# Y7 Sets and Probability

## What do I need to be able to do?

**By the end of this unit you should be able to:**

- Identify and represent sets
- Interpret and create Venn diagrams
- Understand and use the intersection of sets
- Understand and use the union of sets
- Generate sample spaces for single events
- Calculate the probability of a single event
- Understand and use the probability scale

## Keywords

**Set:** collection of things
**Element:** each item in a set is called an element
**Intersection:** the overlapping part of a Venn diagram **(AND ∩)**
**Union:** two ellipses that join **(OR ∪)**
**Mutually Exclusive:** events that do not occur at the same time
**Probability:** likelihood of an event happening
**Bias:** a built-in error that makes all values wrong (unequal) by a certain amount, e.g. a weighted dice
**Fair:** there is zero bias, and all outcomes have an equal likelihood
**Random:** something happens by chance and is unable to be predicted

## Identify and represent sets

The **universal set** has this symbol $\xi$ – this means EVERYTHING in the Venn diagram is in this set

A set is a collection of things – you write sets inside curly brackets { }

$\xi$ = {the numbers between 1 and 50 inclusive}

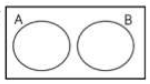
My sets can include every number between 1 and 50 including those numbers

$A$ = {Square numbers}

$A$ = {1, 4, 9, 16, 25, 36, 49}

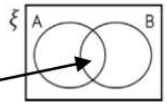
All the numbers in set $A$ are square number and between 1 and 50

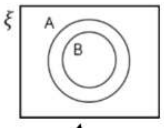
## Interpret and create Venn diagrams




Mutually exclusive sets
The two sets have nothing in common
No overlap

Union of sets
The two sets have some elements in common – they are placed in the intersection

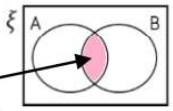



Subset
All of set B is also in Set A so the ellipse fits inside the set

The box
Around the outside of every Venn diagram will be a box. If an element is not part of any set it is placed outside an ellipse but inside the box

## Intersection of sets

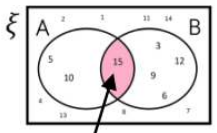



Elements in the intersection are in set $A$ AND set B

The notation for this is $A \cap B$

$\xi$ = {the numbers between 1 and 15 inclusive}

$A$ = {Multiples of 5} $B$ = {Multiples of 3}




The element in $A \cap B$ is 15

In this example there is only one number that is both a multiple of 3 and a multiple of 5 between 1 and 15

## Probability of a single event

Probability = number of times event happens / total number of possible outcomes

P(Blue) = 4/10 ← There are 4 blue sectors; There are 10 sectors overall

Probability notation P ( event )

= 2/5

Probability can be a fraction, decimal or percentage value

4/10 = 40/100 = 0.40 = 40%

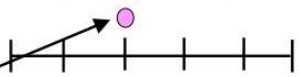
Probability is always a value between 0 and 1

## The probability scale

Impossible 0 or 0% | Even chance 0.5, $\frac{1}{2}$ or 50% | Certain 1 or 100%

The more likely an event the further up the probability it will be in comparison to another event (It will have a probability closer to 1)

There are 2 pink and 2 yellow balls, so they have the same probability



There are 5 possible outcomes
So 5 intervals on this scale, each interval value is $\frac{1}{5}$

## Sum of probabilities

Probability is always a value between 0 and 1

The probability of getting a blue ball is $\frac{1}{5}$
∴The probability of **NOT** getting a blue ball is $\frac{4}{5}$

The sum of the probabilities is 1

The table shows the probability of selecting a type of chocolate

| Dark | Milk | White |
|---|---|---|
| 0.15 | 0.35 | |

P(white chocolate) = 1 – 0.15 – 0.35
= 0.5