Foundation STATISTICS & PROBABILITY

Averages

mode/modal – most common value or values (modal class).
median – the middle number when they are in ascending order.
mean – add the numbers up and divide by how many there are.
range – the difference between the largest and smallest value.

Important Terms

frequency – the number of elements in a group.
quantitative data – information about numbers, e.g. ages or heights (quantities).
qualitative data – information about everything else, e.g. eye colour or favourite food.
random sampling – every piece of data has the same chance of being chosen.

Sample Space

A fair coin is flipped and a fair dice is rolled. The sample space diagram below can be used to represent the outcomes.

	1	2	3	4	5	6
H	H, 1	H, 2	H, 3	H, 4	H, 5	H, 6
T	T, 1	T, 2	T, 3	T, 4	T, 5	T, 6

Pie Charts

To calculate the angle needed, we divide 360° by the total frequency. This tells us the number of degrees needed for 1 person. We can then multiply this by the frequencies to find the angles.

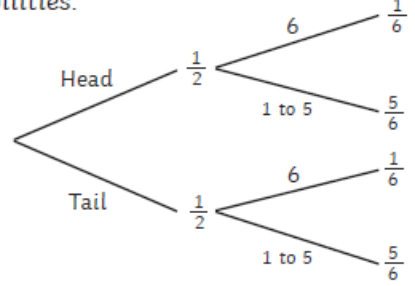
E.g. 10 people were asked their favourite colour.

Favourite Colour	Frequency	Degrees
Red	3	$3 \times 36 = 108°$
Yellow	5	$5 \times 36 = 180°$
Blue	2	$2 \times 36 = 72°$

$360 \div 10 = 36$

Tree Diagrams

A fair coin is flipped and a fair dice is rolled. The tree diagram below can be used to represent some outcomes and their probabilities.



Probability

Probability is about estimating how likely something is to happen. We use fractions, decimals and percentages to describe probability. Only occasionally do we use words (for example, **likely**, **impossible**, **certain**) and we never use ratios!

Probability of an outcome =

$$\frac{\text{number of ways the outcome can happen}}{\text{total possible outcomes}}$$

The probability of rolling a 5 on a fair dice is $\frac{1}{6}$

Scatter Graphs

Easy to spot as the coordinates are scattered. Always draw a **straight line of best fit** (which follows the trend of the data) when you see this type of graph. The line of best fit can be used to make estimates.

These can have **positive correlation** when the line slopes upwards or **negative correlation** when the line slopes downwards.

If you cannot draw a line of best fit, there is **no correlation**.

Mean from a Frequency Table

where f is the frequency and x is the data (e.g. time, number of pets). **Remember,** with continuous data you need to find the midpoint first.

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Higher STATISTICS & PROBABILITY

Learn all the foundation key facts and remember these top tips!

Histograms

Remember that the frequency is given by the **area** of each bar.

Frequency density = $\frac{\text{frequency}}{\text{class width}}$

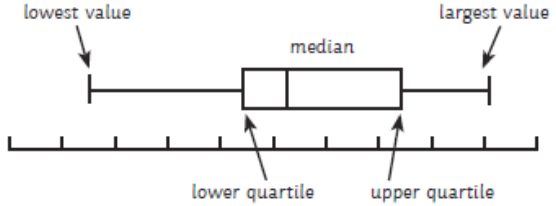
Remember, the height of the bar is the frequency density.

Cumulative Frequency

Add the frequencies up as you go along and plot at the **end** of the class interval.

To find the **median**, draw a horizontal line from $\frac{1}{2}$ of the total frequency to the graph then read off on the x-axis. To find the quartiles, draw horizontal lines from $\frac{1}{4}$ and $\frac{3}{4}$ of the total frequency to the graph then read off on the x-axis. The difference between these is the **interquartile range**.

Box and Whisker Plots



When comparing two of these, make sure you compare the average (median) and the interquartile range. The smaller the IQR, the more **consistent** the data.

Tree Diagrams

Remember these two formulae:

P(A **and** B) = P(A) × P(B)

P(A **or** B) = P(A) + P(B)

Always leave your answer as a fraction if possible, it makes the sums easier!

Capture/Recapture

Always remember these assumptions:

There is no death or migration of animals.

The sampling methods are always the same.

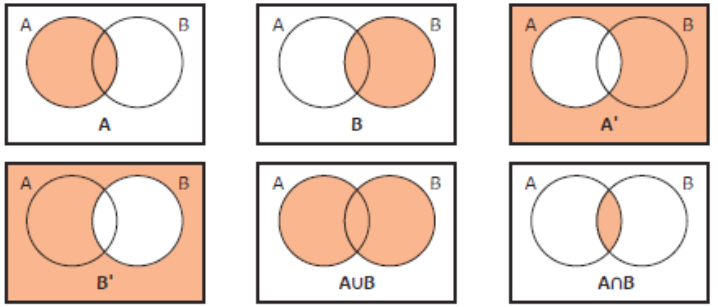
The marking does not affect the survival rate of the animals.

E.g. A scientist captures 30 fish, marks them and releases them back into a lake. The next day he captures 40 fish, 8 of which are marked. Estimate the total number of fish in the lake.

$\frac{8}{40} = \frac{1}{5}$

Therefore, 30 can be assumed to be $\frac{1}{5}$ of the population. To find the total population, 30 × 5 = 150 fish.

Venn Diagrams



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