

# Modified Enlarged 36pt

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 

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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.**

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**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.**

**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 (kg)</b>	<b>Cost per bag (£)</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 = £ \_\_\_\_\_

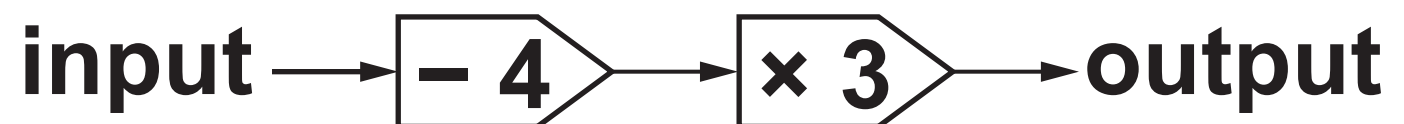
Child price = £ \_\_\_\_\_

[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  $k$ .

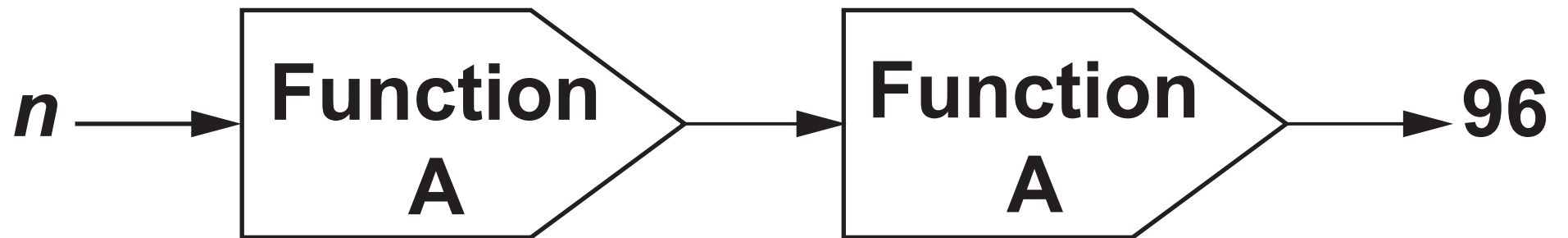
(a)  $k =$  \_\_\_\_\_ [3]

**(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]**

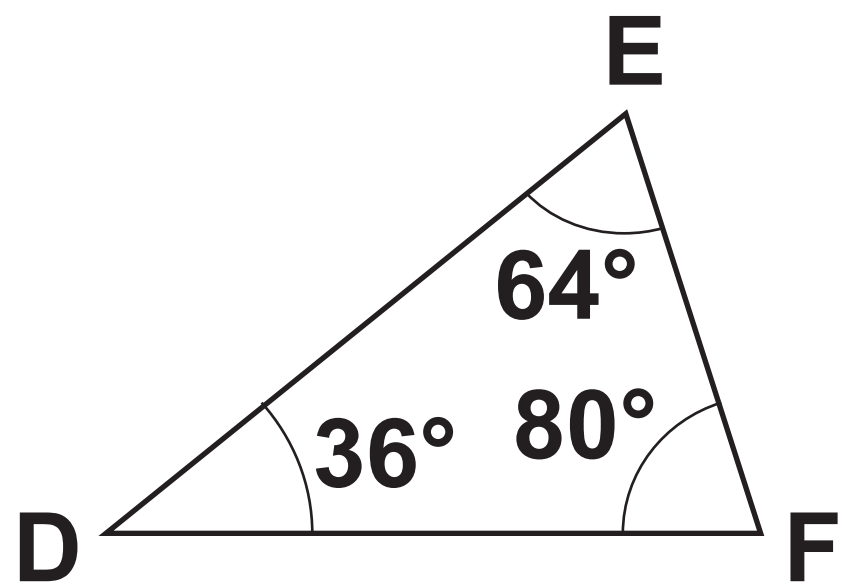
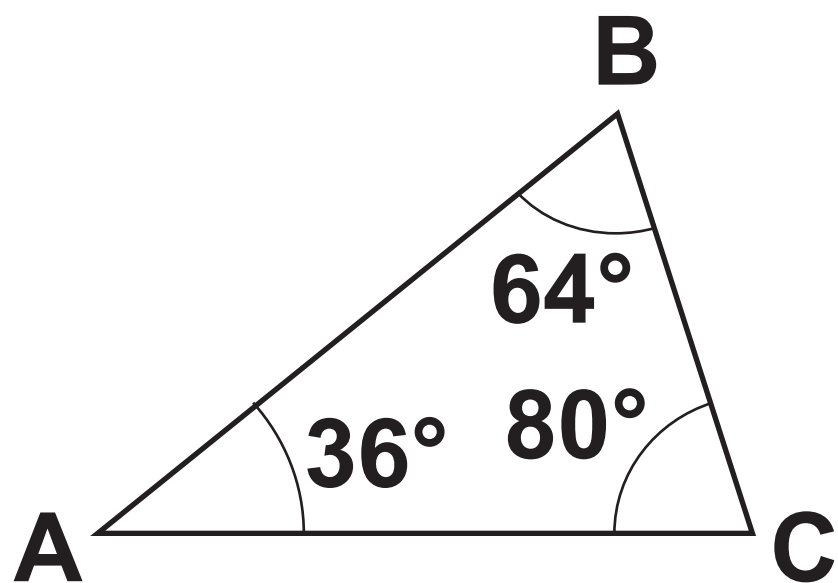
**(b) Write down the annual percentage increase in the value of the house.**

