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| Centre Number       |  |  |  |  |  | Candidate Number |  |  |  |  |
| Surname             |  |  |  |  |  |                  |  |  |  |  |
| Other Names         |  |  |  |  |  |                  |  |  |  |  |
| Candidate Signature |  |  |  |  |  |                  |  |  |  |  |

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|---------------------|------|
| For Examiner's Use  |      |
| Examiner's Initials |      |
| Pages               | Mark |
| 2 – 3               |      |
| 4 – 5               |      |
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| 8 – 9               |      |
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| 14 – 15             |      |
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| 18 – 19             |      |
| TOTAL               |      |



General Certificate of Secondary Education  
Higher Tier  
January 2013

# Applications of Mathematics 93701H (Linked Pair Pilot)

Unit 1 Finance and Statistics

# H

Thursday 17 January 2013 9.00 am to 10.30 am

|  |  |
|--|--|
| <p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>mathematical instruments.</li> </ul> <p>You may use a calculator.</p> |  |
|--|--|

### Time allowed

- 1 hour 30 minutes

### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.14 unless another value is given in the question.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- The quality of your written communication is specifically assessed in Questions 3 and 10. These questions are indicated with an asterisk (\*).
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

### Advice

- In all calculations, show clearly how you work out your answer.



J A N 1 3 9 3 7 0 1 H 0 1

WMP/Jan13/93701H

# 93701H

Answer **all** questions in the spaces provided.

**1** This spreadsheet is used to work out monthly pay.

|          | A    | B          | C              | D       | E           |
|----------|------|------------|----------------|---------|-------------|
| <b>1</b> | Name | Annual pay | Taxable income | Tax     | Monthly pay |
| <b>2</b> | Jim  | 17000      | =B2-7600       | =0.2*C2 | =(B2-D2)/12 |

Jim's annual pay is £ 17 000

**1 (a)** What is the value in cell C2?

.....

Answer ..... (1 mark)

**1 (b)** What is the value in cell E2?

.....  
.....  
.....

Answer ..... (3 marks)



2

|  |
|--|
| <p align="center"><b>Flags-4-U</b></p> <p align="center">Paving slabs £ 4 each<br/>+<br/>Delivery £ 20</p> |
|--|

2 (a) Write down a formula for the cost, £ C, of buying  $x$  paving slabs and having them delivered.

.....

C = ..... (2 marks)

2 (b)

|   |
|---|
| <p align="center"><b>Stones-R-Us</b></p> <p align="center">Paving slabs £ 2.50 each<br/>+<br/>Delivery £ 35</p> |
|---|

James wants to buy some paving slabs and have them delivered. The total cost is the same from both companies.

How many paving slabs does he want to buy?

.....  
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Answer ..... (3 marks)



**3** A smoothie recipe uses banana, kiwi and yoghurt in the ratio 4 : 1 : 3 by weight.

**3 (a)** A smoothie is made using 280 g of banana.

How much kiwi and yoghurt are needed?

.....  
.....  
.....

Kiwi ..... g

Yoghurt ..... g

(3 marks)

**3 (b)** Express the weight of kiwi as a percentage of the weight of the smoothie.

.....  
.....  
.....

Answer ..... %

(2 marks)

**\*3 (c)** Each smoothie costs 72p to make.

**3 (c) (i)** The smoothies are sold at the school fayre.  
The school wants to make at least 30% profit on each smoothie.

Work out the cheapest selling price to do this.

.....  
.....  
.....

Answer .....

(4 marks)



**3 (c) (ii)** The cost of banana for one smoothie is 15p.  
The price of bananas increases by 40%.

Work out the percentage increase in the cost of making a smoothie.

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.....

Answer ..... % (4 marks)

**Turn over for the next question**



**4** A music shop manager wants to know whether people buy music from shops or websites.

**4 (a)** One of the questions he asks is

Do you use music shops?

Write down **one** criticism of the question.

.....  
.....

*(1 mark)*

**4 (b)** Write a suitable question to find whether people buy music from shops or websites. You should include a response section.

*(2 marks)*



**4 (c)** The manager decides to survey the first 20 customers entering his shop on a Monday morning.

Give **one** reason why this sample is likely to be biased.

