IGCSE · Cambridge (CIE) · Maths

3 hours 33 questions

Calculator Questions

Forming & Solving Equations

Forming Equations from Words / Forming Equations from Shapes / Problem Solving with Equations

Medium (10 questions)	/39
Hard (13 questions)	/82
Very Hard (10 questions)	/59
Total Marks	**/180**

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Medium Questions

1 Rangan buys 3.6kg of potatoes and 2.8kg of leeks.
The total cost is $13.72.
Leeks cost $2.65 per kilogram.

Find the cost of 1 kg of potatoes.

$ .....

(3 marks)

2 (a) Ahmed sells different types of cake in his shop.
The cost of each cake depends on its type and its size.

Every small cake costs $\$x$ and every large cake costs $\$(2x + 1)$The total cost of 3 small lemon cakes and 2 large lemon cakes is $12.36.

Find the cost of a small lemon cake.

$ .....

(3 marks)

(b) The cost of 18 small chocolate cakes is the same as the cost of 7 large chocolate cakes.

Find the cost of a small chocolate cake.

$ ..... [3]

(3 marks)

3 The angles of a quadrilateral are $x°$, $(x+5)°$, $(2x-25)°$ and $(x+10)°$.

Find the value of x.

x = ...

(3 marks)

4 Oranges cost 21 cents each.
Alex buys x oranges and Bobbie buys $(x+2)$ oranges.
The total cost of these oranges is $4.20.
Find the value of x.

x = ...

(3 marks)

5 (a) Esme buys x magazines at $2.45 each and y cards at $3.15 each.

Write down an expression, in terms of x and y, for the total cost, in dollars, of the magazines and the cards.

$ .....

(2 marks)

(b) Esme spends \$60.55 in total.
She buys 8 magazines.

How many cards does she buy?

(2 marks)

6 i) Factorise $y^2 + 5y - 84$.

[2]

ii)

NOT TO SCALE

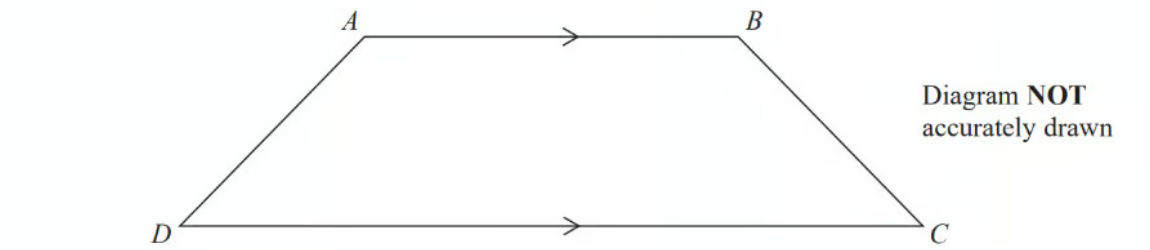
The area of the rectangle is 84 cm^2.

Find the perimeter.

..... cm [3]

(5 marks)

7 The diagram shows a trapezium.

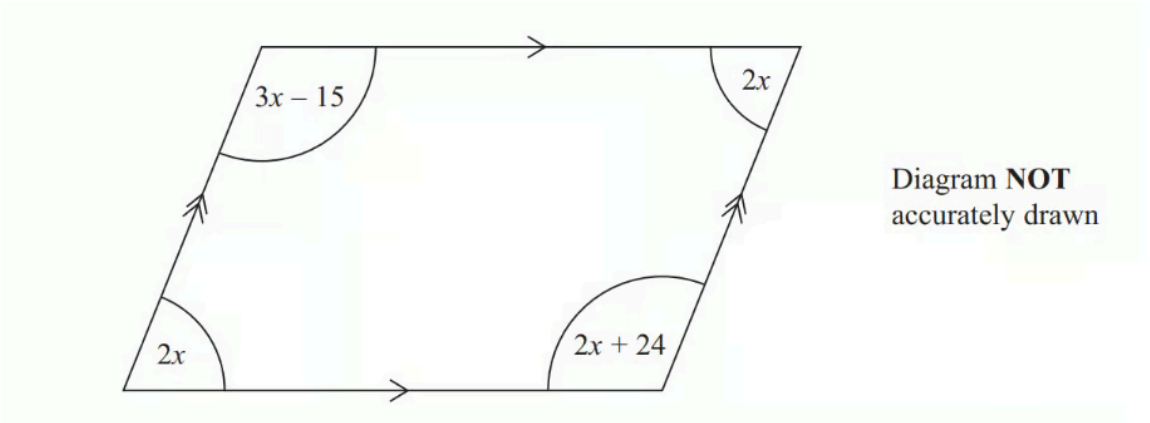


AD = x cm.
BC is the same length as AD.
AB is twice the length of AD.
DC is 4 cm longer than AB.