**(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.

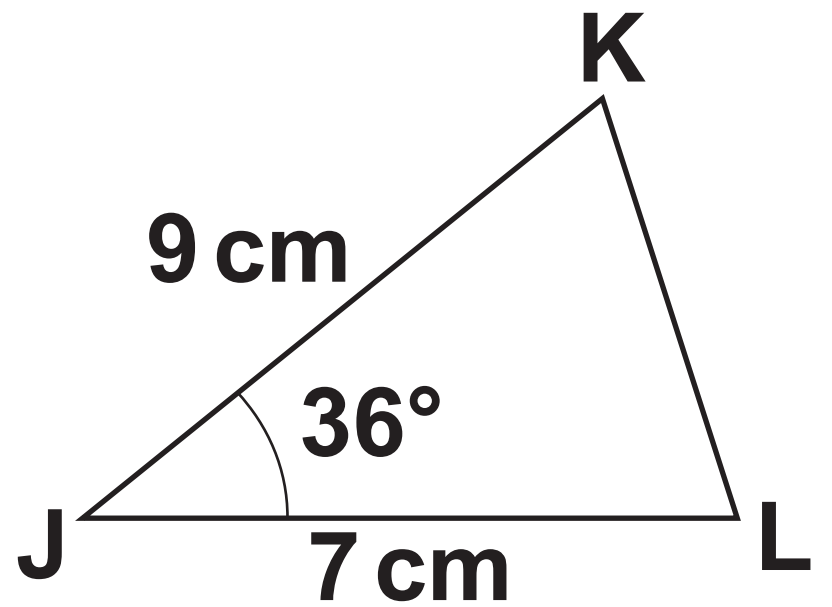
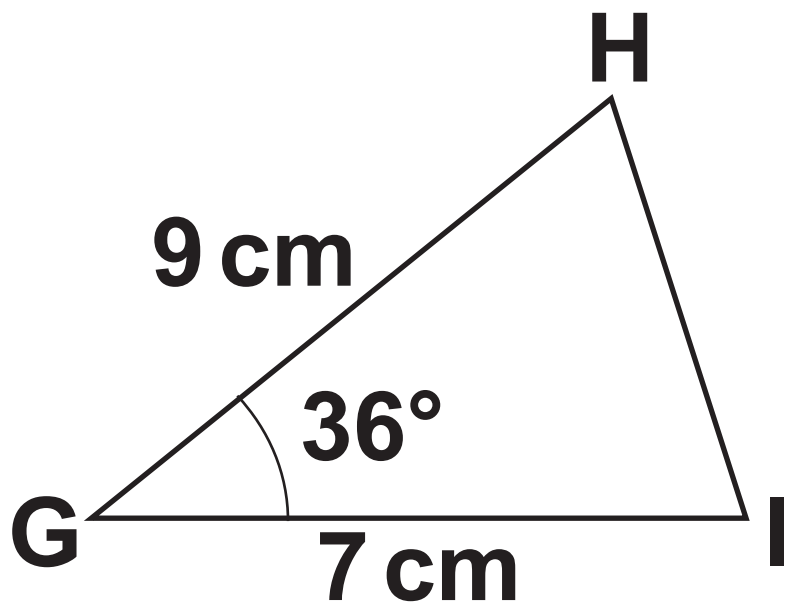
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\_\_\_\_\_ because \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [1]

(b) Prove that these two triangles are congruent.

