Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4361/01

S16-4361-01

APPLICATIONS OF MATHEMATICS

UNIT 1: Applications 1
FOUNDATION TIER

A.M. THURSDAY, 9 June 2016

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.*(a)(b)*	**9**	
2.*(c)*	**5**	
3.	**11**	
4.	**9**	
5.	**5**	
6.	**11**	
7.	**4**	
8.	**3**	
9.	**5**	
10.*(a)(b)(c)(d)*	**11**	
10.*(e)*	**3**	
Total	**80**	

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ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **4***(b)*.

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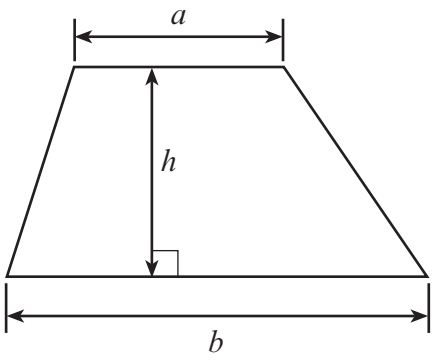
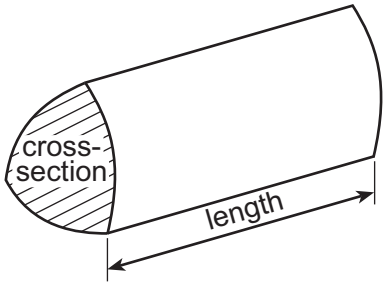
Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



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1. Anwen's phone number has 6 digits.
Anwen remembers her phone number as three lots of 2-digit numbers.

The first 2-digit number is a prime number between 20 and 25.
The second 2-digit number is a square number between 50 and 70.
The third 2-digit number is a factor of 30 that is divisible by 3.

All 6 digits of her phone number are different.

What is Anwen's phone number? [4]

.....

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.....

.....

4

Anwen's phone number is: ....

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2. Jim grows potatoes in his garden.

He grows the potatoes by planting seed potatoes during the Spring.

Jim sees an advert in the local gardening magazine.

> 1 kg of seed potatoes costs £1.99
>
> 1 kg of seed potatoes will produce 12 kg of potatoes to eat

Jim decides to buy 15 kg of these seed potatoes.

(a) How much will Jim pay for these seed potatoes? [2]

.....

.....

(b) (i) How many kilograms of potatoes are the seed potatoes that Jim buys likely to produce? [2]

.....

.....

(ii)

> Supermarket offer!
>
> 2·5 kg bag of potatoes for £2

Jim uses all of the potatoes he has grown.
How much is he likely to save by growing his own potatoes rather than buying the same amount of potatoes at the supermarket? [5]

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(c) The part of the garden where Jim grows his potatoes is rectangular in shape.
It has an area of 250 square metres and is 10 metres wide.
Jim needs to buy fencing to go around this part of the garden.
What length of fencing does he need to buy?
State the units of your answer. [5]

