

| | | |
|-------------|---------------|------------------|
| Surname | Centre Number | Candidate Number |
| Other Names | | 0 |



GCSE LINKED PAIR PILOT

4361/01

APPLICATIONS OF MATHEMATICS

UNIT 1: Applications 1

FOUNDATION TIER

A.M. WEDNESDAY, 15 January 2014

1 hour 30 minutes

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.

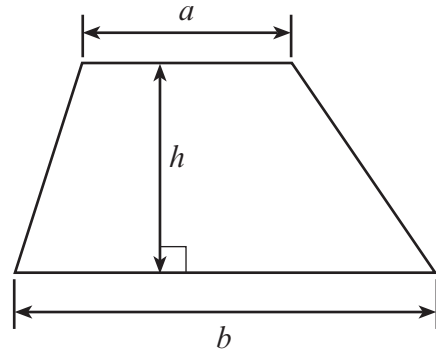
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 5(a).

| For Examiner's use only | | |
|-------------------------|--------------|--------------|
| Question | Maximum Mark | Mark Awarded |
| 1. | 5 | |
| 2. | 10 | |
| 3. | 5 | |
| 4. | 9 | |
| 5. | 11 | |
| 6. | 3 | |
| 7. | 9 | |
| 8. | 5 | |
| 9. | 5 | |
| 10. | 2 | |
| 11. | 6 | |
| 12. | 10 | |
| Total | 80 | |

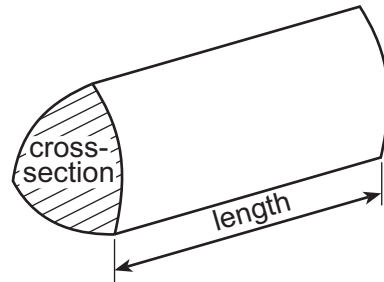
4361
010001

Formula List

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



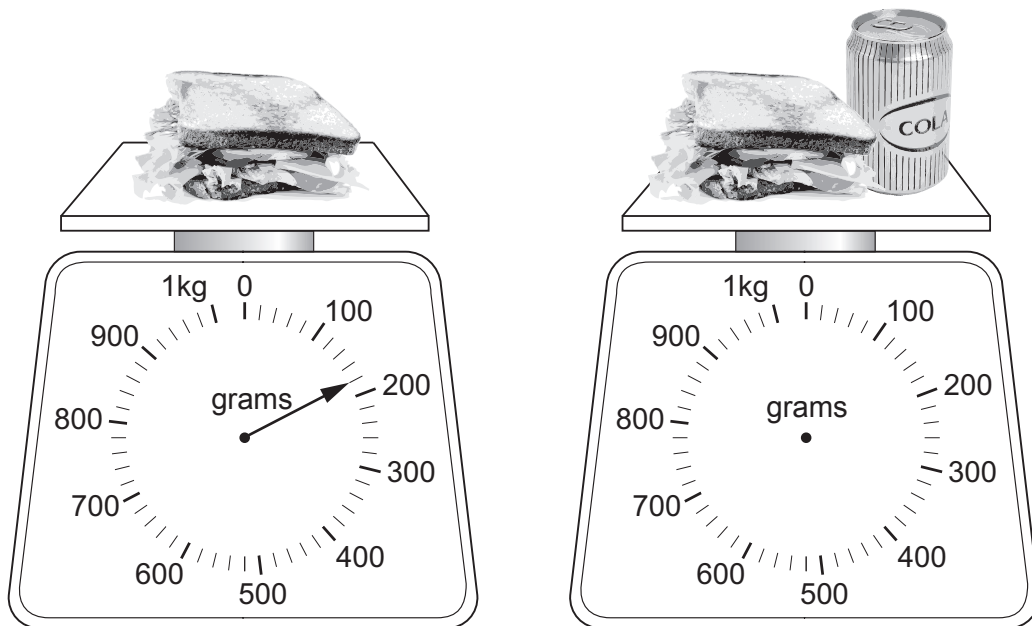
Volume of prism = area of cross-section \times length



1. (a) Rhys decides to weigh his packed lunch.

