

Surname	Centre Number	Candidate Number
Other Names		0



GCSE LINKED PAIR PILOT

4361/01



W16-4361-01

APPLICATIONS OF MATHEMATICS

UNIT 1: Applications 1

FOUNDATION TIER

A.M. WEDNESDAY, 13 January 2016

1 hour 30 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	3	
3.(a)	3	
3.(b)	3	
3.(c)	2	
3.(d)	2	
3.(e)	4	
4.	3	
5.	2	
6.	7	
7.	8	
8.(a)	7	
8.(b)(c)	6	
9.	3	
10.	7	
11.	7	
12.	9	
Total	80	

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

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.

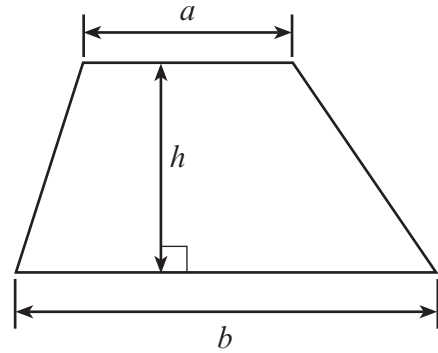
Scale drawing solutions will not be acceptable where you are asked to calculate.

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

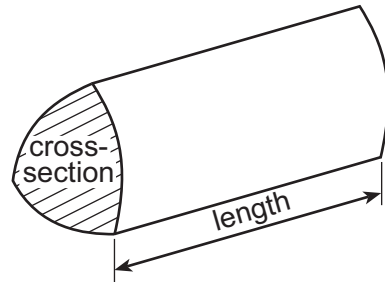
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 6.

Formula List

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



Volume of prism = area of cross-section \times length



1. (a) Siân has a bag containing 20 sweets.

10 of them have a strawberry flavour and 10 have an orange flavour.

Siân chooses one sweet at random.

Circle the best expression from those given below to describe the chance of Siân choosing a strawberry flavour sweet. [1]

impossible **unlikely** **even chance** **likely** **certain**

(b) Four friends, Ellie, Kieran, Tom and Nia enter a competition.

One friend is selected at random to win the competition.

Circle the best expression from those given below to describe the chance of Tom winning the competition. [1]

impossible **unlikely** **even chance** **likely** **certain**

(c) Paula writes each of the 10 letters of the word CAERNARFON on cards and places the cards face down on the table. She selects one card at random.

(i) Paula thinks the probability of obtaining any of the letters is the same. Explain why Paula is incorrect. [1]

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(ii) What is the probability of Paula **not** obtaining the letter E from the word CAERNARFON? [1]

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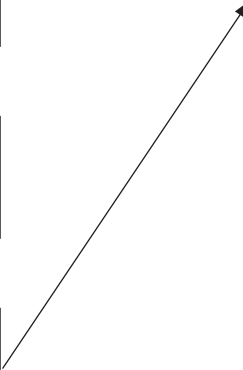
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2. Emyr has to match each statement with a number.
He has already matched one correctly.
Match each of the other statements with a correct number.