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[3]



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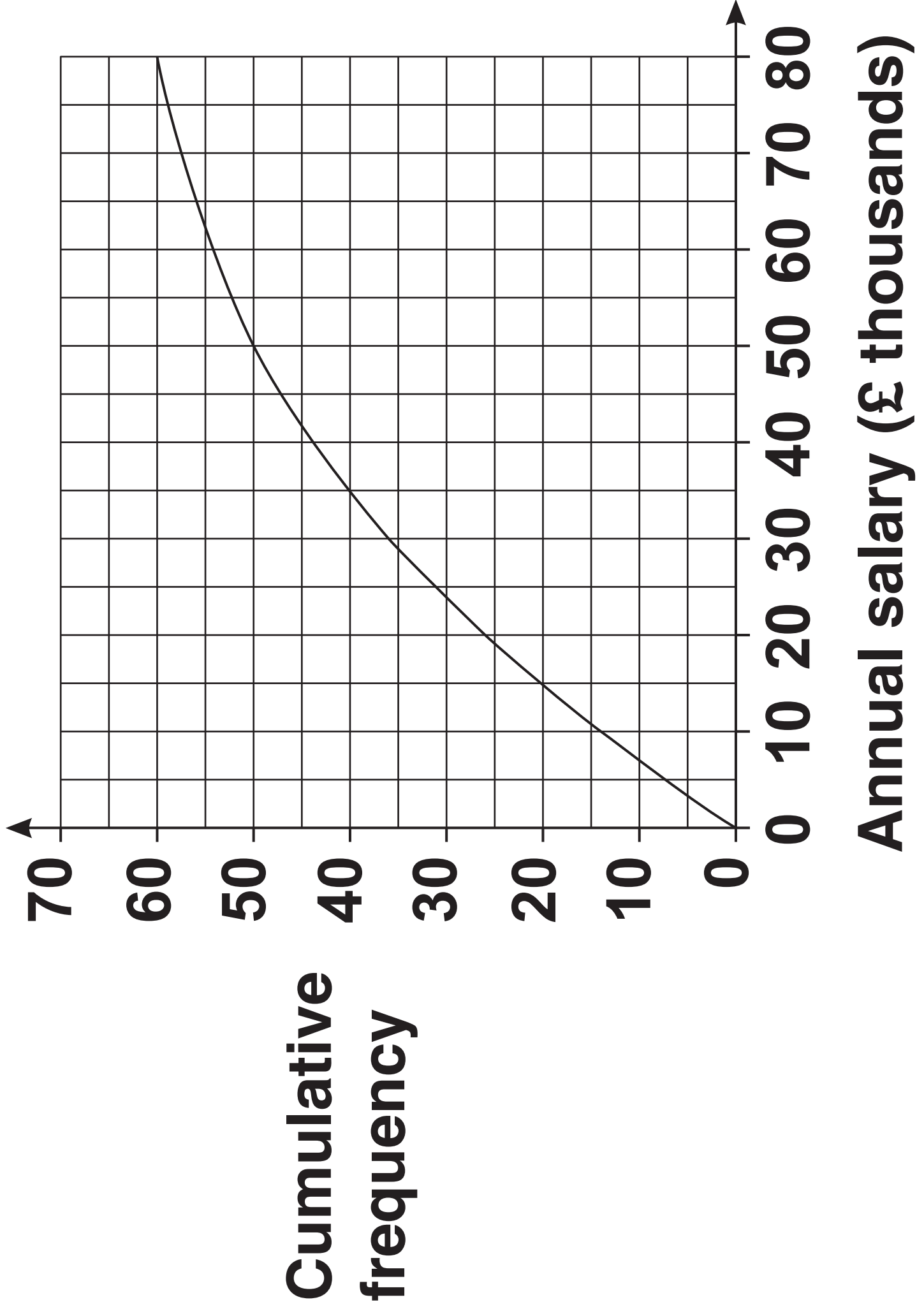
**12 The cumulative frequency graph opposite summarises the annual salary,  $p$  (£ thousands), of the 60 workers in a factory.**

