Change the subject of the formula to m.

$$L = \frac{\sqrt{m}}{k}$$

1

Solve the equation

2

$$3x + 1 = \frac{x-5}{2}.$$

Change the subject of the formula to s.

3

$$t = \frac{7s+4}{2}.$$

A formula used to calculate the flow of water in a pipe is

4

$$f = \frac{kd^2}{20}.$$

Change the subject of the formula to d.

$$W = BH^2.$$

5

Change the subject of the formula to H.
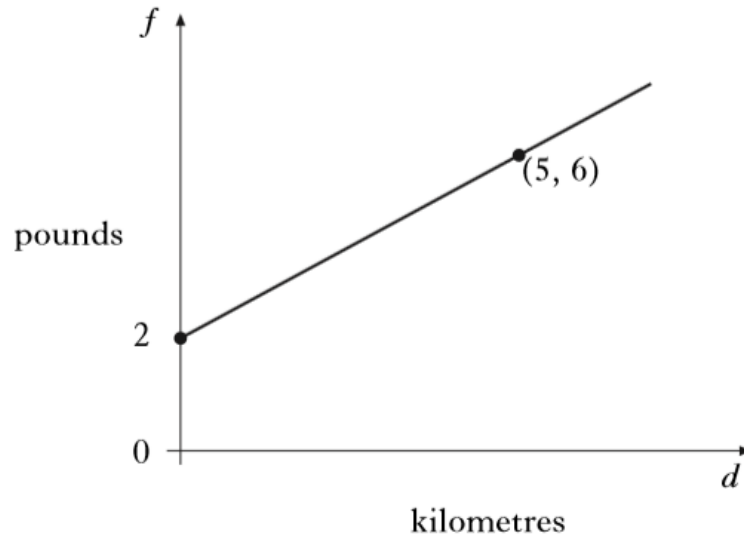
$$P = \frac{2(m-4)}{3}$$

6

Change the subject of the formula to m.

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

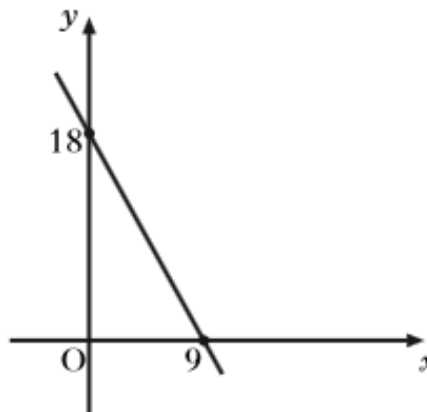The graph shows the fare, f pounds for a journey of d kilometres.

