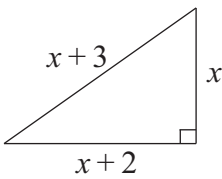


1. [6 marks]

A right-angled triangle has sides of length x cm, $(x + 2)$ cm and $(x + 3)$ cm.



(a) Use Pythagoras’ theorem to write down an equation in x .

.....
(1)

(b) Show that your equation simplifies to $x^2 - 2x - 5 = 0$

(2)

(c) By solving the equation $x^2 - 2x - 5 = 0$, find the length of each side of the triangle.
Give your answers correct to one decimal place.

..... cm, cm, cm
(3)



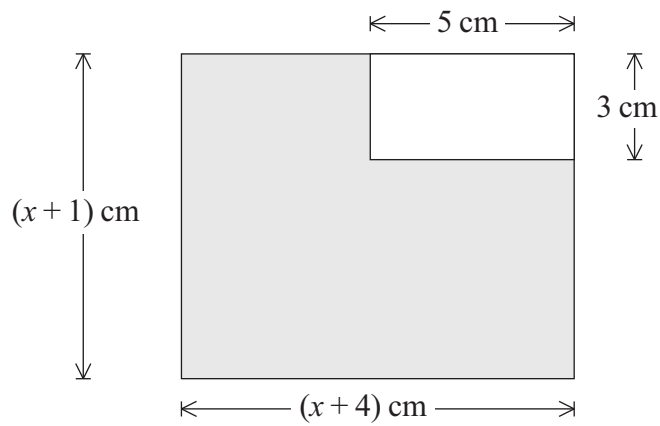


Diagram **NOT**
accurately drawn

A rectangular piece of card has length $(x+4)$ cm and width $(x+1)$ cm.

A rectangle 5 cm by 3 cm is cut from the corner of the piece of card.

The remaining piece of card, shown shaded in the diagram, has an area of 35 cm^2 .

(a) Show that $x^2 + 5x - 46 = 0$

(3)

(b) Solve $x^2 + 5x - 46 = 0$ to find the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$
(3)



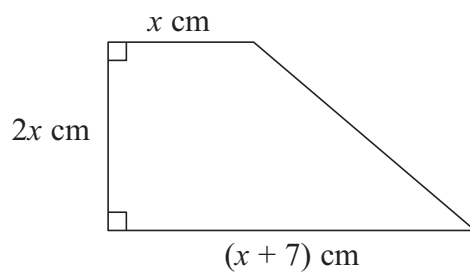


Diagram **NOT**
accurately drawn

The diagram shows a trapezium.
The trapezium has an area of 17 cm^2

(a) Show that $2x^2 + 7x - 17 = 0$

(3)

(b) Work out the value of x .
Give your answer correct to 3 significant figures.
Show your working clearly.

$x = \dots\dots\dots$
(3)



The diagram shows a trapezium.

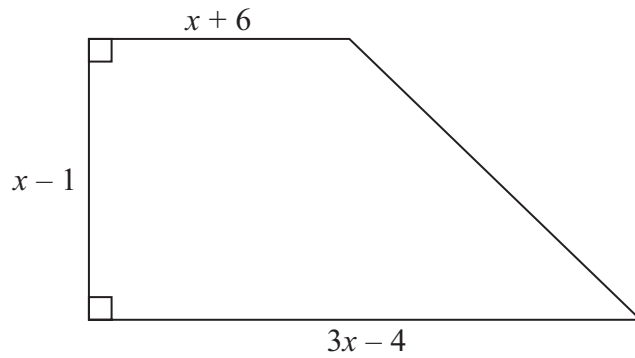


Diagram **NOT**
accurately drawn

All measurements on the diagram are in centimetres.

The area of the trapezium is 119 cm^2

(i) Show that $2x^2 - x - 120 = 0$

(ii) Find the value of x .
Show your working clearly.

$x = \dots\dots\dots$



A rectangular lawn has a length of $3x$ metres and a width of $2x$ metres.
The lawn has a path of width 1 metre on three of its sides.

