

## Guidance for tutors

Outcome	P4	Student can consistently:	Solve problems involving relative frequency.
How the topic is examined	<ul style="list-style-type: none"> <li>Examinated through test paper questions.</li> <li>Questions are equally like to appear on calculator and non-calculator papers.</li> <li>There are two ways in which this topic could be examined               <ul style="list-style-type: none"> <li>Students could be asked to find the set of relative frequencies given some outcome.</li> <li>Students could be asked to work out an estimate of a probability based on successive outcomes and relate this to theoretical probabilities where appropriate.</li> </ul> </li> </ul>		
Prior knowledge	<ul style="list-style-type: none"> <li>Students should be confident:               <ul style="list-style-type: none"> <li>Basic probability</li> <li>Simplifying a fraction</li> <li>Converting a fraction to a decimal.</li> </ul> </li> <li>In addition questions involving this topic can have links to:               <ul style="list-style-type: none"> <li>Probability in a table (P2)</li> <li>AND/OR diagrams (P5)</li> </ul> </li> </ul>		
Suggested tuition approaches	<ul style="list-style-type: none"> <li>A relative frequency is a fraction of times that an event occurs.</li> <li>Students need to understand that we use relative frequencies to estimate the probability of events that we cannot work out exactly (e.g. the probability it will rain in June).</li> <li>Given a list of outcomes (e.g. spinning a spinner) students should be able to complete a table of relative frequencies.</li> <li>Students should be able to compare this to theoretical probabilities.</li> <li>Relative frequencies can be written as a fraction, decimal or percentage.</li> <li>Students should know that the more times you repeat an experiment the more accurate the relative frequency will be (e.g. if I roll a die 6 times it is unlikely I get every number once – which is what you would expect. If however I roll it 6000 times, I am likely to get it close to 1000 times each unless the die is biased)</li> <li>Students need to be able to work out an expected frequency of an event. Expected number of outcomes is calculated by multiplying the number of trials by the probability of the outcome.</li> </ul>		

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Number	1	2	3	4
Relative Frequency	0.6	0.15	0.2	0.35

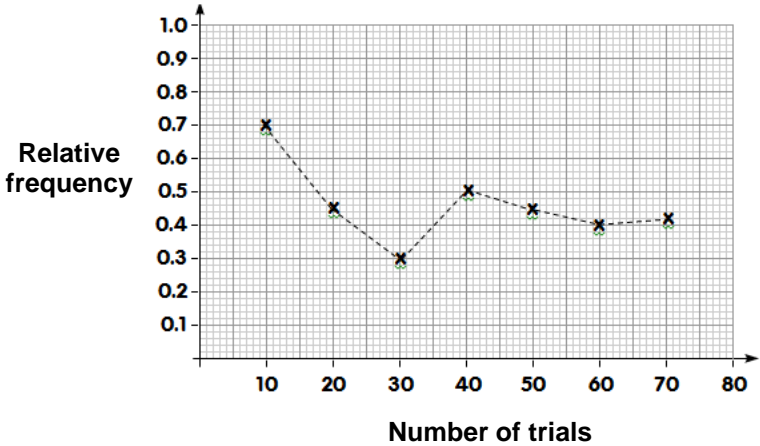
The spinner is spun 200 times.

**The table shows the relative frequency. Is the spinner biased? Discuss.**

*Possibly. The theoretical probabilities should be 0.375, 0.25, 0.125, 0.25  
It seems to be biased towards 1. We might want to spin it a few more times to make sure, but if the pattern continues then it is likely to be biased.*

- Students could be asked to plot relative frequency on a graph over time. You should use a dotted line on the graph. Over time the dotted line should tend to the exact probability as the number of trials increases.

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Common errors and misconceptions	<ul style="list-style-type: none"><li>• When asked to complete a table of relative frequencies, students just write down a frequency. Remember a relative frequency is a fraction of times that an event occurs.</li><li>• Students add probabilities incorrectly; (e.g. <math>0.3 + 0.23 = 0.26</math> is a common wrong answer – students forget that 0.3 is equal to 0.30). Encourage students to use a calculator if they have one to check.</li><li>• When probabilities are given as fractions students can struggle – particularly converting to a decimal.</li><li>• Calculating the expected number of outcomes can cause issues without a calculator. Students might want to convert the probability to a percentage first.</li></ul>
Suggested resources	<ul style="list-style-type: none"><li>• Questions<ul style="list-style-type: none"><li>◦ <a href="http://www.cimt.org.uk/projects/mepres/allgcse/pr5-es.pdf">http://www.cimt.org.uk/projects/mepres/allgcse/pr5-es.pdf</a> (pp 71 - 73)</li><li>◦ <a href="https://www.tes.com/teaching-resource/gcse-maths-relative-frequency-worksheet-6151426">https://www.tes.com/teaching-resource/gcse-maths-relative-frequency-worksheet-6151426</a></li></ul></li><li>• Past GCSE Questions<ul style="list-style-type: none"><li>◦ <a href="http://www.castleschool.co.uk/assets/files/Student%20Resources/probability-and-relative-frequency2.pdf">http://www.castleschool.co.uk/assets/files/Student%20Resources/probability-and-relative-frequency2.pdf</a></li></ul></li><li>• Video tutorial<ul style="list-style-type: none"><li>◦ <a href="http://corbettmaths.com/2013/06/20/relative-frequency/">http://corbettmaths.com/2013/06/20/relative-frequency/</a></li></ul></li></ul>

