GCSE Required Practical – Physics 2 – Force and acceleration

What's the point of the practical?

To find out what happens to the acceleration when we change the mass.
And to find out what happens to the acceleration when we change the force.

Force (N) = mass (kg) x acceleration (m/s²)

$$\text{Acceleration (m/s}^2) = \frac{\text{change in velocity (m/s)}}{\text{time (s)}}$$
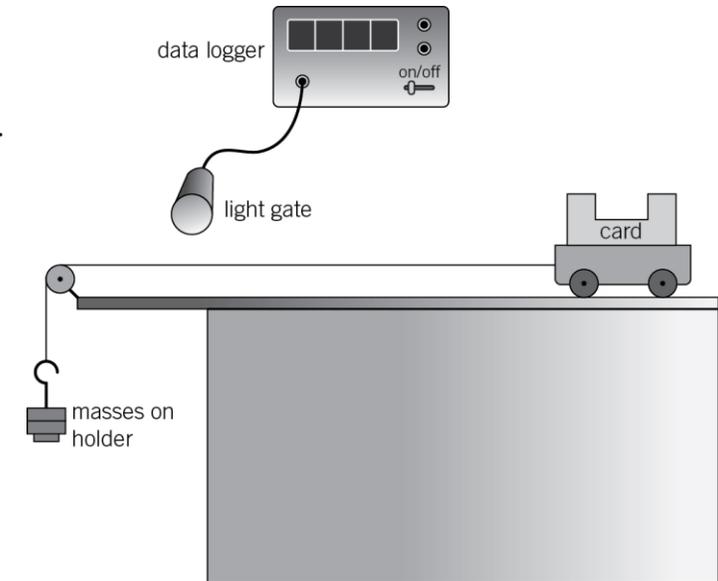
Results:
The more force, the more acceleration.
The more mass, the less acceleration.

Example Apparatus

Data logger and light gate - Measures velocity or acceleration

Masses – make the trolley (car) move

data logger

light gate

card

masses on holder

What may they ask us about?

- They may get you to work out acceleration from force and mass (easy) or give you the change in velocity and time so you need to use both equations above.
- State one possible source of error (*friction slows the trolley down, the trolley doesn't go in an exact straight line, the masses hit the floor and stop pulling on the string*)
- What is the IV, DV and control variables for each part of the experiment?

(*remember, if you're changing the mass, the force should stay the same, if you're changing force, the mass should stay the same – only one thing changes*)

- Interpret graphs of results and use them to calculate or make predictions:

Acceleration–force graph for trolley

acceleration in m/s²

force in N
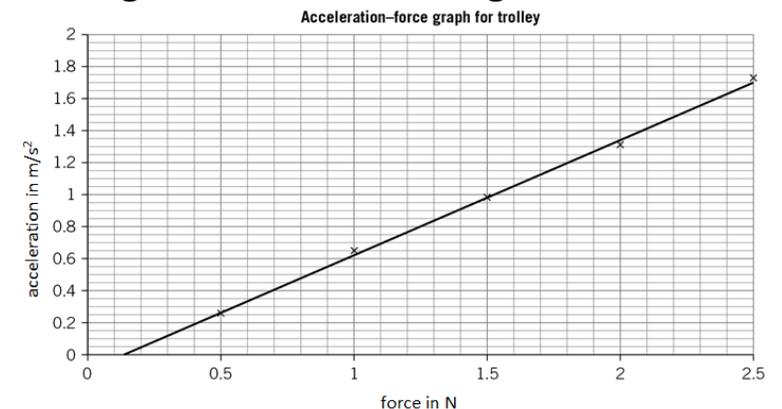
# GCSE Required Practical – Physics 2 – Force and extension of a spring

Extension = how much the length has increased from it's original length

What's the point of the practical?
To find out the relationship between force and extension.

Results:

Hooke's Law: extension is directly proportional to the force applied, as long as the limit of proportionality is not exceeded
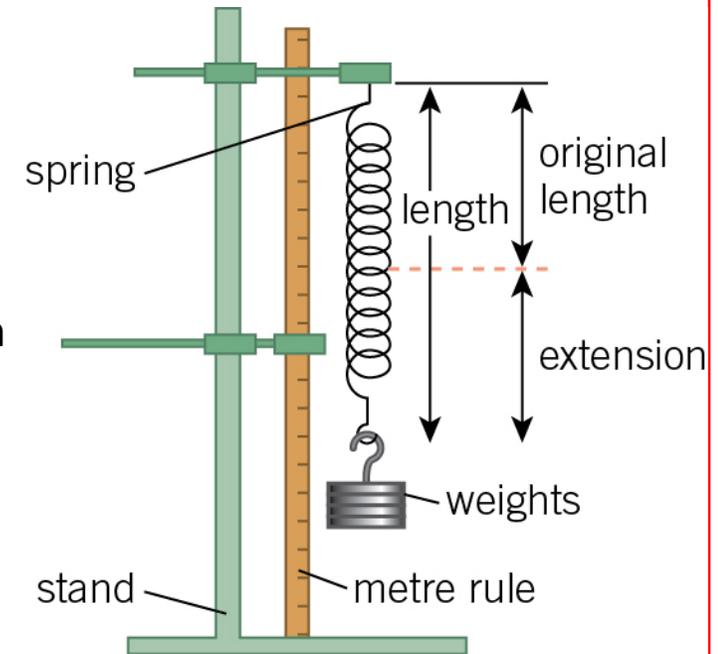