The pointer on the first scale shows the weight of his sandwich.
His drink weighs 350 grams.

Draw a pointer on the second scale to show the total weight of his sandwich and his drink. [3]



- (b) The top of Rhys' drink is in the shape of a circle with diameter 6.2 cm.
Draw a circle with diameter 6.2 cm to represent the top of his drink. [2]

2. Simon has a photograph of his dog.
The photograph has a length of 6 inches and a width of 4 inches.



Diagram not drawn to scale

- (a) Using 1 inch is approximately 2.5 cm, write the measurements of Simon's photograph in cm. [2]

.....

.....

.....

6 inches = cm

4 inches = cm

- (b) Find the area of Simon's photograph. Give your answer in cm². [2]

.....

.....

.....

Area = cm²

- (c) Simon wishes to have his photograph framed.
The cost, in £, of framing his photograph is calculated using the following formula.

$$C = (L + W) \times 0.55$$

Where C = cost in £

L = length of photograph in cm

W = width of photograph in cm

Find the cost of framing Simon's photograph. [2]

.....

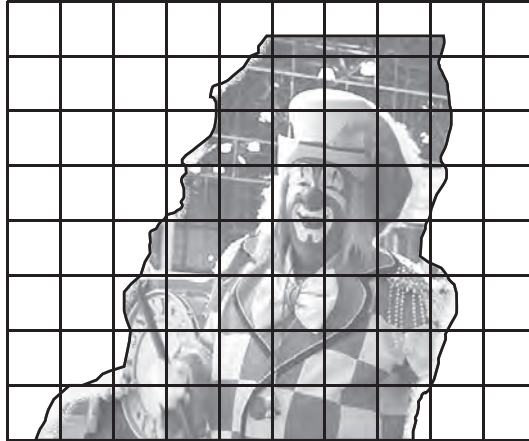
.....

.....

.....

- (d) Simon found part of an old photograph.
Each square represents 3 cm^2 .
Estimate the area of the photograph.

[4]



.....

.....

.....

Area = cm^2

4361
010005

3. Shari was asked to buy the following items from her local shop.

| Item | Price |
|----------------|----------|
| Chicken curry | £2.97 |
| Pizza | £3.04 |
| Washing powder | £6.09 |
| Butter | £1.13 |
| Bread | 89 pence |

The shopkeeper tells Shari that the total is £102.23.

Shari does not think that this is correct.

Show clearly how Shari could **approximate each of these prices** to convince the shopkeeper that **his total** is not correct. [4]

.....

.....

.....

.....

.....

.....

What mistake do you think the shopkeeper made?

[1]

.....

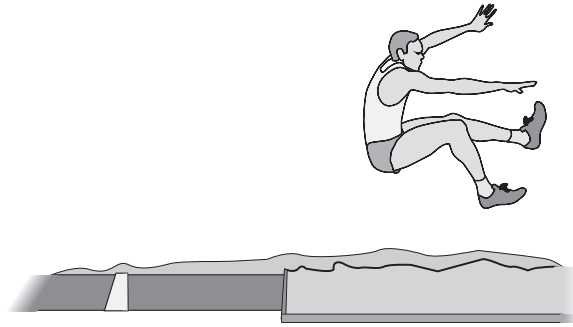
.....

.....

.....

.....

4.



In an athletic competition, Billy jumped the following distances in the long jump.

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 4·10 m | 4·08 m | 4·36 m | 4·25 m | 4·36 m | 4·17 m | 4·41 m | 4·27 m |
|--------|--------|--------|--------|--------|--------|--------|--------|

(a) What were Billy's longest and shortest jumps in the athletic competition? [2]

Longest jump = m Shortest jump = m

(b) Calculate the mean, median, mode and range of the 8 distances given in the table. [7]

Mean

.....