.....  
.....

(1 mark)

**4 (d)** How should the manager choose a sample?

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(2 marks)

**Turn over for the next question**



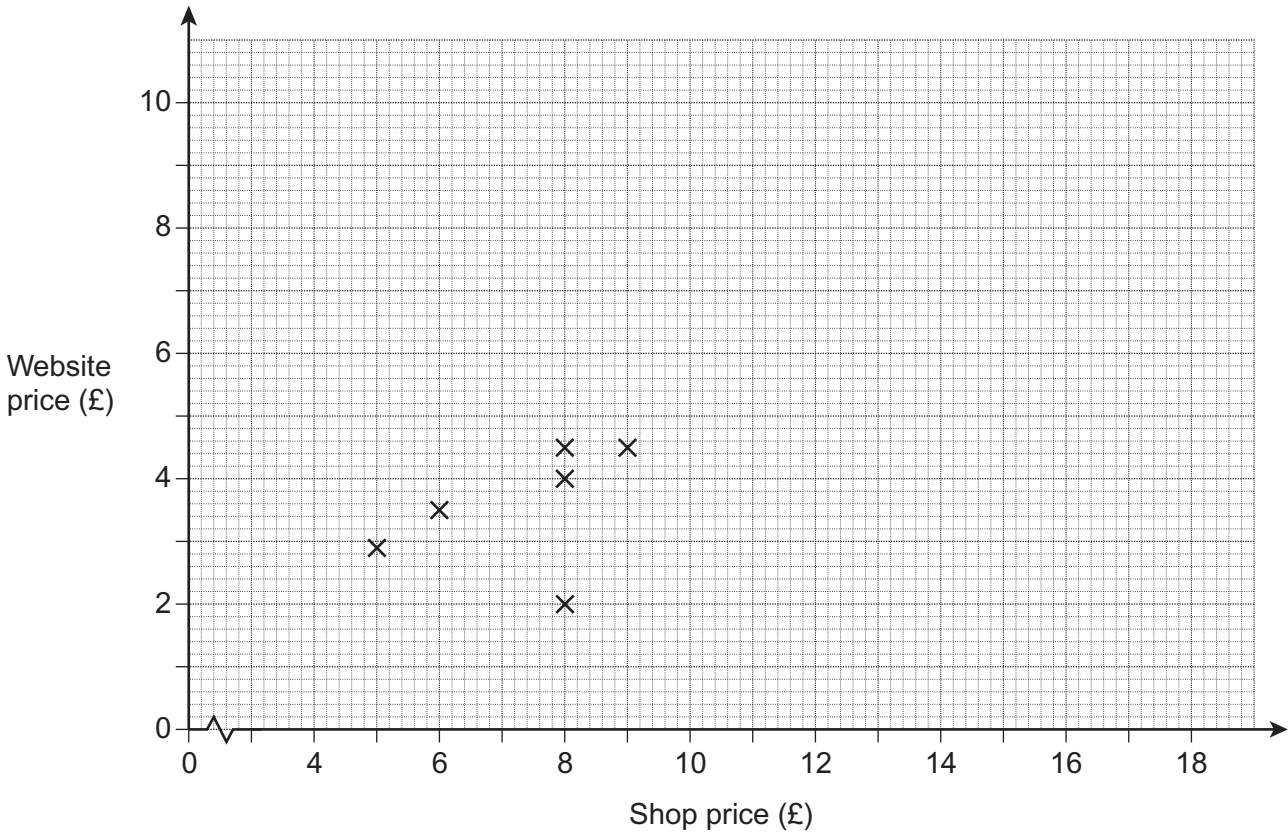
5 Here are the shop and website prices of some books.

|                   |      |      |   |   |      |      |      |      |      |      |
|-------------------|------|------|---|---|------|------|------|------|------|------|
| Shop price (£)    | 5    | 6    | 8 | 8 | 8    | 9    | 10   | 13   | 13   | 17   |
| Website price (£) | 2.90 | 3.50 | 2 | 4 | 4.50 | 4.50 | 5.40 | 7.20 | 8.00 | 9.80 |

5 (a) The first six points have been plotted on this scatter diagram.

