

# *A Guide to Introducing Probability*

## **Teaching Approach**

There is a tendency to teach probability as an abstract concept and apply it only to games of chance problems. The truth is, probability calculations can be applied to almost all real life situation. They can be applied to insurance quotes, drug testing kits, traffic and weather conditions. From the beginning of the section, learners need to be made aware of this and apply the skills to everyday situations.

The first video reviews the important concepts of probability: what probability is, terminology, and the probability scale. To revise the probability scale, a fun and worthwhile activity is to make a large probability scale the length of your classroom (stick it up on the wall or down on the floor), and let learners attach cards with different fractions between 0 and 1 to it to show where different probabilities are represented. Your learners need to be able to use the terminology of probability confidently.

The second video focuses on the theoretical probability of an event occurring. Once your learners have watched the video, do a couple of questions with them, to get them familiar with working with probability calculations.

Before watching the third video, discuss the probability of winning the lottery. The odds of winning it are greatly against anyone who plays, and yet every week there are still winners. At this point, introduce the concept of relative frequency and watch video 3.

By the end of the section, learners should be able to do all the above calculations and define complementary, inclusive and exclusive events. These are covered in the remaining videos of the series.

This videos have been developed to follow on from each other to develop the skills needed in the probability section. Once the section has been completed, you can use the questions found in the task video to test your learner's skills and understanding of the section.

## Video Summaries

Some videos have a 'PAUSE' moment, at which point the teacher or learner can choose to pause the video and try to answer the question posed or calculate the answer to the problem under discussion. Once the video starts again, the answer to the question or the right answer to the calculation is given.

Mindset suggests a number of ways to use the video lessons. These include:

- Watch or show a lesson as an introduction to a lesson
- Watch or show a lesson after a lesson, as a summary or as a way of adding in some interesting real-life applications or practical aspects
- Design a worksheet or set of questions about one video lesson. Then ask learners to watch a video related to the lesson and to complete the worksheet or questions, either in groups or individually
- Worksheets and questions based on video lessons can be used as short assessments or exercises
- Ask learners to watch a particular video lesson for homework (in the school library or on the website, depending on how the material is available) as preparation for the next days lesson; if desired, learners can be given specific questions to answer in preparation for the next day's lesson

### 1. Introduction to Probability

In this lesson we see how probability language is used in our daily lives. Then we define mathematical probability and use a probability experiment to understand the terminology used. We also look at a probability scale.

### 2. Introducing Fair Trials

In this lesson, we see how to write and calculate probabilities. These calculations are based on fair trials that are conducted within the lesson.

### 3. Introducing Relative Frequency

Theoretical and Relative frequency are defined and explored through an experiment using dice.

### 4. Introducing Venn Diagrams

Hoops, bean bags and a room are used to explain the terms and concepts used to represent probability in Venn diagrams.

### 5. Introducing Complementary Events

Complementary events are defined and discussed in detail.

### 6. Introducing Inclusive and Exclusive Events

In this lesson, we calculate the probability of mutually exclusive events happening and the probability of inclusive events happening.

## Resource Material

1. Introduction to Probability	<a href="http://www.onlinemathlearning.com/math-probability.html">http://www.onlinemathlearning.com/math-probability.html</a>	A list of resources explaining probability.
	<a href="http://mathsclass.net/comments/introducing-probability/">http://mathsclass.net/comments/introducing-probability/</a>	An amusing video to introduce probability.
	<a href="http://www.wirral-mercy.gov.uk/VLE_Live_resources/Intervention/progression_maps/pdf/tl4y7_lessons_d1.1_d1.2.pdf">http://www.wirral-mercy.gov.uk/VLE_Live_resources/Intervention/progression_maps/pdf/tl4y7_lessons_d1.1_d1.2.pdf</a>	A PDF note on probability.
2. Introducing Fair Trials	<a href="http://www.bbc.co.uk/schools/gcsebitesize/maths/statistics/probability1rev3.shtml">http://www.bbc.co.uk/schools/gcsebitesize/maths/statistics/probability1rev3.shtml</a>	A series of problems that introduce how to calculate probability.
	<a href="http://www.mathsisfun.com/data/probability-events-independent.html">http://www.mathsisfun.com/data/probability-events-independent.html</a>	Explanation of probability and how to do calculations.
3. Introducing Relative Frequency	<a href="https://everythingmaths.co.za/grade-10/10-probability/10-probability-02.cnxmlplus">https://everythingmaths.co.za/grade-10/10-probability/10-probability-02.cnxmlplus</a>	A textbook note on relative frequency.
	<a href="http://www.youtube.com/watch?v=7jUlt39tUBM">http://www.youtube.com/watch?v=7jUlt39tUBM</a>	A YouTube clip on relative frequency.
4. Introducing Venn Diagrams	<a href="http://www.purplemath.com/modules/venndiag.htm">http://www.purplemath.com/modules/venndiag.htm</a>	A note explaining Venn diagrams.
	<a href="http://www.regentsprep.org/regents/math/algebra/ap2/pracvenn.htm">http://www.regentsprep.org/regents/math/algebra/ap2/pracvenn.htm</a>	Practice questions on Venn diagrams.

