Surname	
Other Names	
Candidate Signature	

AQA

General Certificate of Secondary Education
Higher Tier
November 2013

Applications of Mathematics (Linked Pair Pilot)
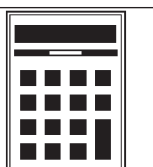
93701H

H

Unit 1   Finance and Statistics

Friday 8 November 2013   9.00 am to 10.30 am

For this paper you must have:
● mathematical instruments.
You may use a calculator.

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 π button, take the value of π 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 1, 2, 3 and 9.
  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 book.
● You are expected to use a calculator where appropriate.

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

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

1 The spreadsheet shows information about some items sold in a shop.

	A	B	C	D
1	Item	Price (£)	Quantity sold	Income (£)
2	Bolts	2.28	30	68.40
3	Screws	1.79	42	75.18
4	Locks	3.42	15	
5				

1 (a) What formula is used in cell D2?

Answer .... *(1 mark)*

1 (b) Work out the value in cell D4.

....

Answer .... *(1 mark)*

*1 (c) Cell D5 is used for the total income.

Write down the formula for cell D5.

....

Answer .... *(2 marks)*

*2   A bank pays interest on savings at a rate of 2% per year.

Complete the flow chart to work out the interest on savings of £A after one year.

Remember to include   input,   action,   output,   and   end boxes.

Start
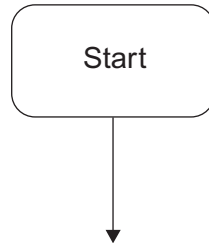
(4 marks)

3 The table shows information about flight times, t (hours), to Spain.

Time, t (hours)	Frequency
$2 \leqslant t < 2.5$	4
$2.5 \leqslant t < 3$	10
$3 \leqslant t < 3.5$	5
$3.5 \leqslant t < 4$	1

*3 (a) Draw a suitable frequency diagram to represent the data.
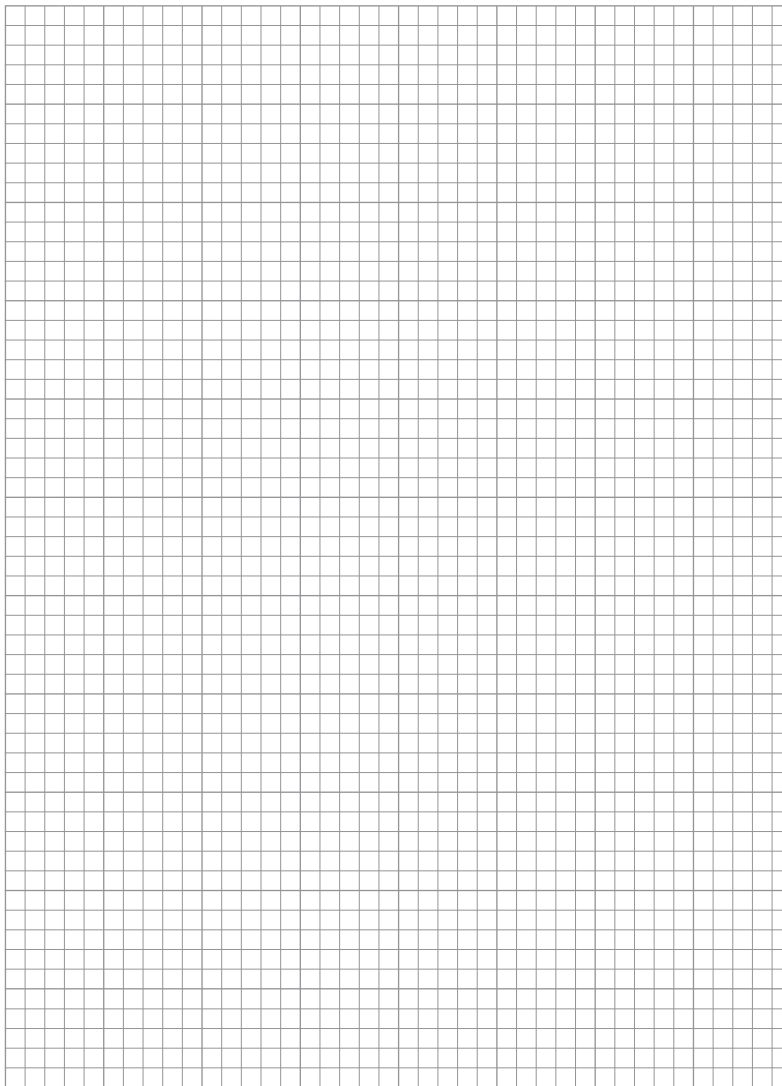
(4 marks)

3 (b) Use midpoints to estimate the mean flight time.

