



THIRD SPACE  
LEARNING

# Mathematics

## Paper 3

### (Calculator)

### Higher Tier

AQA GCSE

SET 2

# Mathematics Paper 3 (Calculator) Higher Tier AQA GCSE

## SET 2

Name

Total marks



Paper length: 1hr 30mins

## Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided
  - there may be more space than you need.
- You must show all your working.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- Calculators may be used.

## Information

- The total mark for this paper is 80
- The marks for each question are shown in brackets
  - use this as a guide as to how much time to spend on each question.

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

*Please note, this practice paper is an example to help revision, these topics can be tested in other ways and other topics may be included in the actual papers*

- 1 Circle the relative frequency that represents 8 out of 25 successful trials.

[1 mark]

0.8      0.08      0.25      0.32

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- 2 A number,  $n$ , is rounded to 1 decimal place.  
The result is 8.7.

Circle the error interval for  $n$ .

[1 mark]

$$8.65 \leq n \leq 8.75$$

$$8.65 \leq n < 8.74$$

$$8.65 < n < 8.74$$

$$8.65 \leq n < 8.75$$

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- 3 Write 240 as a percentage of 160.  
Circle your answer.

[1 mark]

50%      67%      150%      320%

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4 Convert  $48m^2$  to  $cm^2$ .

Circle your answer.

[1 mark]

4800

480000

0.48

0.0048

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5(a) Simplify  $p^3 \times p^4$ .

[1 mark]

Answer \_\_\_\_\_

5(b) Simplify  $\frac{12q^7}{3q^2}$ .

[2 marks]

Answer \_\_\_\_\_

- 6** Here is some information about the number of siblings that 32 children have.

Number of siblings	Frequency
0	8
1	13
2	7
3	3
4	1

- 6(a)** Work out the mean number of siblings.

**[3 marks]**

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Answer \_\_\_\_\_

- 6(b)** Explain how you know that your answer is reasonable.

**[1 mark]**

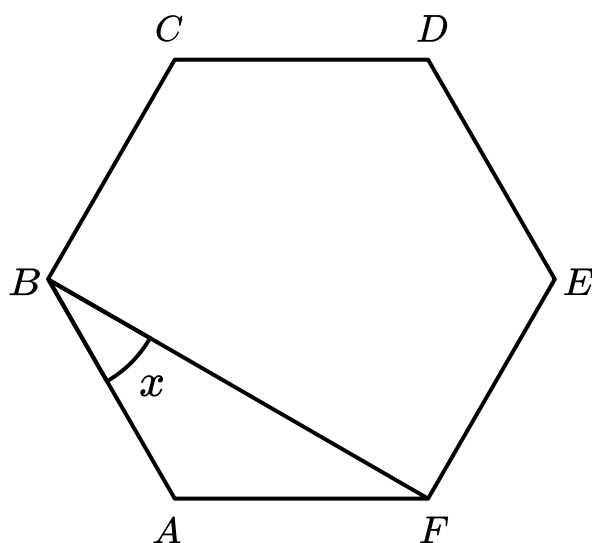
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7 Here is a regular hexagon.



Work out the size of angle  $x$ .

Give reasons for each stage of your working.

[4 marks]

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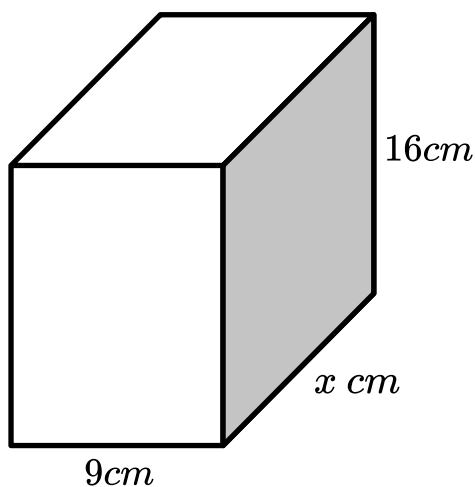
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Answer \_\_\_\_\_°

- 8 A company is designing some new packaging in the shape of a cuboid.

The packaging must have a height of  $16\text{cm}$ , a length of  $9\text{cm}$  and a width of  $x\text{ cm}$ , as shown below.



The company wants the surface area to be less than  $900\text{cm}^2$ .

- 8(a) Show that  $50x + 288 < 900$ .

[4 marks]

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- 8(b) Solve  $50x + 288 < 900$ .

[2 marks]

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Answer \_\_\_\_\_

- 8(c)  $x$  must be an integer. Write down the greatest possible value of  $x$ .

