Mathematics test

Paper 2
Calculator allowed

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below.

First name _____

Last name _____

School _____

Remember

- The test is 1 hour long.
- You may use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, a pair of compasses and a scientific or graphic calculator.
- Some formulae you might need are on page 2.
- This test starts with easier questions.
- Try to answer all the questions.
- Write all your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marker's use only	Total marks	
	Borderline check	

Instructions

Answers

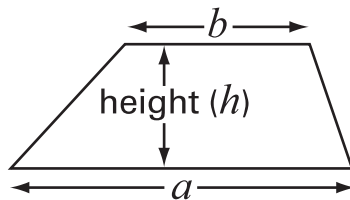This means write down your answer or show your working and write down your answer.

Calculators

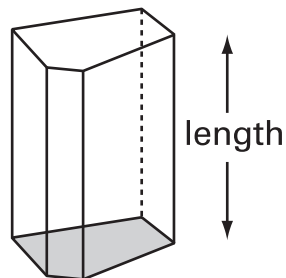You **may** use a calculator to answer any question in this test.

Formulae
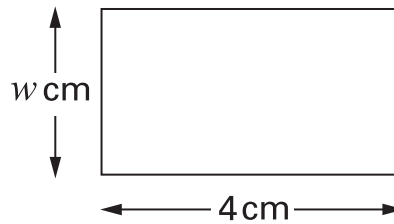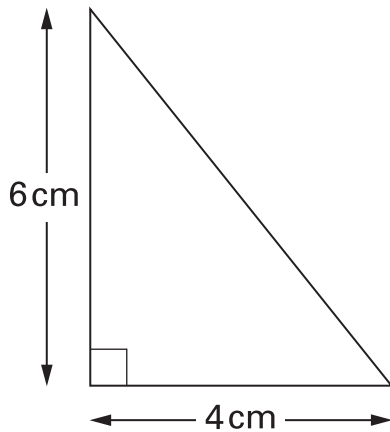## You might need to use these formulae

Trapezium

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

Prism

Volume = area of cross-section × length

1. The triangle and the rectangle below have the **same area**.

Not drawn
accurately

6 cm

4 cm

w cm

4 cm

Work out the value of w

Show your working.

$w = $ .... cm

2 marks

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2. In 2001 the average yearly wage was **£21842**

On average, people spent **£1644** on their family holiday.

What percentage of the average yearly wage is that?
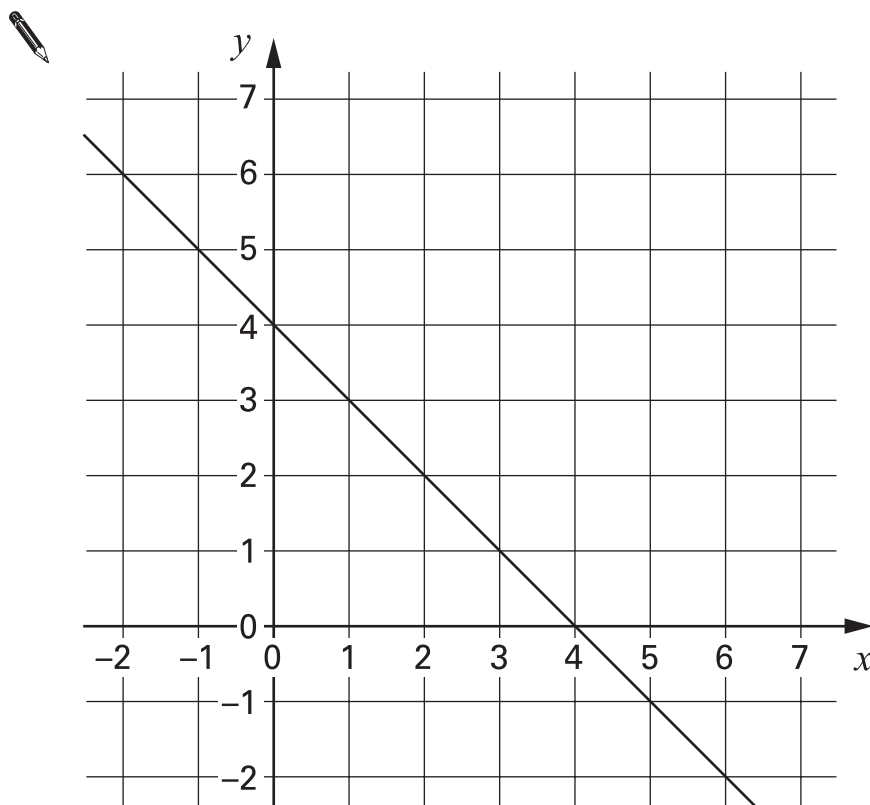
Show your working.