	<a href="http://www.shodor.org/interactive/activities/ShapeSorter/">http://www.shodor.org/interactive/activities/ShapeSorter/</a>	An interactive Venn diagram which allows the user to sort shapes.
<b>5. Introducing Complementary Events</b>	<a href="http://en.wikipedia.org/wiki/Complementary_event">http://en.wikipedia.org/wiki/Complementary_event</a>	Wikipedia note on complementary events.
	<a href="http://www.sparknotes.com/math/algebra1/probability/section2.rhtml">http://www.sparknotes.com/math/algebra1/probability/section2.rhtml</a>	A note of complementary events and odds in probability.
	<a href="http://www.youtube.com/watch?v=uzldZkR2CWo">http://www.youtube.com/watch?v=uzldZkR2CWo</a>	A YouTube clip showing probability, complement of an event, independent and dependent events.
<b>6. Introducing Inclusive and Exclusive Events</b>	<a href="http://www.mathsisfun.com/data/probability-events-mutually-exclusive.html">http://www.mathsisfun.com/data/probability-events-mutually-exclusive.html</a>	A note explaining inclusive and exclusive events
	<a href="http://www.mathgoodies.com/lessons/vol6/addition_rules.html">http://www.mathgoodies.com/lessons/vol6/addition_rules.html</a>	A note on addition rules for probability

## Task

### Question 1

For each question, write down the number of possible outcomes; the number of favourable outcomes; and the probability statement using a fraction.

What is the probability of:

- getting Tails if you flip a coin?
- guessing the correct answer in a question with choices a, b, c or d?
- drawing an Ace from a full pack of playing cards?
- picking a red jelly tot from a packet of 7 yellow, 10 red and 9 green jelly tots?

### Question 2

In a basket, there are three different colours of eggs:

- yellow:  $\frac{1}{5}$
- blue: 50%
- red:  $\frac{6}{20}$

Half of the eggs of each colour are striped.

What is the probability of choosing a yellow or a striped egg?

### Question 3

In a motor race, there are seven teams. Each team has two cars in the race.

3.1 Write a probability statement for Team A's chance of winning the race.

3.2 Write a probability statement for Team A's chance of NOT winning. Use the statement for a complementary event.

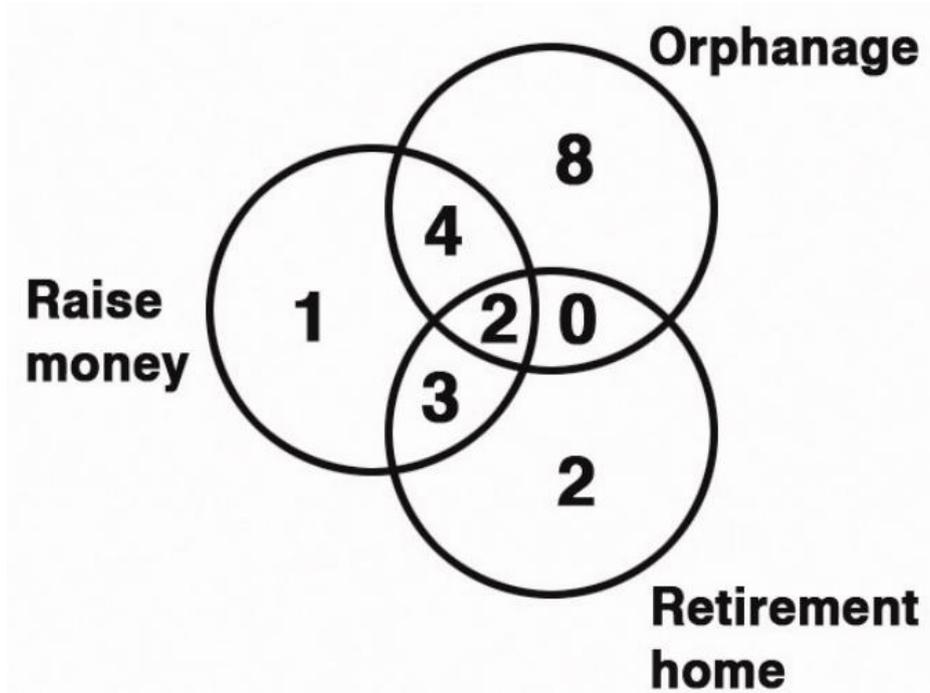
### Question 4

In a class there are 10 blond girls, 20 brunette girls, 5 blond boys and 10 brunette boys. If all 45 students attend class on a particular day, find the probability that a student selected at random will be:

- 4.1 A boy
- 4.2 A brunette girl
- 4.3 A boy or a girl

**Question 5**

20 learners are asked what social responsibility activities they prefer to do. They can raise money for a charity, play with the children at an orphanage and entertain the aged at a retirement home. This Venn diagram shows the results.