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

**(a) £ \_\_\_\_\_ thousands [1]**

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

<b>Annual salary, <math>p</math> (£ thousands)</b>	<b>Cumulative frequency</b>
<b><math>p \leq 10</math></b>	
<b><math>p \leq 20</math></b>	
<b><math>p \leq 30</math></b>	
<b><math>p \leq 50</math></b>	
<b><math>p \leq 80</math></b>	



**(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.**

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**[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.**

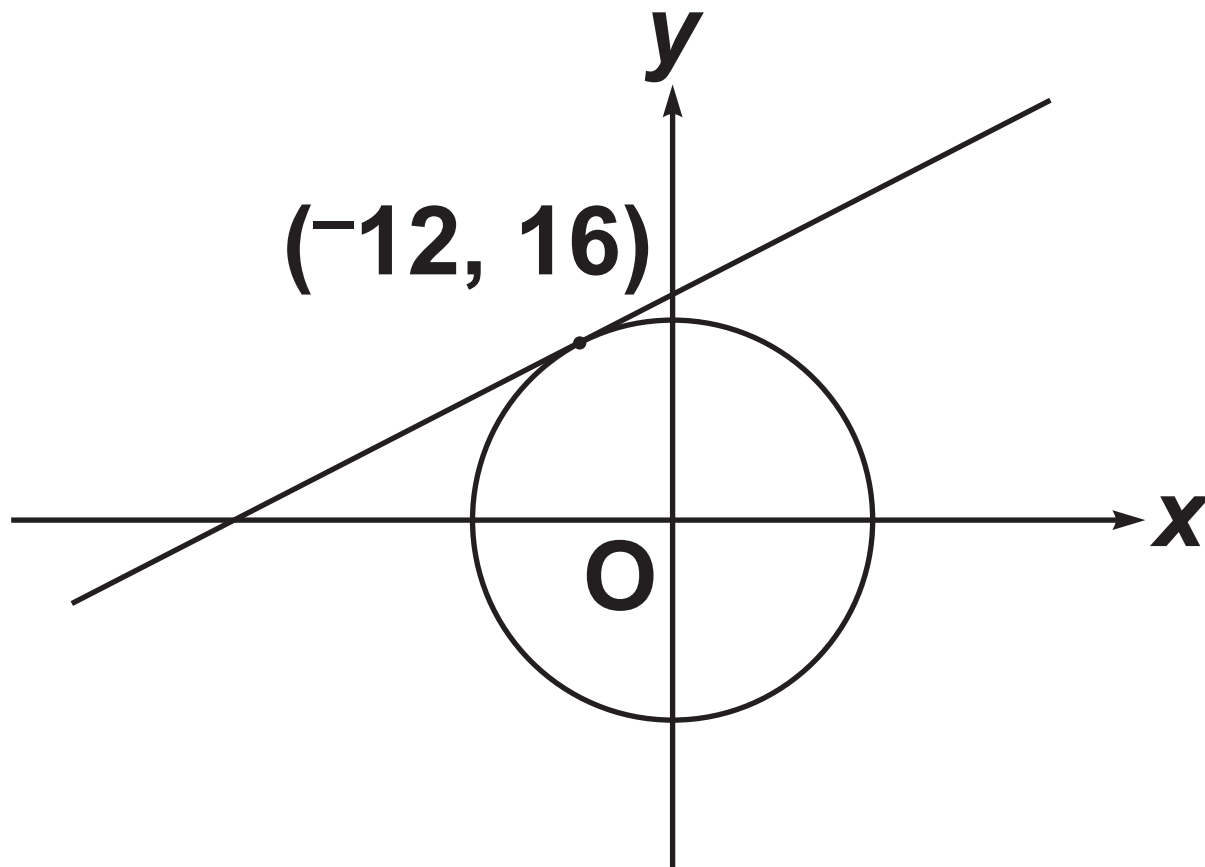
**The name must be in a different  
colour to the trailer.**