Flight time, t (hours)	Frequency	Midpoint	
$2 \leqslant t < 2.5$	4		
$2.5 \leqslant t < 3$	10		
$3 \leqslant t < 3.5$	5		
$3.5 \leqslant t < 4$	1		

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Answer .... hours   *(3 marks)*

3 (c) Flights of less than 3 hours are called short-haul flights.

What percentage of these flights to Spain are short-haul flights?

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Answer .... %   *(2 marks)*

9

Turn over ▶

4 Bulbs are sold in packs.

A pack of 15 bulbs costs £5
A pack of 20 bulbs costs £6.10
A pack of 25 bulbs costs £6.50

Work out the cheapest way to buy **exactly** 80 bulbs.
You **must** show your working.

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Cheapest way ....

Cheapest cost £ ....

(3 marks)

5 Sam's car insurance should cost £2000

He is given a 30% discount.

How much does he pay?

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£ .... *(3 marks)*

6 A librarian wants to improve the services provided by a library.

6 (a) He decides to interview people coming out of a supermarket one Monday morning.

Give **two** reasons why this is not a good sample to take.

Reason 1 ....

....

Reason 2 ....

....

(2 marks)

6 (b) Write a suitable question the librarian could ask to find the age of people using the library.

Include response boxes.

(2 marks)
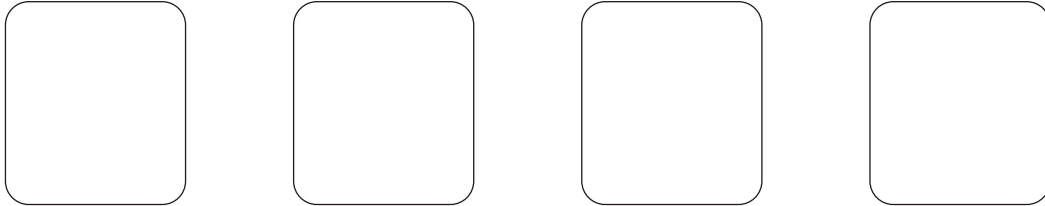
10

Turn over ▶

7   A **single digit** number is written on each of the cards below so that

all of the numbers are greater than zero

the mean of the four numbers is twice the mode.

Work out a possible set of numbers.

(3 marks)

8 (a) Jane earns £ 1200 per month, before any deductions.

Her tax allowance is £ 9440 per year.

She pays tax at 20% of her taxable income.

How much tax does Jane pay in a year?

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£ .... *(4 marks)*

8 (b) Jane saves £ 784

She spends it on a holiday and new clothes in the ratio 5 : 2

How much does she spend on the holiday?

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£ .... *(2 marks)*

Turn over ▶

*9   In a school election there are three candidates, Amir, Beth and Carla.

Amir gets x votes.

Beth gets $2x$ votes.

Carla gets 40 votes fewer than Beth.

500 pupils vote in the election.

Set up and solve an equation to work out how many votes Beth gets.

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Answer ....   *(5 marks)*

10 In this question assume that all the men work for the same hours and at the same work rate.

A builder estimates 5 men would need 12 days to complete the job.

What would his estimate be for 4 men to complete the same job?
You **must** show your working.

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Answer .... days   *(3 marks)*

Turn over for the next question

Turn over ▶

11 Ben is investigating the depreciation in the value of 1-year-old cars.
The depreciation is given as a percentage of the price of the car when new.

He collects this information about **diesel** cars.

Depreciation, d (%)	Frequency
$10 < d \leqslant 20$	15
$20 < d \leqslant 30$	24
$30 < d \leqslant 40$	17
$40 < d \leqslant 50$	4

Depreciation, d (%)	Cumulative frequency
$\leqslant 10$	
$\leqslant 20$	
$\leqslant 30$	
$\leqslant 40$	
$\leqslant 50$	

