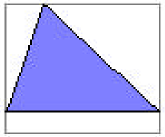
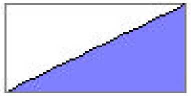
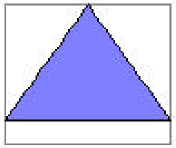
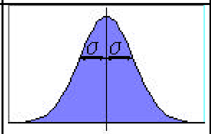
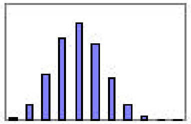
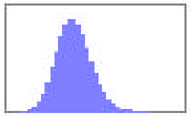
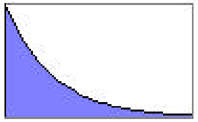
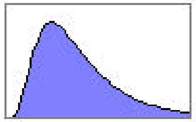
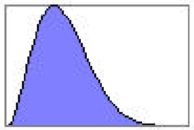
Name *defining characteristics*	**Example distributions**	**Use**	**Situations where suitable**	**Examples**
Triangular *Minimum, most probable, maximum*	  	This is the most commonly used distribution. It has no theoretical justification; however, it is a very simple and clear distribution to use. Note that it overestimates the size of the tails at the expense of values close to the mean.	Where the distribution is not known, and it is thought not suitable for a normal distribution, either because it is bounded or because it is not symmetrical. Situations where a simple intuitive understanding is paramount and flexibility is a great advantage.	The operational maintenance costs of a project have been estimated as being a minimum of £40k, with the most probable £60k and a maximum of £100k. The actual cost could be modelled as a triangular distribution. Note that the mean, or expected value, of a triangular distribution is not the most probable value, but is in fact given by: $\text{mean} = \dfrac{\text{minimum} + \text{most probable} + \text{maximum}}{3}$
Normal / Gaussian *Mean, standard deviation*		Another frequently used distribution. This is in part due to the result of the central limit theorem which states that the mean of a set of values drawn *independently* from the same distribution will be normally described. Many distributions tend towards normal at their limits (e.g. Poisson and binomial).	Many natural variables fall into a normal distribution, such as human heights (male or female), elephant weight etc. Distribution of errors A situation where the distribution is not known, but it is known to be symmetrical around a mean value, and more likely to be near the centre than the extremes.	The retail price inflation has been assumed to be 3% per annum. However there is a chance that it could be above or below this rate. The mean here is 3%, and the standard deviation (σ) should be estimated bearing in mind that the probability that a value falls within: +/- 1σ of the mean = 68% probable +/ 2σ of the mean = 95% probable +/- 3σ of the mean = 99.7% probable

Name *defining characteristics*	**Example distributions**	**Use**	**Situations where suitable**	**Examples**
Uniform distribution *Minimum, maximum*		Used if the variable is bounded by a known maximum and minimum, and all values in between occur with equal likelihood.	Like the other non-parametric distributions, this has the advantage of being intuitively obvious, and highlights the risk as one where there is very little information about its distribution.	The position of a leak along a pipeline, or the price at any given point in time of a highly market sensitive commodity such as petrol.
Binomial *Number of trials, probability for each trial*		For each trial there are only two outcomes (i.e. pass/fail, heads/tails) The trials are independent: what happens in one trial does not affect the subsequent trials The probability remains the same from trial to trial	This should be used if you require the number of events that will occur given a certain number of trials and a known probability of occurrence.	You want to describe the total number of defective items in a sample of 100 manufactured items, given that the probability of any one item being defective is 7%. The number of defective items will be given by a binomial distribution with n=100, p=0.07.
Poisson distribution *Rate of occurrence*		The rate of occurrences remains constant The number of occurrences is not limited The occurrences are independent	This discrete distribution describes the number of events that will occur in a given unit of time, given that the rate is known.	If there is a performance measurement system that deducts payment every time a failure occurs, and it is assumed that the rate of occurrence will be 20 times a year: the number of such events that occur in a given quarter will be described by a Poisson distribution with a rate of 20/4 = 5/quarter.

Name *defining characteristics*	**Example distributions**	**Use**	**Situations where suitable**	**Examples**
Exponential *Rate of occurrence*		Describes the amount of time between occurrences The rate of occurrence is independent of previous occurrences	Only used for describing the time between (or until) occurrences.	If destructive tests show that a light bulb lasts on average 5200 hours, how long a given light bulb will last will be described by an exponential distribution if we further assume that the rate of failure is constant (i.e. the chances of it failing are the same throughout its life).
Log normal *Mean, standard deviation*		This distribution is also used reasonably frequently. The central limit theorem states that if a quantity is the *product* of two or more independently chosen variables, the distribution will tend to log normal.	Naturally occurring variables that are themselves the product of a number of naturally occurring variables. Any variable that extends from zero to +infinity and is positively skewed. Useful for representing quantities that vary over several orders of magnitude.	The volume of gas in a naturally occurring gas reservoir is often log normally distributed, being a product of its volume, pressure, gas/liquid ratio etc.
Beta distribution $\beta(\alpha_1,\alpha_2)$ *Number of trials, n, number of positive events, r.*		Used to determine the probability of an event given a number of trials *n* have been made with a number of recorded successes *r*. This distribution is primarily used to extrapolate the data taken from a sample to the whole population.	If you only have a limited set of data and have to generate a probability distribution from them. Note that this gives a distribution of the probability of an event or series of events, rather than how many events will occur.	If in 100 (*n*) firings of a gun, it mis-fired 16 (*r*) times, what is the probability that it will misfire? Use Beta(17, 85). This also works for estimating cases where there have been no misfires (i.e. *r* = 0) provided there is some chance of failure.

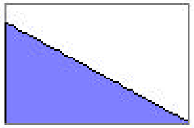
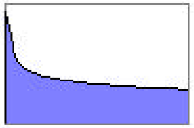
Name *defining characteristics*	**Example distributions**	**Use**	**Situations where suitable**	**Examples**
$\sigma_1 = r + 1$ $\sigma_2 = n - r + 1$	 			

Figure 4: Examples of different distributions