**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  $(-12, 16)$ .

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

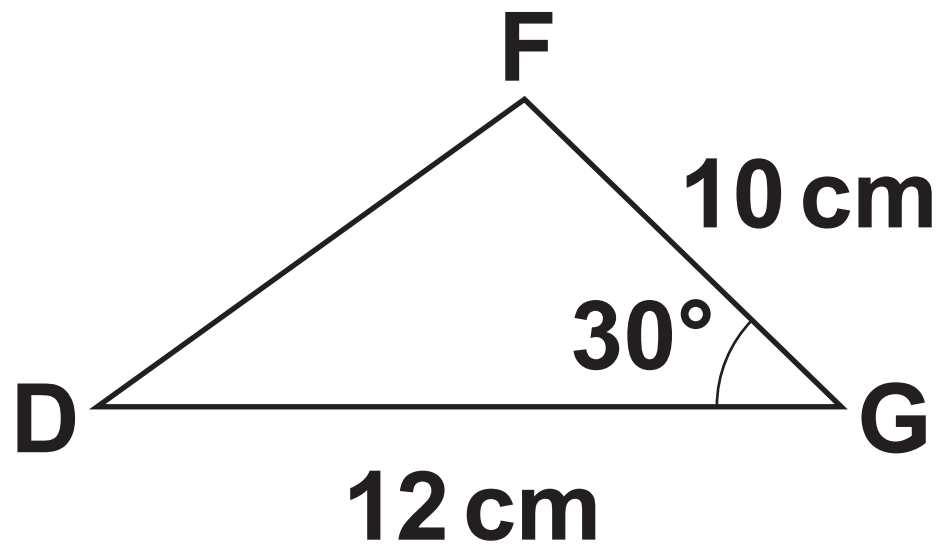


Find the value of  $p$ .

$p = \underline{\hspace{2cm}} \quad [5]$

**15 (a) Calculate length DF in this triangle.**

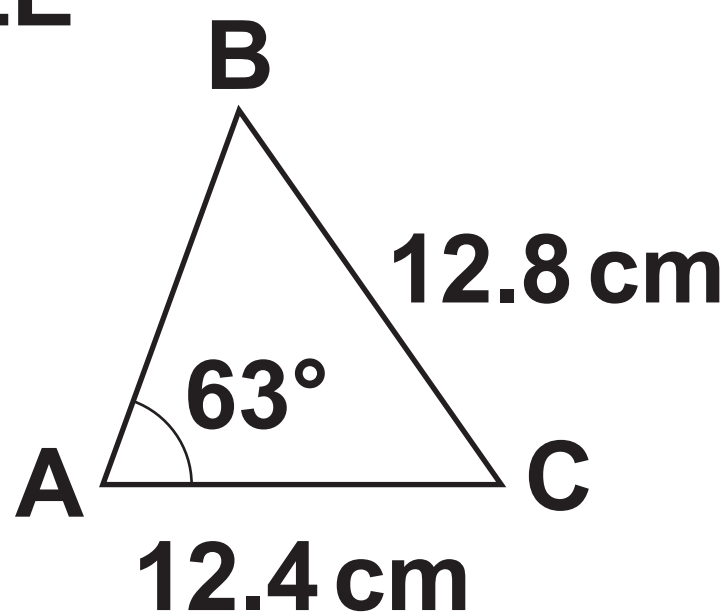
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**(a) \_\_\_\_\_ cm [3]**