Complete the scatter diagram.

(2 marks)





5 (b) Describe the type of correlation shown on the scatter diagram.

.....  
(1 mark)

5 (c) A book has a shop price of £ 15.

Estimate its website price.  
You **must** show your working.

£ ..... (2 marks)

5 (d) The shop manager thinks that one of the prices on the website is incorrect.

Circle this point on the graph.  
Give a reason for your answer.

.....  
.....  
(2 marks)

Turn over for the next question

7

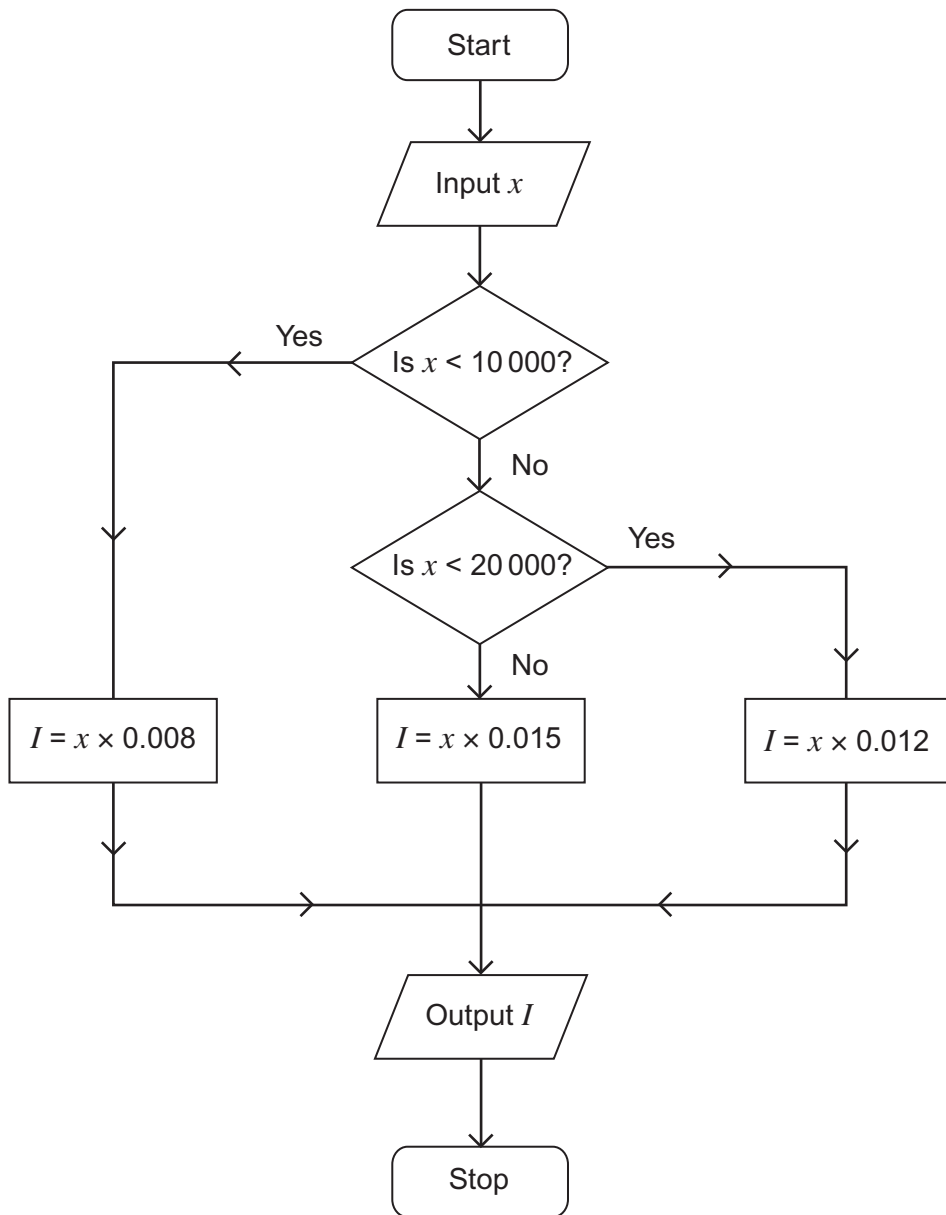
Turn over ►



6 These interest rates are paid on investments.

| Investment           | Interest rate (percent per year) |
|----------------------|----------------------------------|
| Less than £ 10 000   | 0.8                              |
| £ 10 000 to £ 19 999 | 1.2                              |
| £ 20 000 or more     | 1.5                              |

This flow chart can be used to work out the interest, £  $I$ , earned on an investment of £  $x$ .