Limit of proportionality
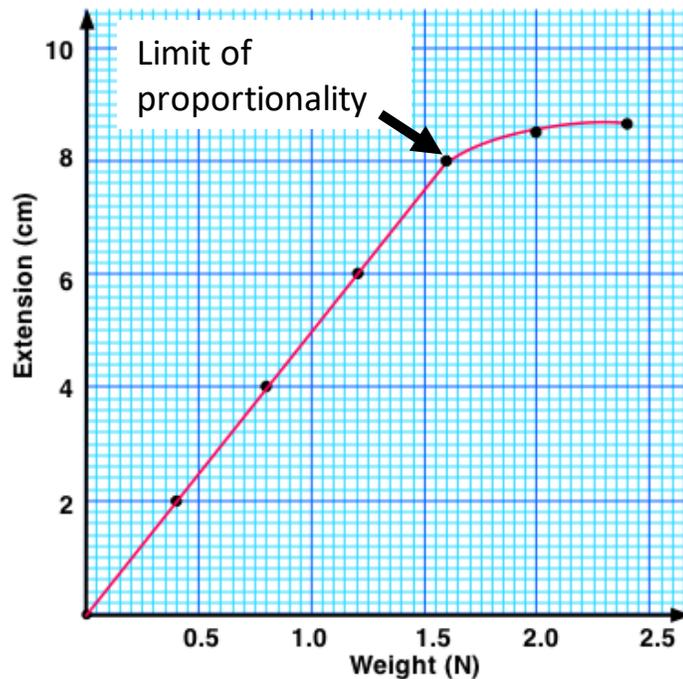
Example Apparatus

Weights – provide a force (N)

Spring - stretches

Metre rule – measures the length of the spring (before and after)

spring
original length
length
extension
weights
stand
metre rule

What may they ask us about?
- Describe the relationship (***directly propotional***). Label the **limit of proportionality** (*where it's no longer a straight line*)
- What error could cause the extension to NOT start at zero (*if you measured, the length and not the extension. The **extension** should be zero with no weights, but the **length** of the spring will be a few cm*)
- What is the IV (force), what is the DV (extension), comment on repeatability, resolution, etc

GCSE Required Practical – Physics 2 – Waves in a tank (water)

Wave speed (m/s) = frequency (Hz) x wavelength (m)

What's the point of the practical?
To find out how wavelength, frequency and wave speed are related.
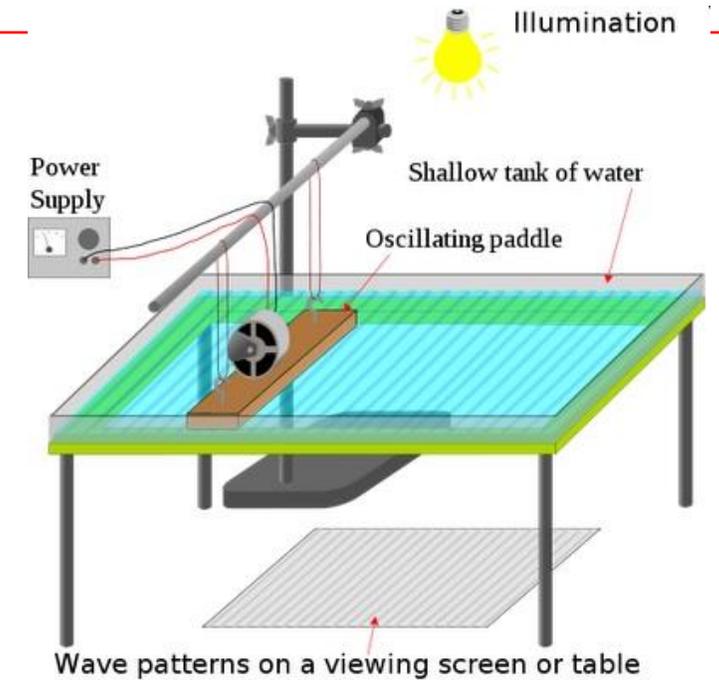
Results:
Speed = frequency x wavelength.
If you double the double the frequency, the wavelength is halved and vice versa.
Wave **speed stays the same** because it's always the same material (water)

Example Apparatus

Oscillating paddle – moves up and down to produce waves

Illumination

Power Supply

Shallow tank of water

Oscillating paddle

Wave patterns on a viewing screen or table

What may they ask us about?
- Explain why the wave speeds you calculate are all about the same but **not identical.** (*Wave speed is the same in water but it's hard to be 100% accurate with measurements each time because it's hard to see where exactly the waves are, the waves keep moving, some waves are reflected*)
- How could you improve the accuracy of measurements? (add insulation to stop reflected waves, use a bigger pool, brighter light, sharper paddle to get nice clean waves)
- Comment on repeatability, reproducibility, range, uncertainty and calculate means

Wave speed (m/s) = frequency (Hz) x wavelength (m)

What's the point of the practical?
To find out how wavelength, frequency and wave speed are related.

