

PROBABILITY

Note Title

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Theoretical Probability

If we have a situation where there are a number of **EQUALLY LIKELY** possibilities (eg throwing a die, choosing a bead out of a bag), then we can find the probability of an event using

$$\text{probability} = \frac{\text{number of ways the event can happen}}{\text{total number of possibilities}}$$

Example Counters numbered 1 to 12 are put in a bag and a counter is drawn out at random. Find the probability that:

(a) the number is less than 6

$$\frac{5}{12}$$

(b) the number is 6 or more

$$1 - \frac{5}{12} = \frac{7}{12}$$

(c) the number is a multiple of 4

$$\frac{3}{12} = \frac{1}{4} \quad \text{or} \quad 0.25 \quad \text{or} \quad 25\%$$

(Probabilities are most commonly written as fractions, but can also be decimals or percentages.)

Experimental Probability

In many situations we cannot be certain that all the possible outcomes are equally likely, so we cannot use the methods of theoretical probability.

In this case, one way to estimate probabilities is to repeat an experiment lots of times. (The more times it is repeated, the better the estimate should be.)

Example When a drawing pin is tossed, it can land 'point up' or 'point down'. What is the probability that it lands "point up"?

My Results:

Point Up		17
Point Down		13

Based on my result,
probability of point up = $\frac{17}{30} = 0.566\dots$

Based on the class results
probability of point up = $\frac{457}{780} = 0.59$
(2 decimal places)

This is a better estimate as it is based on more trials.