The perimeter of the trapezium is 38 cm.
Work out the length of AD.

(4 marks)

8



The diagram shows a parallelogram.
The sizes of the angles, in degrees, are

$2x$

$3x - 15$

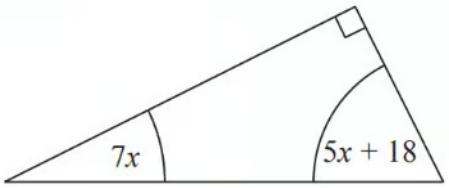
$2x$

$2x + 24$

Work out the value of x.

(3 marks)

9 The diagram shows a right-angled triangle.



All the angles are in degrees.
Work out the size of the smallest angle of the triangle.

(3 marks)

10 Redlands School sent x students to a revision day.

St Samuel's School sent twice as many students as Redlands School.
Francis Long School sent 7 fewer students than Redlands School.

Each student paid £ 15 for the revision day.
The students paid a total of £1155

Work out how many students were sent by each school to the revision day.
You must show all your working.

(5 marks)

Hard Questions

1

NOT TO SCALE

The perimeter of the rectangle is 80 cm.
The area of the rectangle is A cm^2.

i) Show that $x^2 - 40x + A = 0$.

[3]

ii) When $A = 300$, solve the equation $x^2 - 40x + A = 0$ by factorising.

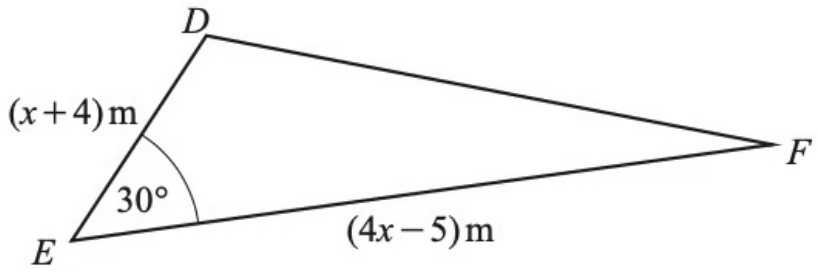
x = ... or x = ... [3]

iii) When $A = 200$, solve the equation $x^2 - 40x + A = 0$ using the quadratic formula.
Show all your working and give your answers correct to 2 decimal places.

x = ... or x = ... [4]

(10 marks)

2



NOT TO SCALE

The area of triangle *DEF* is 70 m^2.

i) Show that $4x^2 + 11x - 300 = 0$.

[4]

ii) Use the quadratic formula to solve $4x^2 + 11x - 300 = 0$.
Show all your working and give your answers correct to 2 decimal places.

x = ... or x = ... [4]

iii) Find the length of *DE*.

DE = ... m [1]

(9 marks)

3 A cone with height 14.8 cm has volume 275 cm^3.
Calculate the radius of the cone.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

..... cm

(3 marks)

4 (a) Paulo and Jim each buy sacks of rice but from different shops. Paulo pays \$72 for sacks costing \$$m$ each.
Jim pays \$72 for sacks costing \$$(m + 0.9)$ each.

i) Find an expression, in terms of m, for the number of sacks Paulo buys.

[1]

ii) Find an expression, in terms of m, for the number of sacks Jim buys.

[1]

(2 marks)

(b) Paulo buys 4 more sacks than Jim.
Write down an equation, in terms of m, and show that it simplifies to $10m^2 + 9m - 162 = 0$.

(4 marks)

(c) i) Solve $10m^2 + 9m - 162 = 0$.

