

**Starter:**

What is 0.25 as a percentage?

What is 75% as a fraction?

What is 6/10 as a decimal?

What is 2/5 as a percentage?

What is 5% as a decimal?

What is 0.85 as a fraction?

**Top Tips!**

Relative frequency is a way of working out experimental probability. It is usually written as a fraction or decimal and is calculated using this formula.

$$\text{Relative frequency} = \frac{\text{number of times the event happens}}{\text{total number of trials}}$$

Example: You note down the colour of the next 50 cars to pass your house. If 13 of the 50 were black cars, the relative frequency is 13/50.

The more trials that are carried out the more accurate the relative frequency gets to the actual probability.

In our example, the more cars you noted the more accurate the relative frequency would be to the actual probability of a black car passing next.

**Examination Question:** 2012 January Link Applications Higher U1 Q4

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.

(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.

(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										

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

(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.

(iv) How would you improve on your estimate?

**Assessment for Learning**

**Video / QR code**

**Starter:**

What is 0.25 as a percentage?

25%

What is 75% as a fraction?

$75/100=3/4$

What is 6/10 as a decimal?

0.6

What is 2/5 as a percentage?

40%

What is 5% as a decimal?

0.05

What is 0.85 as a fraction?

$85/100=17/20$

**Top Tips!**

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Example: You note down the colour of the next 50 cars to pass your house. If 13 of the 50 were black cars, the relative frequency is 13/50.

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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. **No because, 9 of the 10 hours have boxes with more or less than 55 chocolate beans.**

(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. **No, the experiment is random.**

(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	30	38	48	56	62	71	80
Total number of boxes checked	10	20	30	40	50	60	70	80	90	100
Relative frequency	0.8	0.75	0.70	0.75	0.76	0.8	0.8	0.775	0.788..	0.8

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

(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. **0.8, the last result (best result because the most trials) is 0.8**

(iv) How would you improve on your estimate? **More trials**

**Assessment for Learning**

**Video / QR code**