11 (a) Complete the cumulative frequency table and draw the graph.
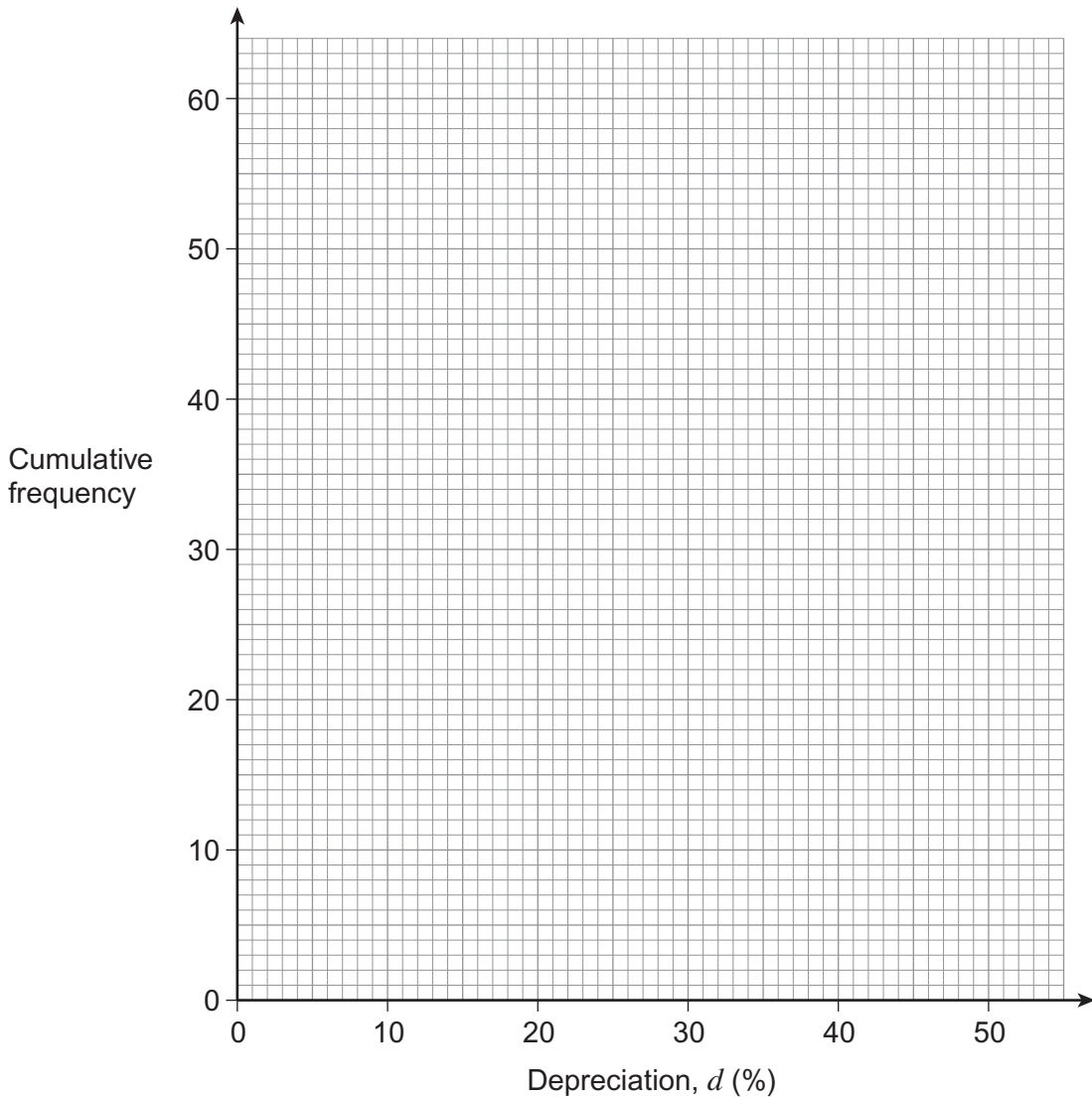
(4 marks)

11 (b)   Use your graph to find the median value and interquartile range.

....

....

Median .... %

Interquartile range .... %   *(3 marks)*

11 (c)   Ben collected information about the depreciation of 1-year-old **petrol** cars.

He finds this data.

Median	32%
Interquartile range	22%

Ben says 'Diesel cars keep their value better than petrol cars'.

Use the data to make **two** comments on his hypothesis.

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(2 marks)

9

Turn over ▶

12 The table shows information about the number of new cars sold, in thousands, in Maryway for each quarter of 2011 and 2012

Some of the four-point moving averages have been calculated.

	2011				2012			
Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Cars (thousands)	89	106	99	84	79	92	85	68
Four-point moving average		94.5	92	88.5	85			

12 (a) Give a reason why four-point moving averages are appropriate.

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(1 mark)

12 (b) Calculate the next four-point moving average.