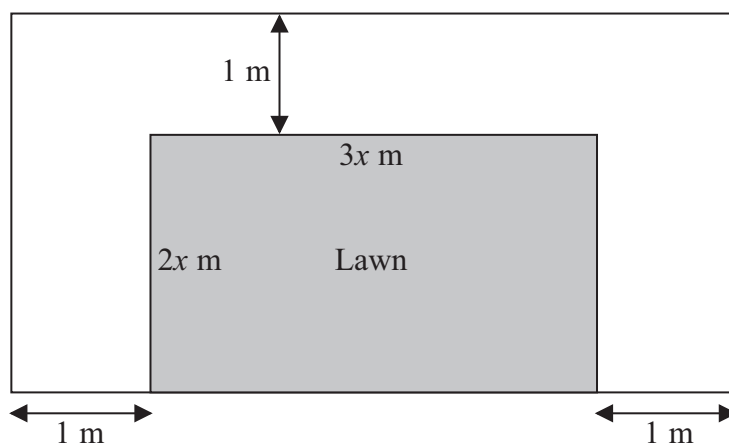


Diagram **NOT**
accurately drawn

The total area of the lawn and the path is 100 m^2

(a) Show that $6x^2 + 7x - 98 = 0$

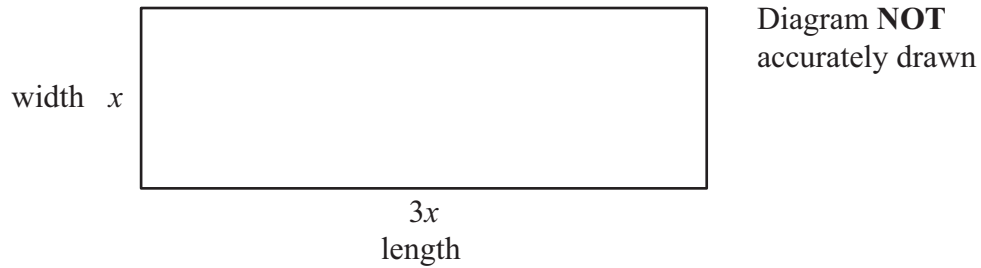
(2)

(b) Calculate the area of the lawn.
Show clear algebraic working.

..... m^2
(5)



The diagram shows a rectangular playground of width x metres and length $3x$ metres.



The playground is extended, by adding 10 metres to its width and 20 metres to its length, to form a larger rectangular playground.

The area of the larger rectangular playground is double the area of the original playground.

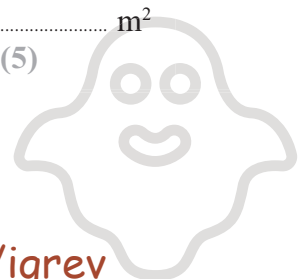
(a) Show that $3x^2 - 50x - 200 = 0$

(3)

(b) Calculate the area of the original playground.

(5)

m^2



The diagram shows a circular pond, of radius r metres, surrounded by a circular path. The circular path has a constant width of 1.5 metres.

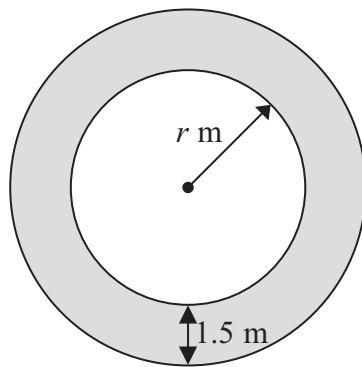


Diagram **NOT** accurately drawn

The area of the path is $\frac{1}{10}$ the area of the pond.

(a) Show that $2r^2 - 60r - 45 = 0$

(3)

(b) Calculate the area of the pond.
Show your working clearly.
Give your answer correct to 3 significant figures.

..... m²
(5)



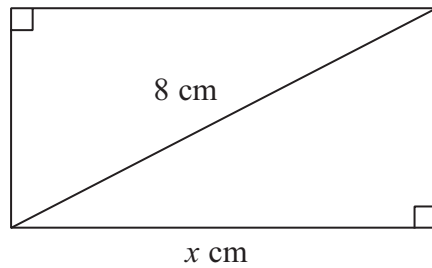


Diagram **NOT**
accurately drawn

The diagram shows a rectangle.
The length of the rectangle is x cm.
The length of a diagonal of the rectangle is 8 cm.
The perimeter of the rectangle is 20 cm.