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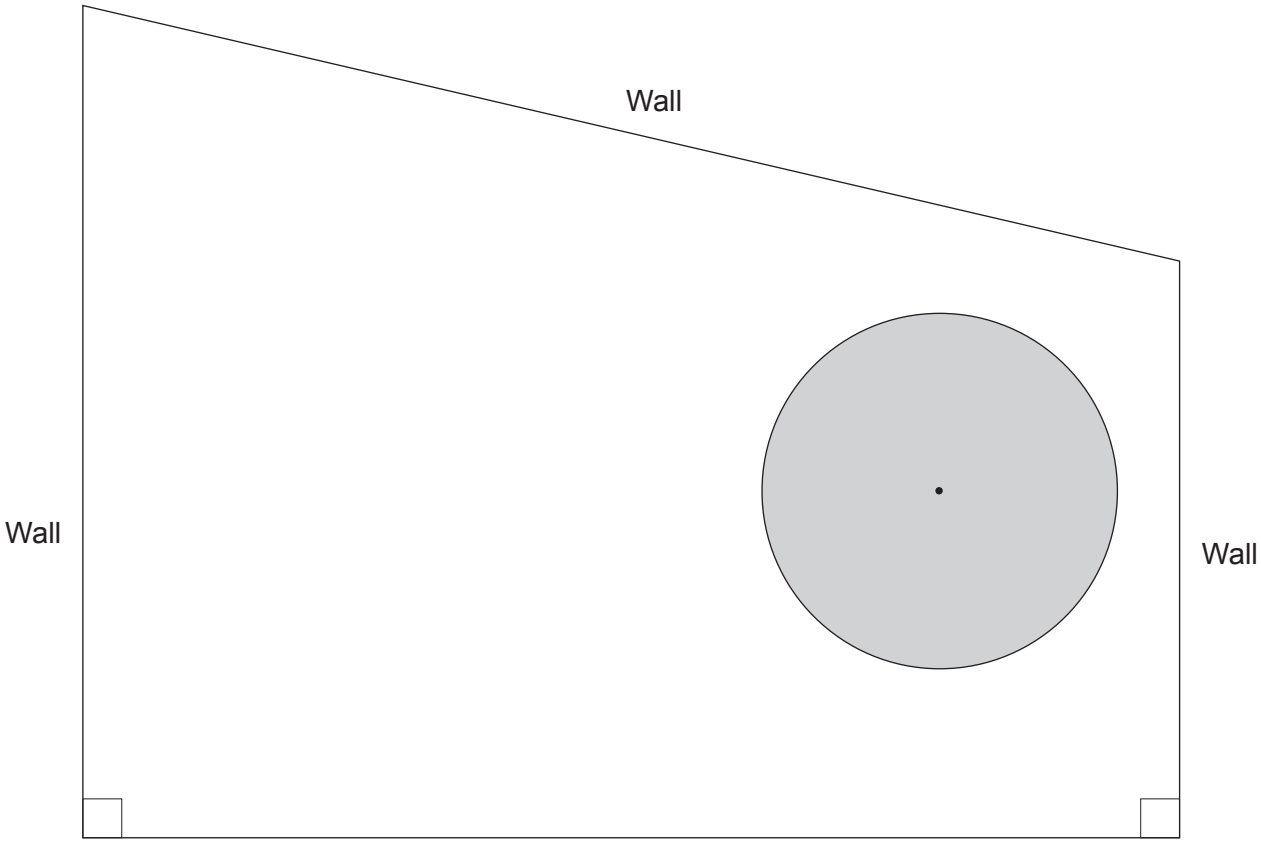
3. The diagram below is a **scale drawing** of Imran's garden.
The angles in two of the corners are each 90°, as shown.
Imran has a circular pond in his garden.
There is a wall that runs on 3 sides of the garden.

Scale: 1 cm represents 2 metres



(a) What is the diameter of the pond in the scale drawing?

(i) Give your answer in centimetres. [1]

..... cm

(ii) Give your answer in millimetres. [1]

..... mm

(b) Measure the acute angle in the garden. [1]

..... °

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(c) What is the total length of the wall that runs on 3 sides of the actual garden? [4]

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Total length of the wall = ... m

(d) A square flower bed of side 4·6 m is to be placed in Imran's garden.
One of the corners of the flower bed is at *A*.
Draw the flower bed on the scale drawing. [2]

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(e) Imran knows that his garden is shaped as a quadrilateral.
What is the name of the quadrilateral?
Give a reason for your answer. [2]

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4.

A theme park advertises some of its prices as:

Single Tickets	
Standard (ages 13+)	£23
Reduced (see note below)	£16
Under 3s	FREE
Group Tickets	
Group of 4 (2 standard & 2 reduced)	£68
Group of 5 (2 standard & 3 reduced)	£80
Group of 6 (2 standard & 4 reduced)	£92

Note:
Reduced prices are available for all those aged 3 to 12, senior citizens and disabled.