.....

.....

Median

.....

.....

Mode

.....

Range

.....

4361
010007

5. A group of family and friends decide to go away for the weekend together.

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

The group of family and friends book tickets for the theatre for the first evening of their weekend.

The group consists of 6 adults, 4 children and 2 senior citizens.

The following information shows the cost of the tickets for seats in different parts of the theatre.

| Seated Area | Cost per person | |
|---------------------|------------------------|--|
| Lower Stalls | £45 | |
| Mid Stalls | £45 - £60 | Rows A - C £45 Rows D - J £60 |
| Circle | £35 - £45 | Rows A - C £45 Rows D - G £35 |
| Upper Circle | £25 - £30 | Rows A - F £30 Rows G - K £25 |
| Boxes | £45 | |
| Balconies | £15 - £25 | Balconies A - D £25 Balconies E - H £15 |

The family and friends were unable to book tickets to sit together.

They book the following seats:

- 2 adults and 1 child in the Upper Circle - Row C
- 2 senior citizens in the Mid Stalls - Row F
- 4 adults and 3 children in Balcony A.

The tickets for senior citizens and children are half price.

- (b) On the second day, the group of family and friends go to an agricultural show. The diagram shows four halls at the showground.

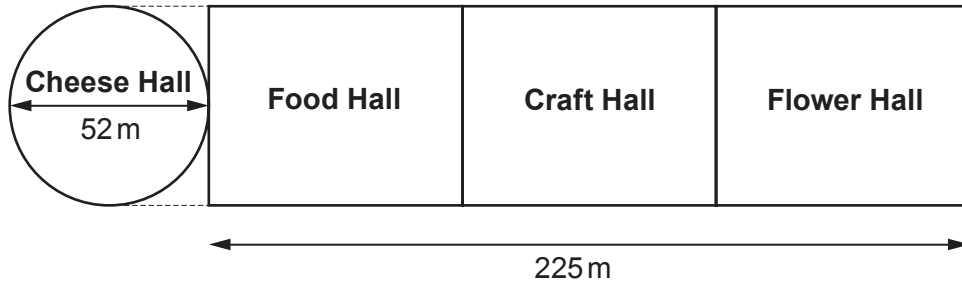


Diagram not drawn to scale

The diameter of the circular hall is 52 m.
The total length of the 3 rectangular halls is 225 m.
The rectangular halls are all the same size.

Calculate the area of the Flower Hall.

[4]

.....

.....

.....

.....

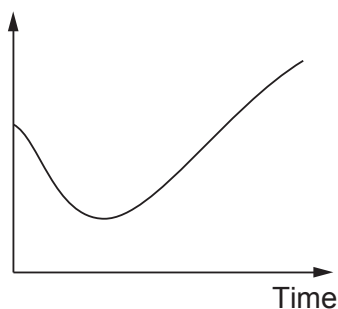
.....

6. The graphs below were sketched to represent three of the following four statements:

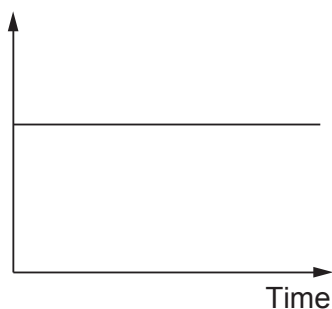
- A. An oven warming up until it reaches the required temperature to bake a cake
- B. The temperature of a cup of coffee as it cools
- C. Ceri's body temperature remained constant throughout the day
- D. The temperature dropped overnight and rose the next morning

Match a statement to each of the following graphs.

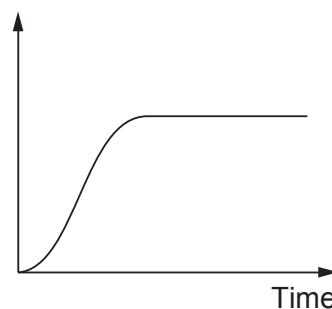
[3]



.....