.... %

2 marks

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3. The graph shows a straight line.

(a) Fill in the table for some of the points on the line.

(x, y)	(,)	(,)	(,)
$x + y$			

1 mark

(b) Write an equation of the straight line.

....

1 mark

(c) On the graph, draw the straight line that has the equation $x + y = 6$

1 mark

4.

There are **20 questions** in a quiz.

A **correct** answer scores **2 points**. An **incorrect** answer **loses 1 point**.

A question not answered scores 0 points. A negative total is possible.

(a) What are the maximum and minimum points you could get on the quiz?

maximum ………… minimum …………

1 mark

(b) A pupil answers **10** of the 20 questions.

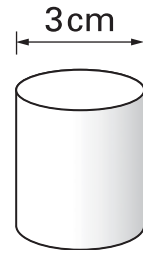**8 are correct**.

How many points does he score?

…………

1 mark

(c) Complete the table to show 3 different ways to score **24 points**.

Number of answers that are correct	Number of answers that are incorrect	Number of questions that are not answered
12	0	8

2 marks

5. (a) The cross-section of a cylindrical cotton reel is a circle.

The **diameter** of this circle is **3cm**.
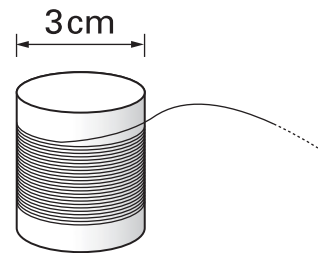
3cm

What is the **circumference** of this circle?

🖉

.... cm

1 mark

(b) **91 metres** of cotton goes round the cotton reel.

3cm

About how many times does the cotton
go round the reel?

Show your working, and give your answer
to the **nearest ten**.

🖉

....

2 marks

6

6.   Doctors sometimes use this formula to calculate how much medicine to give a child.

$$c = \frac{ay}{12 + y}$$

c is the correct amount for a child, in ml

a is the amount for an adult, in ml

y is the age of the child, in years

(a) A child who is **4 years old** needs some medicine.

The amount for an adult is **20 ml**.

Use the formula to work out the correct amount for this child.

You **must** show your working.

. . . .

2 marks

(b) Another child needs some medicine.

The amount for an adult is **30 ml**.

The correct amount for this child is **15 ml**.

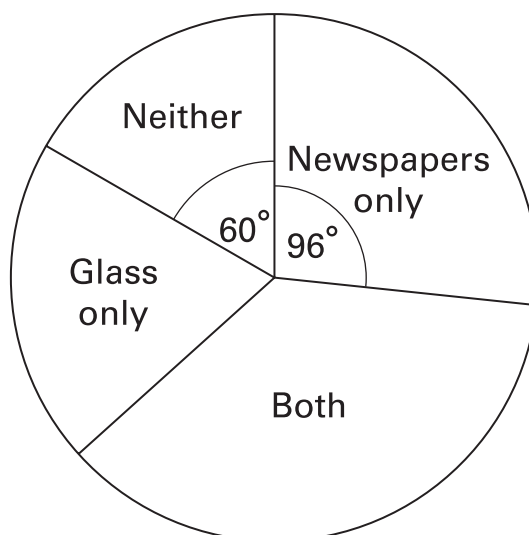How old is this child? Show your working.

. . . .

2 marks

7. (a) A teacher asked her pupils if they recycled newspapers and glass.

The pie chart shows the results.

5 pupils answered 'Neither'.

How many pupils answered 'Newspapers only'?

Show your working.