(a) How much will it cost for 2 adults and a child aged 10 to visit the theme park? [2]

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(b) You will be assessed on the quality of your written communication in this part of the question.

16 friends want to visit the theme park.
5 of the group are under the age of 13.
All the members of the group are over the age of 3.

What is the cheapest way to buy their tickets?
How much does this cost?

You must show all your working. [7]

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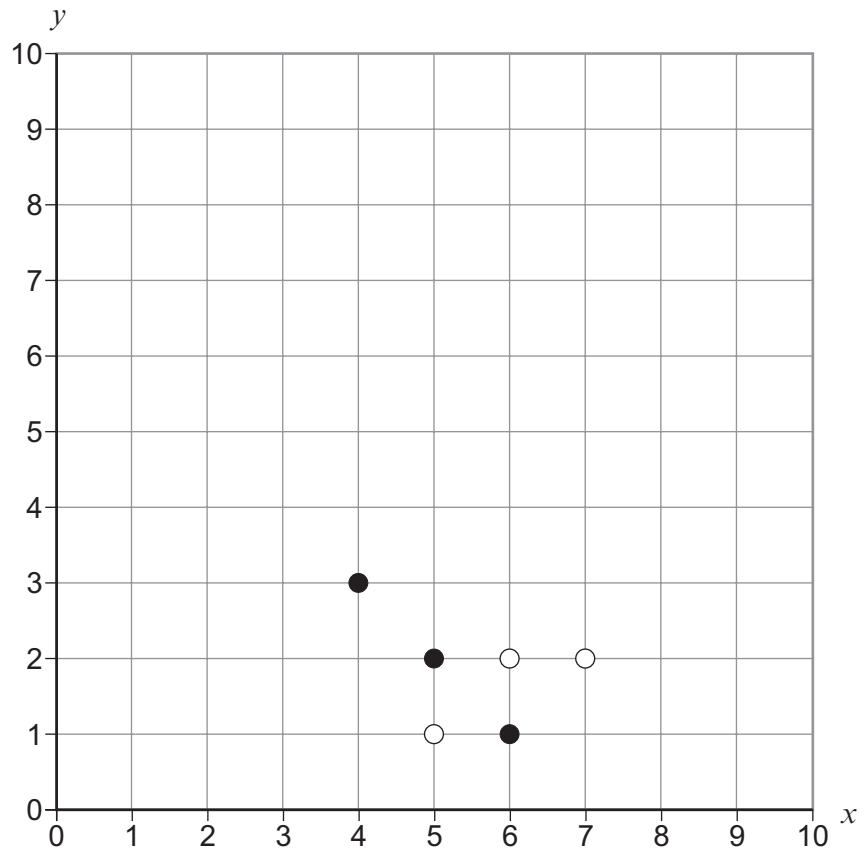
5. A game for 2 players is played on a grid using coordinates.
One player has white counters ○ .
The other player has black counters ●.

Players take it in turns to place a counter on the grid.
A player wins if they place 4 of their counters next to each other in a straight line, either horizontally, vertically or diagonally.

The players have taken 3 turns each.
The diagram below shows the position of their counters.



(a) The player with the white counters decides to place the next counter at (8, 2).
Draw this counter on the grid. [1]

(b) Where could the next black counter be placed in order to win the game?
Write down the coordinates of the position of this counter. [1]

(..... , ...)

