

**Modified Enlarged 24pt**  
**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Tuesday 5 November 2019 – Morning**

**GCSE (9–1) Mathematics**

**J560/04 Paper 4 (Higher Tier)**

**Time allowed: 1 hour 30 minutes**  
**plus your additional time allowance**

**YOU MUST HAVE:**

**Insert for Question 7**

**YOU MAY USE:**

**a scientific or graphical calculator**

**geometrical instruments**

**tracing paper**

**A model for question 18**

**Please write clearly in black ink.**

**Centre number**

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

**Candidate number**

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|--|--|--|--|

**First name(s)** \_\_\_\_\_

**Last name** \_\_\_\_\_

**READ INSTRUCTIONS OVERLEAF**



## **INSTRUCTIONS**

**Use black ink. You may use an HB pencil for graphs and diagrams.**

**Answer ALL the questions.**

**Read each question carefully before you start to write your answer.**

**Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.**

**Write your answer to each question in the space provided.**

**If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.**

## **INFORMATION**

**The total mark for this paper is 100.**

**The marks for each question are shown in brackets [ ].**

**Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.**

**Answer ALL the questions.**

**1 Carol makes birthday cards.  
Each card takes the same amount of time to make.**

**She makes 3 cards in 48 minutes.  
She has an order for 80 cards.**

**Can she complete this order in 3 days if she works 8 hours  
each day?  
Show how you decide.**

\_\_\_\_\_ because \_\_\_\_\_  
\_\_\_\_\_ [5]

2 Use the formula  $F = \frac{s}{\sqrt{tm}}$  to find the value of  $F$  when

$$s = 5.8 \times 10^6$$

$$t = 4.1 \times 10^8$$

$$m = 3.7 \times 10^{-2}.$$

Give your answer in standard form, correct to 2 significant figures.

\_\_\_\_\_ [4]

- 3 At a railway station, trains are either eastbound or westbound.  
An eastbound train leaves the station every 25 minutes.  
A westbound train leaves the station every 45 minutes.**

**An eastbound train and a westbound train both leave the station at 8 am.**

**When is the next time that two trains leave the station together?**

\_\_\_\_\_ **[4]**

- 4 Bob makes dry concrete by mixing cement, sand and stone in the ratio 1 : 2 : 3 by weight. He buys the cement, sand and stone in bags as shown in this table.**

|               | <b>Weight of bag<br/>(kg)</b> | <b>Cost per bag<br/>(£)</b> |
|---------------|-------------------------------|-----------------------------|
| <b>Cement</b> | <b>25</b>                     | <b>5.50</b>                 |
| <b>Sand</b>   | <b>20</b>                     | <b>2.00</b>                 |
| <b>Stone</b>  | <b>15</b>                     | <b>3.90</b>                 |

**He packs the dry concrete into 30 kg bags.**

**Bob buys just enough cement, sand and stone to make 50 bags of dry concrete.**

- (a) Show that Bob buys 500 kg of sand. Use the space below. [3]**

**(b) Bob sells the 50 bags of dry concrete for a total of £396.**

**Calculate Bob's percentage profit.**

**(b) \_\_\_\_\_ % [5]**

**5 Multiply out and simplify.**

$$(4x + y)(x - 3y)$$

\_\_\_\_\_ **[3]**



**6 A bag of sweets contains only mints, sherberts and toffees.**

**The ratio of the number of mints to sherberts is 2 : 3.**

**The ratio of the number of sherberts to toffees is 7 : 5.**

**What fraction of the sweets are sherberts?**

\_\_\_\_\_ **[3]**

- 7** 12 students take two tests.  
Each test is out of 60.  
The scatter diagram on the insert shows the results for 10 of the students.