Results:
Speed = frequency x wavelength.
If you double the double the frequency, the wavelength is halved and vice versa.
Wave **speed stays the same** because it's always the same material (string)

Example Apparatus

Weight – hold the String tight (taut)

frequency generator

vibrator (nearly at a node)

pulley

weight
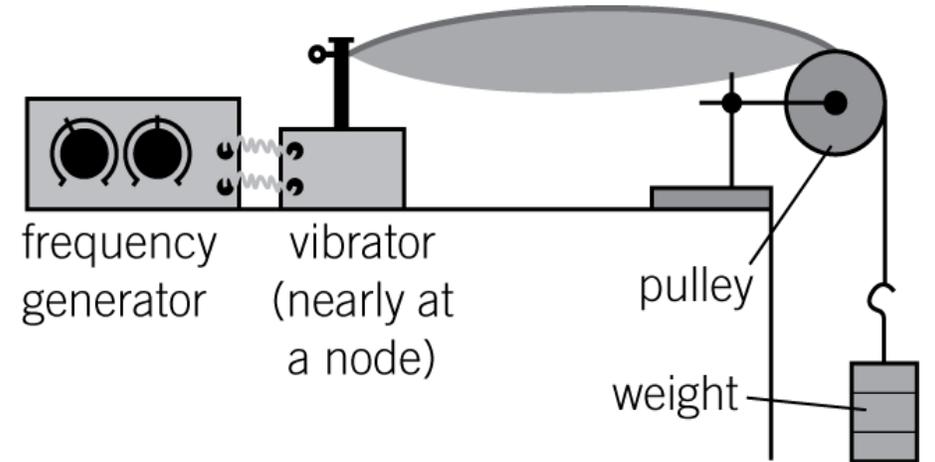
Frequency generator and vibrator (oscillator) – make the string vibrate to produce waves.

What may they ask us about?
How could you measure the waves more accurately? (*use a different colour or width string to make it easier to see the waves*)
Comment on repeatability, reproducibility, uncertainty and calculate means

GCSE Required Practical – Physics 2 – Surfaces and radiation

Infrared Radiation: electromagnetic waves that heat things up.   Emit: when something **gives off** something

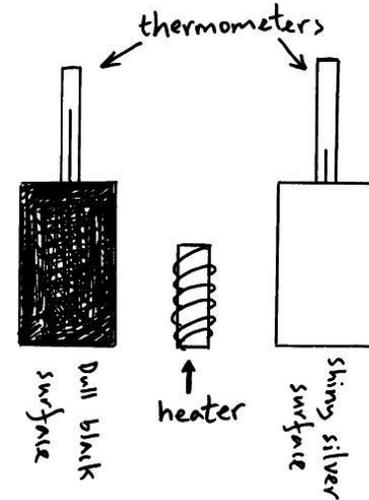Absorb: when something takes in or soaks up something (don't say attract!)

What's the point of the practical?

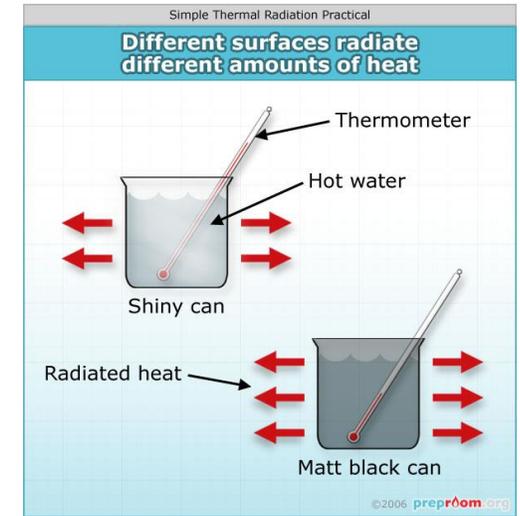To find out how the colour and texture of the surface affects how much heat (radiation) is absorbed or emitted

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Results:

Matt black surfaces **absorb** and **emit** much more radiation than shiny smooth surfaces.

Example Apparatus

Heated from the outside   Heated from the inside

What may they ask us about?

- Independent, dependent and control variables (*same sizes, same volumes, same thickness, starting temp etc*)
- Why should you put lids on each container (*to reduce heat loss through convection*)
- Resolution of measurements *(1°C?),* repeatability, reproducibility, calculating means etc
- Why won't you get exactly the same measurements if you repeat the experiment? What are the sources of error? (*hard to read the temp at exactly the right time, slightly different volumes, slightly different starting temperatures, can may be warm already*)