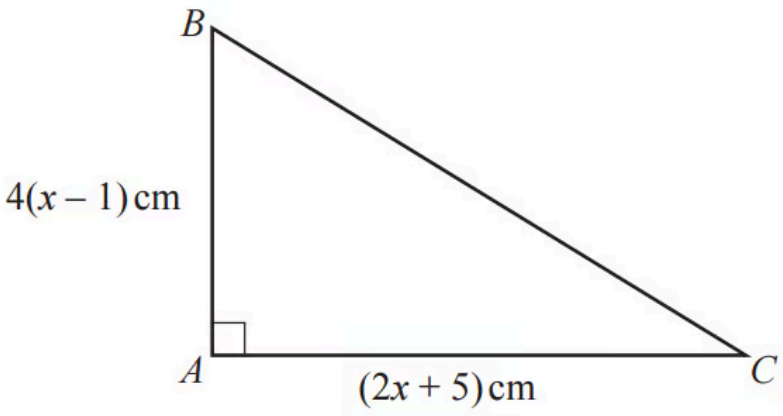
m = ... or m = ... [3]

ii) Find the number of sacks of rice that Paulo buys.

[1]

(4 marks)

5 (a) The diagram shows a right-angled triangle *ABC*.



NOT TO SCALE

The area of this triangle is 30 cm^2.
Show that $2x^2 + 3x - 20 = 0$.

(3 marks)

(b) Use factorisation to solve the equation $2x^2 + 3x - 20 = 0$.

x = ... or x = ...

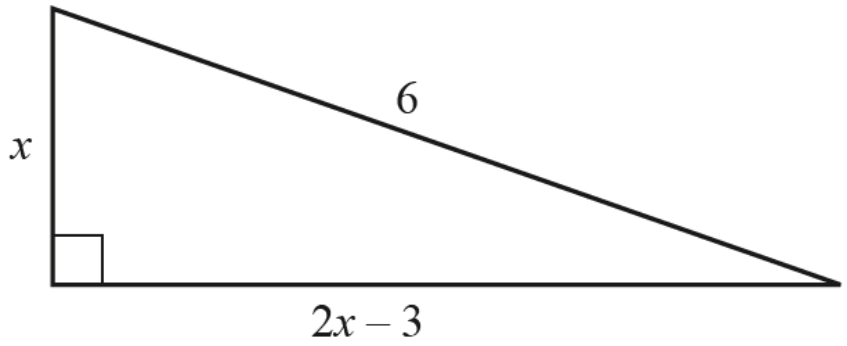
(3 marks)

(c) Calculate *BC*.

BC = ... cm

(3 marks)

6 (a) In this question, all measurements are in metres.



NOT TO SCALE

The diagram shows a right-angled triangle.

Show that $5x^2 - 12x - 27 = 0$.

(3 marks)

(b) Solve $5x^2 - 12x - 27 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ .....

(4 marks)

(c) Calculate the perimeter of the triangle.

..... m

(2 marks)

(d) Calculate the smallest angle of the triangle.

(2 marks)

7 At a football match, the price of an adult ticket is $\$x$ and the price of a child ticket is $\$(x - 2.50)$.
There are 18 500 adults and 2400 children attending the football match.
The total amount paid for the tickets is $320 040.
Find the price of an adult ticket.

$ .....

(4 marks)

8 Solve.

$$\frac{3y}{2y-1} = \frac{3}{4}$$

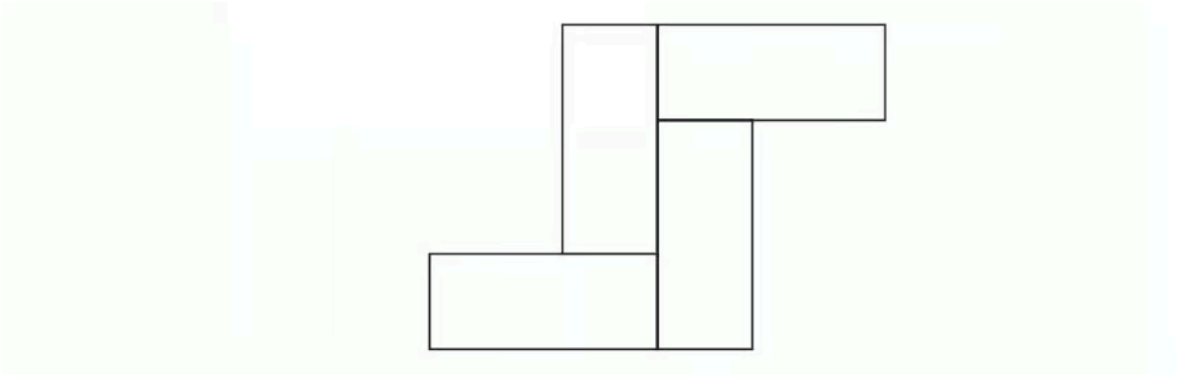
y = ...