[1 mark]

Answer \_\_\_\_\_

9  $x = 4 \times 10^5$   
 $y = 6 \times 10^3$

Work out  $x + 2y$ .

Give your answer in standard form.

**[2 marks]**

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Answer \_\_\_\_\_

10 Work out

0.5 cubed : reciprocal of 0.5

Give your answer in the form  $1 : n$

**[3 marks]**

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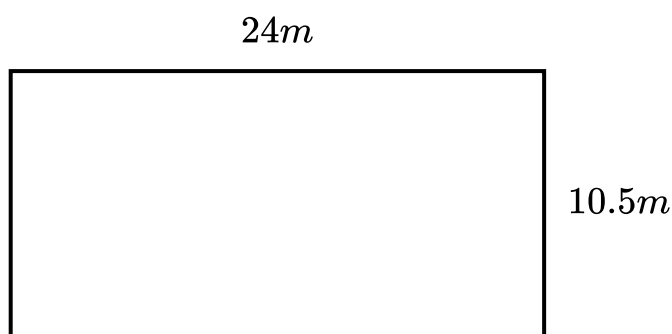
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Answer \_\_\_\_\_ :



11 Here is a plan of Harry's garden.



Harry wants to create a wildflower meadow.

To do this, Harry is going to mix a wildflower seed mix with a grass seed mix in the ratio 2:5.

Harry will then spread the seed mix on his garden.

1kg of his seed mix will cover  $20m^2$ .

Grass seed comes in 5kg bags, which cost £32 each.

Wildflower seed comes in 1kg bags, which cost £21 each.

Work out the total cost of the seed for Harry's garden.

[4 marks]

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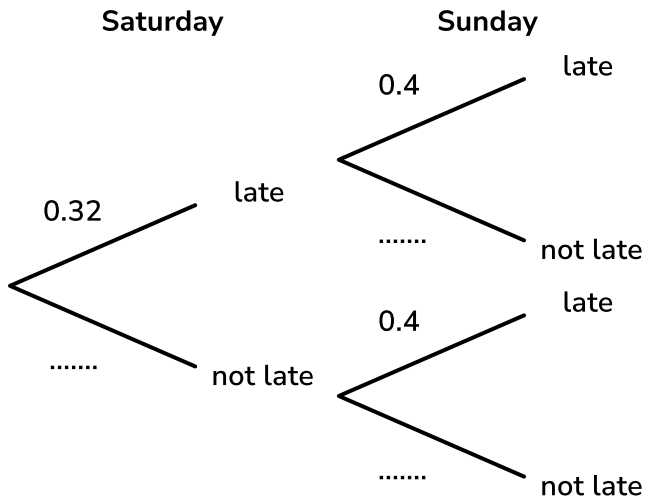
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- 12** The probability tree diagram shows the probability that Richard's bus will be late on the weekend.



- 12(a)** Complete the tree diagram.

**[1 mark]**

- 12(b)** Calculate the probability that Richard's bus will be on time on at least one day.

**[3 marks]**

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Answer \_\_\_\_\_

**Turn over for the next question**



- 15** An object exerts a force of 80N on an area of  $16\text{cm}^2$ .

Brian increases the area of the base of the object, which decreases the pressure caused by the force by 20%.

By what percentage does Brian increase the area?

**[4 marks]**

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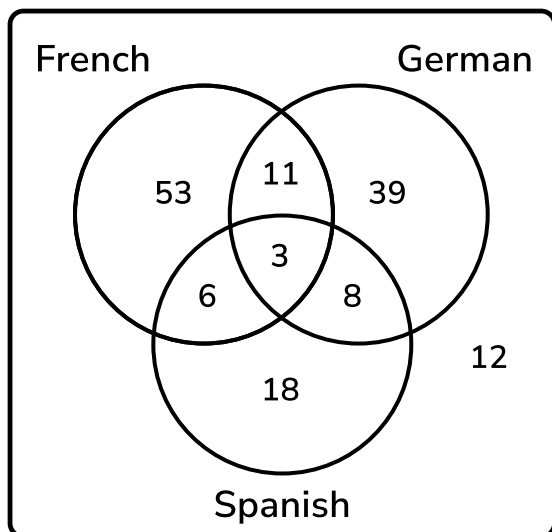
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Answer \_\_\_\_\_

**Turn over for the next question**

- 16 This Venn diagram shows the number of year 11s who study French ( $F$ ), German ( $G$ ) and Spanish ( $S$ ).



One student is chosen at random.