**6 (a)** Phil makes an investment of £ 2000.

How much interest does Phil earn?

.....  
.....

£ ..... (2 marks)

**6 (b)** Sam makes an investment of £ 36 000.

How much interest does Sam earn?

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£ ..... (2 marks)

**6 (c)** Megan's investment earns £ 225 interest.

How much was her investment?

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£ ..... (3 marks)

7

Turn over ►

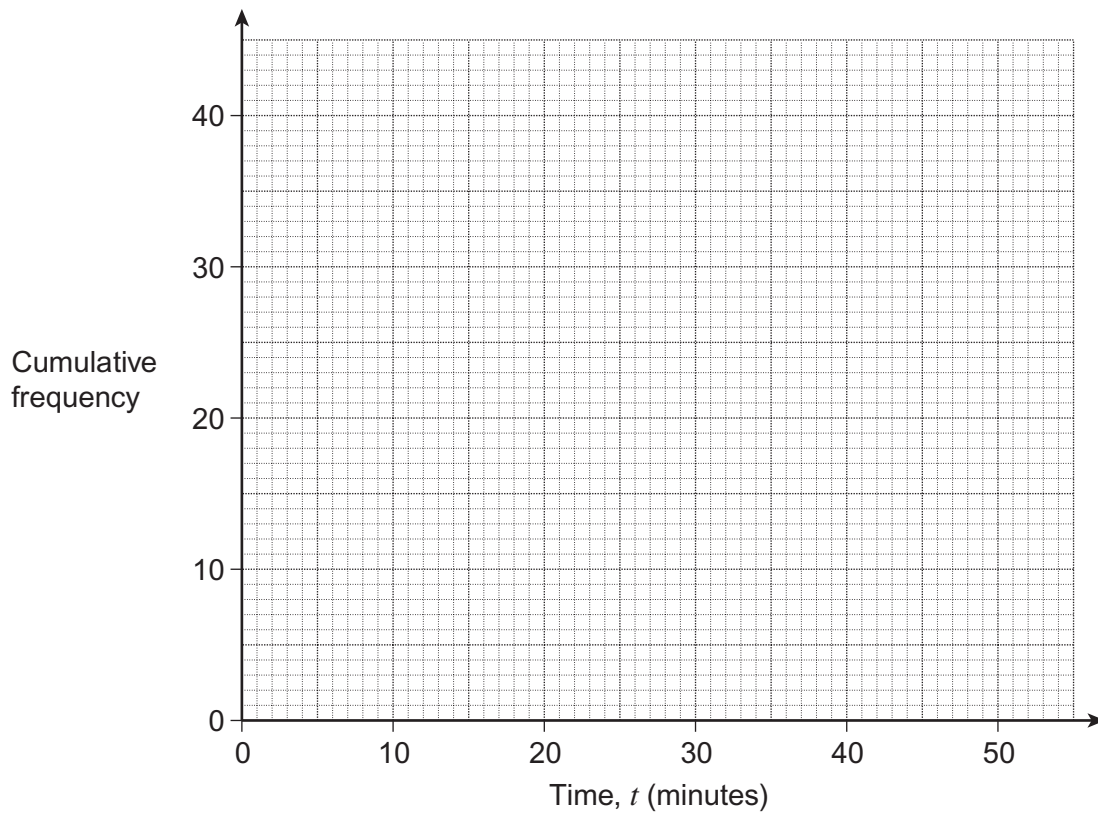


7 Dan and Jane take it in turns to drive to work.

The table shows information about 40 journeys when Dan drives.

| Time, $t$ (minutes) | Frequency |
|---------------------|-----------|
| $10 \leq t < 20$    | 8         |
| $20 \leq t < 25$    | 10        |
| $25 \leq t < 30$    | 14        |
| $30 \leq t < 45$    | 8         |

7 (a) Draw a cumulative frequency diagram to show this information on the grid.