**(a)** The table shows the results for the other 2 students.

|               |           |           |
|---------------|-----------|-----------|
| <b>Test 1</b> | <b>36</b> | <b>38</b> |
| <b>Test 2</b> | <b>44</b> | <b>41</b> |

**Plot these results on the scatter diagram. [1]**

**(b)** Describe the type of correlation shown in the scatter diagram.

**(b)** \_\_\_\_\_ **[1]**

**(c) (i)** Draw a line of best fit on the scatter diagram. **[1]**

**(ii)** Another student was absent for Test 2.  
The student scored 40 marks on Test 1.

**Use your line of best fit to estimate a result for this student on Test 2.**

**(c)(ii)** \_\_\_\_\_ **[1]**

**(d) Work out the percentage of THE 12 STUDENTS whose result on Test 1 is LOWER than their result on Test 2.**

**(d) \_\_\_\_\_ % [4]**

8 The diagrams show the price paid by two groups of people visiting a funfair.

|            |   |    |
|------------|---|----|
| 5 adults   | £ |    |
| 4 children | £ |    |
| Total £    |   | 78 |

|            |   |    |
|------------|---|----|
| 3 adults   | £ |    |
| 6 children | £ |    |
| Total £    |   | 63 |

Assume each adult pays the same price and each child pays the same price.

Find the price for an adult and the price for a child.

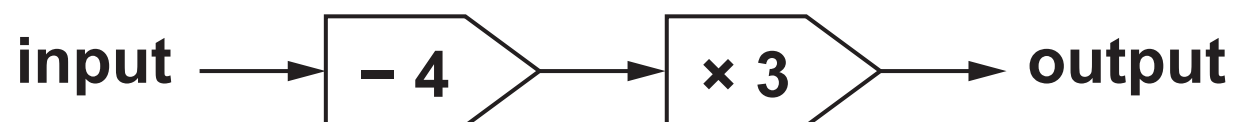
Adult price = £ \_\_\_\_\_

Child price = £ \_\_\_\_\_

[5]

9 Here is function A.

Function A :



(a) A number,  $k$ , is input into function A.  
The output is also  $k$ .

Find the value of  $k$ .

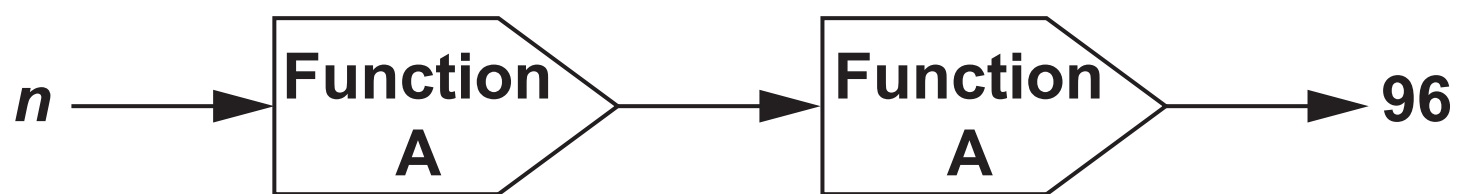
(a)  $k =$  \_\_\_\_\_ [3]

(b) The output of function A is  $y$ .

Write an algebraic expression, in terms of  $y$ , for the input of function A.

(b) \_\_\_\_\_ [2]

- (c) The diagram shows a composite function with an input,  $n$ , and an output of 96.



Find the value of  $n$ .

(c)  $n =$  \_\_\_\_\_ [2]

- 10 The value of a house, £ $H$ , is given by the formula

$$H = 165\,000 \times 1.03^t$$

where  $t$  is the number of years after 1st January 2010.

- (a) Write down the value of the house on 1st January 2010.

(a) £ \_\_\_\_\_ [1]

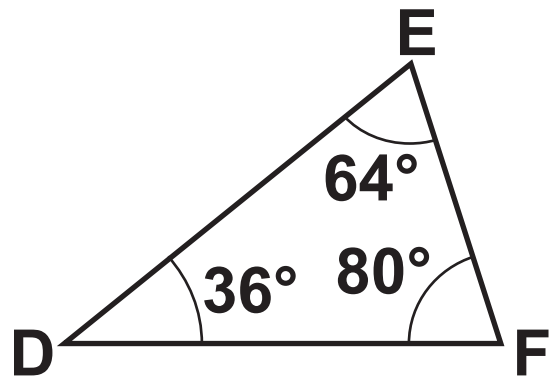
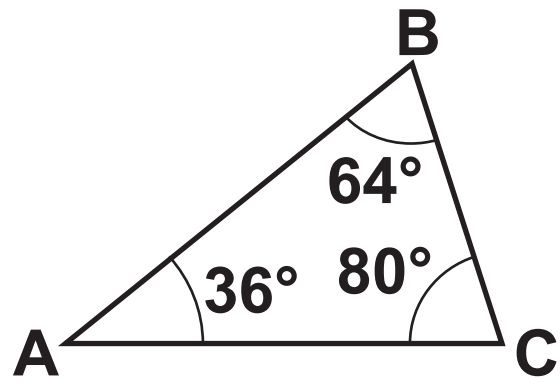
**(b) Write down the annual percentage increase in the value of the house.**

**(b) \_\_\_\_\_ % [1]**

**(c) Show that the value of the house is over £200 000 on 1st January 2017. Use the space below. [2]**

- 11 (a) Are these two triangles definitely congruent?  
Give a reason.