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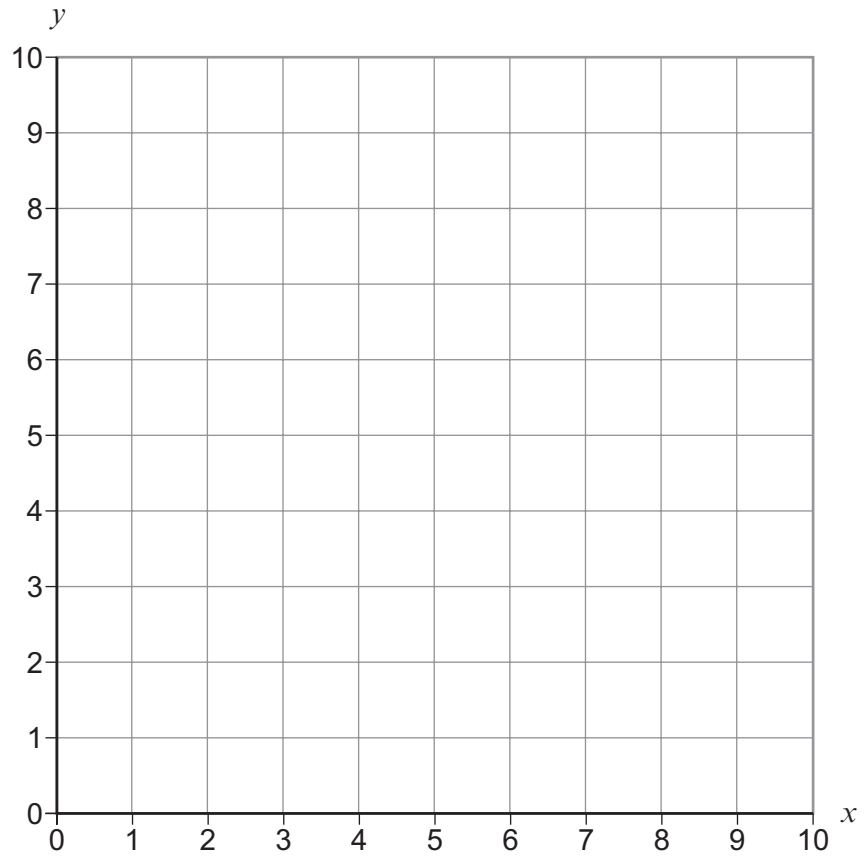
(c) At the end of another game, the player with black counters notices that all of his counters have been placed in positions where

$$y\text{-coordinate} = x\text{-coordinate} + 4.$$

On the grid below, show all the positions where the black counters could have been placed. [3]



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6.

(a) At a village fayre, a stall is raising money for charity using a game involving 2 bags of discs.

In each bag there are 5 discs.
In the 1st bag, the discs are numbered 1, 2, 3, 5 and 7.
In the 2nd bag, the discs are numbered 3, 4, 6, 8 and 9.

To play the game, one disc is selected at random from each bag.
The score for the game is the product of the numbers on the discs.

(i) Complete the following table to show all the possible scores. [2]

2nd bag \ 1st bag	1	2	3	5	7
9	9	18			
8	8	16			
6	6	12			
4	4	8	12	20	28
3	3	6	9	15	21

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(ii) You win a prize by getting a score of 12 or less.
It costs £1 to play the game once.
The prize for winning the game is £1.50.
If 200 people play the game once, estimate how much money will be raised for charity. [6]

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(b) On another stall, a group of children has a game involving rolling an ordinary 6-sided dice.

(i) What is the probability of obtaining the number 4 on one roll of this dice? [1]

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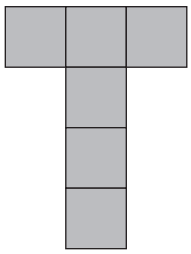
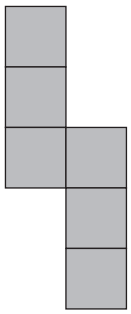
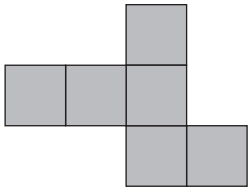
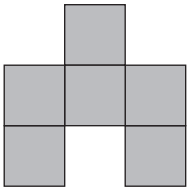
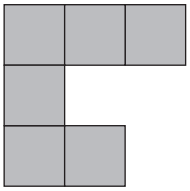
(ii) Circle the nets that could be used for the dice. [2]