.....



.....

7. Jamie is making party tags in the shape of a trapezium, as shown below.

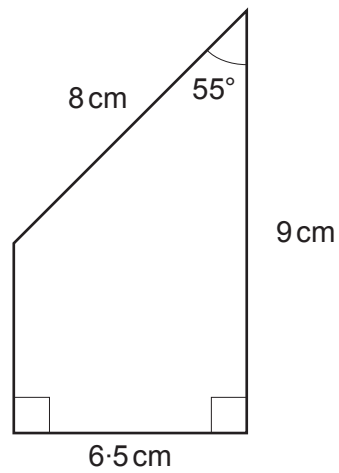


Diagram not drawn to scale

- (a) Jamie thinks the missing angle inside the trapezium is an obtuse angle.
Explain fully why Jamie is correct.

[3]

.....

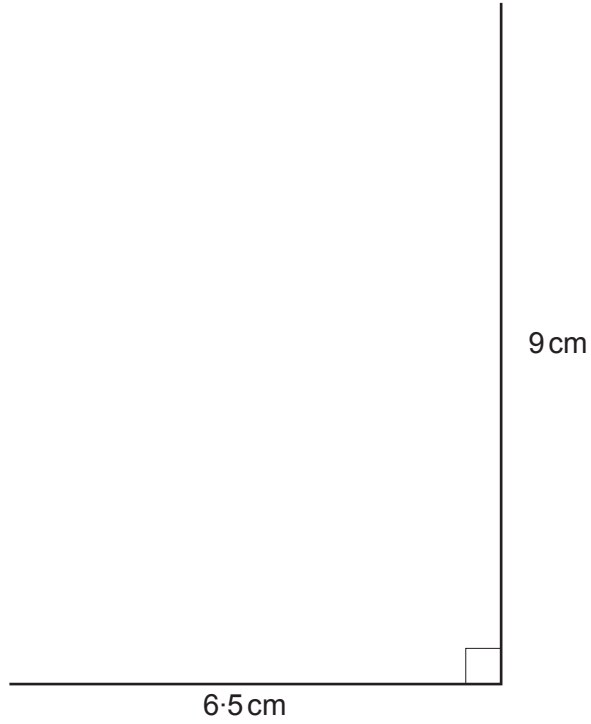
.....

.....

.....

- (b) Part of the party tag has been drawn accurately below.
Accurately complete the rest of the party tag.

[3]



- (c) Jamie wants to place a gold border around the outside of her party tags.
What length of gold border does Jamie need for each party tag?

[3]

.....

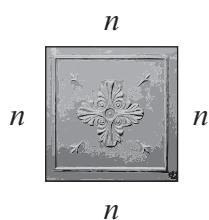
.....

.....

.....

.....

8. (a) A square tile has edges of length n centimetres.



- (i) Write an expression for the perimeter of the square tile. [1]

.....

.....

- (ii) Three of the square tiles are put together to make the following **shape**.



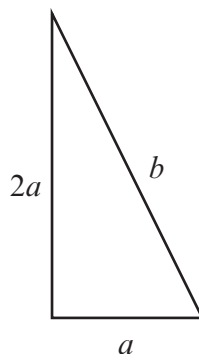
Write an expression for the perimeter of this shape. Simplify your expression fully. [2]

.....

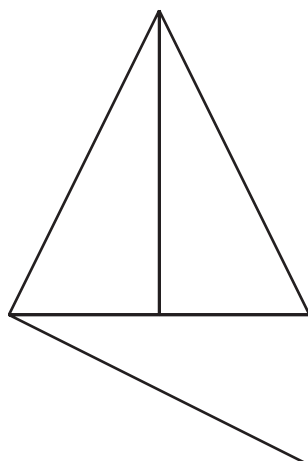
.....

.....

- (b) A right-angled triangular piece of plastic has edges of length a , b and $2a$ centimetres, as shown in the diagram.



