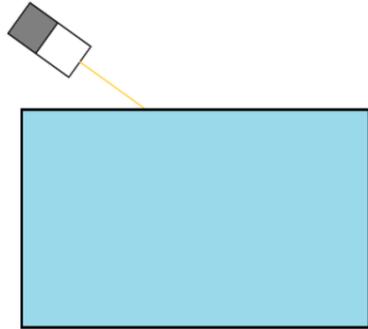


Paper 2

REQUIRED PRACTICALS

Light (Physics Only)



Label the equipment.

What safety precautions should be taken on this experiment?

How can you draw a light ray accurately?

Draw a normal line on the diagram where the ray hits the glass block.

Draw a ray reflecting when it hits the block

Label the angles of incidence and reflection

What is the relationship between the angle of incidence and the angle of reflection?

Draw a ray that refracts when it enters the glass block.

Label the angle of refraction.

Force and Extension

What is the unit for extension?

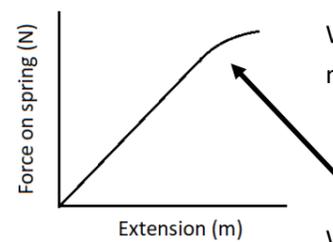
How can you calculate the extension of a spring?

What does 1kg weigh on Earth? (Gravity = 10N/kg)

If 5N gives an extension of 0.1m calculate the spring constant. Give the units.

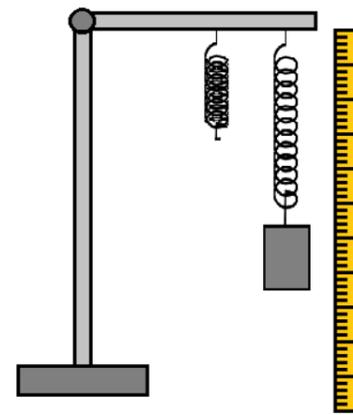
Use the equation to calculate elastic potential energy. Give the units.

$$\text{Elastic potential energy} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$



What is the difference between elastic and inelastic deformation?

What is this point called?



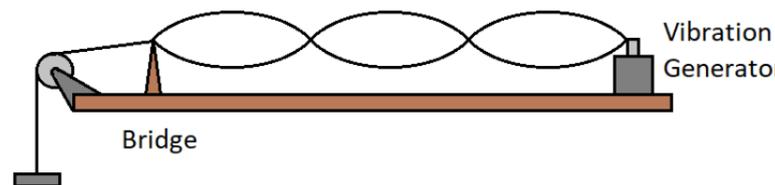
Waves

What is the equation for wave speed? Give all units

What is the frequency of a wave?

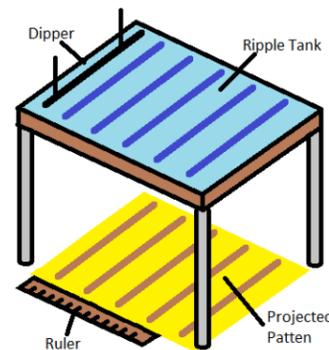
What is the wavelength of a wave?

Why is it more accurate to count the number of waves that pass a point in 10s and divide by 10 rather than count the number in 1s?

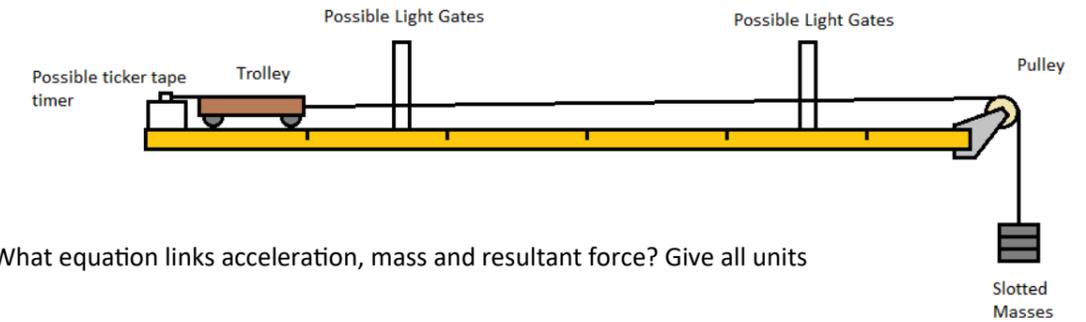


How many complete waves are between the vibration generator and the bridge?