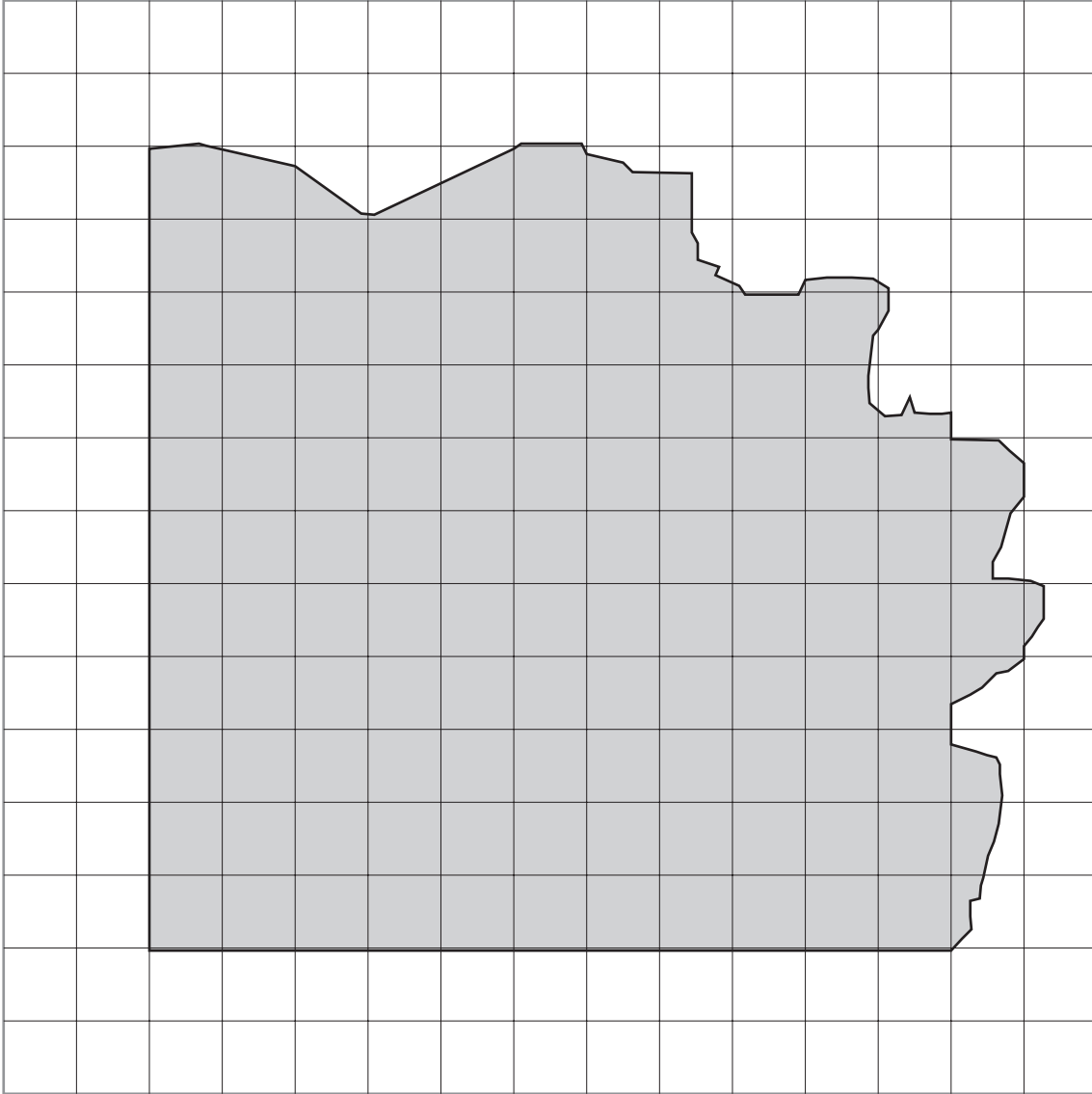
[3]

	6
This is a square number	30
This is a multiple of 10	8
This is a factor of 15	25
This is a cube number	13
This is the difference between 19 and 6	5
	2



3

3. (a) A clothes designer has a small piece of material, which is shown below on the centimetre square grid.



Estimate the area of the small piece of material.
State the units of your answer.

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Estimate for the area of the small piece of material =

[3]

3

(b) The designer wants to have a new emblem for the clothes that he creates.

The new emblem has:

- a rectangle measuring 11 cm by 9 cm,
- a circle of radius 3.5 cm,
- the centre of the circle at the centre of the rectangle.

In the space below, draw the emblem accurately.

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[3]

- (c) The designer decides to alter the outline of his emblem. He cuts out a square of side 2 cm from the top right-hand corner of the rectangle and places it at the bottom left-hand corner, as shown in the sketch below.

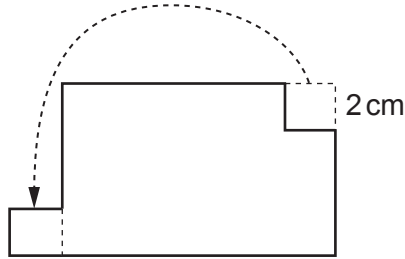


Diagram not drawn to scale

What is the difference between the perimeter of the original rectangle and the perimeter of the outline of the new emblem?
You must explain your answer. [2]

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- (d) The designer uses the following formula to work out how much it will cost to make an item of clothing.

