OCR (B) Physics GCSE

Topic 7 - Ideas About Science

Flashcards

What is the aim of science?

What is the aim of science?

To develop good explanations of natural phenomena.

What is a hypothesis?

What is a hypothesis?

A predictive explanation for an observed phenomenon.

What tools can measure distance?

What tools can measure distance?

Callipers, rulers, tape measures

How is area measured?

How is area measured?

Lengths are measured and used to calculate area.

How is mass measured?

How is mass measured?

Using a balance, or Newton meter (and dividing by g).

How is time measured?

How is time measured?

Using a stopwatch.

How is volume measured?

How is volume measured?

Submerge object in water and measure the change in water level.

Or for a **regular** shape, measure the lengths and calculate using the appropriate formula.

How is temperature measured?

How is temperature measured?

Using a thermometer or thermistor.

What is a control variable?

What is a control variable?

A variable not being investigated, which needs to be controlled in order to have a valid investigation.

Define precision

Define precision

How close the measurements are to the mean value. Repeat measurements which are very close together are precise.

Define accuracy

Define accuracy

How close the measurements are to the true values. If they are very close, they are accurate.

Explain validity

Explain validity

A valid investigation is a fair one, in which all variables are controlled.

How are anomalous results indicated?

How are anomalous results indicated?

By circling them (in a table or on a graph).

What is discrete data?

What is discrete data?

Data which can only take specific values within a range.

Give an example of a discrete variable

Give an example of a discrete variable

Shoe size, eye colour

What is continuous data?

What is continuous data?

Data which can take any value within a range.

Give an example of a continuous variable

Give an example of a continuous variable

Mass, height, length, time

What is the SI unit for length?

What is the SI unit for length?

Metre, m

What is the SI unit for mass?

What is the SI unit for mass?

Kilogram, kg

What is the SI unit for time?

What is the SI unit for time?

Second, s

What is the SI unit for temperature?

What is the SI unit for temperature?

Degrees celsius, ºC

What is the SI unit for pressure?

What is the SI unit for pressure?

Pascal, Pa

What is the SI unit for energy?

What is the SI unit for energy?

Joule, J

What is the SI unit for current?

What is the SI unit for current?

Amperes (Amps), A

What does the prefix tera indicate?

What does the prefix tera indicate?

$x10^{12}$

What does the prefix giga indicate?

What does the prefix giga indicate?

$x10^{9}$

What does the prefix mega indicate?

What does the prefix mega indicate?

$x10^6$

What does the prefix kilo indicate?

What does the prefix indicate?

$x10^3$

What does the prefix centi indicate?

What does the prefix centi indicate?

$x10^{-2}$

What does the prefix milli indicate?

What does the prefix milli indicate?

$x10^{-3}$

What does the prefix micro indicate?

What does the prefix micro indicate?

$x10^{-6}$

What does the prefix nano indicate?

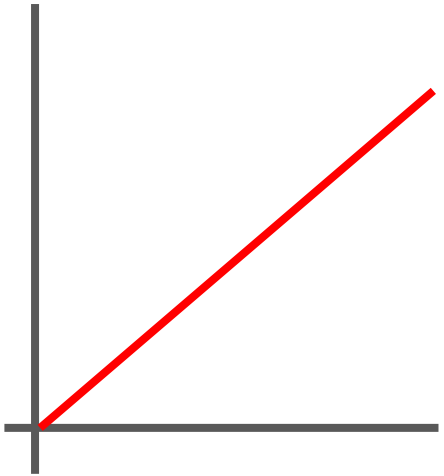
What does the prefix nano indicate?

$x10^{-9}$

What is positive correlation?

What is positive correlation?

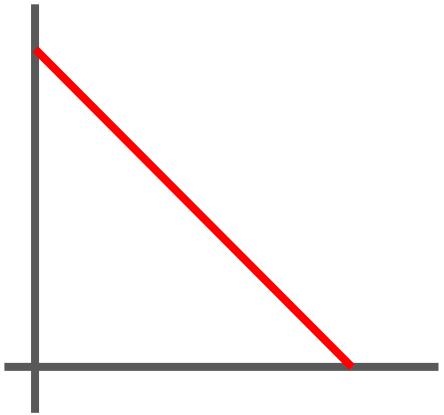
As the x variable increases, the y variable increases.



What is negative correlation?

What is negative correlation?

As the x variable increases, the y variable decreases.



What are the features of a directly proportional graph?

What are the features of a directly proportional graph?

- The gradient is a straight line.
- It passes through the origin (0,0).

What kind of relationship produces a curve?

What kind of relationship produces a curve?

Non-linear (eg. exponential).

What is extrapolation?

What is extrapolation?

Estimating a value outside of the range of data.

What is interpolation?

What is interpolation?

Estimating a value from within the range of measured and plotted values.

How is a mean calculated?

How is a mean calculated?

$$\text{Mean} = \frac{\text{sum of all values collected}}{\text{number of values collected}}$$

What is range?

What is range?

The difference between the maximum and minimum values.

Define repeatability

Define repeatability

The ability of an experiment to be repeated by the **same** person (**same** method/equipment) to produce similar results.

Define reproducibility

Define reproducibility

The ability of an experiment to be repeated by a **different** person using **different** method/results to obtain similar results.

What is a random error?

What is a random error?

An error arising from unpredictable uncontrollable, environmental variation.

What is a systematic error?

What is a systematic error?

An error arising from a consistent fault in technique/equipment which causes each result to differ from the true value by the same amount. (E.g. zero error from not calibrating a balance).

What criteria are required for a scientific theory to be approved?

What criteria are required for a scientific theory to be approved?

- Rigorously tested and used successfully.
- Widely accepted by scientists.

What is peer review?

What is peer review?

When experts in the scientific community check the findings reported by an individual scientist/group before it can be accepted as a theory.

What is a representational model?

What is a representational model?

A model which uses physical analogies or spatial relationships to visualise a scientific idea.

What is a spatial model?

What is a spatial model?

A model which represents data in 3D.

Give an example of a spatial model

Give an example of a spatial model

The DNA double helix.

What is a descriptive model?

What is a descriptive model?

A model which uses words and diagrams to explain phenomena.

What is a mathematical model?

What is a mathematical model?

A model which uses patterns in data of past events, and known scientific relationships, to predict behaviour.

What is a computational model?

What is a computational model?

A digital mathematical model which can quickly apply complex calculations.

What are some positive impacts of science and technology on society?

What are some positive impacts of science and technology on society?

- Medical improvements (eg. radiotherapy, X rays).
- Nuclear energy.

What are some negative impacts of science and technology on society?

What are some negative impacts of science and technology on society?

- Nuclear bombs and disasters.
- Unsustainable fossil fuel consumption leading to global warming.

How is risk calculated? (Higher)

How is risk calculated? (Higher)

Estimating the chance of the risky event occurring over a given time period.

What factors must be taken into consideration when making research decisions?

What factors must be considered when making research decisions?

- Risks
- Benefits
- Cost
- Ethical issues