If the distance between the vibration generator and the bridge is 2m and the frequency of the vibrations is 50Hz calculate the wave speed.



Acceleration



What equation links acceleration, mass and resultant force? Give all units

What force would a 300g mass provide? (Gravitational field strength 10N/kg)

How can the effect of friction on the trolley be removed?

The trolley completes the first 20cm section of track in 0.5 second. What is its speed?

It completes the next 1.45m of the track in 0.5 seconds. Calculate the new speed, the change in speed and the acceleration?

If the trolley had a mass of 1kg what was the resultant force?

Radiation and Absorption

The 4 sides of the Leslie cube are black matt, white matt, black shiny and silver shiny. Boiling water is added and the temperature rise in 5 minutes from the thermometers on each side is recorded.

Why are the bulbs of the thermometers painted matt black?

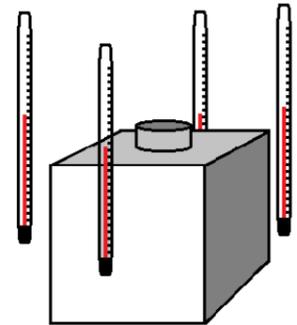
What is the independent and dependent variables?

Name 2 control variables

Should you draw a line graph or a bar chart? Why?

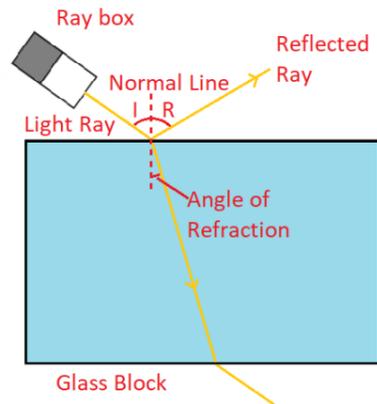
Which side would you expect to emit the most infrared radiation?

Which side would you expect to emit the least infrared radiation?



REQUIRED PRACTICALS

Light (Physics Only)



Label the equipment.

On diagram

What safety precautions should be taken on this experiment?

Ray box gets hot, avoid touching until cool

Glass may be chipped, be careful

How can you draw a light ray accurately?

Mark 2 crosses on the ray, remove equipment and connect crosses with a ruler

Draw a normal line on the diagram where the ray hits the glass block.

On diagram

Draw a ray reflecting when it hits the block

On diagram

Label the angles of incidence and reflection

On diagram

What is the relationship between the angle of incidence and the angle of reflection?

Angle of Incidence = Angle of Reflection

Draw a ray that refracts when it enters the glass block.

On diagram

Label the angle of refraction.

On diagram

Force and Extension

What is the unit for extension?

m

How can you calculate the extension of a spring?

Stretched length (m) - original length (m)

What does 1kg weigh on Earth? (Gravity = 10N/kg)

10N

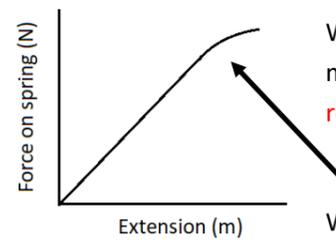
If 5N gives an extension of 0.1m calculate the spring constant. Give the units.

50 N/m

Use the equation to calculate elastic potential energy. Give the units.

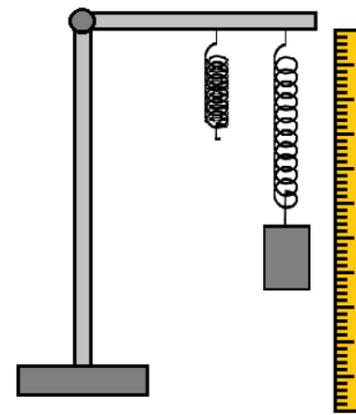
Elastic potential energy = 0.5 x spring constant x (extension)²

$0.5 \times 50 \times (0.1^2) = 0.25J$



What is the difference between elastic and inelastic deformation? Elastic - object returns to original shape when force is removed, Inelastic - object doesn't return to original shape

What is this point called? Limit of proportionality



Waves

What is the equation for wave speed? Give all units

Wave speed (m/s) = Frequency (Hz) x Wavelength (m)

What is the frequency of a wave?