NOT TO SCALE

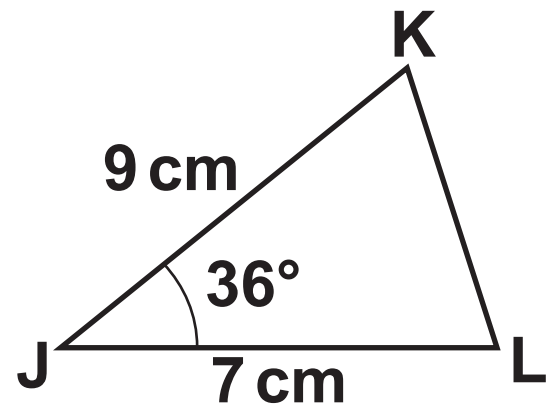
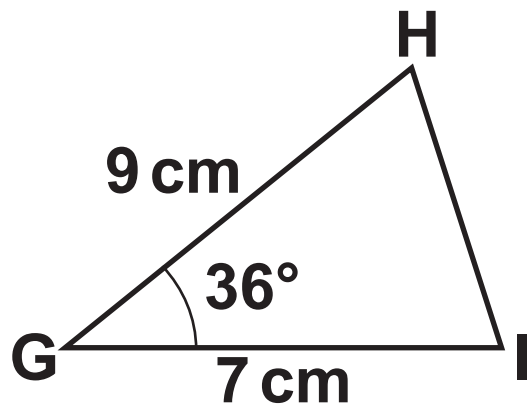


\_\_\_\_\_ because \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [1]



(b) Prove that these two triangles are congruent.

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[3]

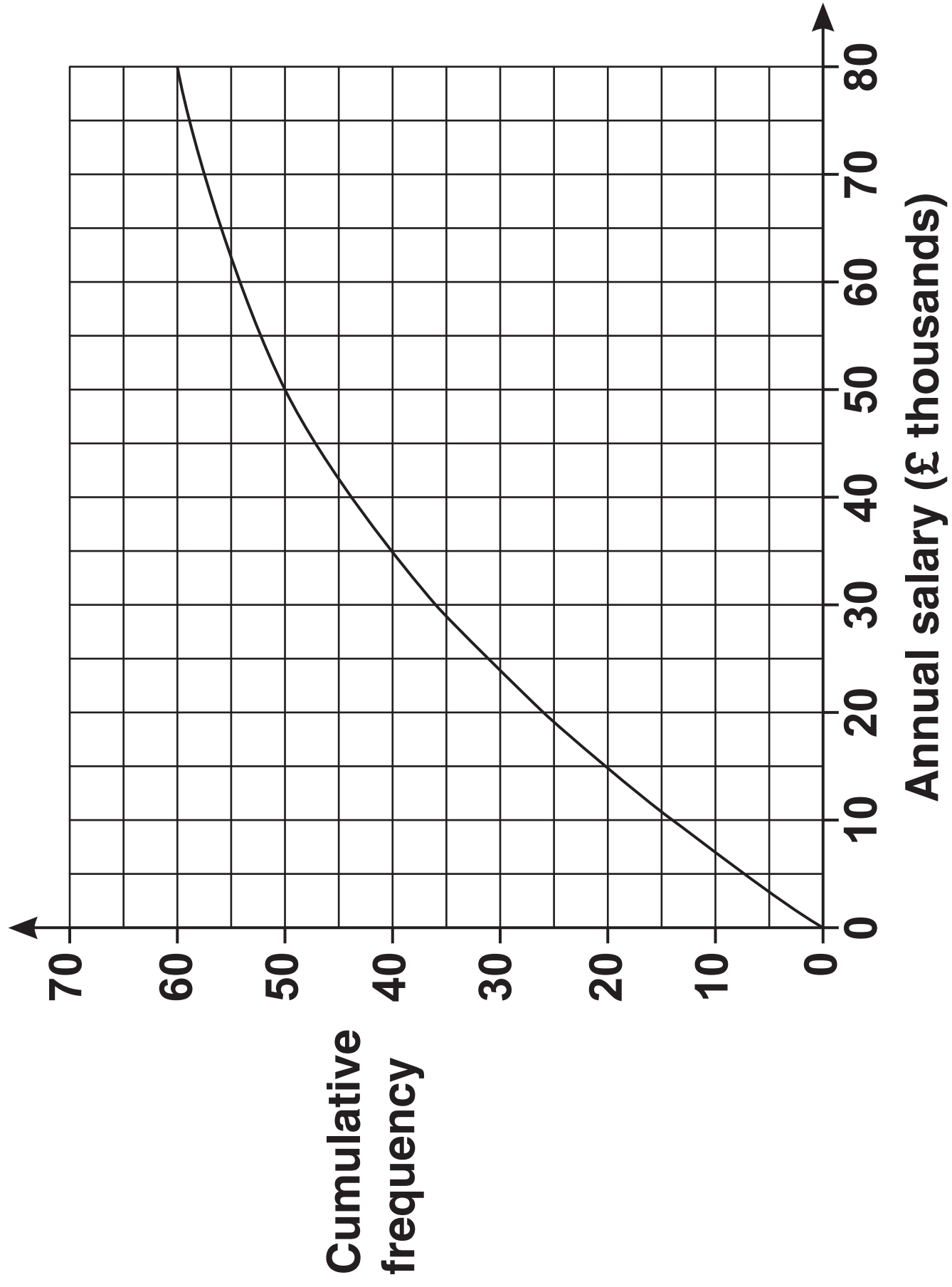
12 The cumulative frequency graph opposite summarises the annual salary,  $p$  (£ thousands), of the 60 workers in a factory.