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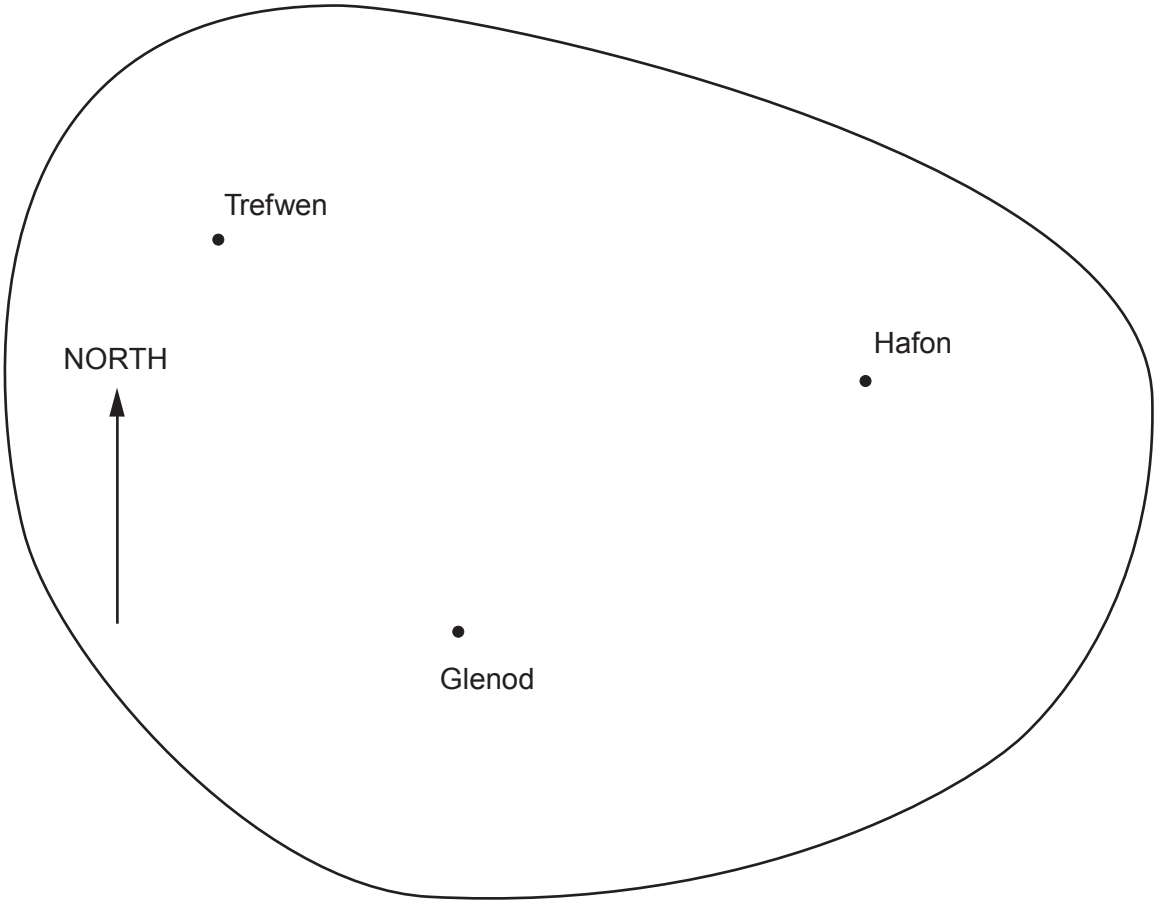
7. Trefwen, Hafon and Glenod are three castles.
The simplified map below shows the positions of the three castles.



A visitor centre is being built.