(a) Show that $x^2 - 10x + 18 = 0$

(4)

(b) Solve $x^2 - 10x + 18 = 0$
Give your solutions correct to 3 significant figures.
Show your working clearly.

(3)



A coin is biased so that the probability that it shows heads on any one throw is p .
The coin is thrown twice.

The probability that the coin shows heads exactly once is $\frac{8}{25}$

Show that $25p^2 - 25p + 4 = 0$



A bag contains x counters.

7 of the counters are blue.

Sam takes at random a counter from the bag and does not replace it.

Jill then takes a counter from the bag.

The probability they both take a blue counter is 0.2

(a) Form an equation involving x .

Show that your equation can be expressed as $x^2 - x - 210 = 0$

(2)

(b) Solve $x^2 - x - 210 = 0$

Show clear algebraic working.

.....
(3)



Clare buys some shares for $\$50x$.

Later, she sells the shares for $\$(600 + 5x)$.

She makes a profit of $x\%$

(a) Show that $x^2 + 90x - 1200 = 0$

(3)

(b) Solve $x^2 + 90x - 1200 = 0$

Find the value of x correct to 3 significant figures.

$x = \dots\dots\dots$

(3)



(a) Show that

$$(a^2 + 1)(c^2 + 1) = (ac - 1)^2 + (a + c)^2$$

(3)

(b) By finding suitable values of a and c , use part (a) to write 650065 as the sum of two square numbers.

$$650065 = \dots\dots\dots + \dots\dots\dots$$

(3)



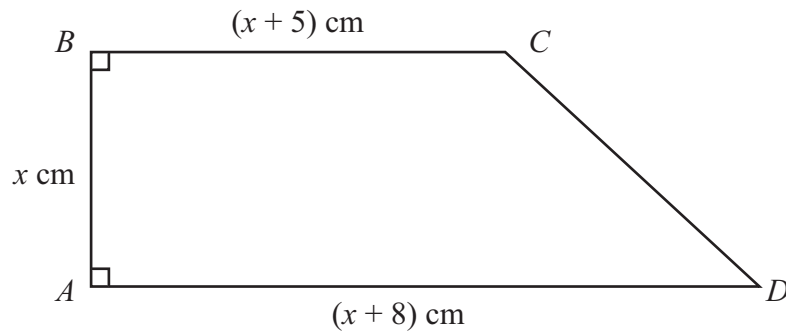


Diagram **NOT**
accurately drawn

The diagram shows a trapezium $ABCD$ with AD parallel to BC .
 $AB = x$ cm, $BC = (x + 5)$ cm and $AD = (x + 8)$ cm.
 The area of the trapezium is 42 cm^2 .

(a) Show that $2x^2 + 13x - 84 = 0$

(2)

(b) Calculate the perimeter of the trapezium.

..... cm

(5)



There are 10 beads in a box.

n of the beads are red.

Meg takes one bead at random from the box and does not replace it.

She takes a second bead at random from the box.

The probability that she takes 2 red beads is $\frac{1}{3}$.

Show that $n^2 - n - 30 = 0$



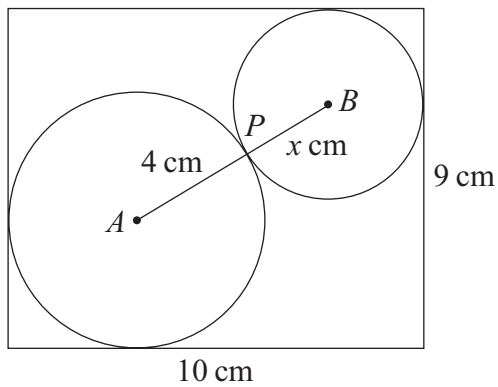


Diagram **NOT**
accurately drawn

The diagram shows one disc with centre A and radius 4 cm and another disc with centre B and radius x cm.

The two discs fit exactly into a rectangular box 10 cm long and 9 cm wide.

The two discs touch at P .

APB is a straight line.

(a) Use Pythagoras' Theorem to show that $x^2 - 30x + 45 = 0$

(4)

(b) Find the value of x .

Give your value correct to 3 significant figures.

$x = \dots\dots\dots$
(3)

