

Statistics and Probability – Key Topics for a C/B Grade

Pie Charts

To draw an accurate pie chart you must calculate the angles. To find the angle for 1 person/item, divide 360° by the total number of people/items. Then multiply to find the angle for each sector. You may need to measure angles in a pie chart, then divide by the angle per person/item to find out how many the sector represents.

Histograms

A histogram represents frequencies with **areas**. You need to work out either frequency density, or how many items each square in the diagram is worth.

Cumulative Frequency

To work out cumulative frequencies, add up the frequencies as you go.

When plotting the graph, the cumulative frequency goes with the **upper** limit of each group.

Averages

Mean – add up the numbers and divide by how many there are.

Median – the middle number *when they are in order*.

Mode – the most common number/item

To find the mean from a frequency table you must multiply the number by the frequency, add these up, and divide by the total frequency. For grouped data, find the mid-point of each group first.

E.g. (only the numbers in the outlined table will be given)

| Number of Children | Number of families | Multiply |
|--------------------|--------------------|----------|
| 1 | 12 | 12 |
| 2 | 8 | 16 |
| 3 | 4 | 12 |
| 4 | 0 | 0 |
| 5 | 1 | 5 |
| Total | 25 | 45 |

Mean = $45 \div 25 = 1.8$ children per family

To find the median from a cumulative frequency graph, half the total frequency and read off the corresponding amount from the graph.

Measures of spread

The **range** is largest – smallest. It is a single number.

The **interquartile range** is upper quartile – lower quartile.

To find the quartiles from a list, find the median and split the list into two either side, and then find the median of each half.

To find the quartiles from a cumulative frequency graph, find one quarter and three quarters of the total frequency, and read the corresponding values off the graph.

Probability

Probabilities add up to 1. Every probability is between 0 and 1.

The probability of something **not** happening is $1 -$ the probability it happens.

To find the **expected frequency** multiply the probability by the number of trials.

If two things cannot both happen at the same time, then the probability of one **or** the other is found by adding up the other probabilities. **This does not apply if both could happen together.**

E.g.

| Number on spinner | Probability |
|-------------------|-------------|
| 1 | 0.4 |
| 2 | 0.27 |
| 3 | 0.05 |
| 4 | |

Probability of getting 4 is $1 - (0.4 + 0.27 + 0.05) = 1 - 0.72 = 0.28$

Probability of **not** getting 1 is $1 - 0.4 = 0.6$

Probability of getting an odd number is $0.4 + 0.05 = 0.45$

If the spinner is spun 200 times, the expected number of 2s is $0.27 \times 200 = 54$

Harder probability

To find the probability of 2 things happening one after another, multiply the probabilities.

Tree diagrams

Tree diagrams can be drawn to help with harder questions. The probabilities on each branch must add up to 1. You multiply across the branches, and add between branches.

You must read the question to see if an item is replaced or not – if it is the probabilities stay the same; if not they change.

In some cases, it may help to imagine which branches you would use, but not actually draw out the whole tree.