Cost of making an item = (1.1 × time × cost per hour) + (2.2 × cost of materials)

Time is in hours and all costs are in £.

The time taken for making an item is 7 hours.
The cost per hour is £6.
The cost of the materials is £50.

Calculate how much it will cost to make this item. [2]

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- (e) The designer packs his items in boxes shaped as cuboids as shown below.

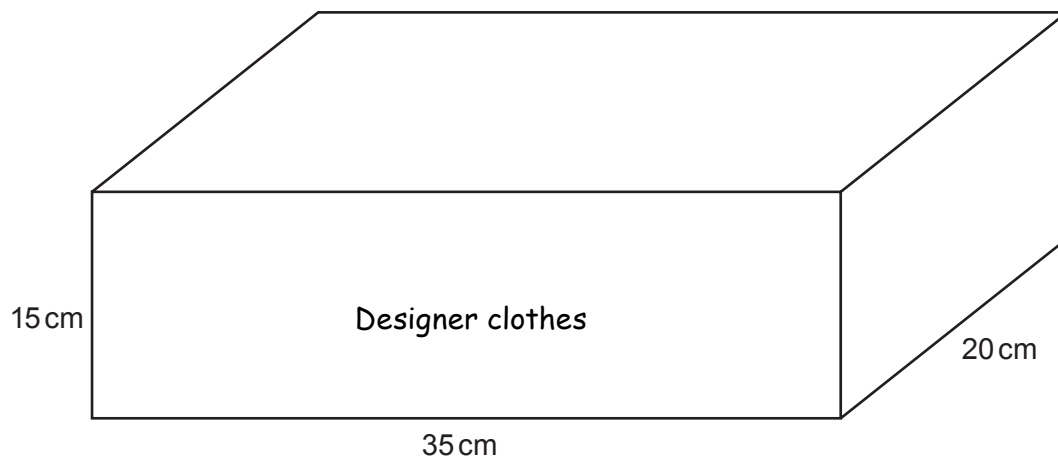
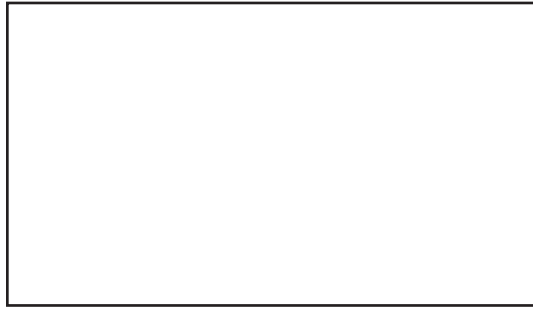


Diagram not drawn to scale

The base of the box is 35 cm long and 20 cm wide.
The box is 15 cm high.

Draw an accurate scale drawing of a net of the box on the opposite page.
Use a scale of **1 cm to represent 5 cm**.

An accurate scale drawing of the base of the box has already been drawn for you on the opposite page. [4]



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4. Clive works for a car company.

He is asked to conduct a survey of the most popular colour of car that people buy.

(a) Where do you think Clive should conduct his survey?
Give a reason for your answer.

[1]

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(b) Would Clive get the same results if he repeated his survey on a different day?
Give a reason for your answer.

[1]

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(c) Part of the way through his survey, Clive has recorded 18 black cars and 12 white cars.
Write this ratio of black cars to white cars in its simplest form.

[1]

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3

5. In a class, pupils were having a discussion about rounding values.

(a) Kim said: "175.1 rounded to the nearest 10 is 170."

Is Kim correct? Explain your answer.

[1]

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(b) Ali had been to see a concert the night before.
There were 7431 people at the concert.
He said: "There were around 7000 people at the concert last night".

Explain why this was a reasonable comment.

[1]

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2

6. You will be assessed on the quality of your written communication in this question.

Karen and her friend want to paint their garden fences.
They see the following offers for paint at *Paint4U*.

£13.99	£29.99	£49.99
 <p>1 litre</p>	 <p>2.5 litre</p>	 <p>5 litre</p>

Karen and her friend both buy 20 litres of the same paint from *Paint4U*.
Karen spends £79.84 less than her friend.
Explain how this could have happened.
Show all your working.

[7]

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7. Hannah bought a rectangular mirror.
The mirror is made up of triangles and quadrilaterals.