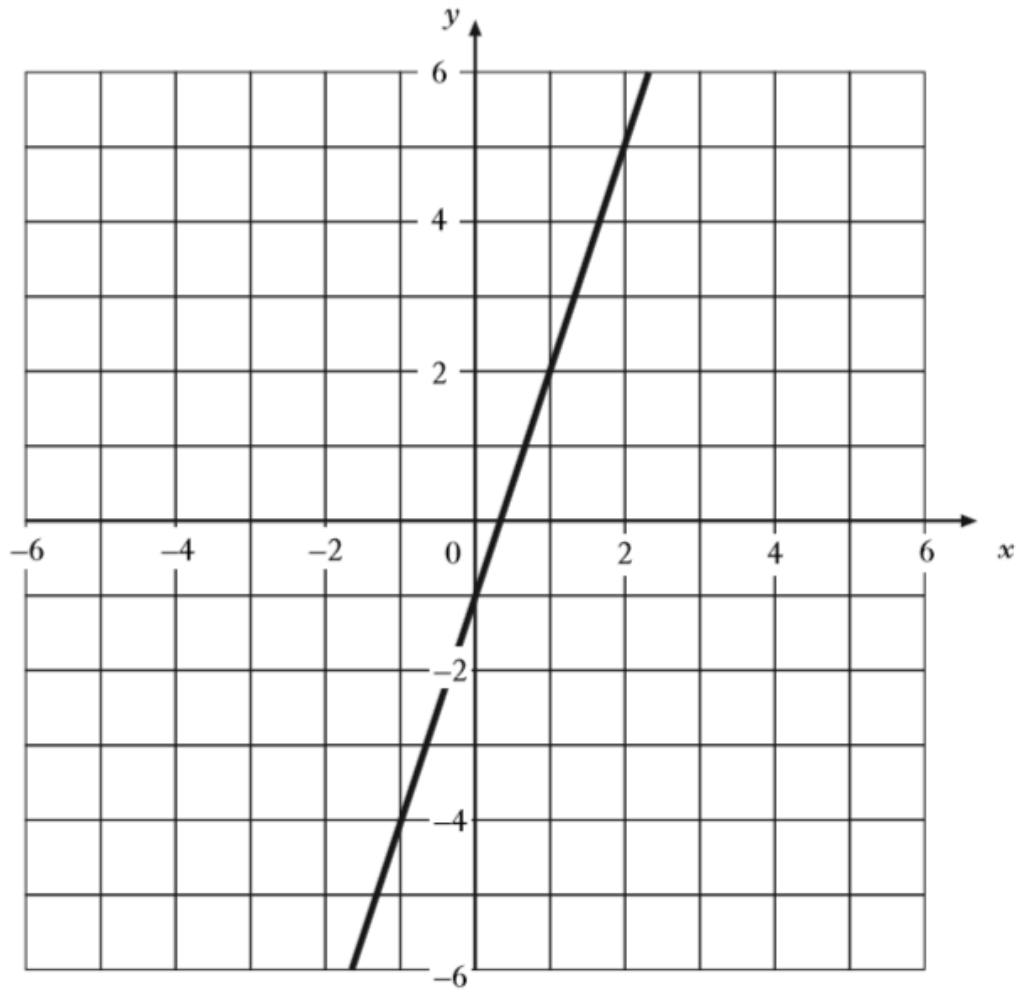The taxi fare for a 5 kilometre journey is £6.

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

8 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.

9

Find the equation of the straight line shown in the diagram.

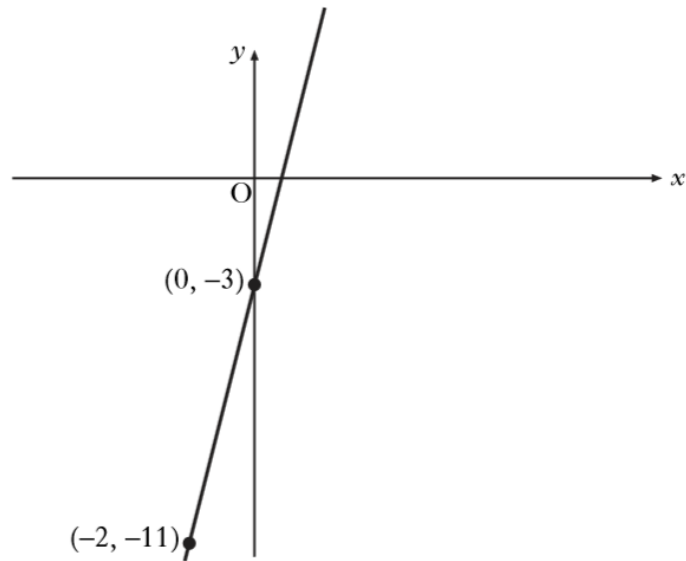Find the point of intersection of the straight lines with equations $x + 2y = -5$ and $3x - y = 13$.

10

A straight line has equation $y = 4x + 5$.
State the gradient of this line.

11

A straight line is represented by the equation $x + y = 5$.
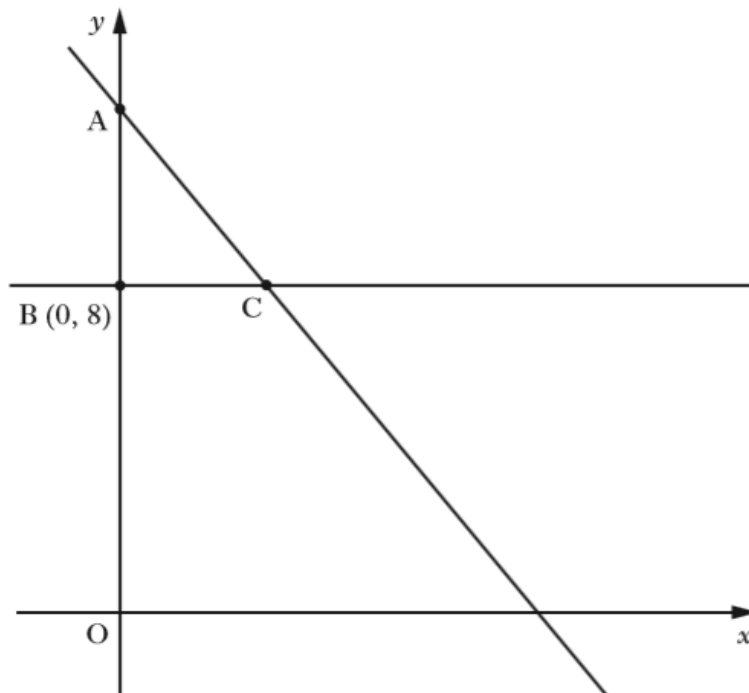Find the gradient of this line.