Write down:

- 16(a)  $P(F)$

[1 mark]

Answer \_\_\_\_\_

- 16(b)  $P(G \cup S)$

[1 mark]

Answer \_\_\_\_\_

- 16(c) One of the students is chosen. The student studies German.

Elliot says the probability that the student also studies Spanish is  $\frac{11}{150}$ .

Elliot is not correct. Explain why.

[1 mark]

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- 17** At the start of year  $t$ , the mass of a radioactive substance is  $M_t$ .  
At the start of the following year, the mass of the radioactive substance is  $M_{t+1}$  where

$$M_{t+1} = 0.8M_t$$

- 17(a)** At the start of 2021 the mass of a radioactive substance is 4500g.  
Find the mass of the substance at the start of 2022.

**[1 mark]**

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Answer \_\_\_\_\_

The half life of a radioactive substance is the amount of time taken for the amount of the radioactive substance to halve.

- 17(b)** Nigel says that the half life of this substance is approximately 3 years.  
Is Nigel correct? Explain how you decide.

**[2 marks]**

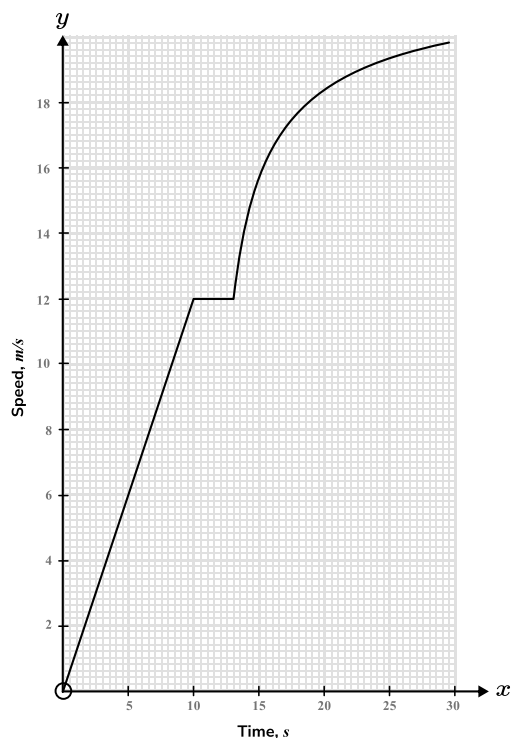
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18 Here is a speed-time graph for a train.



18(a) Describe what is happening between 10 and 13 seconds.

[1 mark]

18(b) Work out the distance travelled by the train in the first 13 seconds of the journey.

[2 marks]

Answer \_\_\_\_\_  $m$

18(c) Work out an estimate for the acceleration of the train at  $t = 20$ .

[2 marks]

Answer \_\_\_\_\_  $m/s^2$

**19** Prove algebraically that  $0.\dot{4}\dot{5} = \frac{5}{11}$

**[3 marks]**

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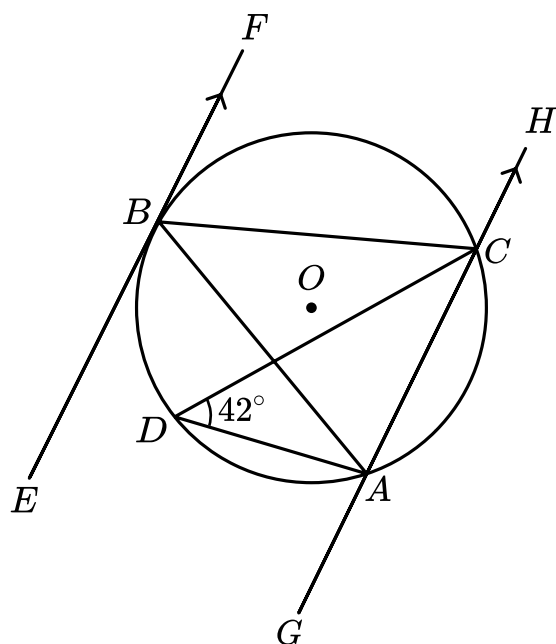
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**Turn over for the next question**



20



O is the centre of the circle.

The line EF is a tangent to the circle at the point B.

The lines EF and GH are parallel.

Angle  $ADC = 42^\circ$ .

Work out the size of angle CBF.

**[3 marks]**

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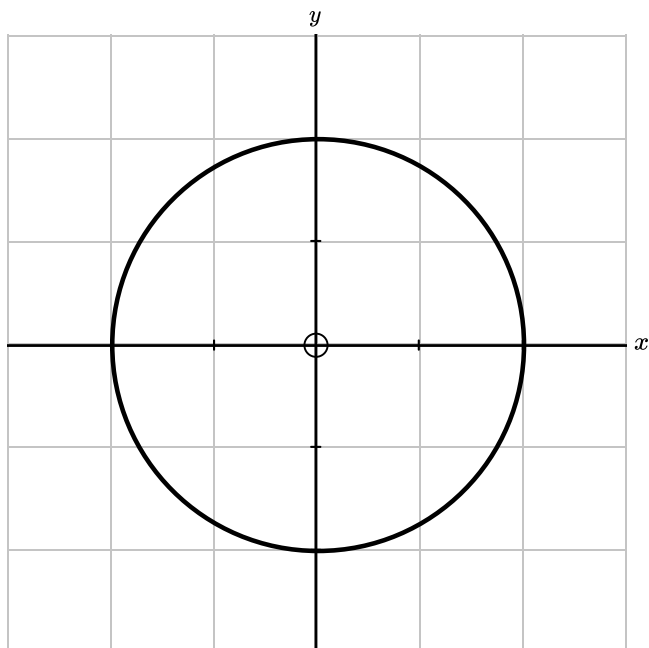
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Answer \_\_\_\_\_ °

21 Here is the graph of a circle.



21(a) The circumference of the circle is  $20\pi$ .

Work out the equation of the circle.

[3 marks]

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Answer \_\_\_\_\_

21(b) Decide whether the point  $(7, 8)$  lies inside the circle, outside the circle or on the circle.

You must show how you decide.

☐

Inside the  
circle

☐

Outside the  
circle

☐

On the  
circle

[3 marks]

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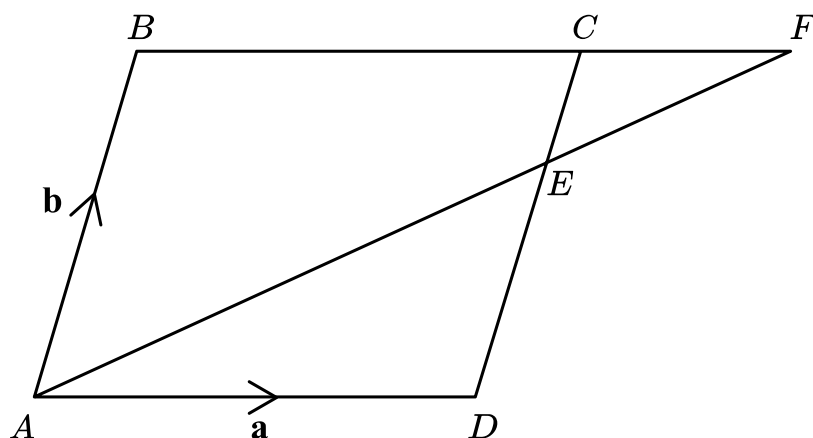
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**22** ABCD is a parallelogram.



$$\overrightarrow{AD} = \mathbf{a}$$

$$\overrightarrow{AB} = \mathbf{b}$$

E is the point such that  $DE:EC = 2:1$

BCF is a straight line such that  $BF = \frac{3}{2}BC$ .

**22(a)** Work out the vector  $\overrightarrow{BD}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

**[1 mark]**

Answer \_\_\_\_\_

**22(b)** Prove that AEF is a straight line.

**[4 marks]**

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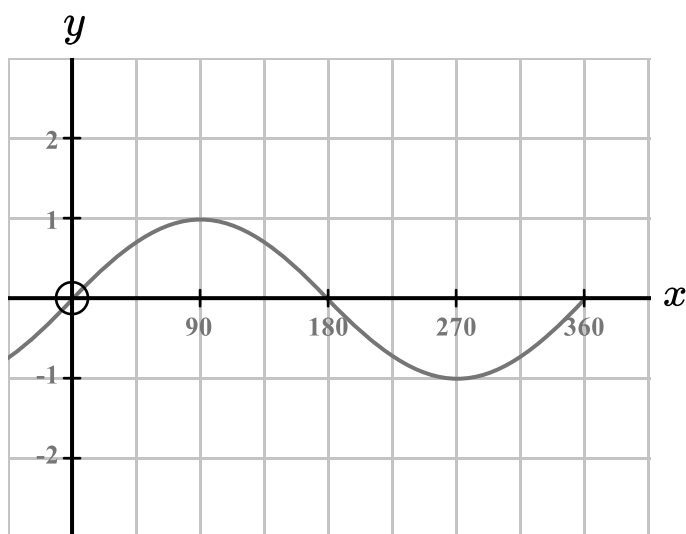


