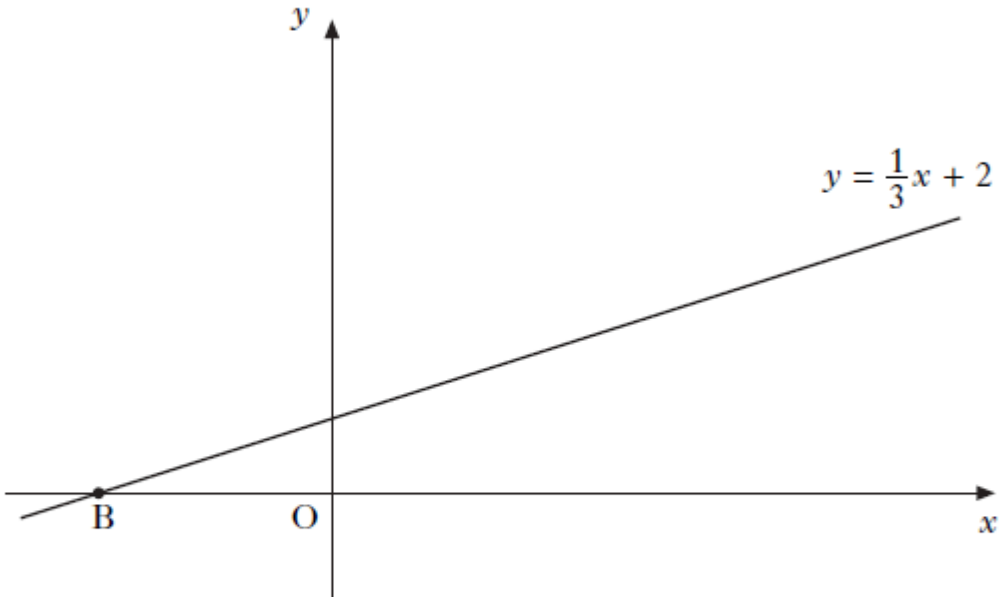
Give two reasons to justify your answer.

15.
14
P1

McGregor's Burgers sells fast food.

The graph shows the relationship between the amount of fat, F grams, and the number of calories, C , in some of their sandwiches.

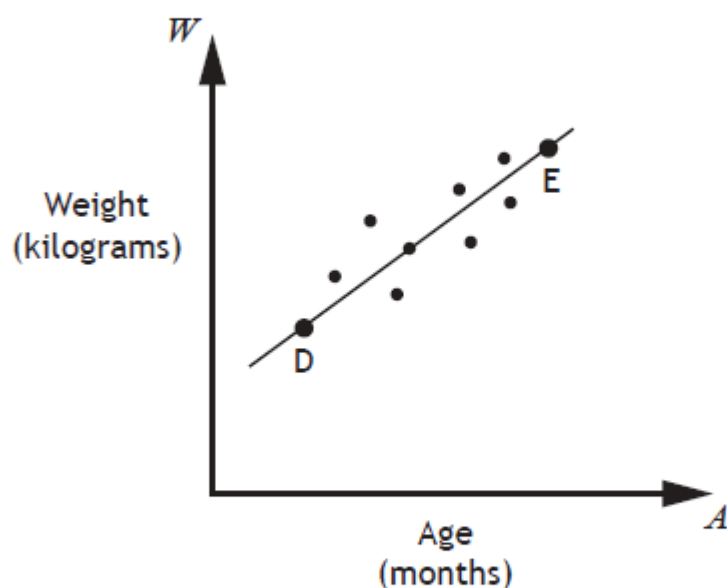


| | |
|-----------------|---|
| | <p>A line of best fit has been drawn.</p> <p>Point A represents a sandwich which has 5 grams of fat and 200 calories.</p> <p>Point B represents a sandwich which has 25 grams of fat and 500 calories.</p> <p>(a) Find the equation of the line of best fit in terms of F and C.</p> <p>(b) A Super Deluxe sandwich contains 40 grams of fat.</p> <p>Use your answer to part (a) to estimate the number of calories this sandwich contains.</p> <p>Show your working.</p> |
| 16. 10 P1 | <p>Part of the graph of the straight line with equation $y = \frac{1}{3}x + 2$, is shown below.</p>  <p>(a) Find the coordinates of the point B.</p> <p>(b) For what values of x is $y < 0$?</p> |
| 17. 14 P1 | <p>(a) A straight line has equation $4x + 3y = 12$.</p> <p>Find the gradient of this line.</p> <p>(b) Find the coordinates of the point where this line crosses the x-axis.</p> |
| 18. 15 P1 | <p>Find the equation of the line joining the points $(-2, 5)$ and $(3, 15)$.</p> <p>Give the equation in its simplest form.</p> |

19.
16
P1

A cattle farmer records the weight of some of his calves.

The scattergraph shows the relationship between the age, A months, and the weight, W kilograms, of the calves.



A line of best fit is drawn.

