



Aberdare Community School
Mathematics Department

WJEC GCSE

Higher – Calculator

Data

Relative frequency

Name:

Set:

Date:

Teacher:

5. A computer program is used to generate 200 digits between 0 and 4 inclusive. It also records the number of times a 3 is generated. The program is run 5 times with the following results.

	1 st run of 200 results	2 nd run of 200 results	3 rd run of 200 results	4 th run of 200 results	5 th run of 200 results
Number of threes	36	34	44	42	38

- (a) Complete the table to show the relative frequency of a 3 being generated.

Total number of digits generated		200	400	600	800	1000
Total number of threes		36	70			
Relative frequency	Fraction	$\frac{36}{200}$	$\frac{70}{400}$			
	Decimal	0.18	0.175			

[3]

- (b) Write down the best estimate of the probability of **this** computer program generating the digit 3.

..... [1]

- (c) Does it seem that the computer program is fair in generating threes?

How do you know? You must give a reason based on probability for your answer.

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 [1]

4. A machine is used to pack boxes of chocolate beans.
 To check the machine, 10 boxes of beans are selected on the hour for 10 consecutive hours.
 There should be exactly 55 chocolate beans in each box.
 Each hour the number of boxes containing exactly 55 chocolate beans is recorded.

Time	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00
Number of the 10 boxes with exactly 55 beans	8	7	6	9	8	10	8	6	9	9

- (a) Is a statement on the box that says

“Contains at least 55 chocolate beans”

always true?

You must give a reason for your answer.

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[2]

- (b) If the experiment were to be carried out again would you expect the results to be exactly the same?

You must give a reason for your answer.

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[2]

- (c) It is decided to record and plot the relative frequencies for the information shown in the previous table.

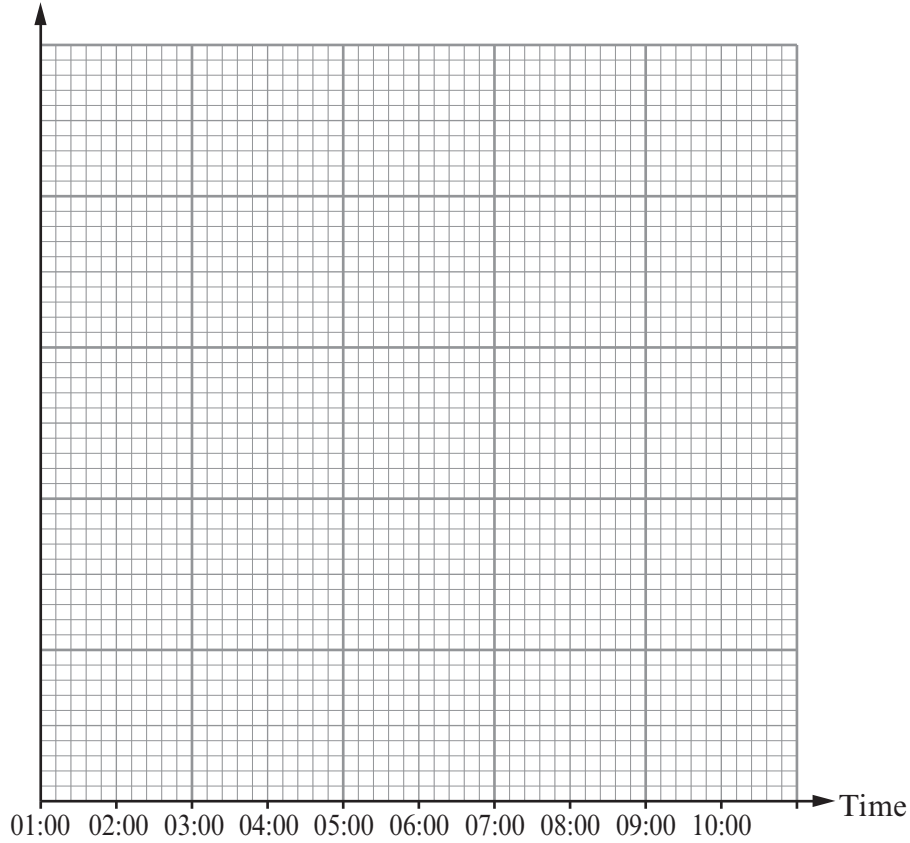
- (i) Complete the table below.

Time, by	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00
Total number of boxes with exactly 55 beans	8	15	21							
Total number of boxes checked	10	20								
Relative frequency										

[4]

(ii) Use the graph paper below to plot the relative frequencies.

