

Which distributions should I use?

Selecting a distribution for an assumption is one of the most challenging steps in creating a Crystal Ball model. Crystal Ball has 17 possible discrete and continuous distributions you can use to describe an assumption, including a custom distribution, which can be a combination of continuous and discrete ranges.

- A **continuous** distribution assumes all values in the range are possible, so any range contains an infinite number of possible values. These distributions are smooth, solid curves.
- A **discrete** probability distribution describes distinct, finite, commonly integer values. These distributions look like different-height columns set next to each other.

The first step in selecting a probability distribution is to use any available data. In the absence of data, use your understanding of the physics or conditions of the variable to help select a distribution. Finally, apply reasonable limits to a simple distribution.

Distribution	Conditions	Applications	Examples
 <p>Normal</p>	<ul style="list-style-type: none"> • The mean value is most likely • It is symmetrical about the mean • It is more likely to be close to the mean than far away 	Natural phenomena.	People's heights, reproduction rates, inflation
 <p>Lognormal</p>	<ul style="list-style-type: none"> • Upper limit is unlimited but values cannot fall below zero • Distribution is positively skewed, with most values near lower limit • Natural logarithm of the distribution is a normal distribution 	Situations where values are positively skewed, but <i>cannot</i> be negative.	Real estate prices, stock prices, pay scales, oil reservoir size

 <p>Triangular</p>	<ul style="list-style-type: none"> • The minimum is fixed • The maximum is fixed • It has a most likely value in this range, which forms a triangle with the minimum and maximum 	When you know the minimum, maximum, and most likely values, <i>popular for when you have limited data.</i>	Sales estimates, number of cars sold in a week, inventory numbers, marketing costs
 <p>Uniform</p>	<ul style="list-style-type: none"> • Minimum is fixed • Maximum is fixed • All values in range are equally likely to occur 	When you know the range and all possible values are equally likely.	A real estate appraisal, leak on a pipeline
 <p>Custom</p>	<ul style="list-style-type: none"> • Very flexible distribution, used to represent a situation you cannot describe with other distribution types • Can be either continuous or discrete or a combination of both • Used to input an entire set of data points from a range of cells 		

Less commonly used distributions are listed below and on the back side of the card.

 <p>Binomial</p>	<ul style="list-style-type: none"> • For each trial, only 2 outcomes are possible; usually, success or failure • The trials are independent • The probability is the same from trial to trial 	Describes the number of times an event occurs in a fixed number of trials, also used for Boolean logic (true/false or on/off).	Number of heads in 10 flips of a coin, likelihood of success or failure
 <p>Poisson</p>	<ul style="list-style-type: none"> • Number of possible occurrences is not limited • Occurrences are independent • Average number of occurrences is the same from unit to unit 	Describes the number of times an event occurs in a given interval (usually time).	Number of telephone calls per minute, number of defects per 100 square yards of material