EMPIRICAL STATEMENTS

About the natural world

Investigated using evidence of our senses

EG. Taller boys have larger hands

EG. High-sugar soft drinks contribute to heart conditions

Something doesn't have to be true to be an Empirical statement as long as theoretically it could be proved of disproved

Not Empirical if it relates to ethics, maths etc.

QUANTITATIVE SKILLS

ACCURACY

Proximity of a measurement to its true value

PRECISION

Proximity of several measurements to each other

UNCERTAINTY

Try and estimate measured quantity to one decimal place smaller than the lowest graduation on a scale

EG. On a ruler with cm and mm read to 3.74

EG. If balance weighs mass to the nearest gram there is an uncertainty reading of +- 0.5g

STATISTICS

Mode - highest - lowest score

Median - Middle score

Mean - Average

Standard deviation - SD = $\sqrt{\sum (mean - x)^2 / n - 1}$

VALID AND SOUND ARGUMENTS

VALID

If the truth of the premise (opening statements) guarantees truth of conclusion

SOUND

If argument is valid and premises are true

EG. All fruit have seeds, some breakfast foods are fruit, therefore, some breakfast foods have seeds = valid and sound

EG. All fish can talk, some birds are fish, therefore, some birds can talk = Valid but unsound

EG. All fruit are edible foods, some edible foods are breakfast foods, therefore, some breakfast foods and fruit = Invalid and unsound

To be a sound argument, it must be a valid one, even if premises are true

VARIABLES

Factors that affect results

Independent or experimental variable is changed (on the X axis of a graph

Controls are kept the same

Dependent variable is beings measured (on the Y axis of a graph)

PROBABILITY

Single - number of favourable outcomes/- number of equally likely outcomes

2 or more - Probability of one X probability of the other

A or B -probability of a X probability of B - probability of A and B

Quantitative skills

CONVERSIONS BETWEEN MEASUREMENTS

Micrometer = 0.001mm

Millimeter = 0.001m

Centimeter = 10mm

Meter = 100cm

Decimeter = 10cm or 1/10 of a meter

Kilometer = 1000m

Megameter = 1000km

Gigameter = 1000000km

Kelvin = degrees celcius + 273

SIGNIFICANT FIGURES

All non-zero digits are significant

Zeros between non-zero digits are significant

Zeros at the beginning of a number are not significant eg. 0.00234

Zeros at the end of a number are significant if there is a decimal in the number eg. 560.00

Only round at final step of equation

Round to least significant decimal place/- figure

Conversion between units = given units X desired/given = desired