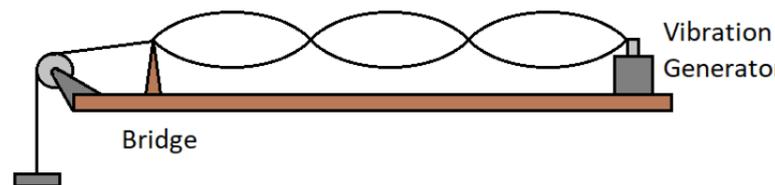
The number of waves that pass a point in 1s

What is the wavelength of a wave?

The distance between 1 peak and the next

Why is it more accurate to count the number of waves that pass a point in 10s and divide by 10 rather than count the number in 1s?

Any timing/counting error will be divided by 10



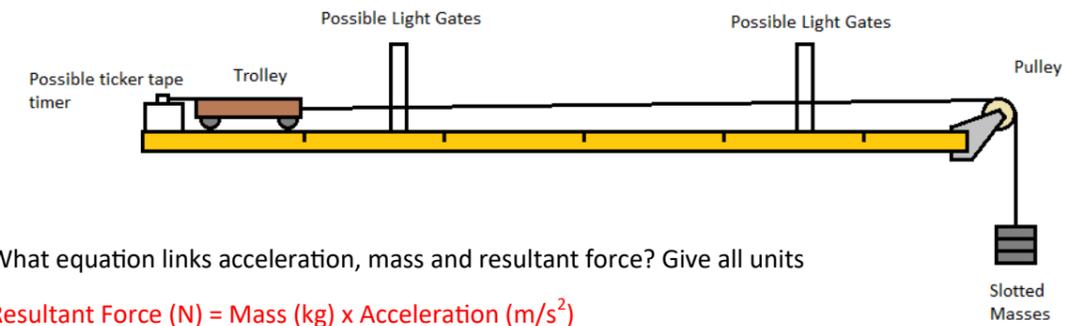
How many complete waves are between the vibration generator and the bridge?

1.5

If the distance between the vibration generator and the bridge is 2m and the frequency of the vibrations is 50Hz calculate the wave speed.

Wavelength = 2m/1.5 = 1.33m Speed = 50Hz x 1.33m = 66.5m/s

Acceleration



What equation links acceleration, mass and resultant force? Give all units

Resultant Force (N) = Mass (kg) x Acceleration (m/s²)

What force would a 300g mass provide? (Gravitational field strength 10N/kg)

3N

How can the effect of friction on the trolley be removed?

Tilt the ramp. A trolley with no force should maintain a steady speed

The trolley completes the first 20cm section of track in 0.5 second. What is its speed?

Speed = Distance / Time = 0.2 / 0.5 = 0.4m/s

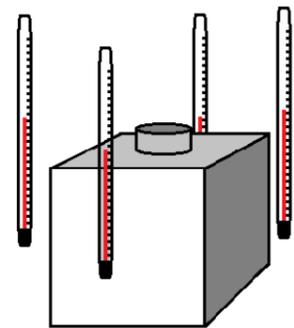
It completes the next 1.45m of the track in 0.5 seconds. Calculate the new speed, the change in speed and the acceleration? New speed = 1.45/0.5 = 2.9m/s

Change in speed = 2.90-0.4=2.5m/s Acceleration = 2.5/0.5 = 5m/s²

If the trolley had a mass of 1kg what was the resultant force? = 1kg x 5 m/s² = 5N

Radiation and Absorption

The 4 sides of the Leslie cube are black matt, white matt, black shiny and silver shiny. Boiling water is added and the temperature rise in 5 minutes from the thermometers on each side is recorded.



Why are the bulbs of the thermometers painted matt black?

Best absorber of infrared radiation

What are the independent and dependent variables?

Independent—Type of surface Dependent—Temperature rise in 5 minutes

Name 2 control variables

Area of each side, Distance to thermometer

Should you draw a line graph or a bar chart? Why?

Bar chart, Type of surface is a categorical variable

Which side would you expect to emit the most infrared radiation?

Black matt

Which side would you expect to emit the least infrared radiation?

Silver shiny