(4 marks)



7 (b) Use your graph to estimate the median journey time.

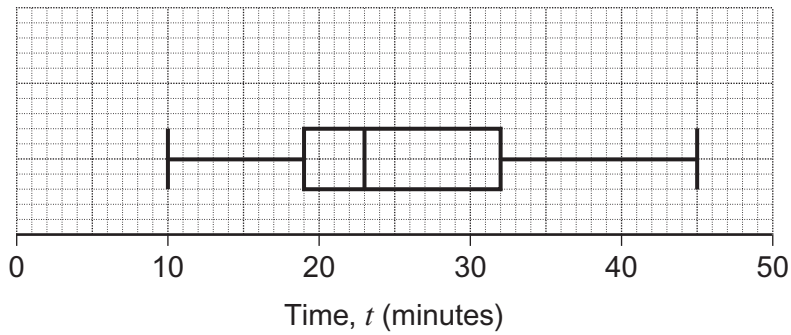
Answer ..... minutes (1 mark)

7 (c) Use your graph to estimate the interquartile range.

.....

Answer ..... minutes (2 marks)

7 (d) The box-and-whisker plot shows information about 40 journeys when Jane drives.



Jane says,  
"My times are quicker and more consistent than Dan's."

Comment on Jane's statement.

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(4 marks)



**8** Some boys share a bag of sweets.

If each boy has 6 sweets, there will be 5 sweets left in the bag.  
If there were 3 more sweets in the bag, each boy could have exactly 7 sweets.

How many sweets were in the bag?

.....  
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Answer ..... (4 marks)

**9** In 2008, the number of visitors to the Lake District was  $8.3 \times 10^6$   
These visitors spent a total of  $\pounds 1.171 \times 10^9$

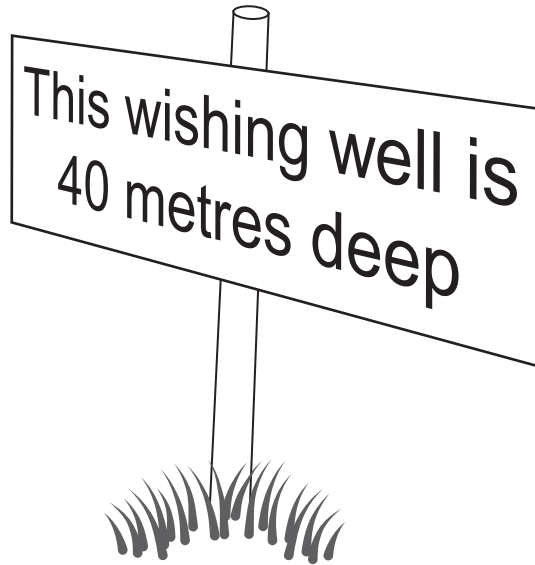
On average, how much did each visitor spend?  
Give your answer to the nearest pound.

.....  
.....  
.....  
.....

£ ..... (3 marks)



\*10 Here is a sign by a wishing well.



A formula for estimating the depth,  $d$  metres, of a well is

$$d = 5t^2$$

where  $t$  is the time in seconds taken by an object to reach the water at the bottom of the well.

A coin is dropped into the well.  
It takes 2.8 seconds, to the nearest tenth of a second, to reach the water.

Does this information support the statement on the sign?  
You **must** show your working.