.... pupils

2 marks

8

(b) The teacher asked a **different class** if they recycled newspapers and glass.

There were **24 pupils** in the class.

9 pupils answered 'Newspapers only'.

On a pie chart, what would the angle be for the sector 'Newspapers only'?

Show your working.

. . . . °

2 marks

8. The heights of Russian dolls are in the ratio **4 : 6 : 7**

(a) In a set of dolls, the height of the **middle** doll is **9cm**.

What are the heights of the other dolls?

9
………… cm   ………… cm   ………… cm
smallest   middle   tallest

1 mark

(b) In another set of dolls, the height of the **tallest** doll is **9cm**.

What are the heights of the other dolls?

Show your working, and give your answers to **1 decimal place**.

9
………… cm   ………… cm   ………… cm
smallest   middle   tallest

2 marks

9. Altogether, I have **10** bags of sweets.

The **mean** number of sweets in the bags is **41**

The table shows how many sweets there are in **9** of the bags.

Number of sweets in a bag	Frequency
39	3
40	2
41	1
42	1
43	0
44	2

Calculate how many sweets there are in the 10th bag.

You **must** show your working.

. . . .

2 marks

10. The diagram shows the net for a right-pyramid with a regular pentagon as its base.

The net is constructed using five straight lines.
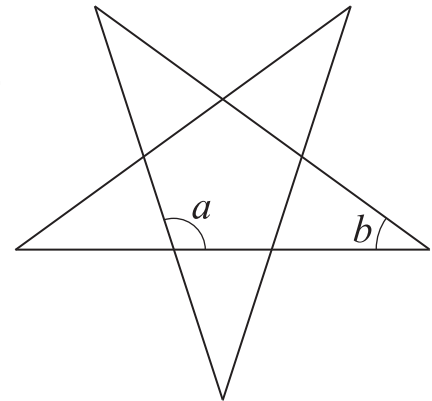
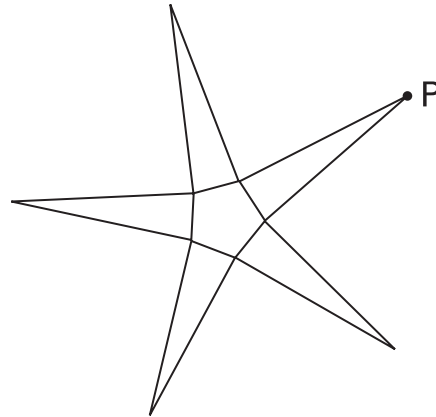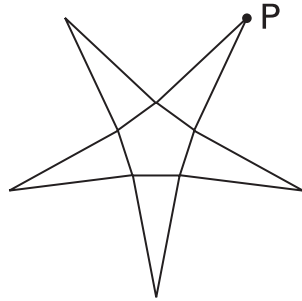(a) Without measuring, explain why angle a must be 108°

🖉

(b) Calculate the size of angle b.
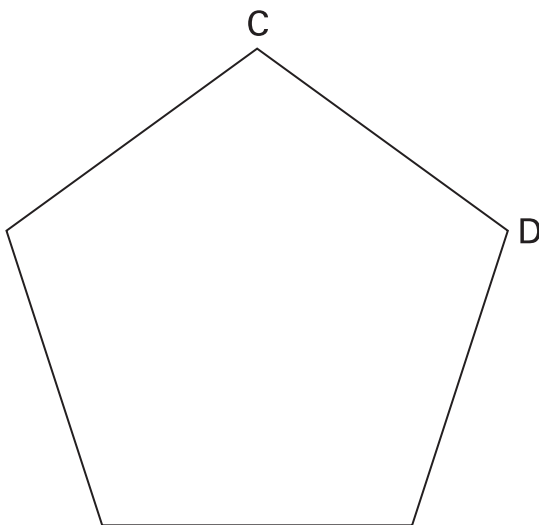
You **must** show your working.

🖉

. . . . °

(c) On these nets, the point marked P lies on the perpendicular bisector of a side of the pentagon.

On side CD of the regular pentagon below, use compasses and a straight edge to **construct** the **perpendicular bisector**.

