Review of probability

Year 9
Mathematics

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Learning Objectives

By the end of the lesson I hope that you understand and can apply the following to a range of questions from the Year 9 Mathematics course.

- Understand and remember the key terms used in probability
- Understand how probabilities can be expressed using numbers
- Be able to find the probabilities of certain events.

Recap of past learning

Whilst this is a “new” topic this year, you will have been doing Probability for years!!!

So, whilst there is nothing new to teach, it might be helpful to recap some of the work done in previous years before we get a little more complex this year.

Pr( ) =

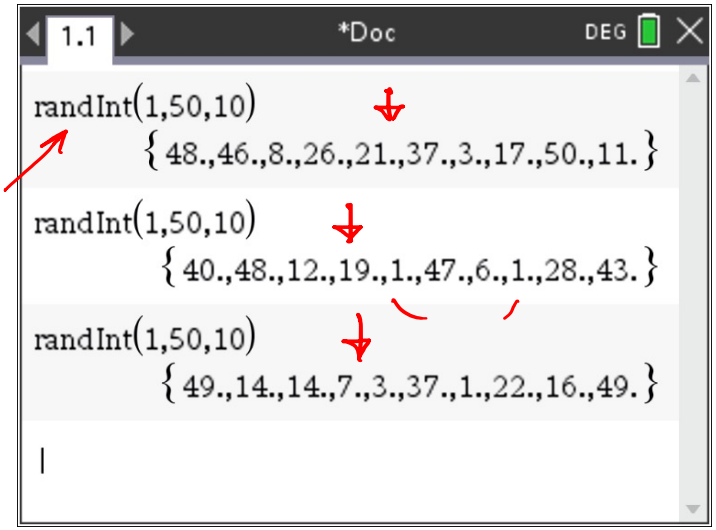
n( ) =

The language of Probability: Random Experiment

When we perform an experiment which will have a random outcome it means that we have no real chance of predicting exactly what might happen. The results are pre-ordained and so are random.

The CAS calculator (which you will use next year) has a great function which will create random numbers.

These numbers are random and, if I repeat it a number of times, we shouldn't get the same numbers in the same order.



randInt (1, 50, 10)

The language of Probability: Sample Space

This is a list of all the possible outcomes when performing an experiment.

When we roll a die, whilst we might not be able to predict which number comes next (as it's random), we know which numbers are likely

Sample Space is listed in curly brackets.

Hence, the sample space for a die would be:

$$\{1, 2, 3, 4, 5, 6\}$$

$\varepsilon = \{1, 2, 3, 4, 5, 6\}$

Note the use of the commas!

The language of Probability: Event

An event is the collection of outcomes from an experiment.

So, for example, if we looked at rolling a die again, the event "rolling a number greater than 3" would have the outcomes 4, 5 and 6.

This is an example of a **compound event because it contains more than one element from the sample space**.

A : number greater than 3

: > 3

The language of Probability: Find the Probability an event happens

This is the main part of the work we will do, but there is so much more to probability than we will cover this year!

$$\Pr(Event) = \frac{Number\ of\ successes}{Number\ of\ outcomes}$$

$\mathcal{E} = \{1, 2, 3, 4, 5, 6\}$

This is something I teach!

A success is something you are looking to achieve. The number of outcomes are the total possible things which could be achieved.

Note the use of the Pr(Event). This will be needed in every single question!

$Pr(\text{odd nums}) = \frac{3}{6} = \frac{1}{2}$

The language of Probability: Numbers a probability can take

Probabilities can be expressed as a decimal and a percentage.

If we express as a decimal the number will always be between 0 (impossible) and 1 (certain).

Note: Probabilities are more often given as a fraction due to the formula we saw on the previous page.

When we use a percentage we would give the answer as a number (which can be decimal!) between 0 (impossible) and 100 (certain).

Note: **Lots and lots of people get these questions wrong by not putting the answer in the form it was given in.**

1·4

0 → 1

0·4 $\frac{4}{10} = \frac{2}{5}$

0% → 100%

The language of Probability: Language

There are times when we could be asked to give "worded descriptions" of probabilities.

In general we would use the following:

Zero chance
Low chance
Even chance
High chance
Certain chance

Note: I've not really come across low or high chance!

The language of Probability: The complement

No one ever pays me compliments!!!

That's OK … I just need to make sure I know how to **take the complement.**

If I was to tell you $\Pr(raining) = 0.2$ then we could state that the complement would be:

$$\Pr(not\ raining) = 0.8$$

The complement of an event is gained by subtracting the probability of the event happening from 1. This really just assumes there are two events.

Normally we would say $\Pr(not\ A) = 1 - \Pr(A)$

$P(rain) = 0.4$

$P(\overline{rain}) = 0.6$

$P(rain') = 0.6$

$\Pr(not\ A) = 1 - \Pr(A)$

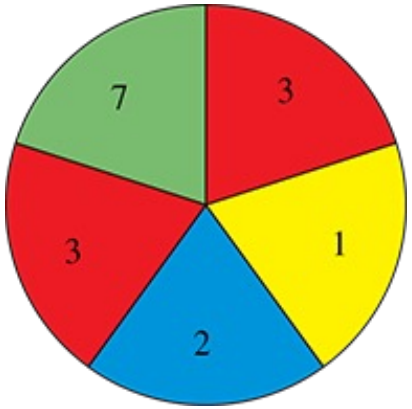
$\Pr(\bar{A}) = 1 - \Pr(A)$

$\Pr(A') = 1 - \Pr(A)$

Example 1

This spinner has five equally divided sections.

- List the sample space using the given numbers.
  - Find Pr(3).
  - Find Pr(not a 3).
  - Find Pr(a 3 or a 7).
  - Find Pr(a number which is at least a 3).



$Pr(3 \text{ or } 7) = \frac{3}{5}$

$Pr(\geq 3) = \frac{3}{5}$

$\varepsilon = \{1, 2, 3, 3, 7\}$

$Pr(3) = \frac{2}{5}$

$Pr(\overline{3}) = 1 - \frac{2}{5} = \frac{3}{5}$

Example 1

A letter is randomly chosen from the word PROBABILITY. Find the following probabilities.

- Pr(L)
- Pr(not L)
- Pr(vowel)
- Pr(consonant)
- Pr(vowel or a B)
- Pr(vowel or consonant)

P R O B A B I L I T Y

$Pr(L) = \frac{1}{11}$

$Pr(\bar{L}) = 1 - 1/11 = \frac{10}{11}$

$Pr(\text{vowel}) = \frac{4}{11}$

$Pr(\text{cons}) = 1 - \frac{4}{11} = \frac{7}{11}$

$Pr(\text{vowel or B}) = \frac{6}{11}$

$Pr(\text{vow or cons}) = 1$

Questions to complete

The following list of questions is a **minimum**. Doing these questions will achieve a good understanding of the work but might not lead to the highest scores.

You are encouraged to return and answer other questions if time permits or for revision.

Chapter 9A:
Questions: 1, 3, 4, 6, 7, 8, 9, 10, 12, 13