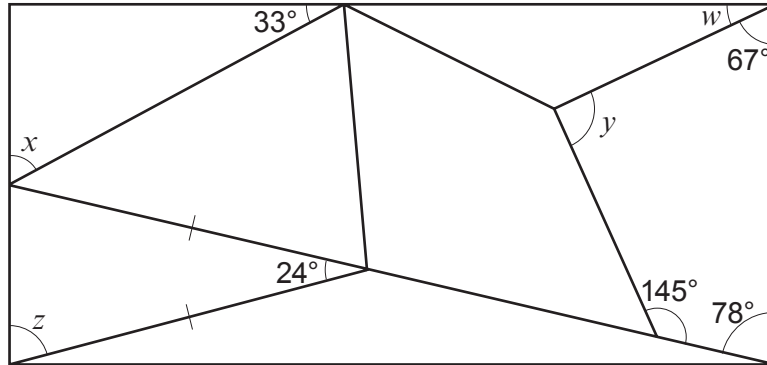


Diagram not drawn to scale

Write down the size of the angles w , x , y and z .

[8]

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$w =$ $^{\circ}$ $x =$ $^{\circ}$ $y =$ $^{\circ}$ $z =$ $^{\circ}$

8

8.



The table shows the midday temperature readings that were recorded in Paris on the first day of each month.

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temperature ($^{\circ}\text{C}$)	7	10	13	15	20	23	25	24	20	16	11	8

- (a) Find the mean, median, mode and range of these temperature readings and complete the tables below. [7]

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Mean midday temperature ($^{\circ}\text{C}$)	
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Median midday temperature ($^{\circ}\text{C}$)	
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Modal midday temperature ($^{\circ}\text{C}$)	
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Range of the midday temperature ($^{\circ}\text{C}$)	
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(b) Jenny looks at the midday temperatures for Paris and says:

"If I go on holiday to Paris in May, the hottest it will be is 20°C."

Is Jenny's statement correct? Give a reason for your answer.

[1]

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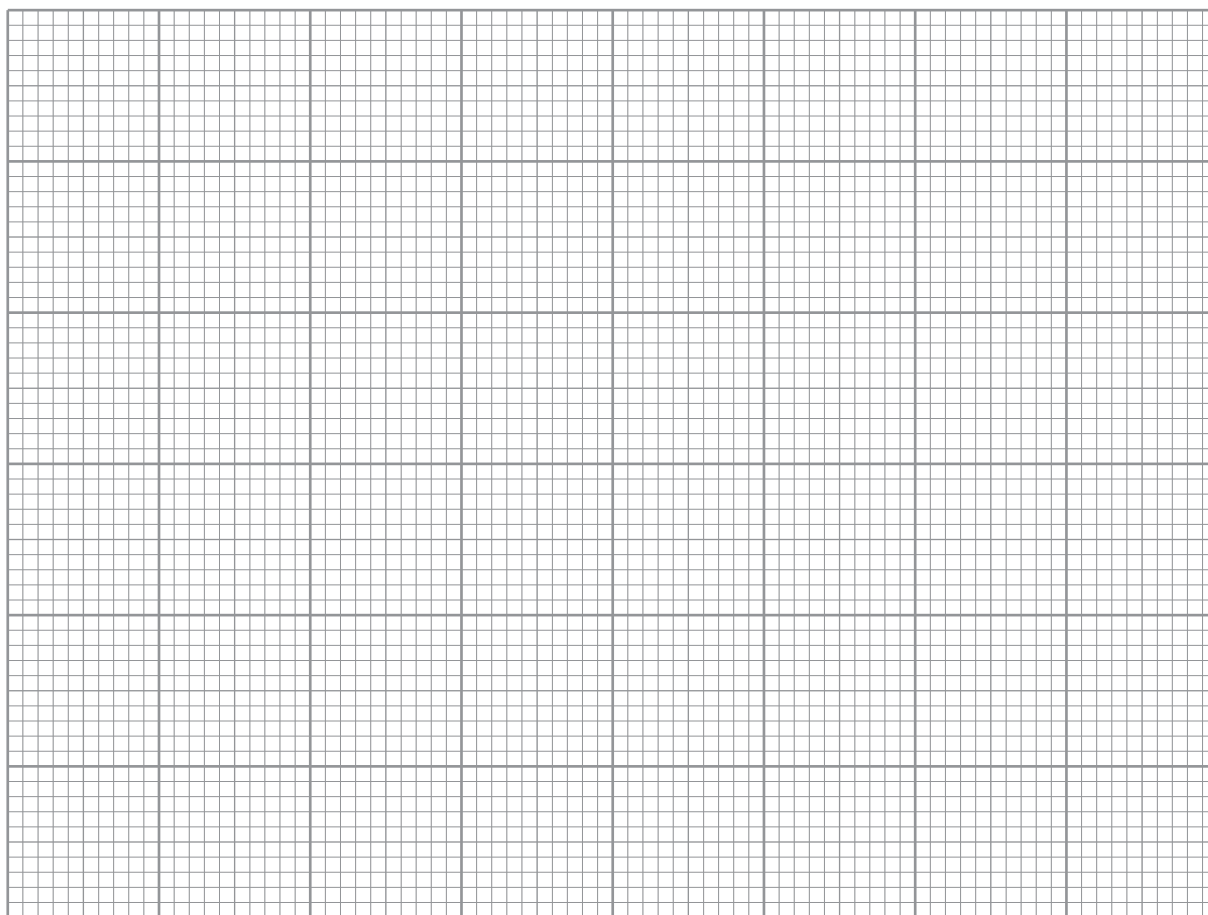
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(c) Jenny prefers to see data displayed graphically.