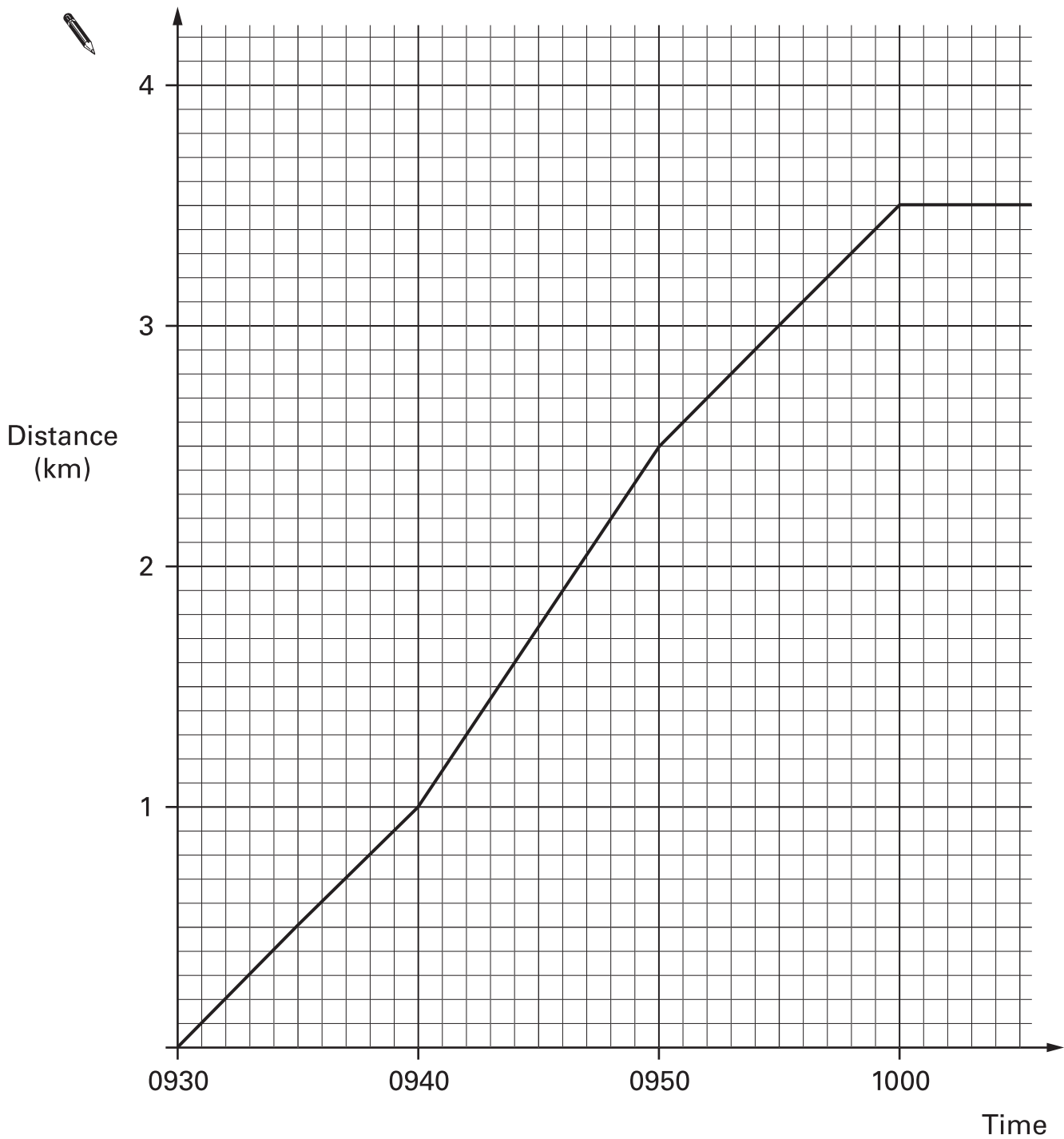You **must** leave in your construction lines.

. . . .
. . . .
2 marks

11.   Kali uses a running machine to keep fit.

The simplified distance-time graph shows
how she used the machine during one run.

Use the graph to answer these questions.