The visitor centre is on a bearing 035° from Glenod and on a bearing of 125° from Trefwen.
What is the bearing of the visitor centre from Hafon? [4]

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Bearing of the visitor centre from Hafon is ..... °

4

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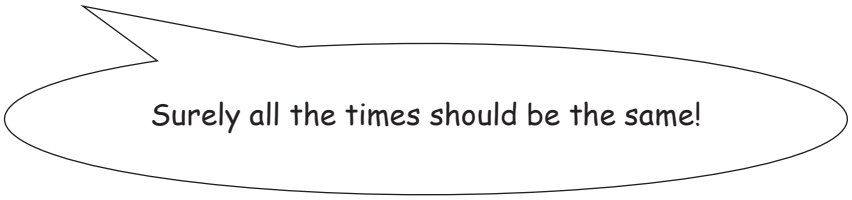
8. Judy, Trefor and Wyn each time how long it takes for a coin to fall from their classroom window to the ground outside.

Judy's coin takes 1·8 seconds.
Trefor's coin takes 2·4 seconds.
Wyn's coin takes 2·2 seconds.

Their friend Abbie says:



List **3** factors that could play a part in the times not being the same. [3]

1. .....

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2. .....

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3. .....

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9. Alfie sells 480 raffle tickets, at 50p each, to raise money for charity.

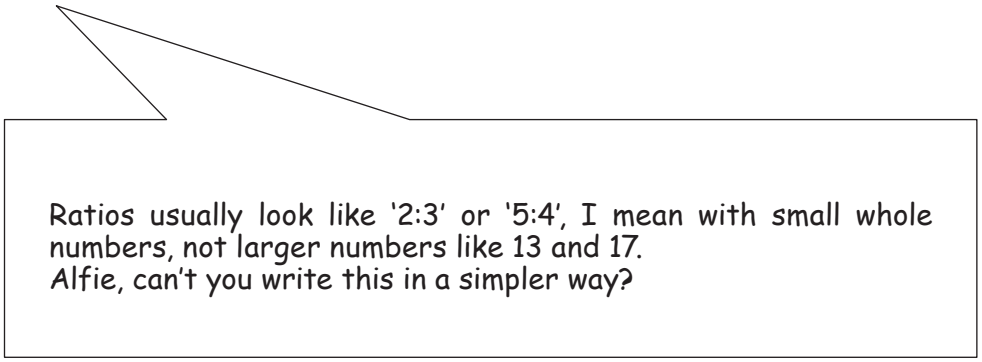
There are 3 different raffle prizes: a bike, roller skates and a teddy bear.

The bike and the roller skates were prizes donated by a local sports shop.
Alfie paid

- £12 for the teddy bear prize,
- £14 to have the raffle tickets printed, and
- £32 to print advertising posters.

After paying the costs, Alfie donates any money raised from the raffle to charity.
He intends to give the money to a children's charity and to the local hospice in the ratio 13:17.

(a) Gary says to Alfie:



How can Alfie explain to Gary that he cannot write the ratio 13:17 in a simpler way? [1]

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(b) Calculate how much money Alfie donates to the local hospice.
Give your answer correct to the nearest £. [4]

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10. *GoPrint* and *MyPrint* are two companies specialising in printing business cards.

The charges for the cards are shown in the table below.

<table>
<tr><th>*GoPrint* charges</th><th>*MyPrint* charges</th></tr>
<tr><td>The first 500 business cards are free.

Example prices:
<table><tr><td>1500 cards</td><td>500 free cards +
£10 for the other 1000 cards
Total cost £10</td></tr><tr><td>2500 cards</td><td>500 free cards +
£20 for the other 2000 cards
Total cost £20</td></tr><tr><td>4000 cards</td><td>500 free cards +
£35 for the other 3500 cards
Total cost £35</td></tr></table>
Ask for a price for any other number of cards required!</td><td>The first 1000 cards cost £20.

Buy more than 1000 cards for a small additional cost.