(3 marks)

9 Here is a rectangle.

The length of the rectangle is 7 cm longer than the width of the rectangle.

4 of these rectangles are used to make this 8-sided shape.

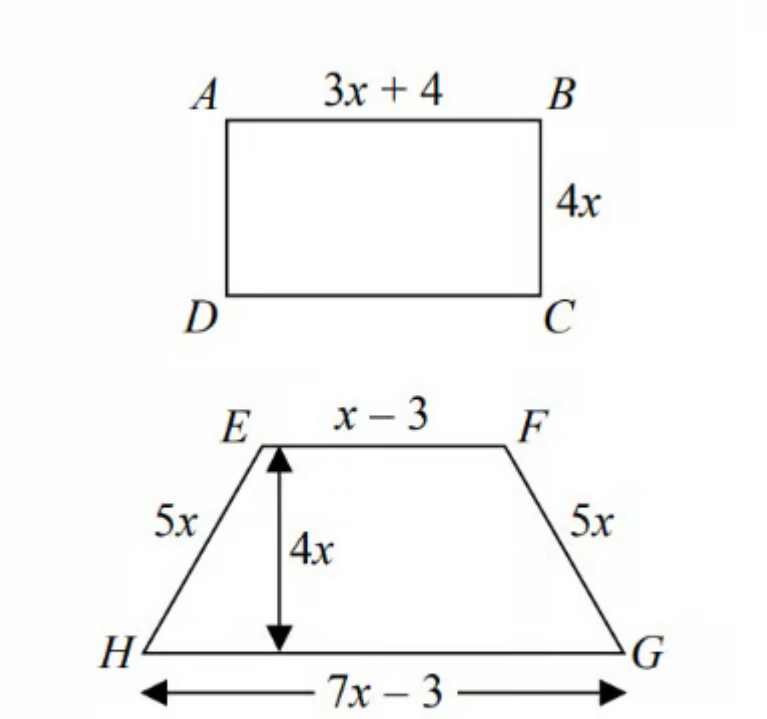


The perimeter of the 8-sided shape is 70 cm.
Work out the area of the 8-sided shape.

(5 marks)

10 $ABCD$ is a rectangle.

$EFGH$ is a trapezium.



All measurements are in centimetres.
The perimeters of these two shapes are the same.

Work out the area of the rectangle.

(5 marks)

11 3 teas and 2 coffees have a total cost of £7.80 5 teas and 4 coffees have a total cost of £14.20

Work out the cost of one tea and the cost of one coffee.

(4 marks)

12 A cinema sells adult tickets and child tickets.

The total cost of 3 adult tickets and 1 child ticket is £30
The total cost of 1 adult ticket and 3 child tickets is £22

Work out the cost of an adult ticket and the cost of a child ticket.

(4 marks)

13 (a) The diagram shows a trapezium.

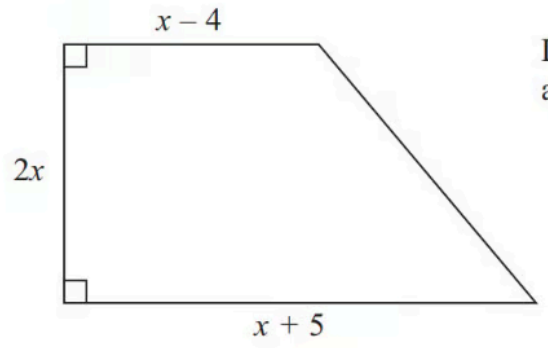


Diagram **NOT** accurately drawn

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2.

Show that $2x^2 + x - 351 = 0$

(2 marks)

(b) Work out the value of x.

(3 marks)

Very Hard Questions

1 Alan invests \$200 at a rate of $r\%$ per year compound interest. After 2 years the value of his investment is \$206.46.

i) Show that $r^2 + 200r - 323 = 0$.

[3]

ii) Solve the equation $r^2 + 200r - 323 = 0$ to find the rate of interest.
Show all your working and give your answer correct to 2 decimal places.

$r =$ ..... [3]

(6 marks)

2 Ahmed sells different types of cake in his shop.
The cost of each cake depends on its type and its size.

Every small cake costs $\$x$ and every large cake costs $\$(2x + 1)$.

Petra spends \$20 on small coffee cakes and \$10 on large coffee cakes.
The total number of cakes is 45.