**(b) Calculate angle ACB in this triangle.**

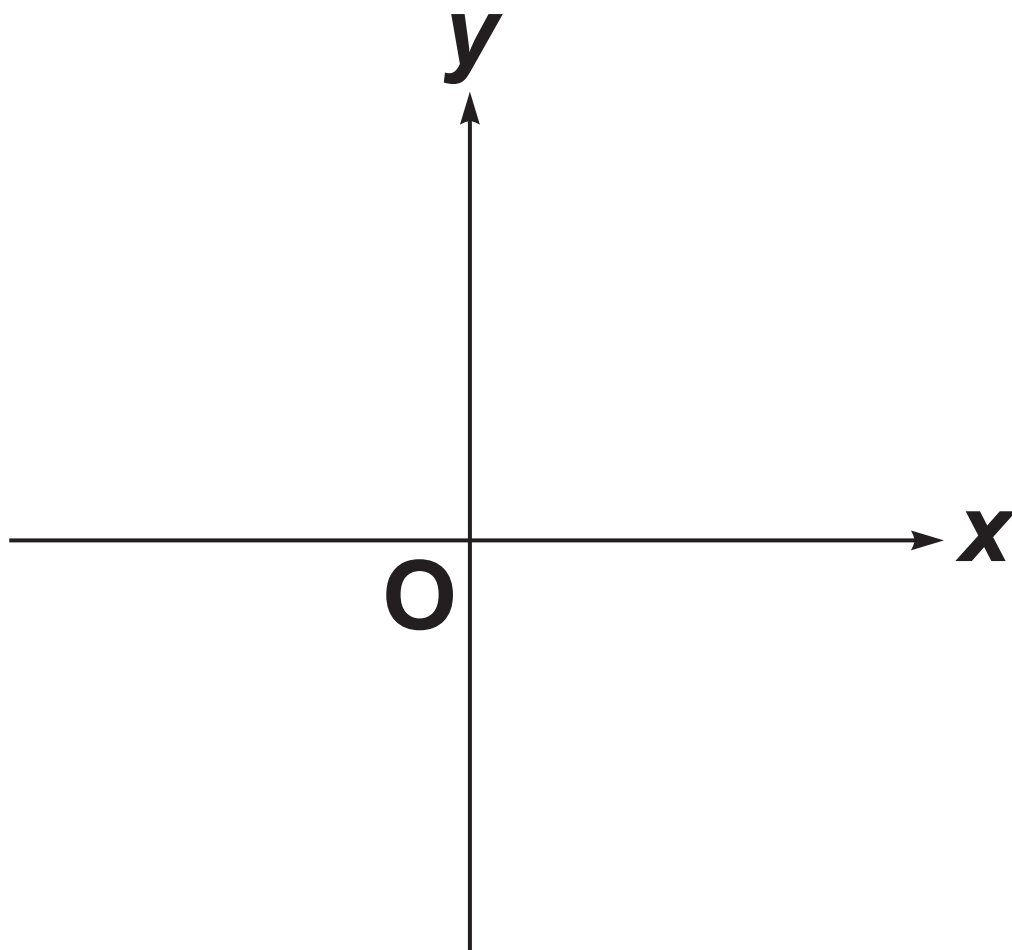
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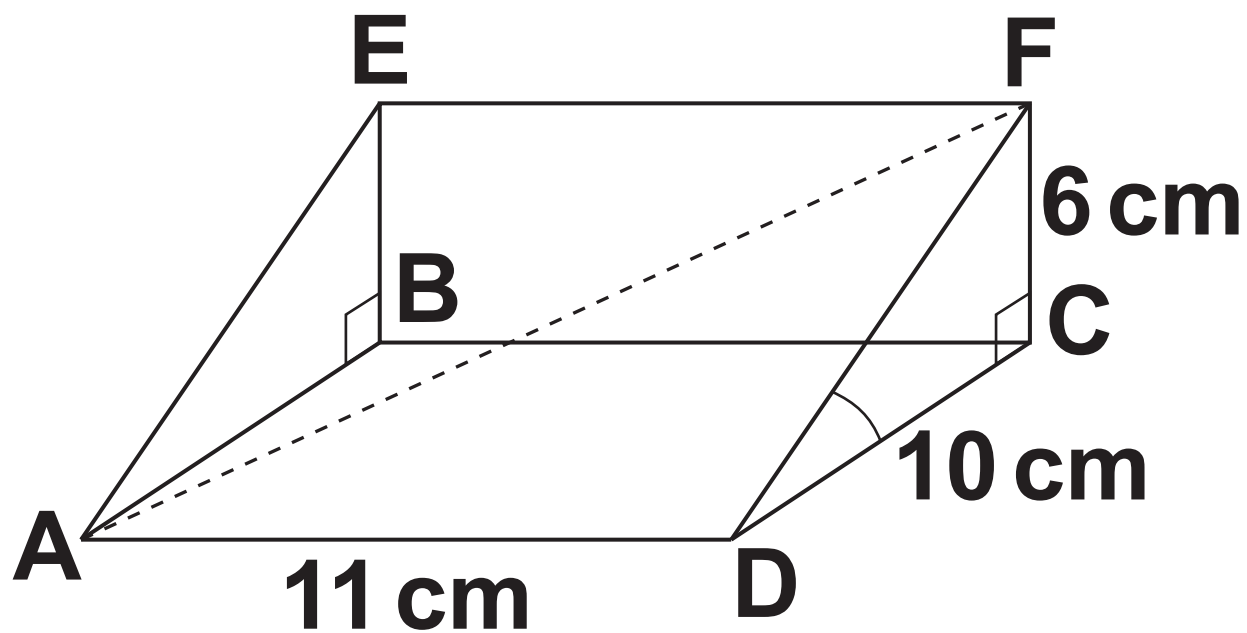
**(b) \_\_\_\_\_ ° [4]**