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(2 marks)

A time-series graph has been drawn for the data.
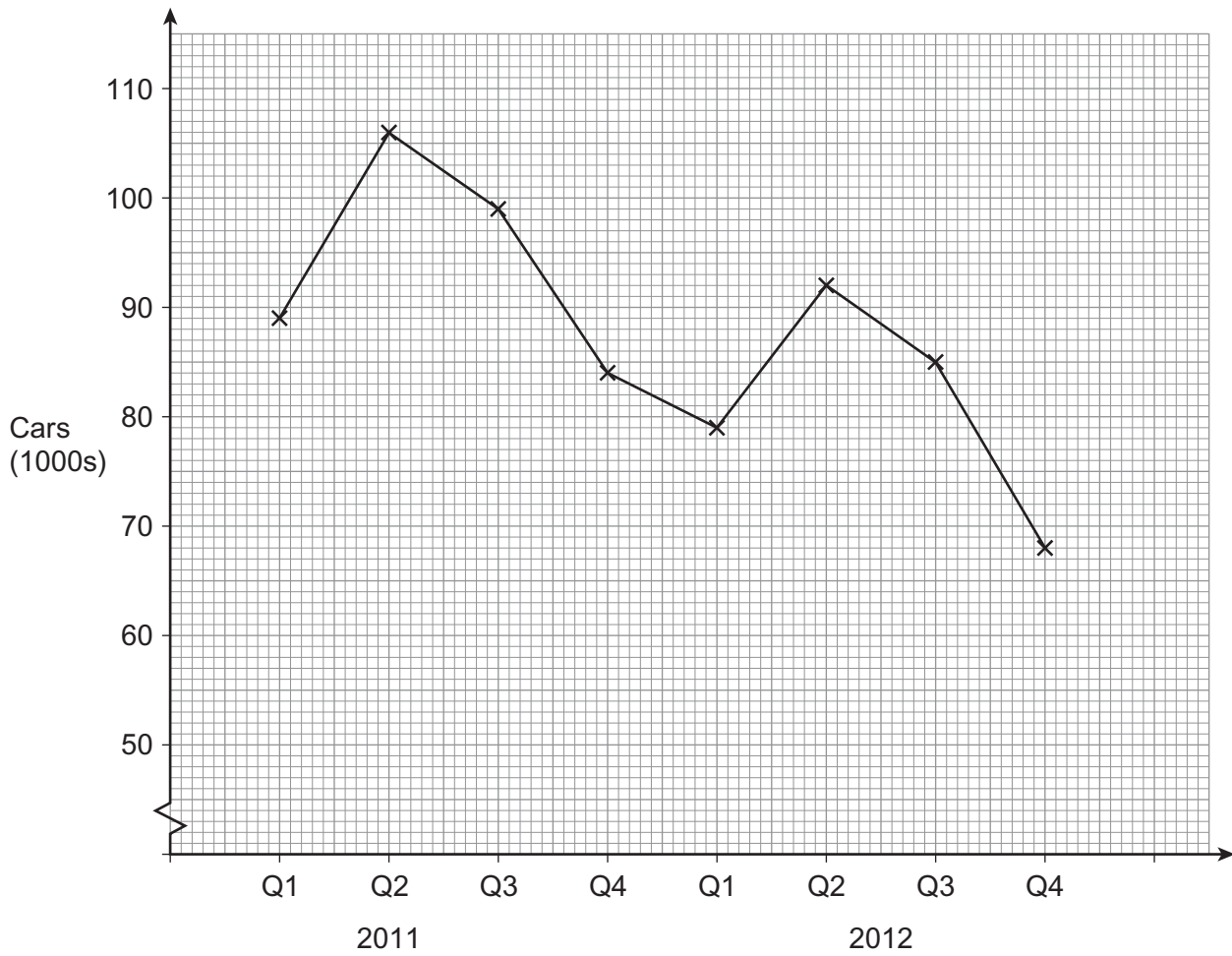
12 (c) Plot the **five** moving averages on the time-series graph.

(2 marks)

12 (d) Use a trend line to help you estimate the number of cars sold in the first quarter
of 2013
You **must** show your working.

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Answer .... *(3 marks)*

8

Turn over ▶

13   Mia sets up a website to sell candles.

In the first month she has 826 orders.

This is exactly 40% of the number of times her website was viewed.

13 (a)   How many times was her website viewed in the first month?

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Answer ....   *(2 marks)*

13 (b)   The next day **everyone** who views her website places an order.

This increased the orders to exactly 41% of the times her website was viewed.
x orders were placed that day.

Use algebra to work out the number of orders placed that day.
You **must** show your working.

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Answer ....   *(4 marks)*

14 In 2010 the total population of Barrow was 71 000 to the nearest thousand.

The number of people aged 65 years or over was 13 000 to the nearest thousand.

Work out the maximum value for the percentage of people who were aged 65 years or over in Barrow in 2010

You **must** show your working.

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Answer .... % *(4 marks)*

Turn over for the next question

10

Turn over ▶

15 A shopkeeper buys and sells oranges and grapefruit.

She buys them in boxes.
She has space for up to 16 boxes.