(a) Use the graph to estimate the median annual salary.

(a) £ \_\_\_\_\_ thousands [1]

(b) Complete this cumulative frequency table. [2]

| Annual salary, $p$<br>(£ thousands) | Cumulative frequency |
|-------------------------------------|----------------------|
| $p \leq 10$                         |                      |
| $p \leq 20$                         |                      |
| $p \leq 30$                         |                      |
| $p \leq 50$                         |                      |
| $p \leq 80$                         |                      |



**(c) Use the information in the cumulative frequency table to calculate an estimate of the mean annual salary.**

**(c) £ \_\_\_\_\_ thousands [5]**

**(d) Explain why your estimate of the median is more reliable than your estimate of the mean.**

\_\_\_\_\_

\_\_\_\_\_ **[1]**

- 13 (a) A transport lorry consists of a cab and a trailer.  
The trailer has a volume of  $90\text{ m}^3$ .  
Alfie makes a model of this lorry using a scale of 1 : 72.**

**Work out the volume of the trailer in Alfie's model, giving your answer in  $\text{cm}^3$ .**

**(a) \_\_\_\_\_  $\text{cm}^3$  [3]**

**(b) Alfie paints his model lorry.  
He has eight colours available.**

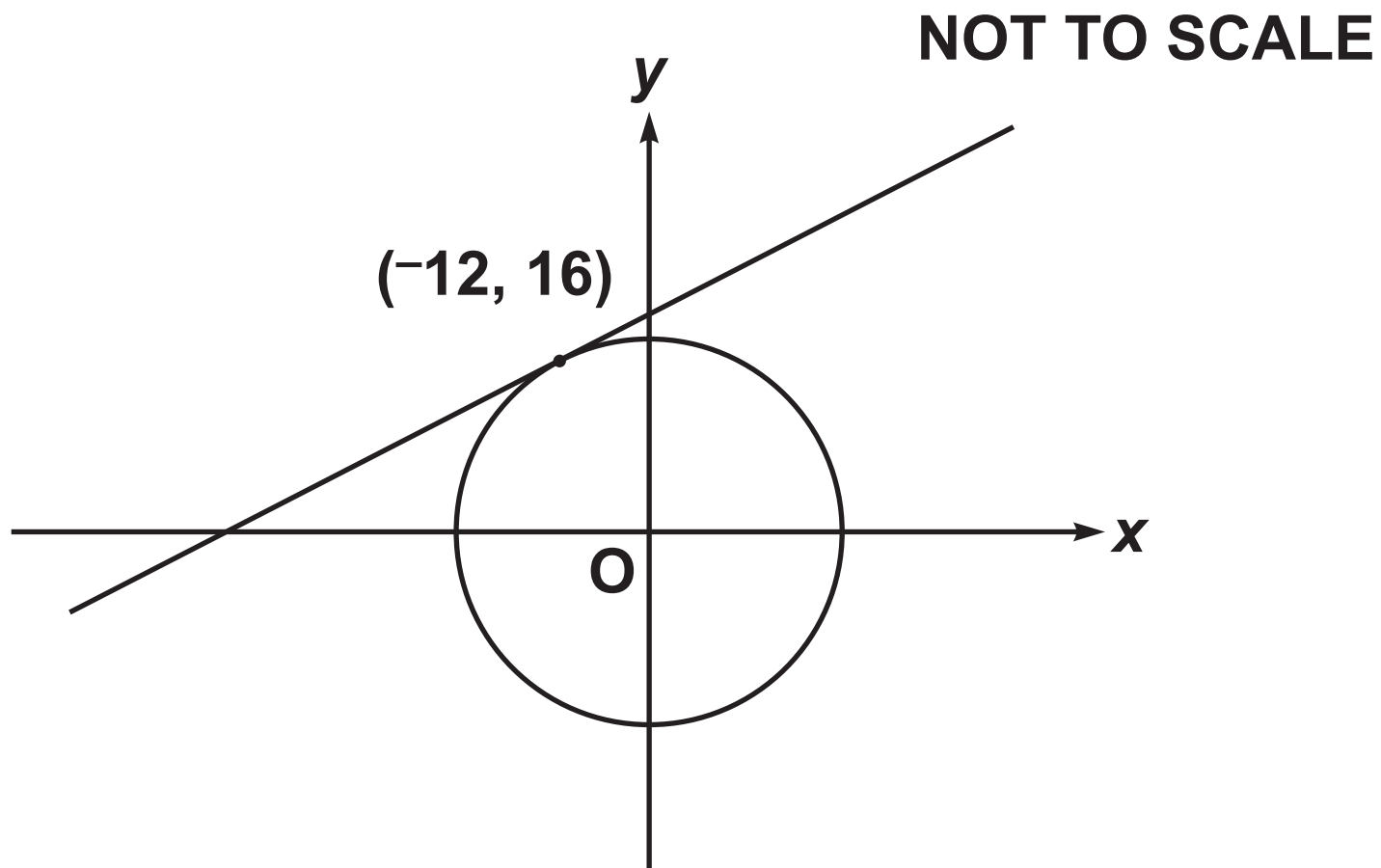
**He decides to paint the cab in one colour and the trailer in  
a different colour.**

**He then wants to paint his name on the trailer.  
The name must be in a different colour to the trailer.**

**In how many different ways can Alfie paint his model  
lorry?**

**(b) \_\_\_\_\_ [3]**

- 14 The diagram shows a circle with centre  $(0, 0)$  and a tangent at the point  $(-12, 16)$ .



The tangent crosses the  $y$ -axis at the point  $(0, p)$ .

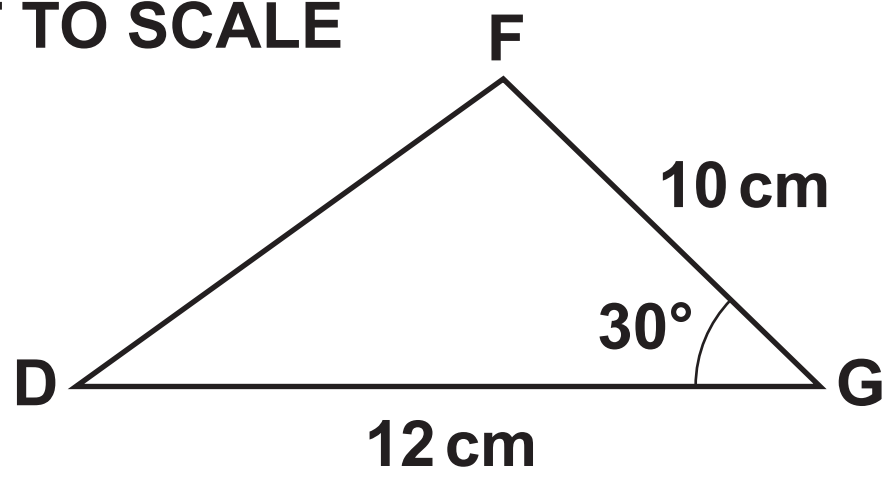
Find the value of  $p$ .