(a) Between 0930 and 0940, what was her speed in **kilometres per hour**?

✎

.... km/h

. . . .
1 mark

(b) Throughout the run, for how many **minutes** did she travel at this speed?

✎

.... minutes

. . . .
1 mark

(c) At 0940, she increased her speed.

By how many kilometres per hour did she increase her speed?

✎

.... km/h

. . . .
1 mark

(d) On another day, Kali started running at **0935**

She ran for **24 minutes** at a constant speed of **10 kilometres per hour**.

Show this information on the graph opposite.

Show any working in the space below.

✎

. . . .

. . . .
2 marks

12. Some numbers are **smaller** than their squares.

For example: $7 < 7^2$

(a) Which numbers are **equal to** their squares?

🖉

. . . .

. . . .

2 marks

(b) Some numbers are **bigger** than their squares.
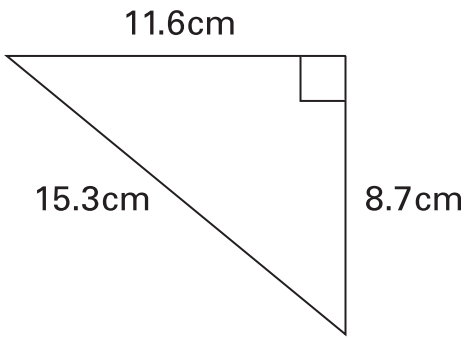
Describe this set of numbers.
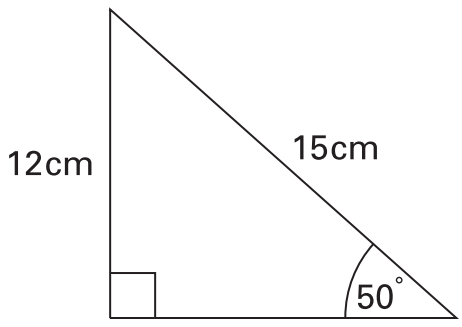
🖉

. . . .

. . . .

2 marks

13. **Is it possible** to have triangles with the angles and lengths shown below?

For each triangle, show calculations then tick (✓) Yes or No.

11.6cm

15.3cm   8.7cm

Calculations:

Decision: ☐ Yes   ☐ No

2 marks

12cm   15cm

50°

Calculations:

Decision: ☐ Yes   ☐ No

2 marks

14.   Look at these expressions.

$$5y - 8$$

first
expression

$$3y + 5$$

second
expression

(a) What value of y makes the two expressions equal?

Show your working.

🖉

$y = $ ....

. . . .
. . . .
2 marks

(b) What value of y makes the first expression **twice** as great as
the second expression?

Show your working.

🖉

$y = $ ....

. . . .
. . . .
2 marks

15.   Each pattern below shows a square grid that is 2 squares high.

Only one square at each end of the top row is shaded.

All squares in the bottom row are shaded.
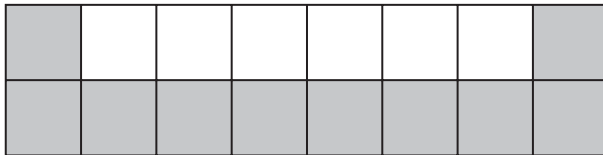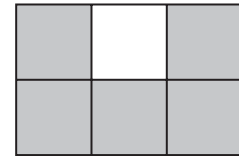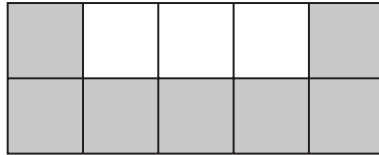
Imagine one of these patterns that has n squares in the bottom row.

Write an expression for the **fraction** of the pattern that is shaded.

. . . .

. . . .

2 marks

16. People were asked if they were considering
changing what they eat.

29% of the people asked said yes.

Of these, 23% said they were considering becoming vegetarian.

What **percentage** of the **people asked** said they were considering
becoming vegetarian?

.... %

1 mark

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17. Solve this equation.