She buys x boxes of oranges at £10 each.
She buys y boxes of grapefruit at £30 each.

She does **not** want to spend more than £300

15 (a) Use this information to show that $x + 3y \leqslant 30$

....

....

(1 mark)

15 (b) Write down another inequality that involves x and y.

....

Answer .... *(2 marks)*

15 (c) Each box of oranges is sold for £20
Each box of grapefruit is sold for £50

The line $x + 3y = 30$ has been drawn on the grid opposite.

Use the graph to work out the number of boxes of each type of fruit that need to be sold to make the maximum profit, and hence find this profit.
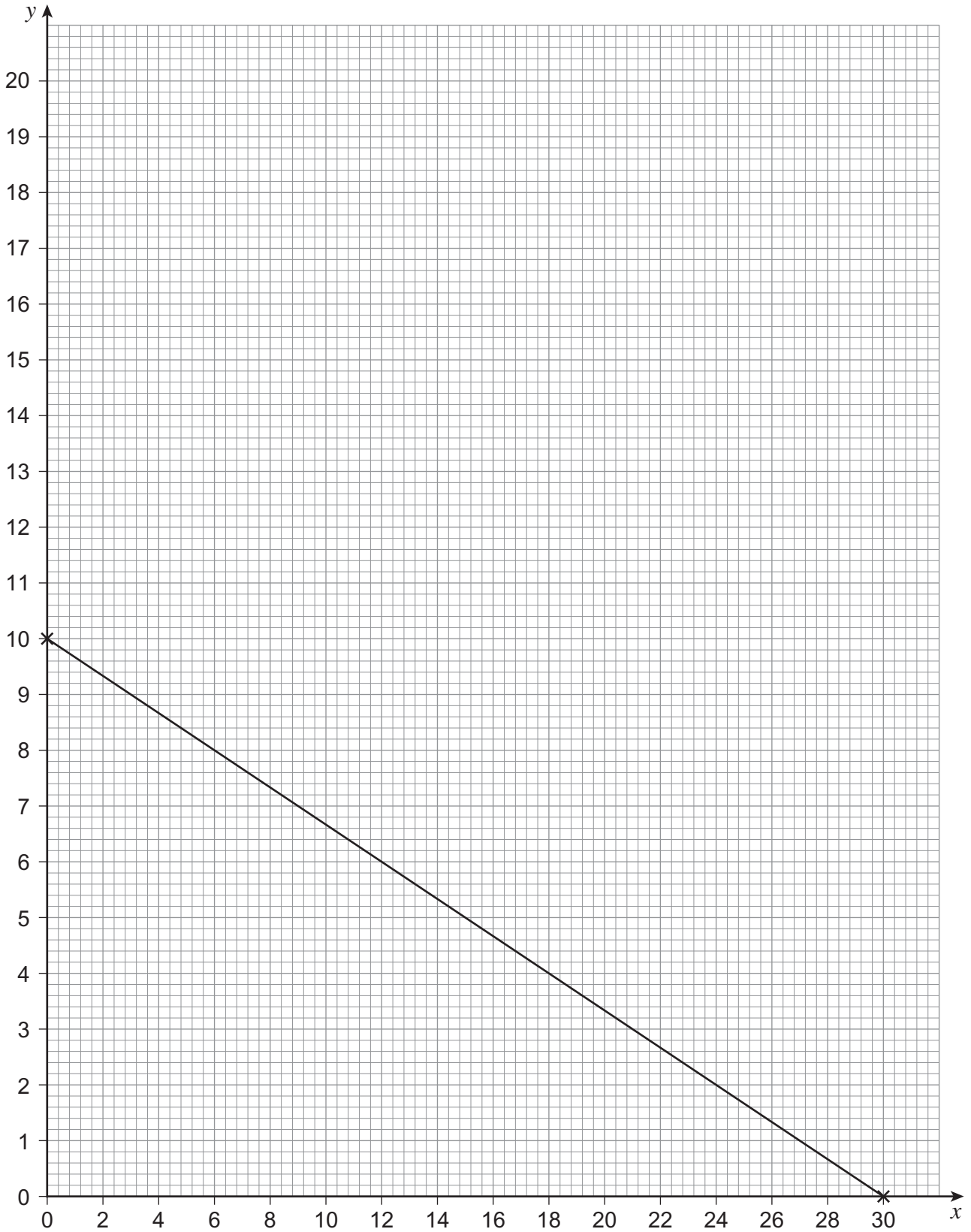
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Number of boxes of oranges ....

Number of boxes of grapefruit ....

Profit £ .... *(6 marks)*

END OF QUESTIONS

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED