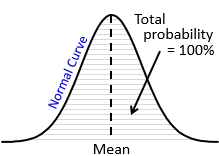
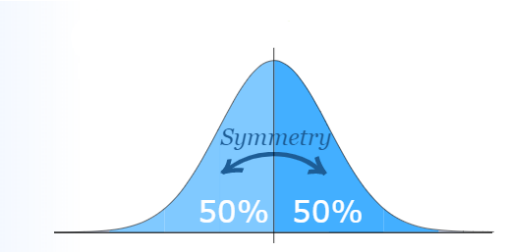
**Probability summary**

1. The normal distribution

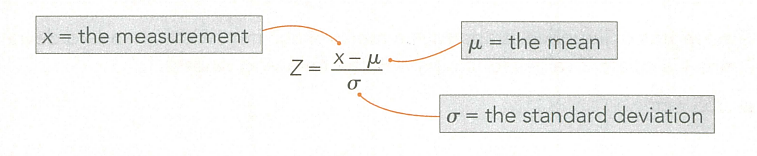
* It is represented by a bell-curve
* The mean is centred with most data clustered around it
* The bell-curve is symmetrical
* A normal distribution is unbounded (there is no limit to where it starts or ends)
* The area under the line represents the total probability and equals 1 (100%)
* The standard deviation measures the spread of the distribution
* Nearly all values lie within three standard deviations on either side of the mean

1. The standard normal distribution

The Z-score measures the number of standard deviations to the right or left of the mean.

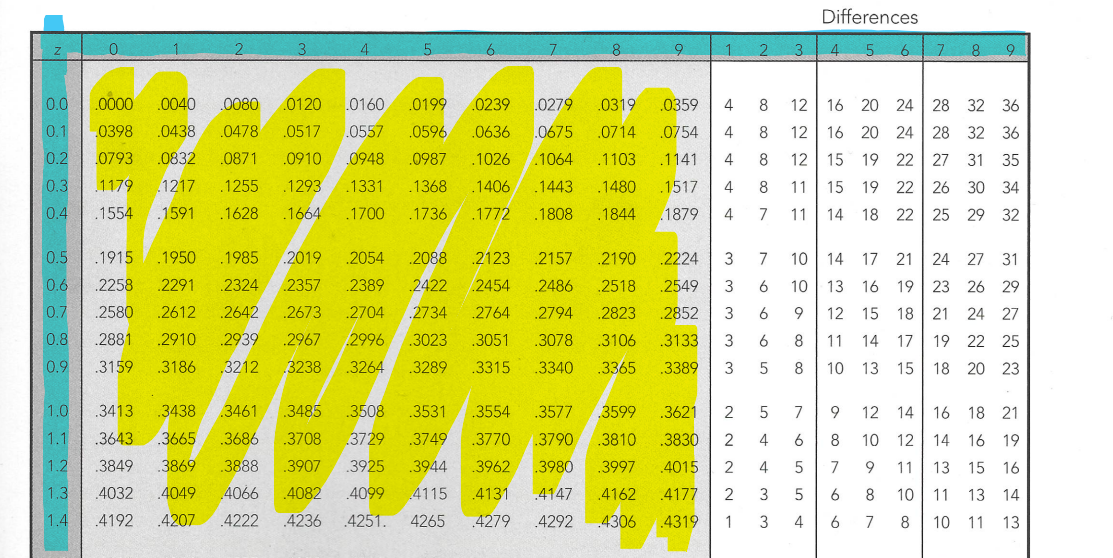
Remember:

* A negative Z-score lies to the left of the mean.
* A positive Z-score lies to the right of the mean.
* The formula to find the Z-score will be given in the assessment, but you must memorise what the symbols mean:



**Z-score**

Read down first and then across.

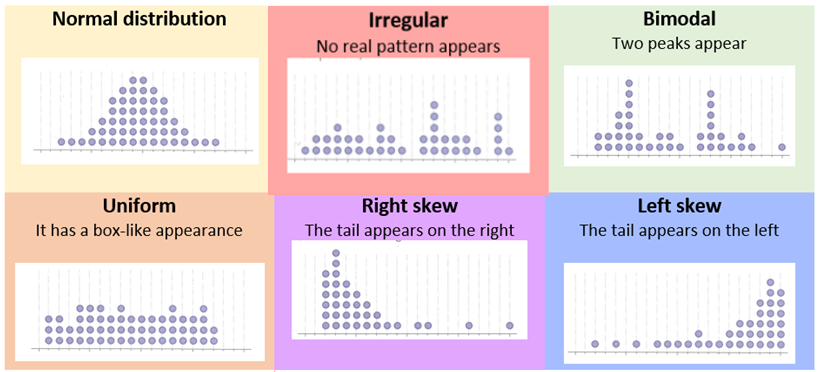


Differences:

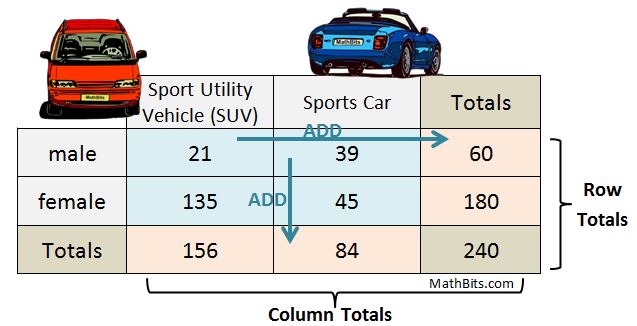
Add these on to the probabilities when using the Z-score to find probabilities.

Probabilities

1. Other shapes of graphs:



1. Two-way frequency tables



1. Calculations

**Remember:**

* “and” means times ()
* “or” means adds (+)

1. Probabilities can be expressed as fractions, decimals, or percentages.

The formula to find a probability as a fraction is:

For example: *What is the probability of rolling 5 with a dice?*

Number of favourable outcomes: There is only one 5 on a dice = 1

Total possible outcomes: A dice has six sides = 6

1. Finding the expected number:

For example:

*A dice is rolled 50 times. How many times would you expect it to land on 3?*

The probability of the event (landing on 3) is:

The number of trails is 50 times.

Calculation:

1. Risk

*Absolute risk* is the probability of something bad happening.

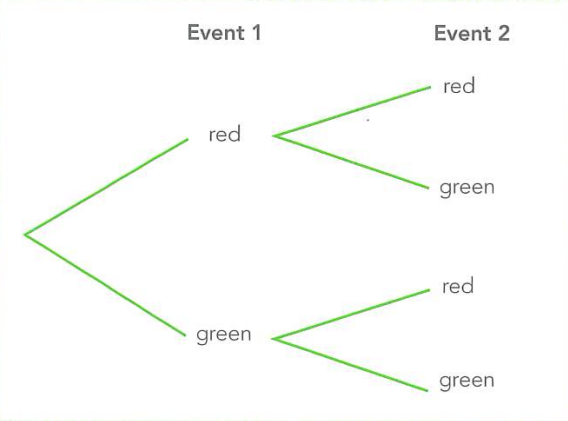
*Relative risk* is the probability of one event divided by the probability of a second event occurring:

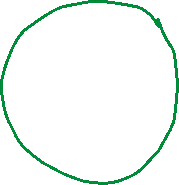
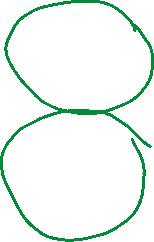
For example:

*According to NHTSA the probability of being in a car accident in an urban area is 53% and in a rural area is 45%. How many times as likely is it to be in a car crash in an urban area than a rural area?*

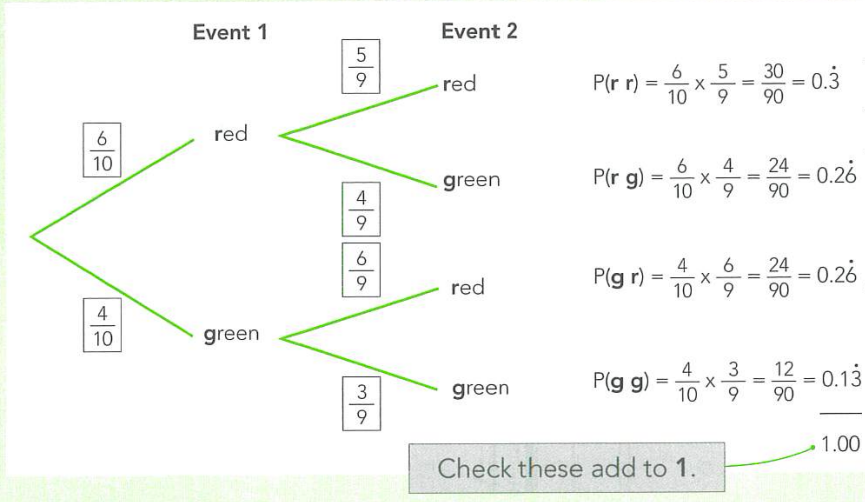
This means that you are 1.1778 times as likely to be in a car crash in an urban area than a rural area, or 0.1778 (1.1778 – 1) **more** likely.

1. Probability trees:





Each group should add to 1.





**Overall outcomes:**

Multiply the probability of each branch together.