Relative frequency



[3]

(iii) Write down the best estimate for the probability that a box selected at random will contain exactly 55 chocolate beans. Give a reason for your answer.

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[2]

(iv) How would you improve on your estimate?

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[1]

8. A factory production line packs buttons into bags.
There are exactly 80 buttons packed into each bag.
There is a mixture of different coloured buttons in each bag.
A total of 600 bags of buttons were packed in a day.

The first 100 bags were checked and it was found that a total of 1200 red buttons had been used.
In the 600 bags of buttons, it was found that the relative frequency of red buttons packed was 40%.

Calculate the relative frequency of red buttons packed in the final 500 bags.

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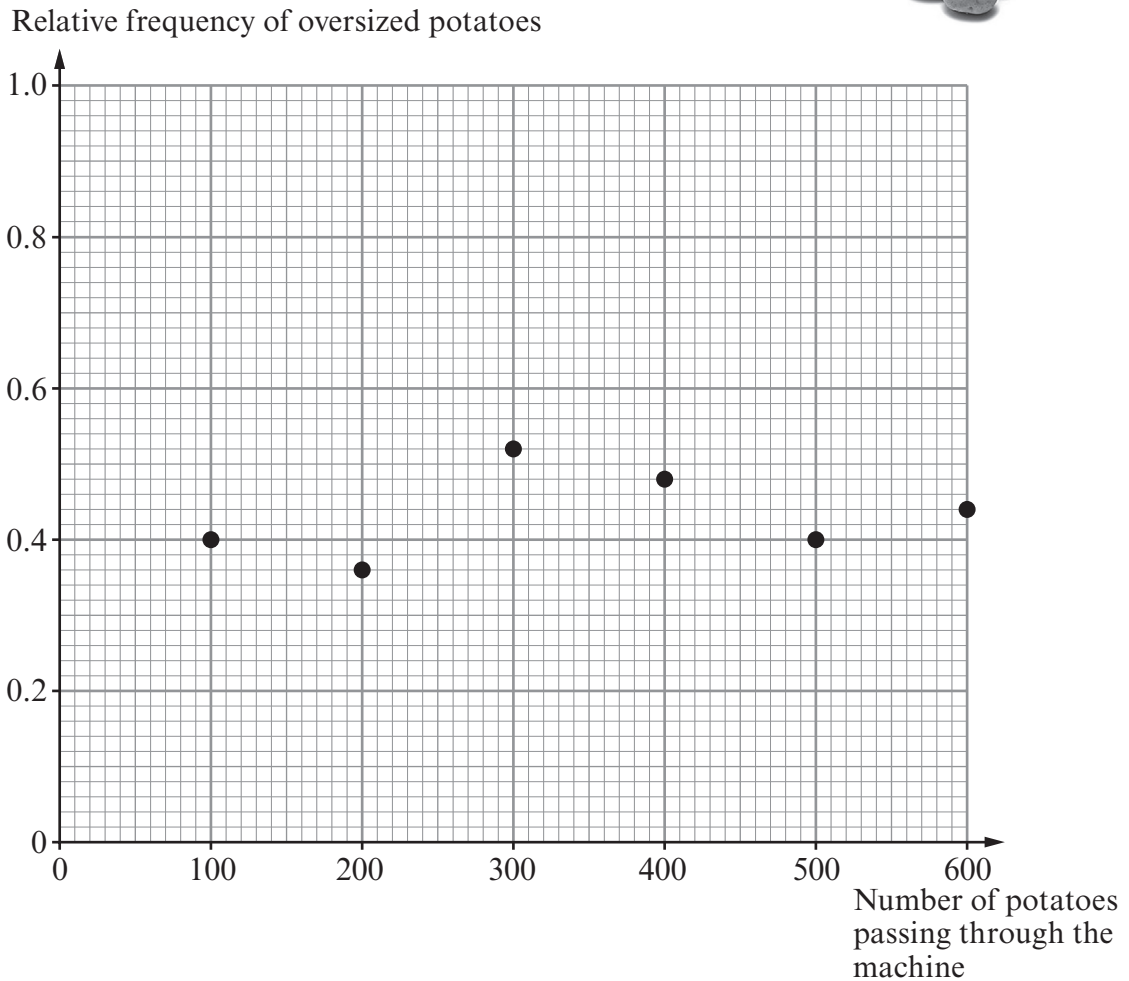
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[7]



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8. A potato producer uses a machine to sort his potatoes. The potato producer carried out a survey to investigate the probability of oversized potatoes passing through his sorting machine. The relative frequency of oversized potatoes passing through the machine was calculated after a total of 100, 200, 300, 400, 500 and 600 potatoes. The results are plotted on the graph below.