(i) Draw a time series graph, using the data on the previous page, to show the midday temperature readings that were recorded in Paris on the first day of each month.

[4]



(ii) Describe fully what happens to the midday temperature readings that were recorded in Paris on the first day of each month over the course of the year.

[1]

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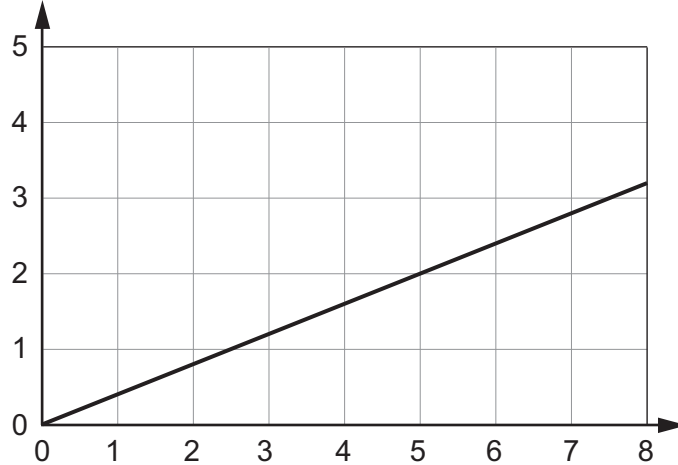
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9. (a) The graph below converts centimetres to inches.
2 inches are equivalent to approximately 5 centimetres.

(i) Label the axes correctly.

[1]

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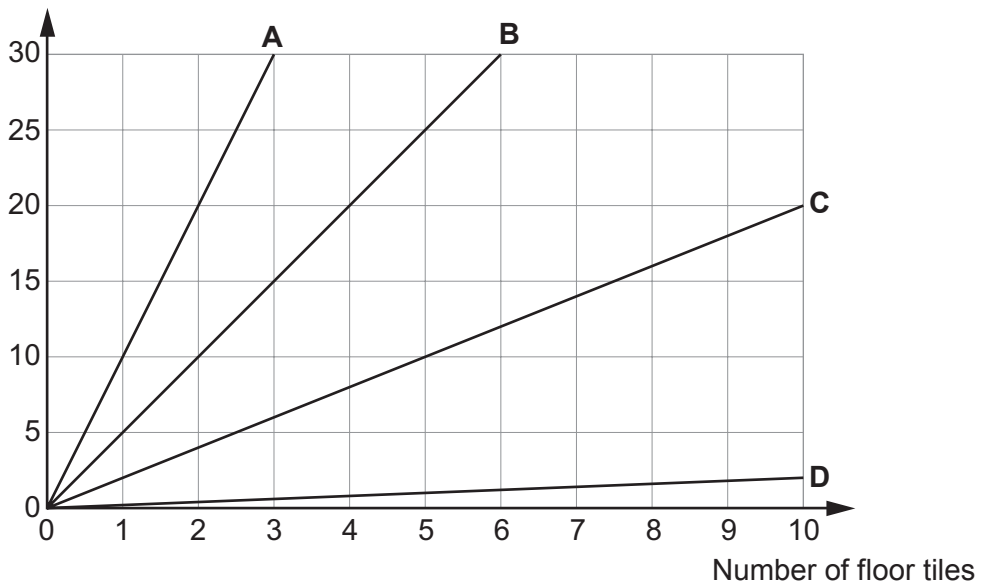
(ii) Use the graph to complete the following statement.