- 5.1 Explain what the number in each part of the Venn diagram represents.
- 5.2 What percentage of all the learners want to raise money?
- 5.3 If we chose one learner at random, what is the probability that he or she wants to visit the orphanage?

## Task Answers

### Question 1

What is the probability of:

- Getting Tails if you flip a coin?  
 Number of possible outcomes = 2  
 Number of favourable outcomes = 1  
 Probability statement:  $P(T) = \frac{1}{2}$
- Guessing the correct answer in a question with choices a, b, c or d?  
 Number of possible outcomes = 4  
 Number of favourable outcomes = 1  
 Probability statement:  $P(C) = \frac{1}{4}$
- Drawing an Ace from a full pack of playing cards?  
 Number of possible outcomes = 52  
 Number of favourable outcomes = 4  
 Probability statement:  $P(T) = \frac{1}{13}$
- Picking a red jelly tot from a packet of 7 yellow, 10 red and 9 green jelly tots?  
 Number of possible outcomes = 26  
 Number of favourable outcomes = 10  
 Probability statement:  $P(T) = \frac{10}{26}$

### Question 2

$$\text{Yellow} = \frac{1}{5} = 20\%$$

$$\text{Blue} = 50\%$$

$$\text{Red} = \frac{6}{20} = 30\%$$

$$\text{Striped eggs} = 50\%$$

$$P(\text{Yellow or Striped}) = 20\% + 50\% = 70\%$$

### Question 3

$$3.1 \quad P(A) = \frac{2}{14} = \frac{1}{7}$$

$$3.2 \quad P(A') = \frac{12}{14} = \frac{6}{7}$$

### Question 4

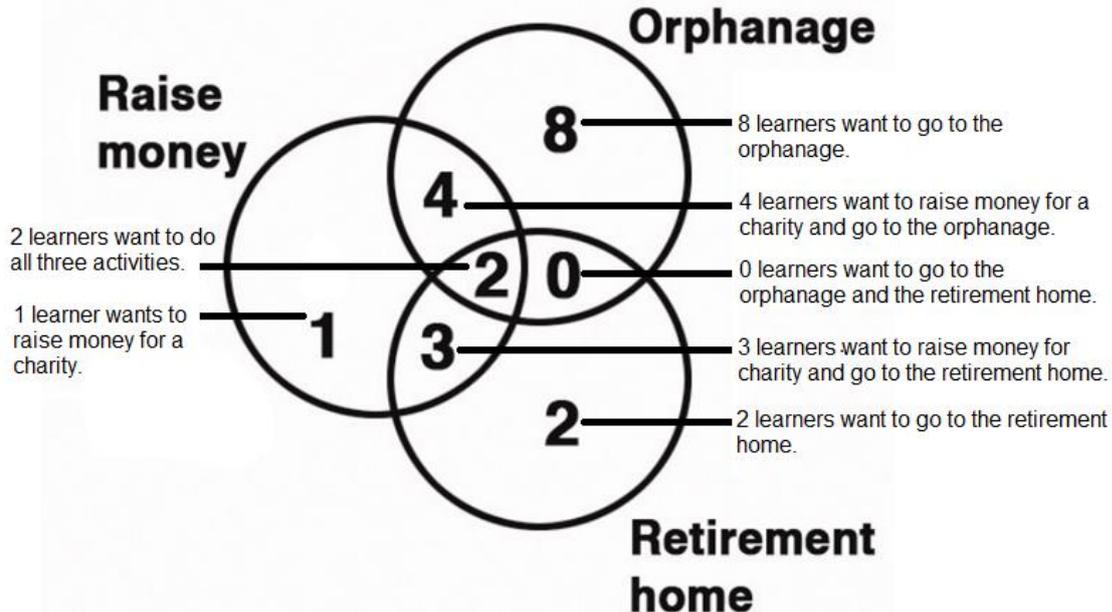
$$4.1 \quad P(B) = \frac{5+10}{45} = \frac{1}{3}$$

$$4.2 \quad P(\text{brunette } G) = \frac{20}{45} = \frac{4}{9}$$

$$4.3 \quad P(B \text{ or } G) = \frac{45}{45} = 1$$

### Question 5

5.1



$$5.2 \quad P(RM) = \frac{4+2+3+1}{20} = 50\%$$

$$5.3 \quad P(O) = \frac{8+4+2}{20} = \frac{14}{20} = \frac{7}{10} = 70\%$$

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