$$p = \underline{\hspace{10cm}} [5]$$



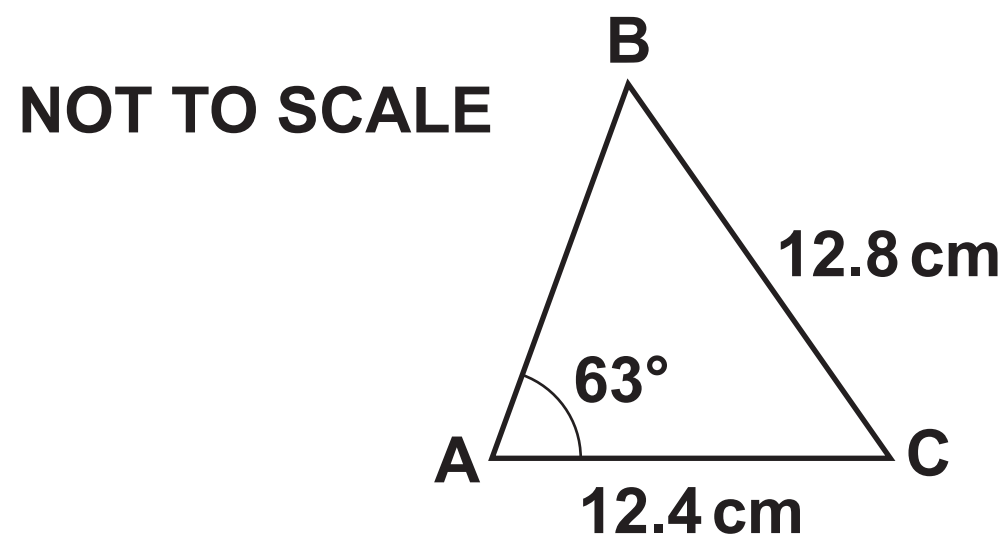
15 (a) Calculate length DF in this triangle.

NOT TO SCALE



(a) \_\_\_\_\_ cm [3]

(b) Calculate angle ACB in this triangle.



(b) \_\_\_\_\_° [4]

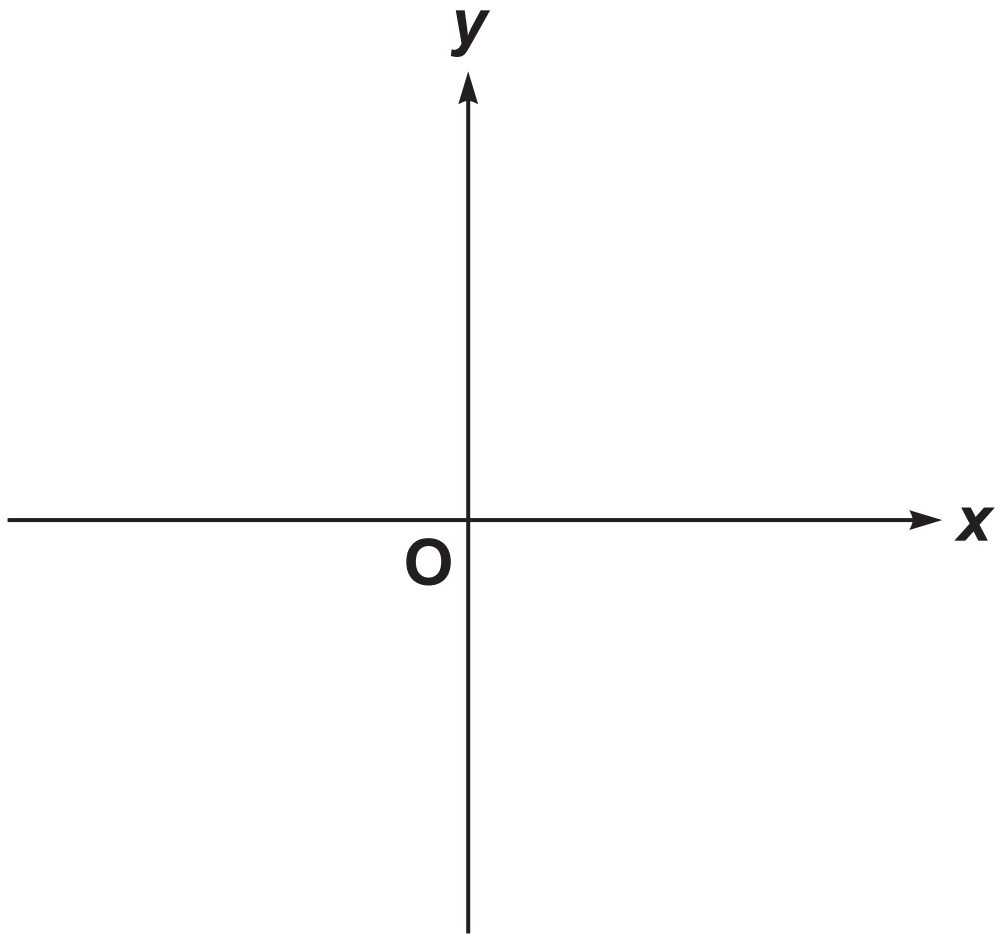
16 Show that  $\frac{x+9}{x^2-1} + \frac{4}{x+1}$  can be written