[1]

..... centimetres = 3 inches

- (b) The graph below shows the time taken in minutes to lay floor tiles by 4 different tilers.

Time taken in minutes



One of the tilers takes 10 minutes to lay 2 floor tiles.
Which line on the graph shows this: A, B, C or D?

[1]

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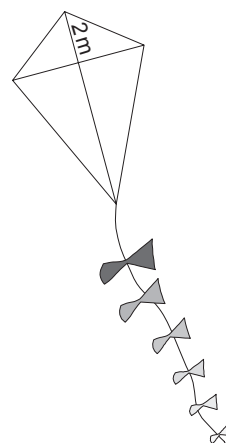
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10. Rowena decides to make a scale drawing of a kite without its tail.

The lengths of the diagonals of this kite are 3 m and 5 m.
The two diagonals meet at a point.
The length of the longer diagonal above this point is 2 m.

- (a) Rowena decides to use a scale of 2 cm to represent 1 m.

Draw the scale drawing of the kite for Rowena.



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[5]

Scale:
2 cm to represent 1 m

- (b) To cut the fabric to make the kite, Rowena needs to measure the size of the angle at each of the vertices.

Write down the size of these angles.

[2]

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7

11. (a) An air parcel company, *FlyPack*, wants to build a helicopter base.

The helicopter base is to be

- equidistant from Shrewsbury and Hereford, **and**
- equidistant from Aberystwyth and Newtown.

The map below is drawn to scale, but the scale has been left out.

Using a pair of compasses and a ruler, indicate the position of the helicopter base on the map.

You must show any lines that you use.

[3]



(b) The distance from Haverfordwest to Carmarthen is approximately 33 miles.
Complete each of the following sentences. [4]

Rhyl is approximately miles from Shrewsbury.

The bearing of Rhyl from Shrewsbury is°.

Carmarthen is approximately miles from Newtown.

The bearing of Carmarthen from Newtown is°.

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7

12. Charlotte runs a snack bar.
She makes and packs 3 varieties of sandwiches to sell.

All her sandwiches sell for £1.50 per pack.

She keeps a list of sandwiches sold during the first hour one Monday morning.

Time sold	Number of sandwiches sold			Total number of sandwiches sold
	Salmon	Cheese	Chicken	
09:00 up to 09:15	4	2	4	10
09:15 up to 09:30	2	8	0	10
09:30 up to 09:45	3	3	4	10
09:45 up to 10:00	5	3	2	10

- (a) What is the best estimate of the probability that the next sandwich Charlotte sells will be a cheese sandwich? [2]

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- (b) Charlotte is thinking she might reduce the price of the least favourite sandwich in order to sell more of them to her customers.
Which sandwich would this be?
Do you think by doing this Charlotte will take more money?
You must explain your answer. [1]

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Charlotte decides not to introduce a special offer.

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only



All sandwiches £1.50 per pack

- (c) Express the ratio of the total number of salmon to cheese to chicken sandwiches sold during the first hour on Monday morning in its simplest form. [2]

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- (d) Early on Tuesday morning Charlotte prepares the sandwiches for the day. She uses the same ratio as the sales for the first hour of Monday morning. She makes a total of 220 sandwiches. How many of these sandwiches should be salmon? [2]

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- (e) The following day Charlotte finds she sells the same number of salmon sandwiches as she does chicken sandwiches. She also notices that she sells twice as many cheese sandwiches as either salmon or chicken sandwiches.
- Why might making sandwiches ready for sale in the same ratio as those sold during the first hour on Monday morning be a problem?
 - How could Charlotte improve her strategy for making sandwiches in advance?
- You must clearly explain your answers. [2]

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