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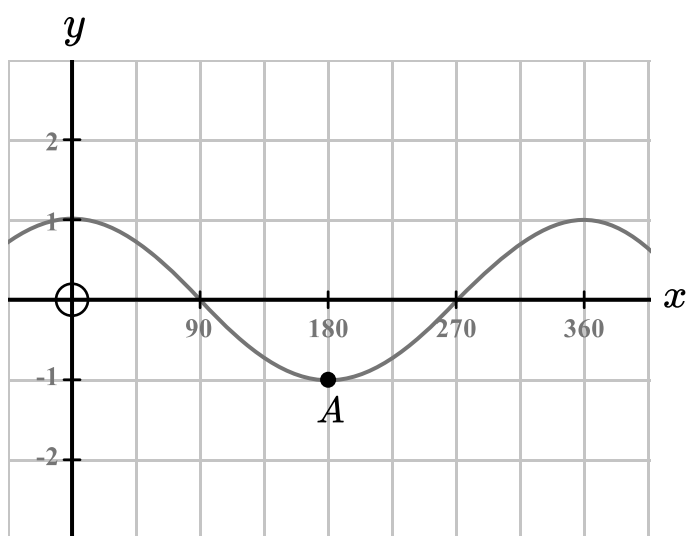
**23** Here is the graph of  $y = \sin(x)$ .



**23(a)** On this grid, sketch the graph of  $y = \sin(x) - 1$ .

**[1 mark]**

**23(b)** Here is the graph of  $y = \cos(x)$ .



A transformation is applied to  $y = \cos(x)$ .

The new coordinates of point A after the transformation are  $(180, 1)$ .

Write down two possible equations for the new graph.

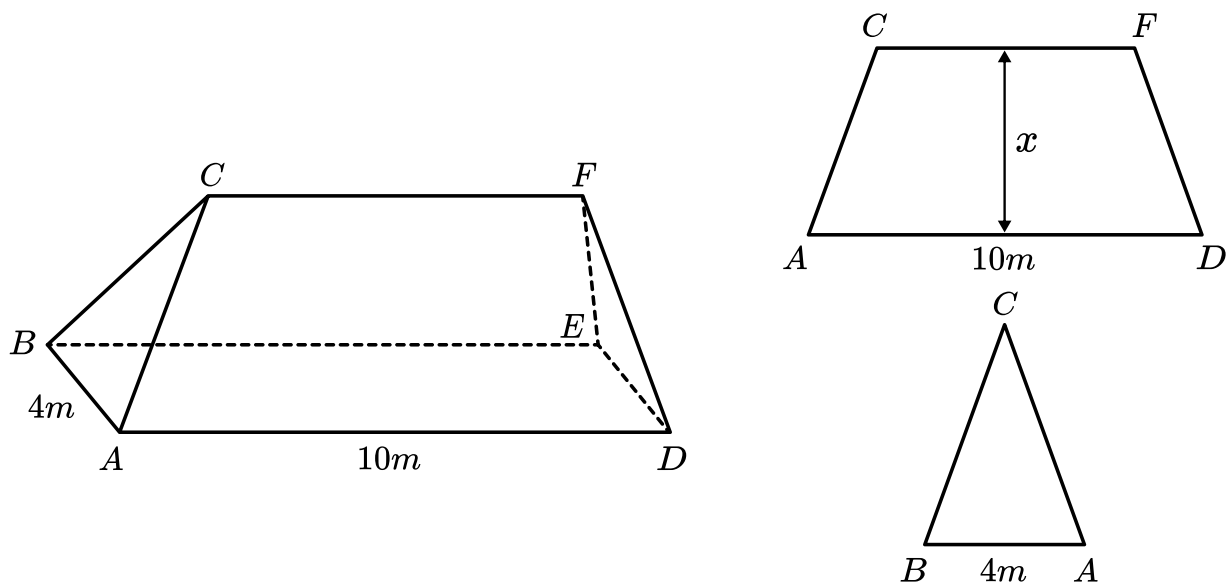
**[2 marks]**

Equation 1 \_\_\_\_\_

Equation 2 \_\_\_\_\_

**24** Here is a diagram of a roof.

The roof is made from two isosceles trapeziums and two isosceles triangles.



The height of the triangles is 1.1 times the height of the trapeziums.

Show that the length CF is given by  $CF = 10 - 2\sqrt{0.21x^2 + 4}$ .

**[4 marks]**

[illegible]

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