

Logic: Rationalism

Going and taking look: empiricism

Theory building: induction

The importance of doubt: scepticism:

Falsifiability: ability to be proven or indicated to be wrong.

Role in mathematics in science: describes objects, events, and relationship (measurement), communications with others, quantifying uncertainty

Qualitative math: that lets you record, analyse and interpret observations without numbers, used)

Measurement: taking variables of interest and making them observable and quantifiable eg- time and speed **Standardising units** and then counting them using an instruments such as weight machine, thermometer, or a clock

- **Nominal values:** the number are used to distinguish between individuals (football players number on back)
- **Ordinal values:** numbers are allowed to be ordered according to category eg- gold bronze silver
- **Interval SCALE:** numbers can be sorted and we can tell how far apart they are on in the arbitrary scale eg(Celsius and natural zero point)
- **Ratio:** numbers have all the above but scale has natural zero point

SI system: is a system of metric units of measurement built around seven base units and larger number of derived units

Measurement error: all measurements involve errors So accuracy of measurement can be estimated is a combination of trueness and precision.

- Trueness: is how close average of our values come towards true value (validity)
- Precision: how closely our repeated measurements agree (reliability)
 - Good trueness and good precision means good accuracy
 - Poor trueness but good precision means poor accuracy

- Good trueness but poor precision means poor accuracy

Statistics: is a single number which tells you something about lots of numbers ie mean, median skewness etc. They are useful for characterising/describing data

Probability: how likely an event is going to happen. EG odd- which might be the ratio of not happening. But science disagrees with what these numbers means. 0 to 1

- **Frequentist:** way of recording how often a certain events happens as a fraction of all possible happenings.
- **Subjectivist:** but others say it's a human judgement about whether or not to be surprised about whether or not to be surprised about what comes up

Computer simulations: Today, computers let us make much more complex models than ever before. But while computerised models can be very helpful in understanding nature and make prediction based of models

Eugene winger unreasonable effectiveness of mathematics: Why should nature obey mathematical law we can manipulate these symbols according to game. learn new things about nature

Inferential statistics: to test the hypotheses and get a clearer answer!

Inferential statistics:

Computer simulations:

“unreasonable effectiveness of mathematics”