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(5 marks)



11 The table shows information about the time,  $t$  (minutes), 100 people spend visiting a castle.

| Time, $t$ (minutes) | Frequency |
|---------------------|-----------|
| $0 < t \leq 40$     | 12        |
| $40 < t \leq 60$    | 36        |
| $60 < t \leq 80$    | 24        |
| $80 < t \leq 150$   | 28        |

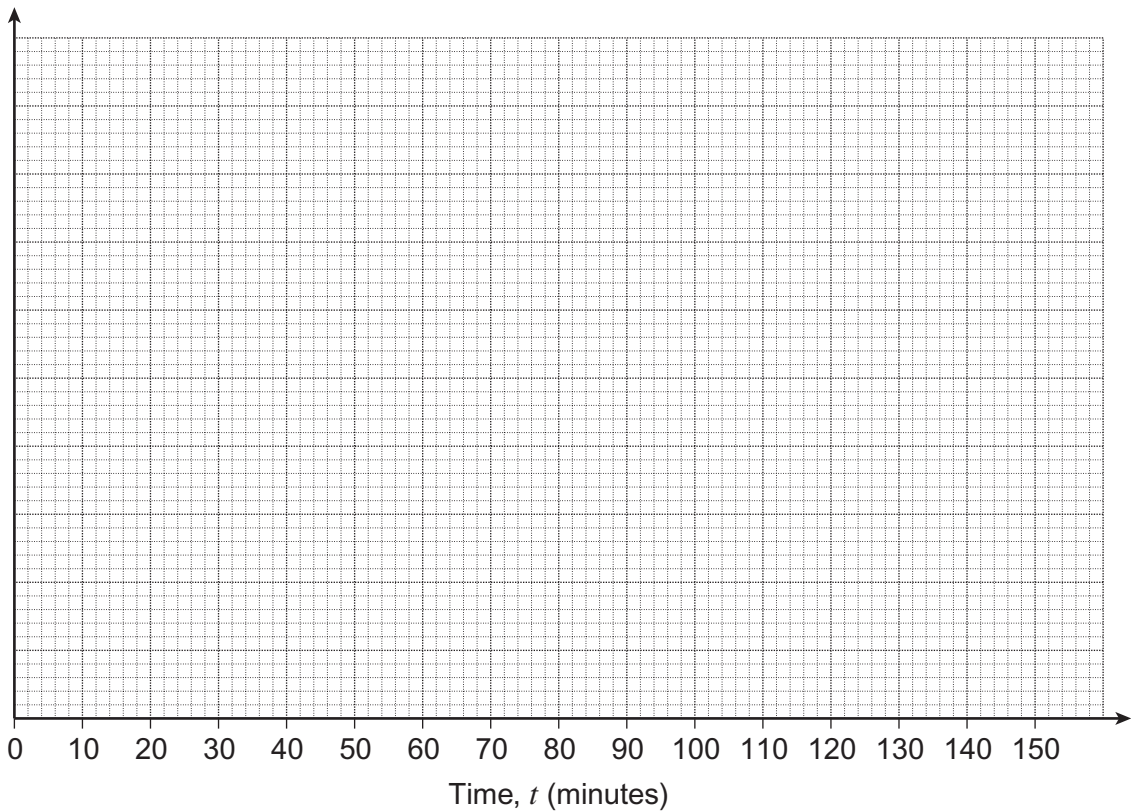
11 (a) Draw a histogram to represent this information.

.....

.....

.....

.....



(3 marks)





11 (b) The table shows information about the time,  $t$  (minutes), 80 people spend visiting a stately home.

| Time, $t$ (minutes) | Frequency |
|---------------------|-----------|
| $0 < t \leq 40$     | 15        |
| $40 < t \leq 60$    | 25        |
| $60 < t \leq 80$    | 22        |
| $80 < t \leq 150$   | 18        |

Naz says,

“The median time at the castle is almost 2 minutes more than the median time at the stately home.”

Is he correct?  
You **must** show your working.

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(5 marks)

Turn over for the next question



**12** A joiner makes two types of garden table.

Deluxe tables each cost £ 400 to make.  
Economy tables each cost £ 200 to make.

She decides to

- spend no more than £ 3000
- make at least two of each type of table
- make no more than 10 tables altogether.

**12 (a)** One inequality for this information is  $d + e \leq 10$

Explain what the letters  $d$  and  $e$  stand for.

.....

.....

(1 mark)

**12 (b)** Use the information above to show that  $2d + e \leq 15$

.....

.....

.....

(1 mark)

**12 (c)** The joiner makes a profit of £ 80 on each deluxe table sold.  
She makes a profit of £ 50 on each economy table sold.