- (a) Write down the best estimate for the probability that one of these potatoes, selected at random, will be oversized. You must give a reason for your answer.

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[2]

(b) A trader offers to buy oversized potatoes at 15p each.
How much would the potato producer receive if he decided to sell, to the trader, all the oversized potatoes in the first 100 potatoes sorted by the machine?

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[3]

(c) The potato producer decides not to sell his potatoes to the trader.
He sells 900 potatoes to a market stall holder.
The potato producer sells these potatoes for £4.50 per 100 potatoes.
He has agreed with the market stall holder that he will give a 2p refund per oversized potato discovered.
What would your best estimate be for the amount you would expect the potato producer to make from this transaction?

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[6]

3. 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]

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

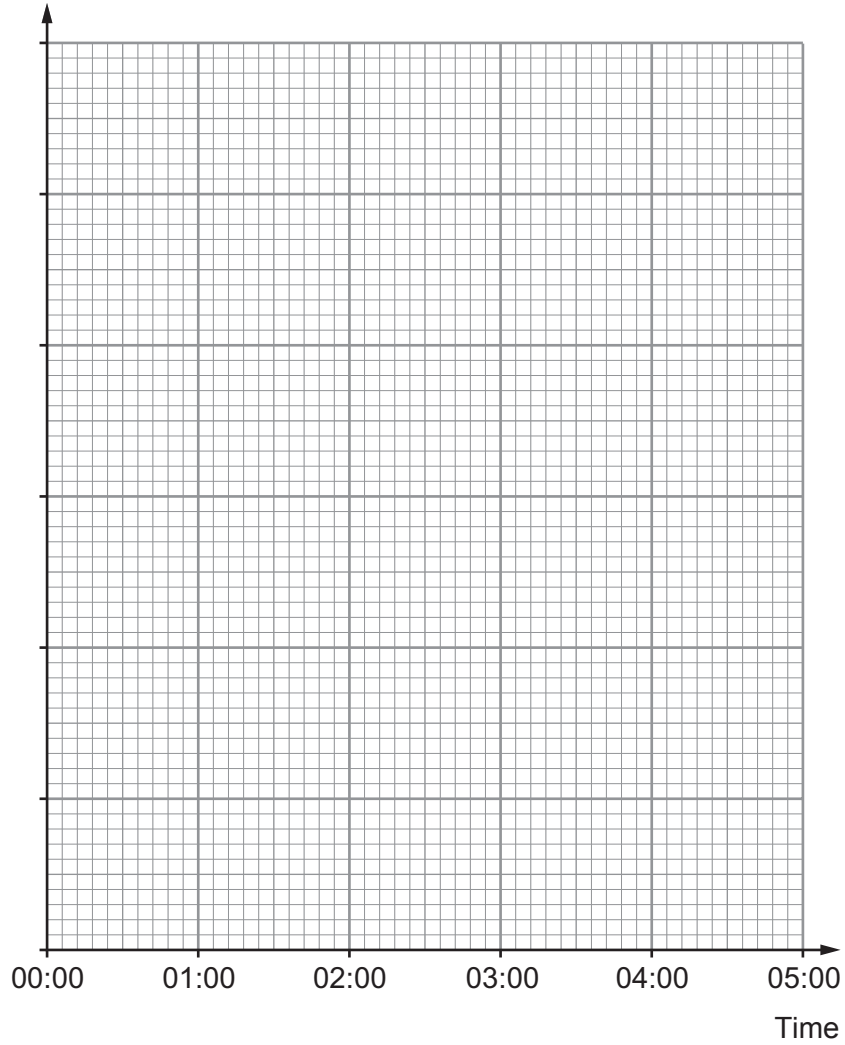
- (i) Complete the table below. [4]

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]

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6. (a) A company delivers boxes of apples.
 There are 20 apples in each layer of each box.
 Each box has five layers of apples.



The number of rotten apples in each of the five layers of one opened box is listed below:

3 0 1 4 1

- (i) Write down the best estimate of the relative frequency for randomly selecting a rotten apple in one layer of apples. [3]

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- (ii) How many rotten apples might you expect to find in 8 boxes of apples? [2]

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- (b) A different company delivers boxes with 24 apples in each box.

The company knows that the number of rotten apples they are likely to find in a box is a factor of 24, but is more than 1 apple.
 The company makes a statement as shown below.



There are **hardly any** rotten apples in our boxes.

- An apple is selected at random from one of these boxes.
 Write down the **best** estimate of the probability that this apple is rotten. [2]

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