- 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.**

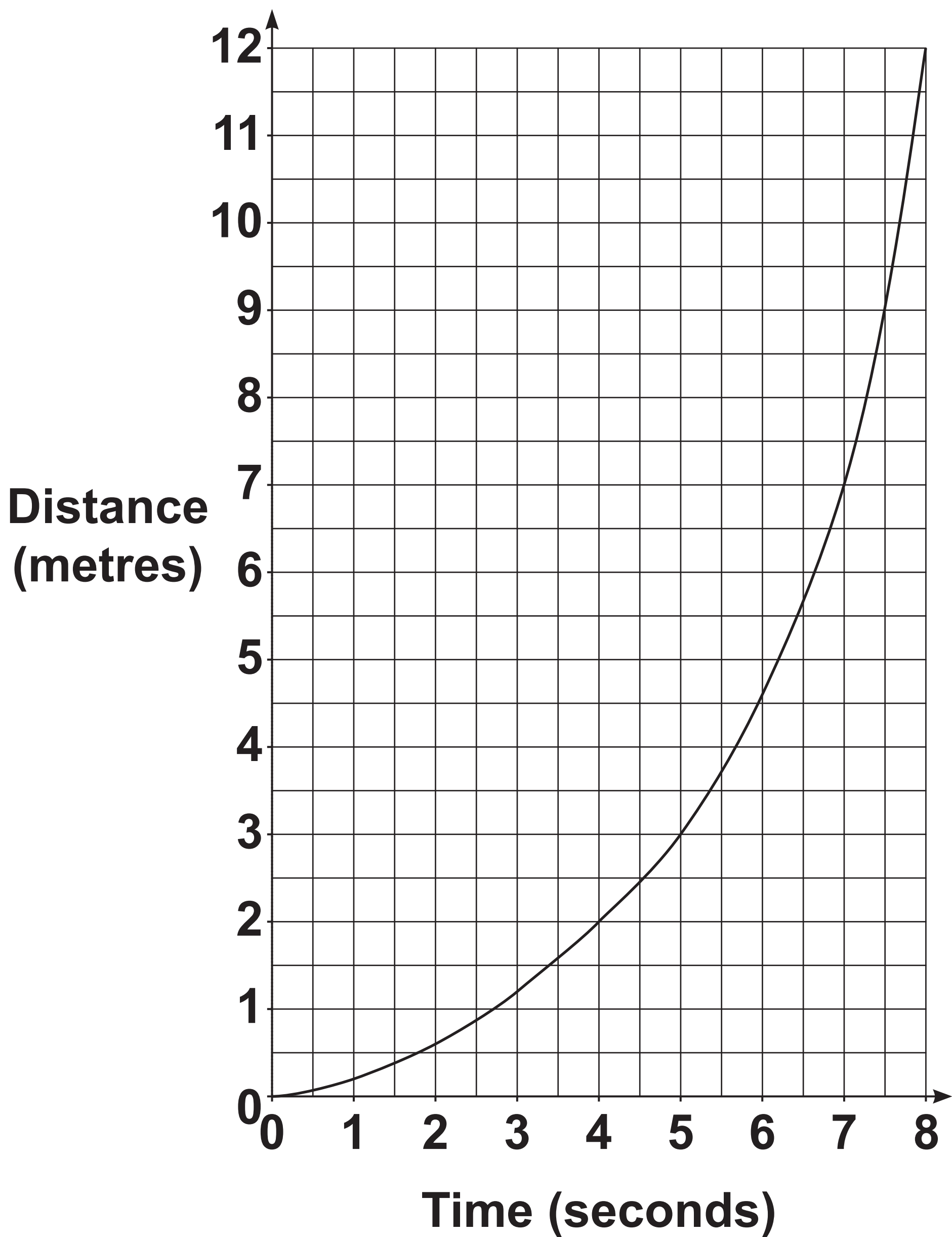
**(c) \_\_\_\_\_ cm [4]**

**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).**


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