12

13

Find the equation of the straight line passing through the points (0, −3) and (−2, −11).

14

The straight line with equation $4x + 3y = 36$ cuts the y-axis at A.

(*a*) Find the coordinates of A.

This line meets the line through B (0, 8), parallel to the x-axis, at C as shown above.

(*b*) Find the coordinates of C.

Solve the inequality
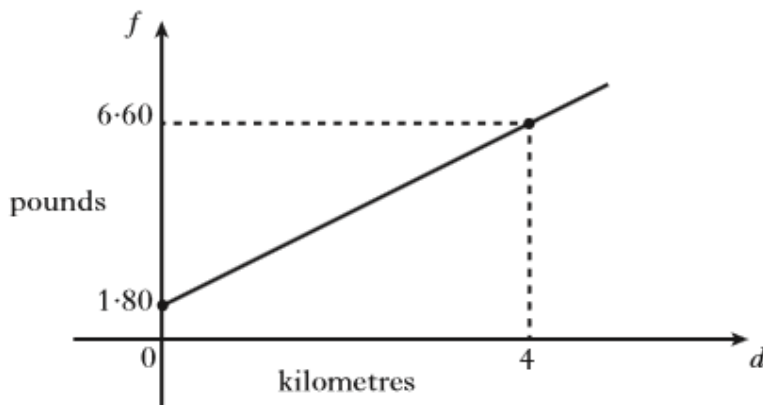
15

$$\frac{x}{4} - \frac{1}{2} < 5.$$

A taxi fare consists of a call-out charge of £1·80 **plus** a fixed cost per kilometre.

16

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.

Change the subject of the formula

17

$$K = \frac{m^2 n}{p}$$

to *m*.

Change the subject of the formula

18

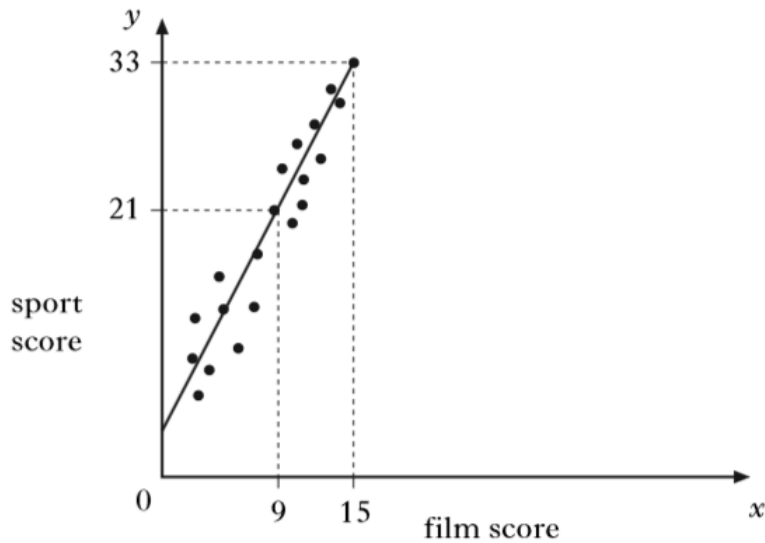$$A = \frac{1}{2} h(a + b)$$

to *h*.

19 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.

20 Change the subject of the formula

$$p = q + \sqrt{a}$$

to a.