Write an equation in terms of x.
Solve this equation to find the cost of a small coffee cake.
Show all your working.

$ .....

(7 marks)

3 The total perimeter of a semicircle is 19.02 cm.
Calculate the radius of the semicircle.

..... cm

(3 marks)

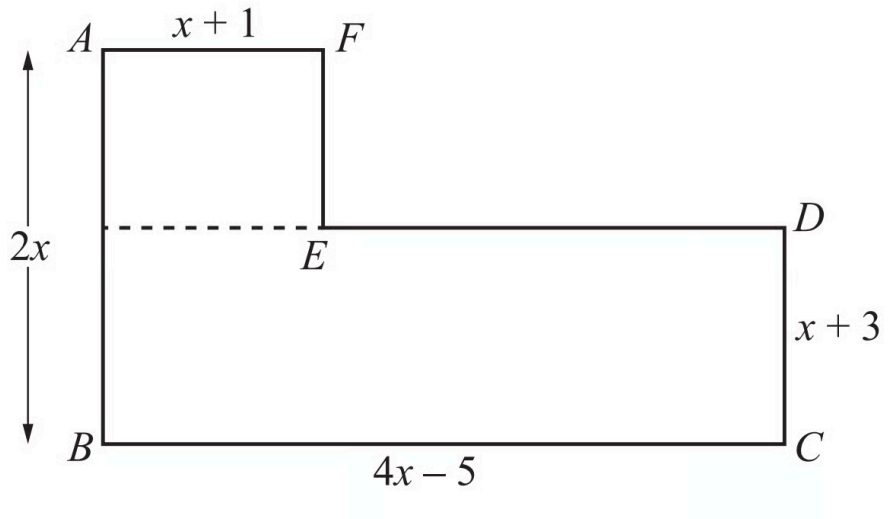
4 Paddy and Anna each invest $2000 for 5 years.
Paddy earns simple interest at a rate of 1.25% per year.
Anna earns compound interest at a rate of r% per year.
At the end of 5 years, Paddy's investment is worth the same as Anna's investment.

Calculate the value of r.

$r =$ .....

(5 marks)

5 (a) All the lengths in this question are in centimetres.



The diagram shows a shape *ABCDEF* made from two rectangles. The total area of the shape is 342 cm^2.

Show that $x^2 + x - 72 = 0$.

(5 marks)

(b) Solve $x^2 + x - 72 = 0$ by factorisation.

$x =$ ..... or $x =$ .....

(3 marks)

(c) Work out the perimeter of the shape *ABCDEF*.

..... cm

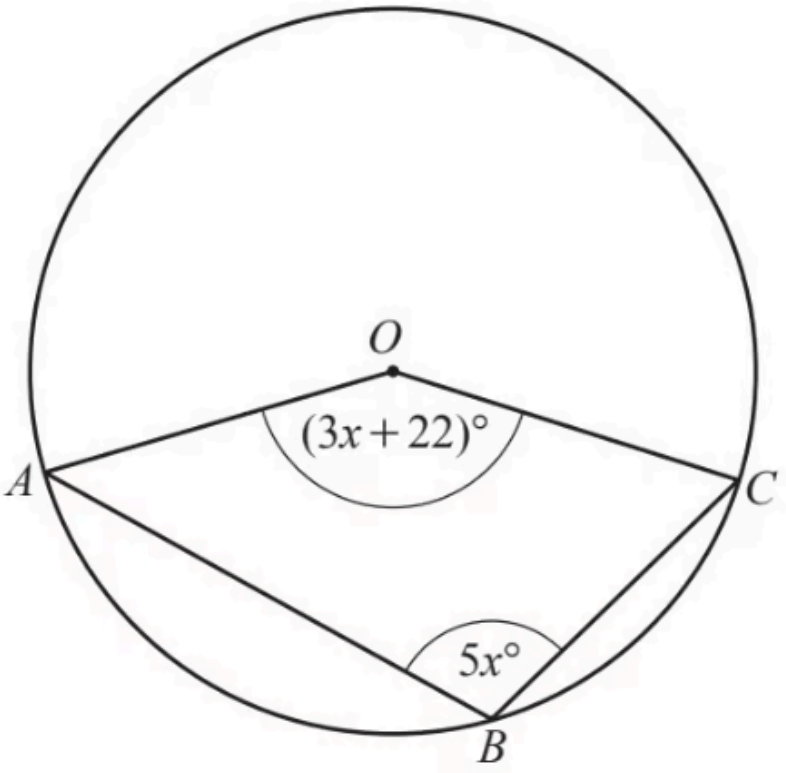
(2 marks)

(d) Calculate angle *DBC*.