in the form  $\frac{a}{x-1}$ , where  $a$  is an integer.

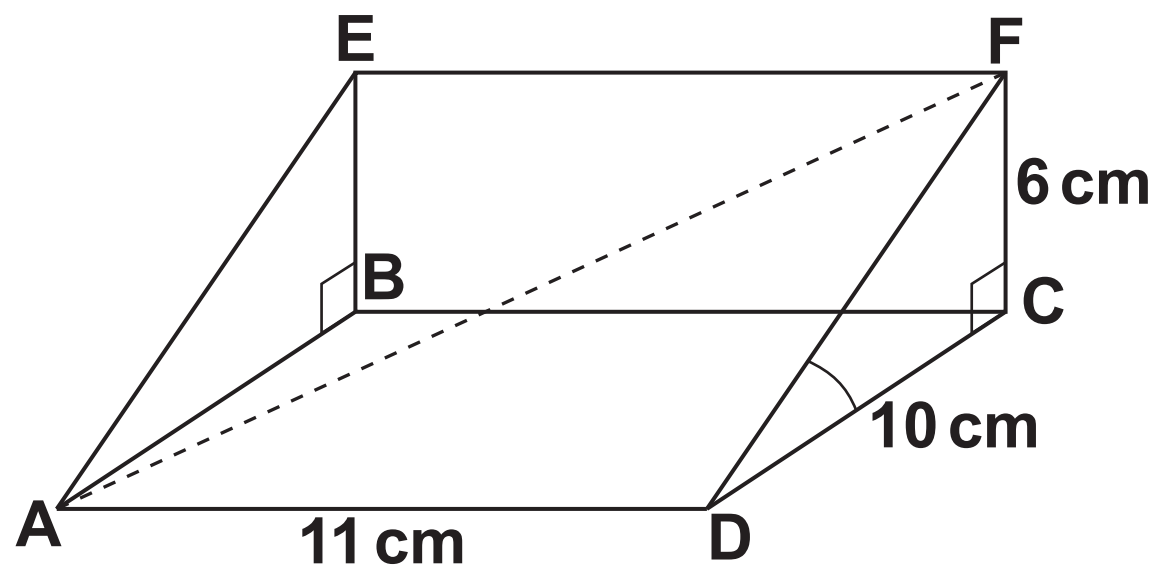
Use the space below.

[4]

- 17 Sketch the graph of  $y = 3^x$ .  
Give the value of the  $y$ -intercept. [2]



- 18 The diagram shows a right-angled triangular prism ABCDEF. You may use a model to help you.



Length  $AD = 11\text{ cm}$ , length  $CD = 10\text{ cm}$  and length  $CF = 6\text{ cm}$ .

(a) Calculate the volume of the prism.