21 Solve algebraically the system of equations
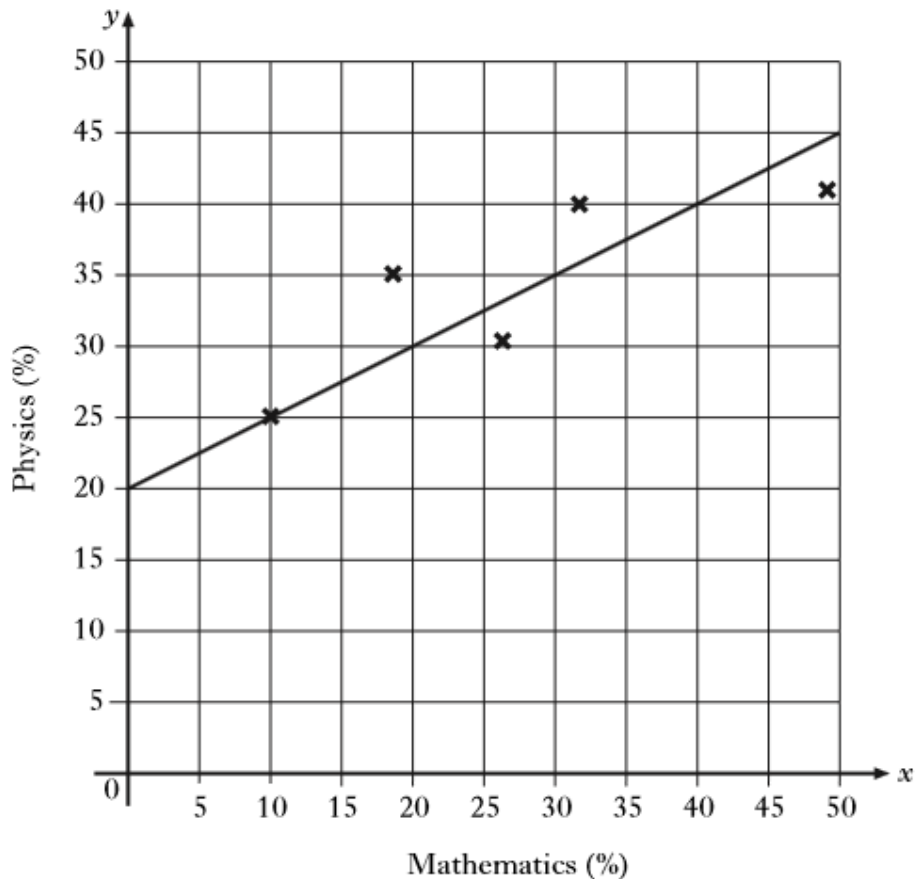
$$2x - 5y = 24$$
$$7x + 8y = 33.$$

22 A formula used to calculate lighting efficiency is

$$E = \frac{I}{D^2}.$$

Change the subject of this formula to D.

These marks are shown on the scattergraph below.
A line of best fit has been drawn.

Physics (%) vs Mathematics (%)

(a)   Find the equation of the line of best fit.

(b)   Another pupil scored 76% in the mathematics test but was absent from the physics test.

   Use your answers to part (a) to predict his physics mark

Change the subject of the formula
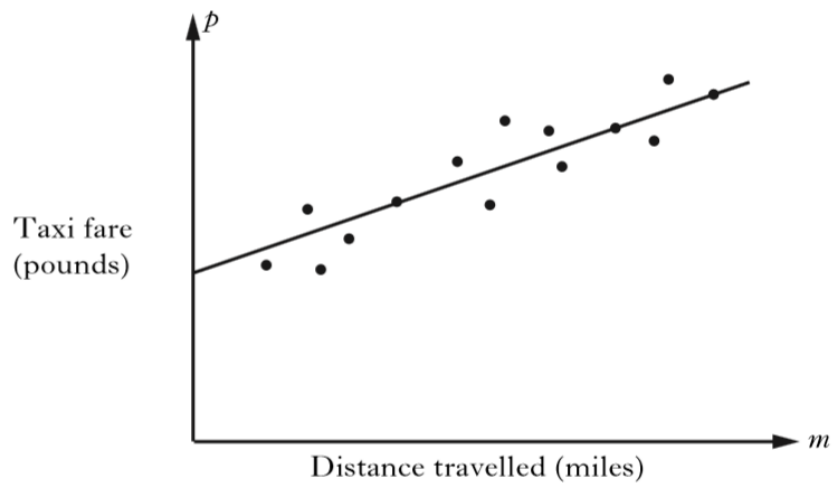
$$P = 2(L + B)$$

to L.

