

# Probability

Using Words and Numbers to Describe Probability



# Learning Objective

To be able to describe probabilities using both words and numbers.

# Success Criteria

- To be able to order events by likelihood.
- To describe probabilities using words.
- To measure probabilities using numbers, based on equally likely outcomes.

# Starter: Ordering Events

Look at the events described below. Can you order them from most likely to happen to least likely to happen?

1. When Alec rolls a dice, it will land on an even number.
2. When Bet picks a number card from a bag with 100 cards numbered 1 to 100, the card will have her age on it.
3. When Queen Elizabeth II picks a number card from a bag with 100 cards numbered 1 to 100, the number will be less than her age.

**Event 2 is the event least likely to happen.**

Only one of the numbers in the bag is Bet's age in years (unless she's over 100 years old, then there is no card with her age) and 99 of them are not her age.



# Definitions

## Probability

A measure of how likely an event is to happen.

## Random

If a letter is picked **at random** from the letters of the alphabet, this means that every letter has an equal chance of being picked.

If you choose a chocolate from a new box of chocolates, you will probably not do so **at random**; you'll probably choose your favourite on purpose and your least favourite will be left for last.

If you write down the name of each person in your class on a separate piece of paper of equal size, put them all in a bag, shake them around then take one out with your eyes closed, you would be picking a card **at random**.





# Describing Probability Using Words

Probability is a measurement or description of how likely an event is to happen. We can give probability using numbers (fractions, decimals or percentages) or using words.

The terms that we use to describe the likelihood of an event are:

likely

unlikely

very likely

very unlikely

certain

impossible

even chance



# Describing Probability Using Words

You should be familiar with most of these words from everyday life (if not from maths lessons) but can you give a definition of 'even chance' or an event which has an even chance of happening?

When the probability of an event is 'even chance', this means that it is as likely to happen as it is to not happen, for example:

**If Gerald's puppy steals his shoe, there is an even chance that it will be the left shoe.**



# Describing Probability Using Words

The order should be:

likely

unlikely

very likely

very unlikely

certain

impossible

even chance



# Describing Probability Using Words

We can show these descriptions of probability on a probability scale:



Even chance has to be right in the middle, because it describes a situation where the probability of an event happening is exactly equal to the probability of it not happening.



# Describing Probability Using Words

Use one of the following terms:

impossible      unlikely      even chance      likely      certain

to describe the probability in each of the following situations:



There are 3 red sweets, 5 green sweets and 4 yellow sweets in a jar. When one is picked out at random, what is the probability that it is... pink?

**Impossible**

There are 12 sweets in the jar, so the probability is less than one even chance, but it is not impossible, not a certainty.

# Using Numbers to Measure Probability

When an event is **certain** to happen, we say that its probability is **1**.

For example, the probability of rolling a number greater than zero on a dice is 1.

An event with **even chance** is exactly as likely to happen as it is to not happen so its probability is  $\frac{1}{2}$ .



When an event is **impossible**, we say that its probability is **0**.

For example, the probability of a dice landing on the ceiling when it is dropped is 0.

A probability is **never less than zero** since an event cannot be less likely than impossible.

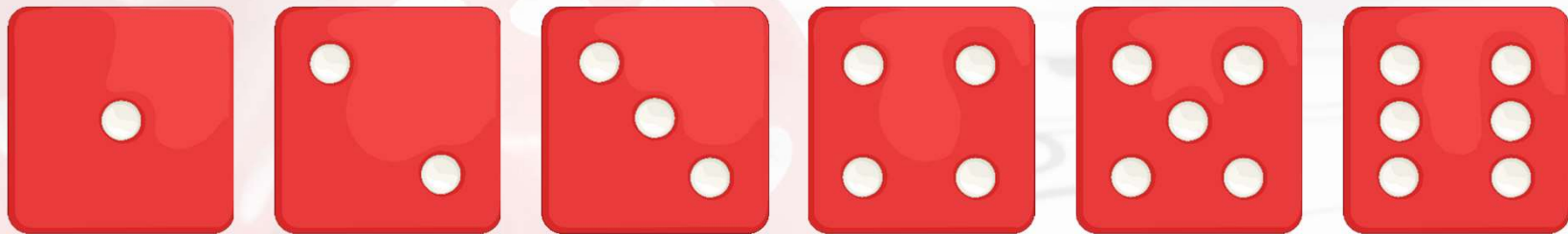
A probability is **never more than one** since an event cannot be more likely than certain.

# Using Numbers to Measure Probability

We can work out numerical probabilities other than 0,  $\frac{1}{2}$  and 1 by looking at possible **outcomes**.

For example, we could describe the probability of getting a 3 when we roll a dice as unlikely, but to give it a numerical value, we need to think about how many possible outcomes there are.

When we roll a dice, there are six outcomes: 1, 2, 3, 4, 5 or 6.



In only one of these outcomes is a 3 thrown, so we say that the probability of throwing a 3 is  $\frac{1}{6}$ .

Use the same method to answer the following questions...

# Using Numbers to Measure Probability

What do we mean when we say that the sweet is picked out at random?

We mean that each sweet in the bag has an equally likely chance to be picked.  
Because  $\frac{1}{12}$  of the sweets are blue and there are 12 sweets in the bag, the probability of picking a blue sweet is  $\frac{1}{12}$ .  
Because  $\frac{9}{12}$  of the sweets are not blue and there are 12 sweets in the bag, the probability of picking a sweet that is not blue is  $\frac{9}{12}$ .





# Decimals and Percentages

So far, we have looked at giving probabilities using words and fractions.

Probabilities may also be given using decimals or percentages, for example, if a probability is given as  $\frac{1}{2}$ , it could otherwise be described as 0.5 or 50%.

Therefore, it is important to be able to convert fractions, decimals and percentages.



# Plenary

Imagine that you write each letter of your first name on a piece of paper then place all of these pieces of paper (which are of equal size) in a bag and shake them around. Without looking, you pick out a slip. Why is this defined as picking at random?

Consider the following **events**. Can you match these events to the **probability descriptions** below? Can you think of events to match the other probability descriptions?

- Picking a vowel
- Picking a consonant
- Picking the letter E
- impossible
- unlikely
- even chance
- likely
- certain

Now find a numerical (fraction, percentage or decimal) probability for each of the events that you used.





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