Show your working.
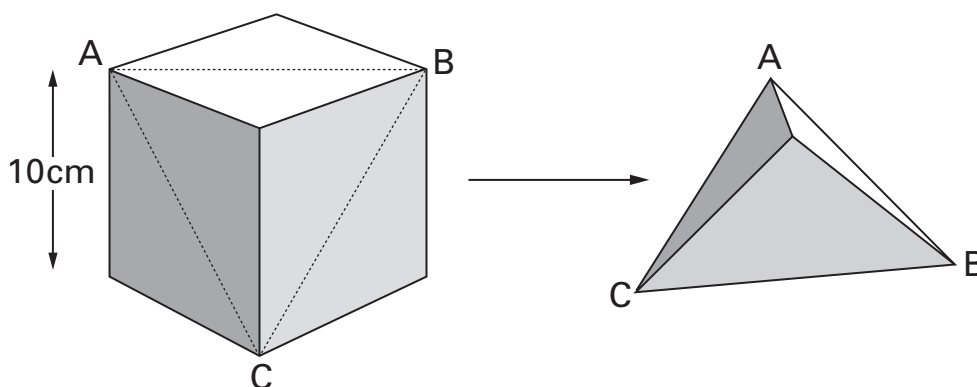
$$\frac{5(2y-3)}{3y} = 3$$

$y = $ ....

2 marks

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18. The side length of a cube is 10 cm.

The cube is cut along a plane through three of the vertices to make a pyramid.

Not drawn accurately

Calculate the **perimeter** of the base, ABC, of the pyramid.
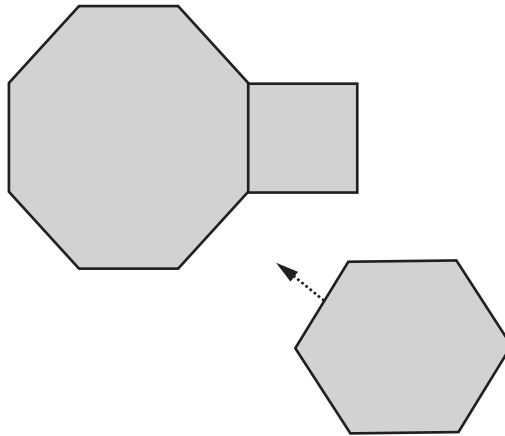
Show your working.

. . . . cm

21

19. A pupil has three tiles.

One is a regular octagon, one is a regular hexagon, and one is a square.

The side length of each tile is the same.

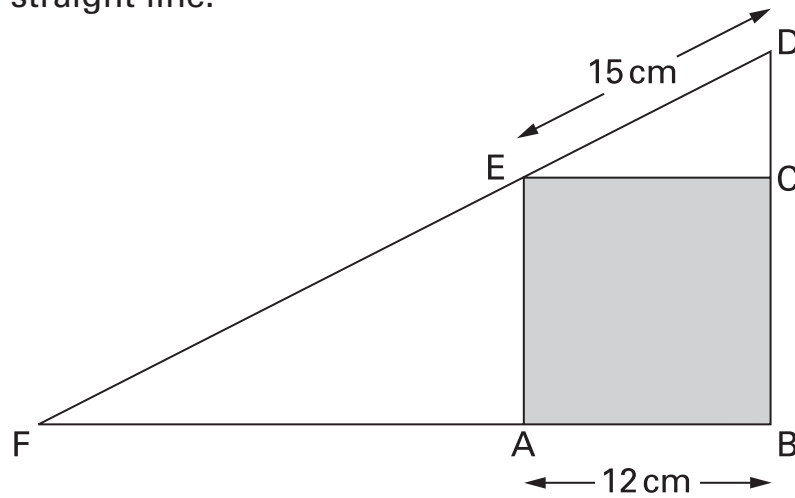The pupil says the hexagon will fit exactly like this.

Not drawn accurately

Show calculations to prove that the pupil is **wrong**.

. . . .

. . . .

. . . .
3 marks

20.   The diagram shows a square inside a triangle.

DEF is a straight line.

Not drawn
accurately

The side length of square ABCE is 12 cm.

The length of DE is 15 cm.

Show that the length of **EF** is **20 cm**.

. . . .

. . . .

. . . .
3 marks

END OF TEST