Change the subject of the formula

$$A = 4\pi r^2$$
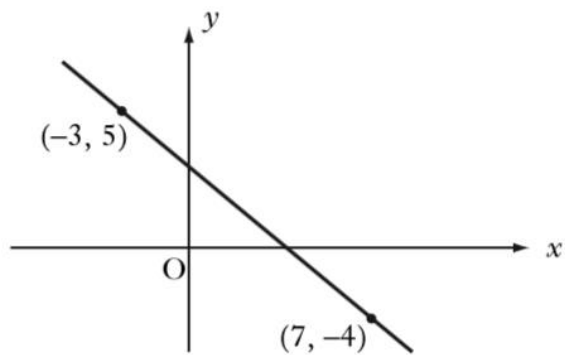
to r.

26 The scattergraph shows the taxi fare, p pounds, plotted against the distance travelled, m miles. A line of best fit has been drawn.

The equation of the line of best fit is $p = 2 + 1{\cdot}5\,m$.

Use this equation to predict the taxi fare for a journey of 6 miles.

27

Calculate the gradient of the straight line passing through the points $(-3, 5)$ and $(7, -4)$.

The graph below shows two straight lines.

- $y = 2x - 3$
- $x + 2y = 14$
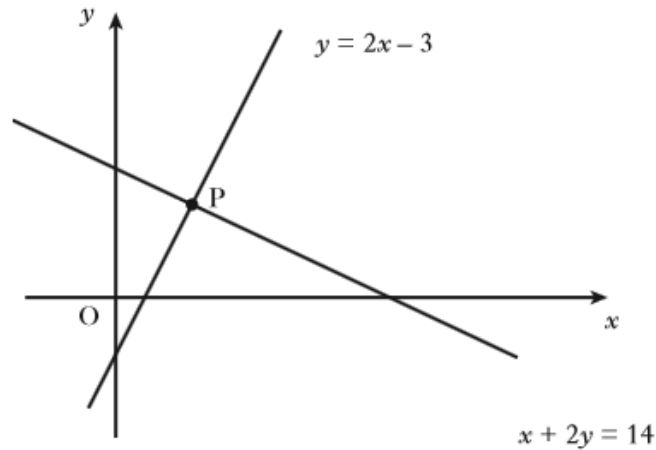
The lines intersect at the point P.

Find, **algebraically**, the coordinates of P.

Part of the graph of the straight line with equation $y = \frac{1}{3}x + 2$, is shown below.

(a) Find the coordinates of the point B.

(b) For what values of x is $y < 0$?

30

A square, OSQR, is shown below.

Q is the point (8, 8).
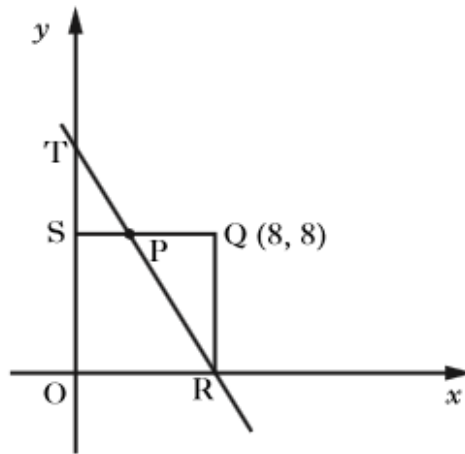
The straight line TR cuts the y-axis at T (0, 12) and the x-axis at R.
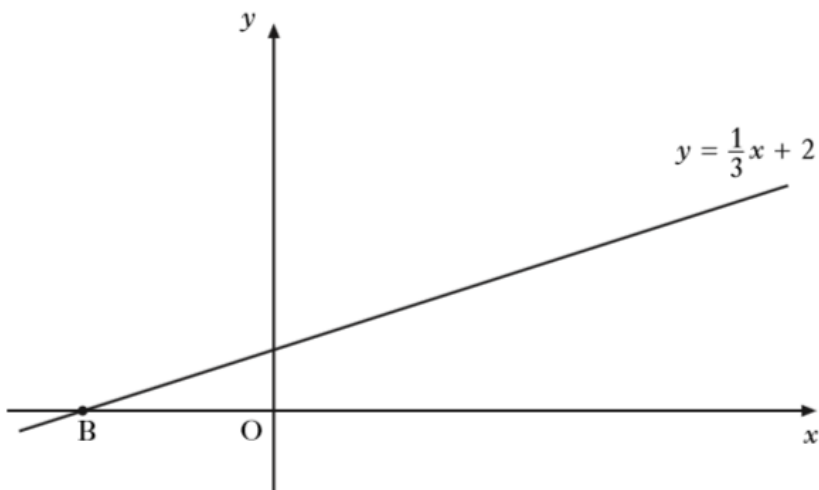
(a) Find the equation of the line TR.

