Probability

A* A B C D

Here are four things you need to know about basic probability for your exam.

1 A probability is the chance an event will happen, and is always a number from 0 to 1.

For EQUALLY LIKELY OUTCOMES, the probability (P) that something will happen is:

$$\text{Probability} = \frac{\text{number of successful outcomes}}{\text{total number of outcomes}}$$

If you know the probability that something will happen, you can calculate the probability that it won't happen.

P(event doesn't happen)
= 1 − P(event does happen)

2 A sample space diagram shows you all the possible outcomes of an event.

Here are all the possible outcomes when two coins are flipped.

Second coin \ First coin	H	T
H	HH	TH
T	HT	TT

There are four possible outcomes. TH means getting a Tail on the first coin and a Head on the second coin.

3 RELATIVE FREQUENCY is sometimes called EXPERIMENTAL PROBABILITY.

You can estimate a probability using the results of an experiment.

$$\text{Estimated probability} = \frac{\text{number of successful trials}}{\text{total number of trials}}$$

If you calculate a probability using relative frequency, it is only an ESTIMATE.

The more trials you carry out, the more accurate your estimate will be.

4 Probability helps you predict the outcome of an event.

If you flip a coin 100 times, you can EXPECT to throw Heads about 50 times.

You might not throw Heads exactly 50 times, but it's a good guess.

Expected number of outcomes
= number of trials × probability

Worked example

grade C

Amir designs a game for his school fete.
It costs 80p to play.
The probability of winning the game is $\frac{2}{5}$
The prize for winning is £1.50
200 people play Amir's game.
Work out an estimate of the profit Amir should expect to make.

80p = £0.80
Money taken in total
= 200 × £0.80 = £160
Expected number of winners
= 200 × $\frac{2}{5}$ = 80
Money paid in prizes
= 80 × £1.50 = £120
Expected profit = £160 − £120 = £40

Now try this

edexcel

grade D

1. The probability that a biased dice will land on a 4 is 0.2
Pam is going to roll the dice 300 times.
Work out an estimate for the number of times the dice will **not** land on a 4
(3 marks)

grade C

2. Jon designs a game to raise money for charity.
It costs £2 to play.
The probability of winning the game is $\frac{1}{5}$
The prize for winning is £5
400 people play Jon's game.
Work out an estimate of the profit Jon should expect to make.
(3 marks)