Three of these right-angled triangular pieces of plastic are put together to create another shape, as shown below.



Write an expression for the perimeter of this shape.
Simplify your expression fully.

[2]

.....

.....

.....

9. A survey is carried out by asking people questions as they come out of a juice bar.



A section of the questionnaire is shown below.

In questions 1 and 2 put a tick (✓) in a box

1. How old are you?
 15 to 20 21 to 30 30 to 40 41+

2. Do you ever go to the juice bar to buy a fruit drink?
 Yes No

3. What method of payment do you use?

(a) Explain why this is a biased survey. [1]

.....
.....

(b) State two criticisms of the design of question 1. [1]
First criticism of question 1:

.....
.....

Second criticism of question 1: [1]

.....
.....

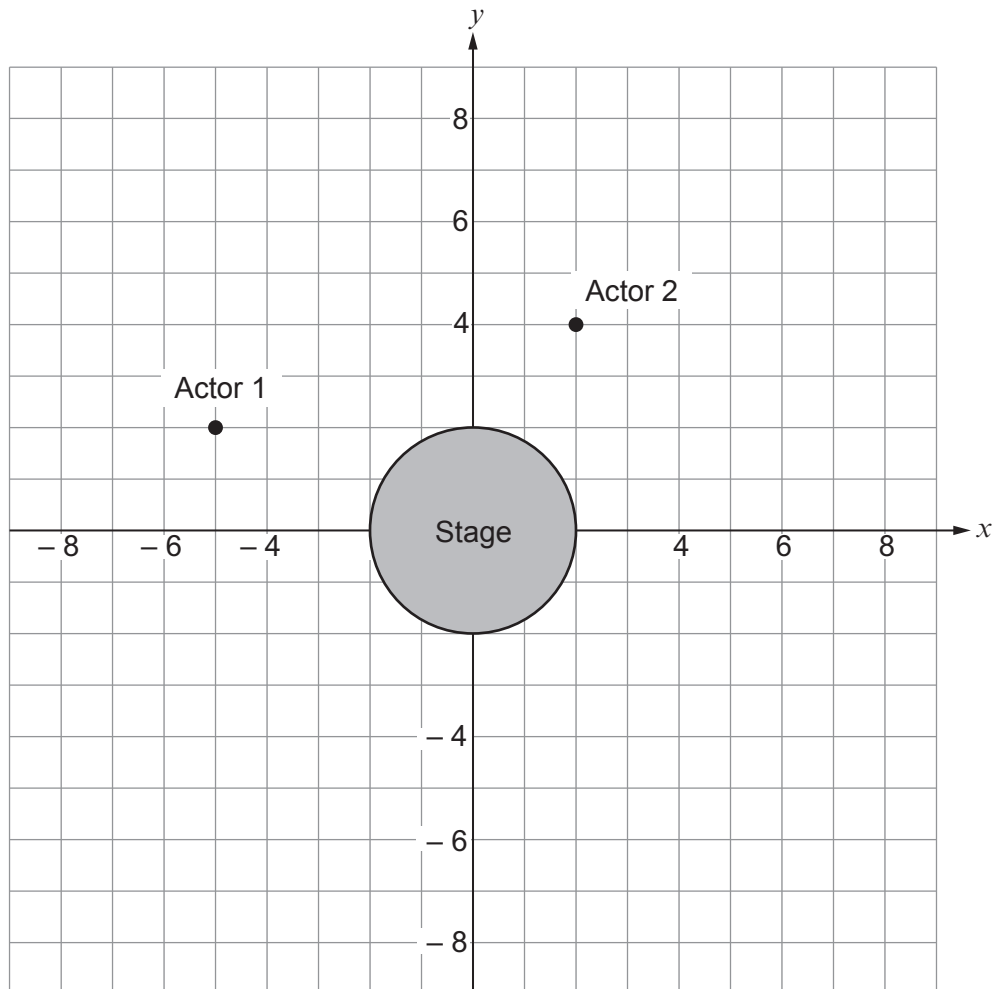
(c) (i) What is wrong with the design of question 3? [1]

.....
.....