The line TR also cuts SQ at P.

(b) Find the coordinates of P.

31

A straight line has equation $y = mx + c$, where m and c are constants.

(a) The point (2, 7) lies on this line.

Write down an equation in m and c to illustrate this information.

(b) A second point (4, 17) also lies on this line.

Write down another equation in m and c to illustrate this information.

(c) Hence calculate the values of m and c.

(d) Write down the gradient of this line.

(a) Brian, Molly and their four children visit Waterworld.

The total cost of their tickets is £56.

Let a pounds be the cost of an adult's ticket and c pounds the cost of a child's ticket.

Write down an equation in terms of a and c to illustrate this information.

(b) Sarah and her three children visit Waterworld.

The total cost of their tickets is £36.

Write down another equation in terms of a and c to illustrate this information.

(c) (i) Calculate the cost of a child's ticket.

(ii) Calculate the cost of an adult's ticket.

(a) A cinema has 300 seats which are either standard or deluxe.

Let x be the number of standard seats and y be the number of deluxe seats.

Write down an algebraic expression to illustrate this information.
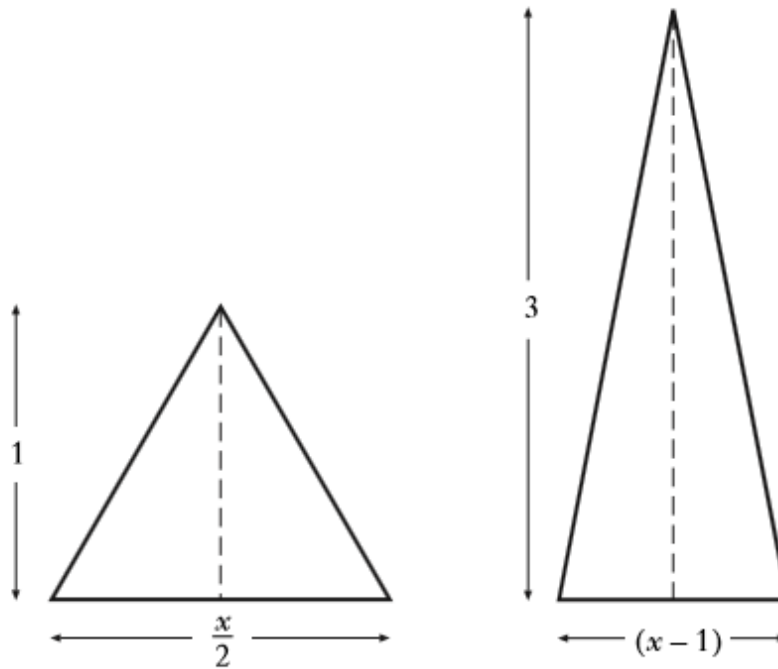
(b) A standard seat costs £4 and a deluxe seat costs £6.

When all the seats are sold the ticket sales are £1380.

Write down an algebraic expression to illustrate this information.

(c) How many standard seats and how many deluxe seats are in the cinema?

34 Two triangles have dimensions as shown.

The triangles are equal in area.

Calculate the value of x.

35 Three groups are booking a holiday. The first group consists of 6 adults and 2 children. The total cost of their holiday is £3148.

Let x pounds be the cost for an adult and y pounds be the cost for a child.

(*a*) Write down an equation in x and y which satisfies the above information.

The second group books the same holiday for 5 adults and 3 children. The total cost of their holiday is £3022.