Angle *DBC* = ...

(2 marks)

6



NOT TO SCALE

A, *B* and *C* lie on the circle, centre *O*.
Angle *AOC* = $(3x + 22)°$ and angle *ABC* = $5x°$.

Find the value of x.

x = ...

(4 marks)

7 In a shop, the price of a monthly magazine is $\$m$ and the price of a weekly magazine is $\$(m - 0.75)$.
One day, the shop receives

- \$168 from selling monthly magazines
- \$207 from selling weekly magazines.

The total number of these magazines sold during this day is 100.

i) Show that $50m^2 - 225m + 63 = 0$.

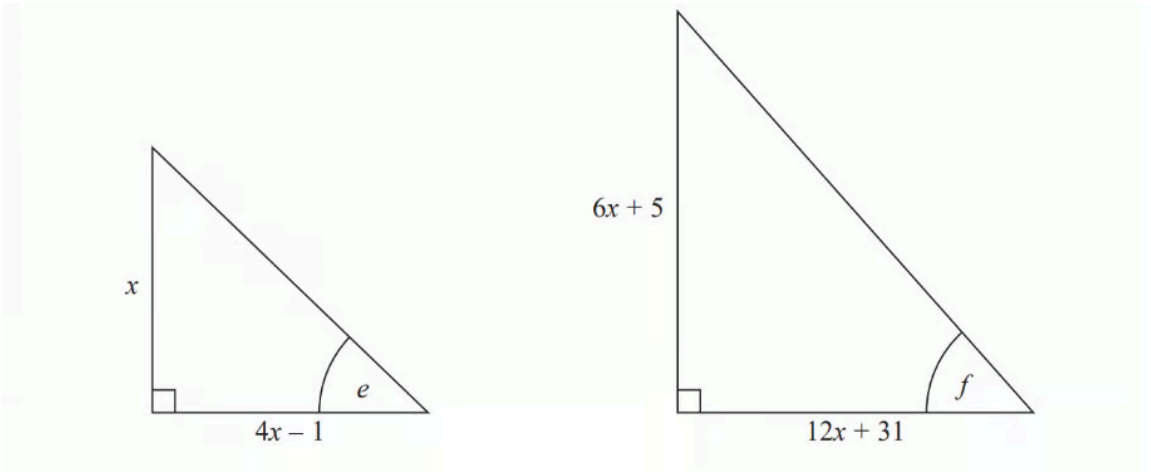
[3]

ii) Find the price of a monthly magazine. Show all your working.

$ ..... [3]

(6 marks)

8 Here are two right-angled triangles.



Given that

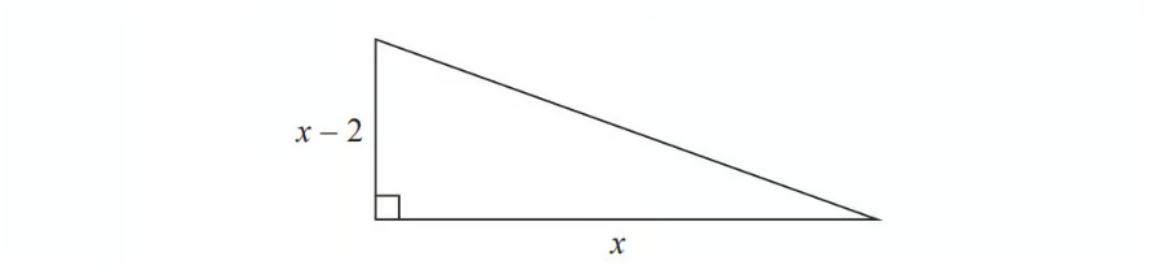
$$\tan e = \tan f$$

find the value of x.

You must show all your working.

(5 marks)

9 Here is a right-angled triangle.



All measurements are in centimetres.
The area of the triangle is 2.5 cm^2 .

Find the perimeter of the triangle.
Give your answer correct to 3 significant figures.
You must show all of your working.

(6 marks)

10 There are only r red counters and g green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{3}{7}$.

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag.
A counter is taken at random from the bag.

The probability that the counter is green is $\frac{6}{13}$

Find the number of red counters and the number of green counters that were in the bag originally.

(5 marks)