(a) \_\_\_\_\_  $\text{cm}^3$  [2]

**(b) Use trigonometry to show that angle  $FDC = 31^\circ$ , correct to the nearest degree. [2]**

**(c) Calculate the exact length of AF.**

**(c) \_\_\_\_\_ cm [4]**

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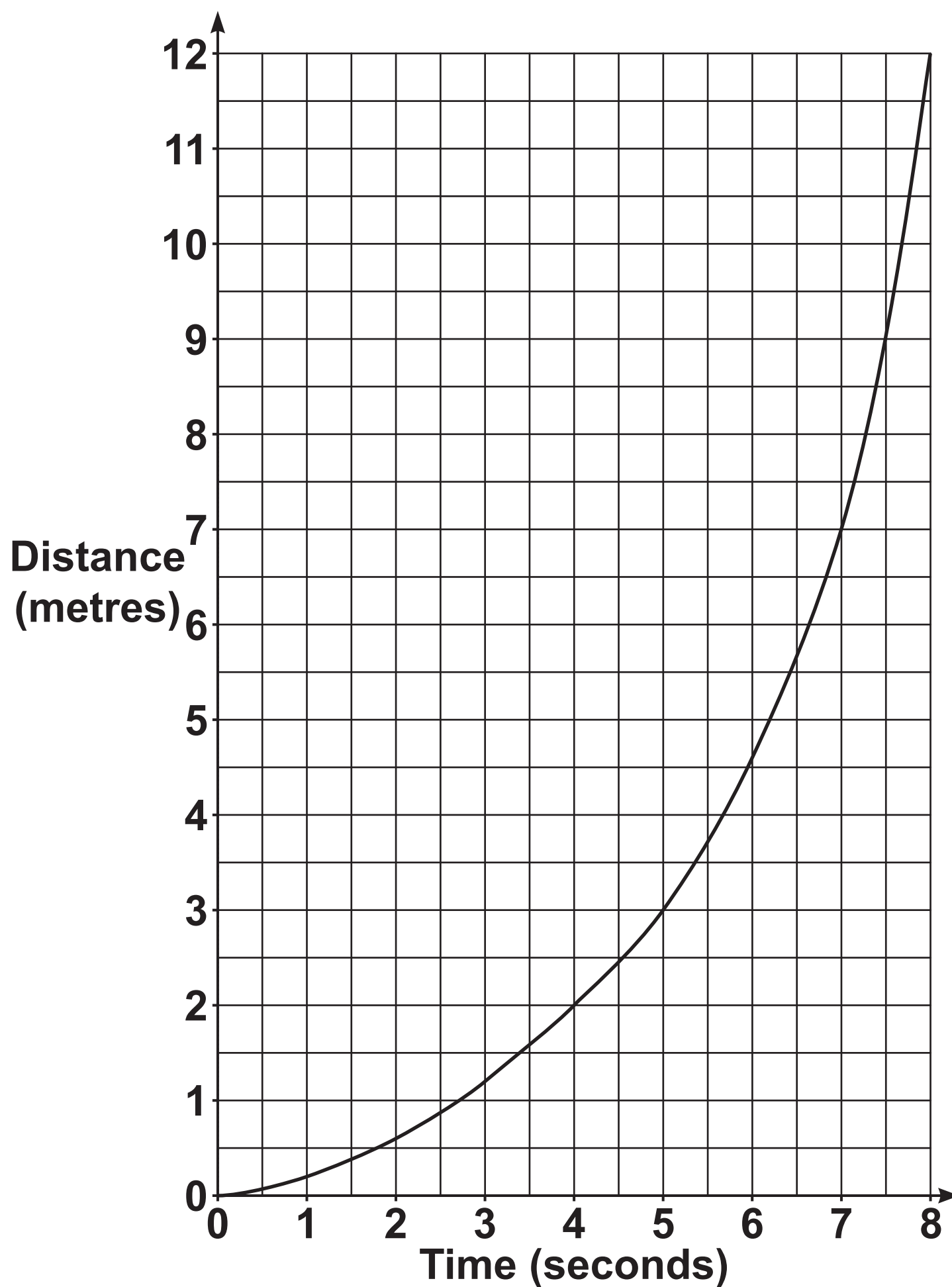
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**19 The graph opposite shows the distance travelled by a particle over 8 seconds.**

**Estimate the speed of the particle at 5 seconds.**

\_\_\_\_\_ m/s [4]





**END OF QUESTION PAPER**

### ADDITIONAL ANSWER SPACE

**If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).**

This image shows a blank sheet of white paper with horizontal ruling lines. A single vertical line runs down the left side, creating a narrow margin. There are 20 horizontal lines in total, evenly spaced across the page. The lines are thin and black.



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