(*b*) Write down a second equation in x and y which satisfies this information.
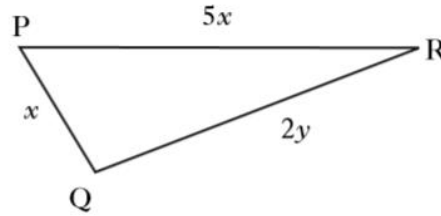
(*c*) The third group books the same holiday for 2 adults and 4 children. The travel agent calculates that the total cost is £2056.

Has this group been overcharged?

Justify your answer.

In triangle PQR:

- PQ = x centimetres
- PR = $5x$ centimetres
- QR = $2y$ centimetres.

(a) The perimeter of the triangle is 42 centimetres.

Write down an equation in x and y to illustrate this information.

(b) PR is 2 centimetres longer than QR.

Write down another equation in x and y to illustrate this information.

(c) Hence calculate the values of x and y.

Jane enters a two-part race.

(a) She cycles for 2 hours at a speed of $(x + 8)$ kilometres per hour.
Write down an expression in x for the distance cycled.

(b) She then runs for 30 minutes at a speed of x kilometres per hour.
Write down an expression in x for the distance run.

(c) The **total** distance of the race is 46 kilometres.
Calculate Jane's **running** speed.

Alan is taking part in a quiz. He is awarded x points for each correct answer and y points for each wrong answer. During the quiz, Alan gets 24 questions correct and 6 wrong. He scores 60 points.

(a) Write down an equation in x and y which satisfies the above condition.

Helen also takes part in the quiz. She gets 20 questions correct and 10 wrong. She scores 40 points.

(b) Write down a second equation in x and y which satisfies this condition.

(c) Calculate the score for David who gets 17 correct and 13 wrong.

39

Aaron saves 50 pence and 20 pence coins in his piggy bank.

Let x be the number of 50 pence coins in his bank.

Let y be the number of 20 pence coins in his bank.

(a) There are 60 coins in his bank.

Write down an equation in x and y to illustrate this information.

(b) The total value of the coins is £17·40.

Write down another equation in x and y to illustrate this information.

(c) Hence find **algebraically** the number of 50 pence coins Aaron has in his piggy bank.

40

To hire a car costs £25 per day plus a mileage charge.

The first 200 miles are free with each additional mile charged at 12 pence.

CAR HIRE

£25 per day

· **first 200** miles free
· each additional mile only 12p

(a) Calculate the cost of hiring a car for 4 days when the mileage is 640 miles.

(b) A car is hired for d days and the mileage is m miles where $m > 200$.

Write down a formula for the cost £C of hiring the car.

41

A straight line is represented by the equation $y = mx + c$.

Sketch a possible straight line graph to illustrate this equation when $m > 0$ and $c < 0$.

Suzie has a new mobile phone. She is charged x pence per minute for calls and y pence for each text she sends. During the first month her calls last a total of 280 minutes and she sends 70 texts. Her bill is £52·50.

42

(a) Write down an equation in x and y which satisfies the above condition.

The next month she reduces her bill. She restricts her calls to 210 minutes and sends 40 texts. Her bill is £38·00.
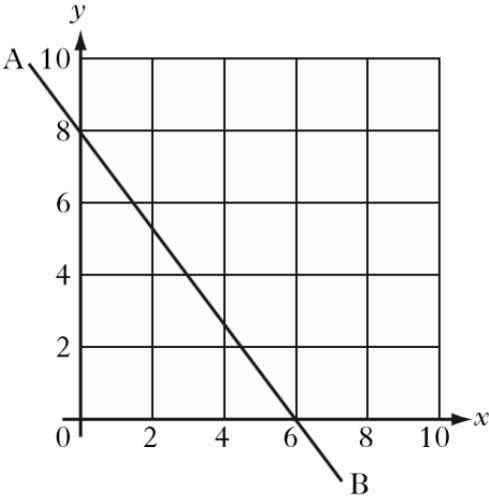
(b) Write down a second equation in x and y which satisfies this condition.

(c) Calculate the price per minute for a call and the price for each text sent.

A straight line is represented by the equation $y = ax + b$.

43

Sketch a possible straight line graph to illustrate this equation when $a = 0$ and $b > 0$.

Find the equation of the straight line AB shown in the diagram.