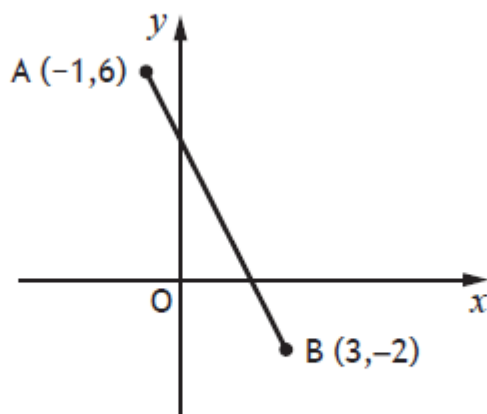
Point D represents a 3 month old calf which weighs 100 kilograms.

Point E represents a 15 month old calf which weighs 340 kilograms.

- (a) Find the equation of the line of best fit in terms of A and W .
Give the equation in its simplest form.
- (b) Use your equation from part (a) to estimate the weight of a one year old calf.
Show your working.

20.
17
P1

The diagram below shows the straight line joining points A and B.



Find the equation of the line AB.

Give the equation in its simplest form.

21.
17
P2

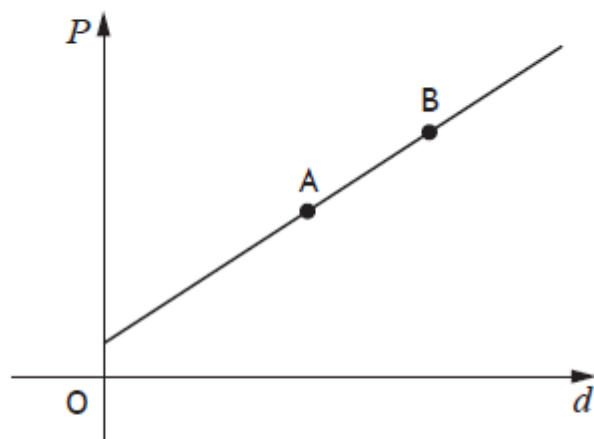
A straight line has equation $3x - 5y - 10 = 0$.

Find the gradient of this line.

22.
18
P1

The cost of a journey with Tom's Taxis depends on the distance travelled.

The graph below shows the cost, P pounds, of a journey with Tom's Taxis against the distance travelled, d miles.



Point A represents a journey of 8 miles which costs £14.

Point B represents a journey of 12 miles which costs £20.

(a) Find the equation of the line in terms of P and d .

Give the equation in its simplest form.

(b) Calculate the cost of a journey of 5 miles.

23.
18
P2

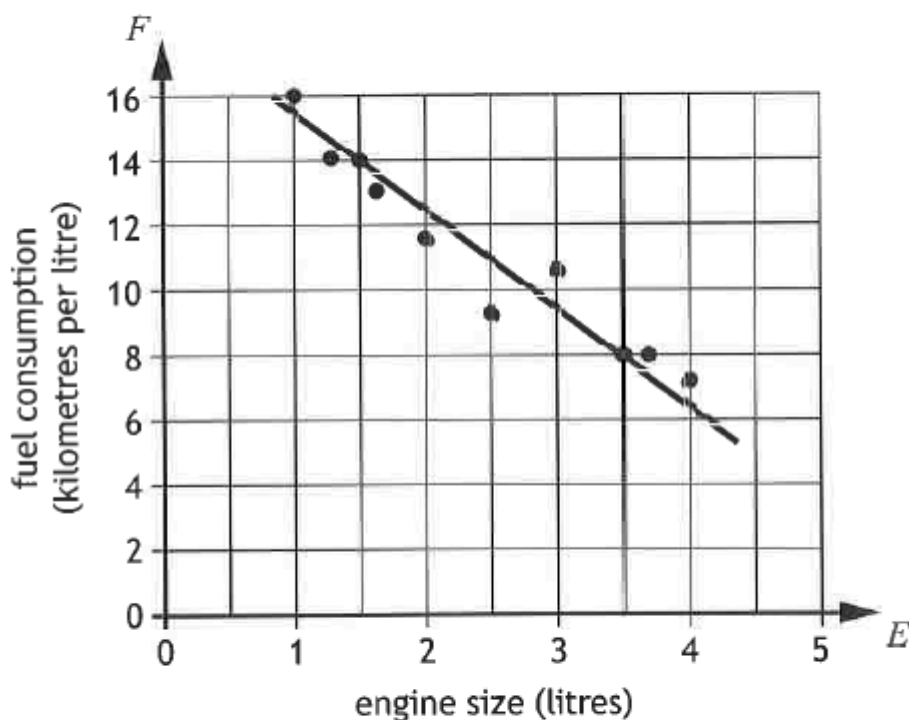
A straight line has equation $2x - 5y = 20$.

Find the coordinates of the point where this line crosses the y -axis.

24.
19
P1

The fuel consumption of a group of cars is recorded.

The scattergraph shows the relationship between the fuel consumption, F kilometres per litre, and the engine size, E litres, of the cars.



A line of best fit has been drawn.

(a) Find the equation of the line of best fit in terms of F and E .

Give the equation in its simplest form.

Amaar's car has an engine size of 1.1 litres.

(b) Use your equation from part (a) to estimate how many kilometres per litre he should expect to get.