For example:
<table><tr><td>2000 cards</td><td>£20 for the first 1000 cards
+
£5 for the other 1000 cards
Total cost £25</td></tr><tr><td>3200 cards</td><td>£20 for the first 1000 cards
+
£11 for the other 2200 cards
Total cost £31</td></tr><tr><td>4400 cards</td><td>£20 for the first 1000 cards
+
£17 for the other 3400 cards
Total cost £37</td></tr></table>
Ask for a price!
No orders for fewer than 1000 cards are taken.</td></tr>
</table>

(a) After paying £20 for the first 1000 cards, how much **extra** does *MyPrint* seem to charge for each additional 100 cards? [2]

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(b) How much do you think *GoPrint* would charge for 1800 cards? [2]

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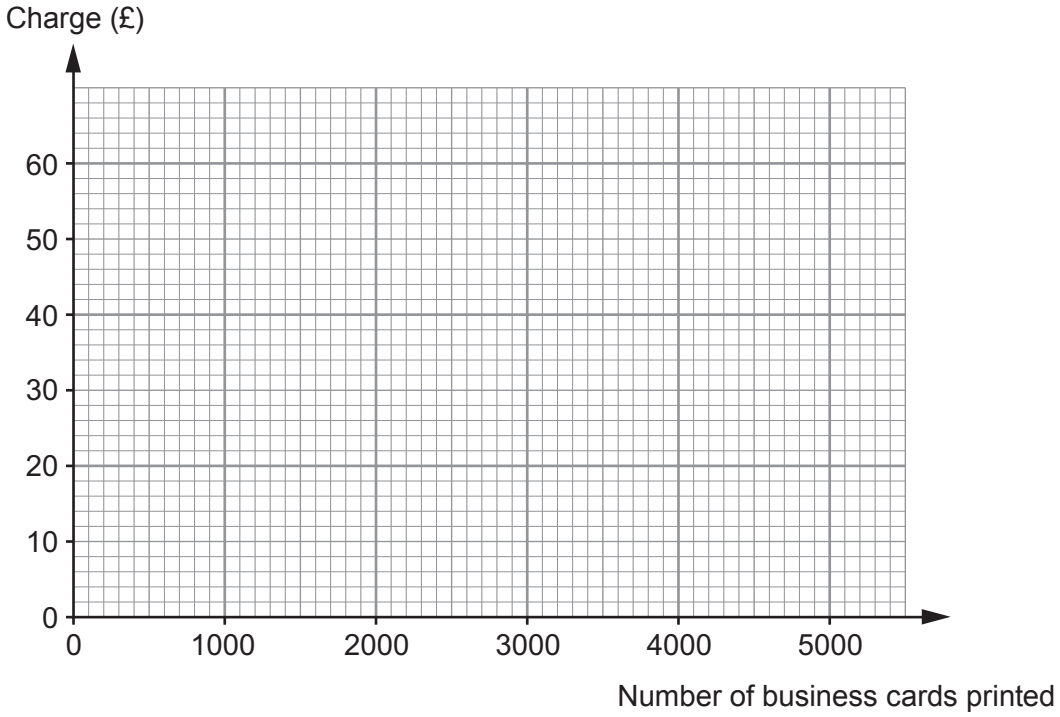
(c) Use the information given in the tables to draw graphs to represent the *GoPrint* and *MyPrint* charges for printing up to 5000 business cards.
Label your graphs clearly. [5]



(d) Rhian decides to order a number of business cards.
She finds that both of the companies, *GoPrint* and *MyPrint*, would charge the same for her order.
How many cards is Rhian intending to order? [2]

11

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(e) *MyPrint* uses the following formula for working out the charges for business cards,

$$C = 20 + \frac{5(n - 1000)}{1000}$$

where

- C is the charge in £, and
- n is the number of business cards printed.

(i) Use this formula to calculate the charge for 56 500 business cards. [2]

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(ii) A trainee in the offices of *MyPrint* takes a telephone call from a customer requesting 800 business cards.
Explain why the formula cannot be used. [1]

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END OF PAPER

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