(ii) Show how question 3 could be improved. [1]

.....
.....

10. The circular stage in *Theatr Seren* is in the centre of the theatre. It is decided to seat four actors amongst the audience to hold the ends of four ribbons. A plan of the theatre is represented by the coordinate grid shown below. The actors are to be seated so that ribbons held by the four of them will form a square.



Mark where the other two actors should be seated, and write down the coordinates of their positions. [2]

(..... ,)

(..... ,)

11. *MacReardon Construction* is contracted to work on a warehouse site where there are a number of liquid storage tanks.



A sketch of the base of one of the liquid storage tanks is shown below.

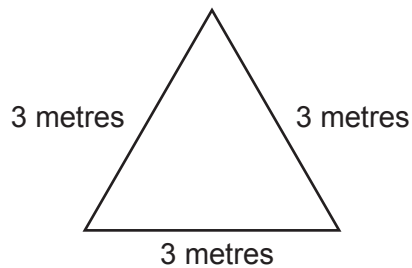


Diagram not drawn to scale

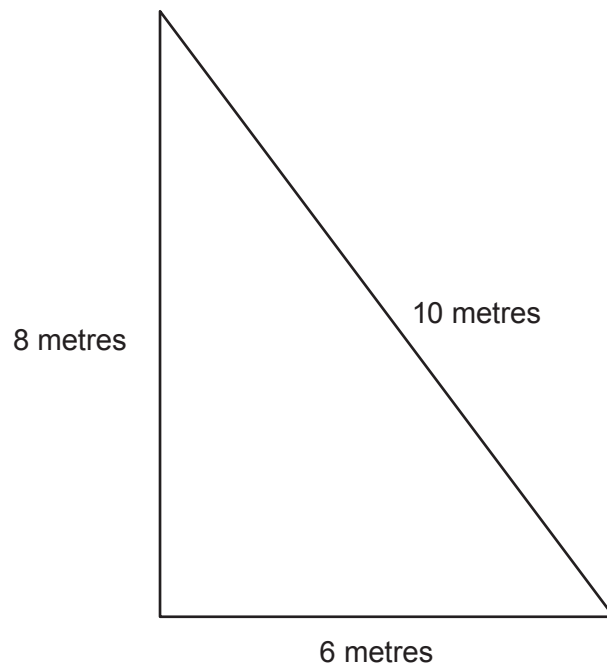
- (a) Use a pair of compasses and a ruler to make an accurate scale drawing of the base shown above.
Use a scale of **2 cm to represent 1 metre**. [3]

- (b) *MacReardon Construction* has been asked to lay a drain surrounding a different liquid storage tank. The drain must be exactly **2 metres** away from the perimeter of the base of the tank.

An accurate scale drawing of the base of this tank is shown below.

A scale of **1 cm to represent 1 metre** has been used.

On the scale drawing below, draw accurately the position of the drain surrounding the tank. [3]



12. A machine is used to pack boxes of pasta shapes.



Each box of pasta shapes should weigh between 200g and 205g.
To check the machine, 10 boxes of pasta shapes are selected every half hour.
At each of these times, the number of boxes weighing between 200g and 205g is recorded.
The results are shown in the table below.

| Time | 00:00 | 00:30 | 01:00 | 01:30 | 02:00 | 02:30 | 03:00 | 03:30 | 04:00 | 04:30 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Number of the 10 boxes weighing between 200g and 205g | 1 | 0 | 2 | 1 | 3 | 2 | 0 | 0 | 1 | 2 |

- (a) Michelle has weighed all the boxes of pasta selected between 00:00 and 04:30. For all these boxes, she finds that the following statement is true.

"Each box of pasta weighs at least 200g."