The lines  $d = 2$  and  $2d + e = 15$  are drawn on the graph opposite.

Complete the graph to show all the information and work out the maximum profit she can make.

.....

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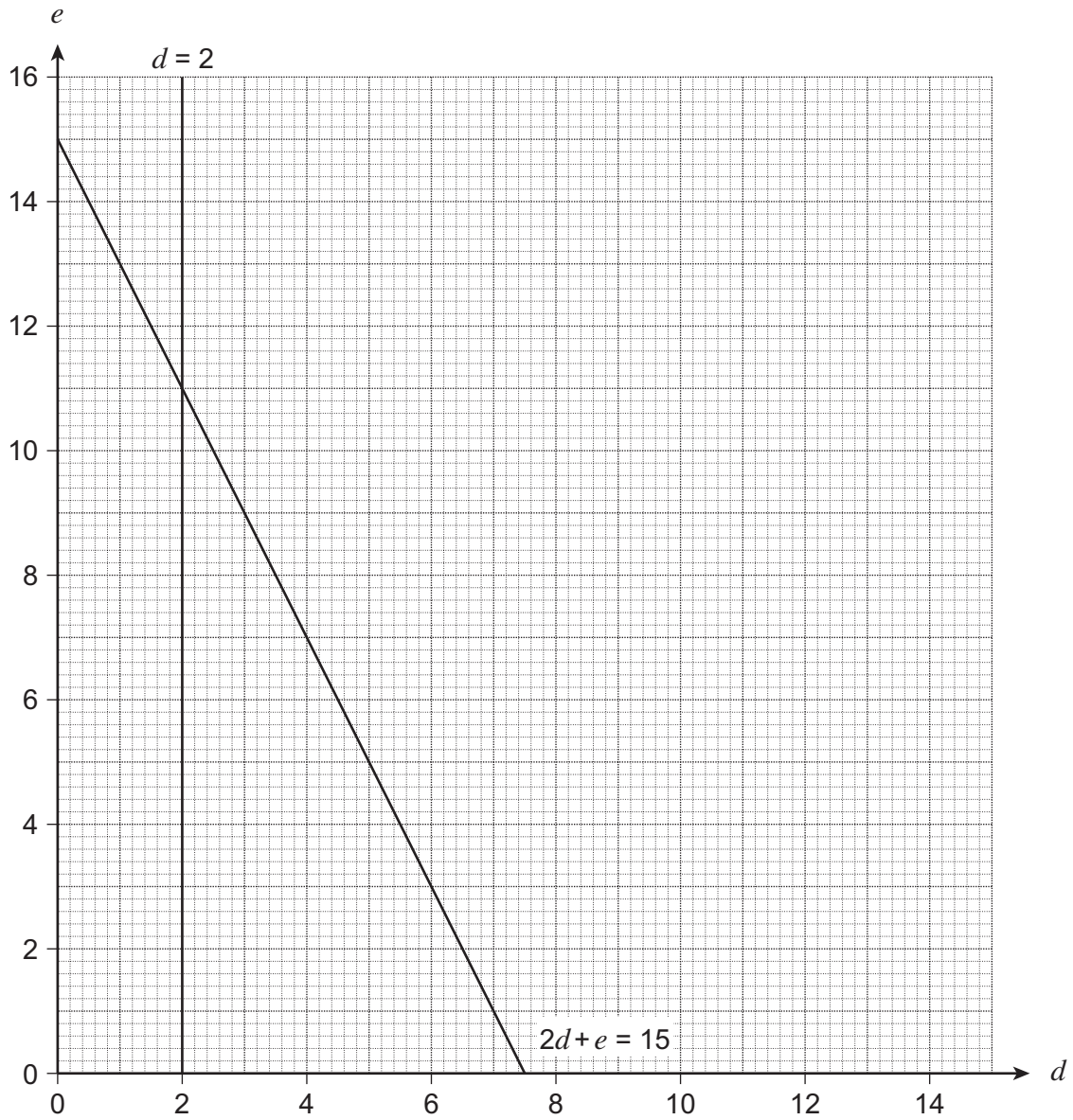
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£ ..... (5 marks)





**END OF QUESTIONS**



**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