Explain, looking at the results in the table above, how this statement could be **true**. [1]

.....

.....

.....

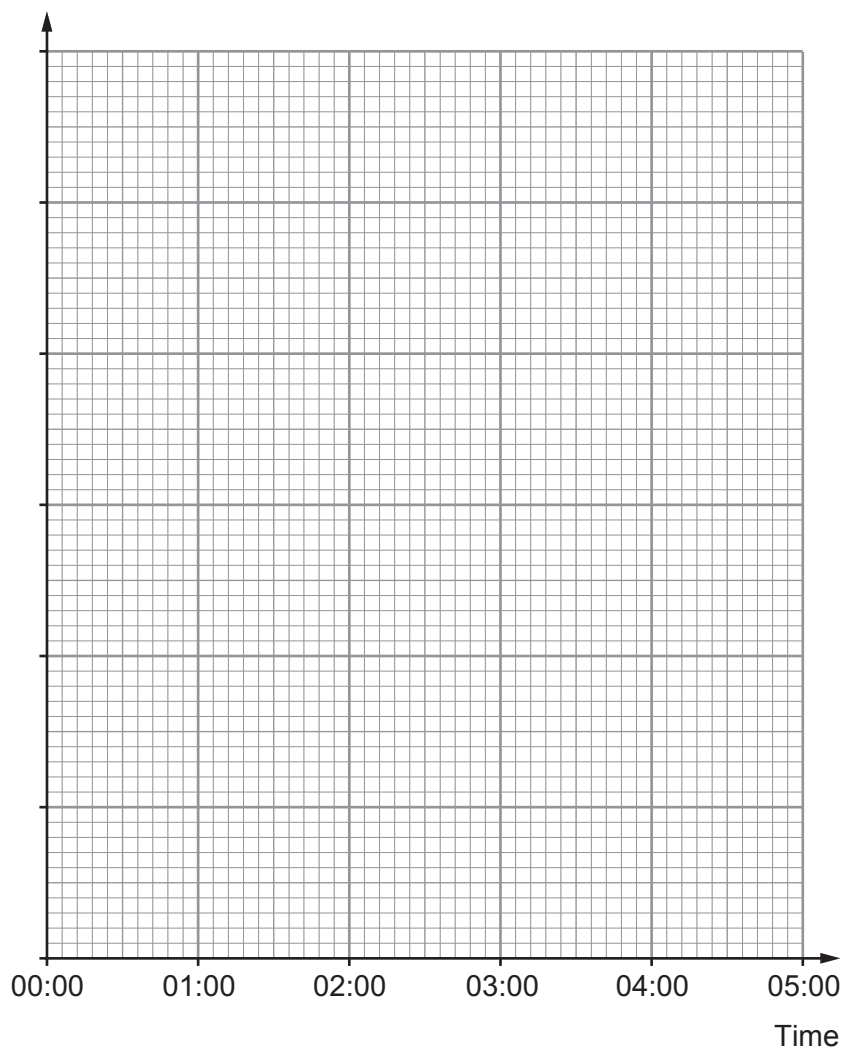
- (b) Michelle decides to record and plot the relative frequencies for the information shown in the previous table.

(i) Complete the table below. [4]

| Time, up to | 00:00 | 00:30 | 01:00 | 01:30 | 02:00 | 02:30 | 03:00 | 03:30 | 04:00 | 04:30 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Total number of the 10 boxes weighing between 200g and 205g | 1 | 1 | 3 | 4 | | | | | | |
| Total number of boxes checked | 10 | 20 | 30 | 40 | | | | | | |
| Relative frequency | 0.1 | 0.05 | | | | | | | | |

- (ii) Use the graph paper below to plot the relative frequencies. [3]

Relative frequency



- (iii) Write down the best estimate for the probability that a box selected at random will weigh between 200 g and 205 g. Give a reason for your answer. [2]

.....

.....

.....

END OF PAPER

BLANK PAGE

BLANK PAGE