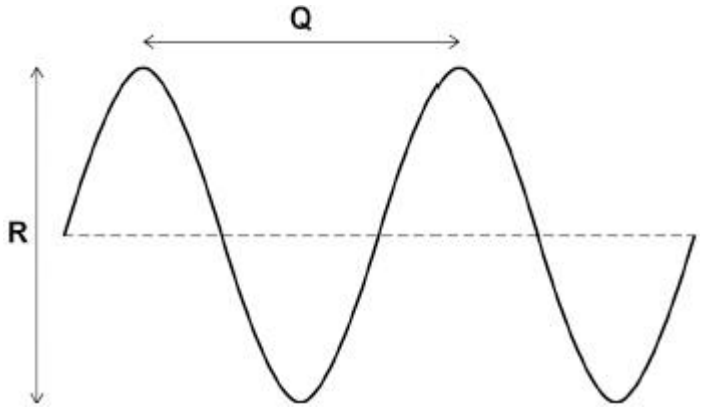
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Electromagnetic waves are transverse.

The figure below represents a transverse wave.



(a) Which of the following gives the wavelength of the transverse wave?

Tick (✓) **one** box.

wavelength = $\frac{Q}{2}$ ☐

wavelength = Q ☐

wavelength = 2 Q ☐

(1)

(b) Which of the following gives the amplitude of the transverse wave?

Tick (✓) **one** box.

amplitude = $\frac{R}{2}$ ☐

amplitude = R ☐

amplitude = 2 R ☐

(1)

(c) Microwaves are electromagnetic waves used for mobile phone communications.

Which other type of electromagnetic wave is also used for communications?

Tick (✓) **one** box.

Radio waves	☐
Ultraviolet	☐
X-rays	☐

(1)

(d) Microwaves from a mobile phone take 0.000 009 s to reach a mobile phone mast.

speed of microwaves = 300 000 000 m/s

Calculate the distance between the mobile phone and the mobile phone mast.

Use the equation:

distance = speed × time

_____

_____

_____

Distance = _____ m

(2)

(e) Mobile phone communications is only one of the uses for microwaves.

Give **one** other use of microwaves.

_____

_____

(1)

(Total 6 marks)

Q2.

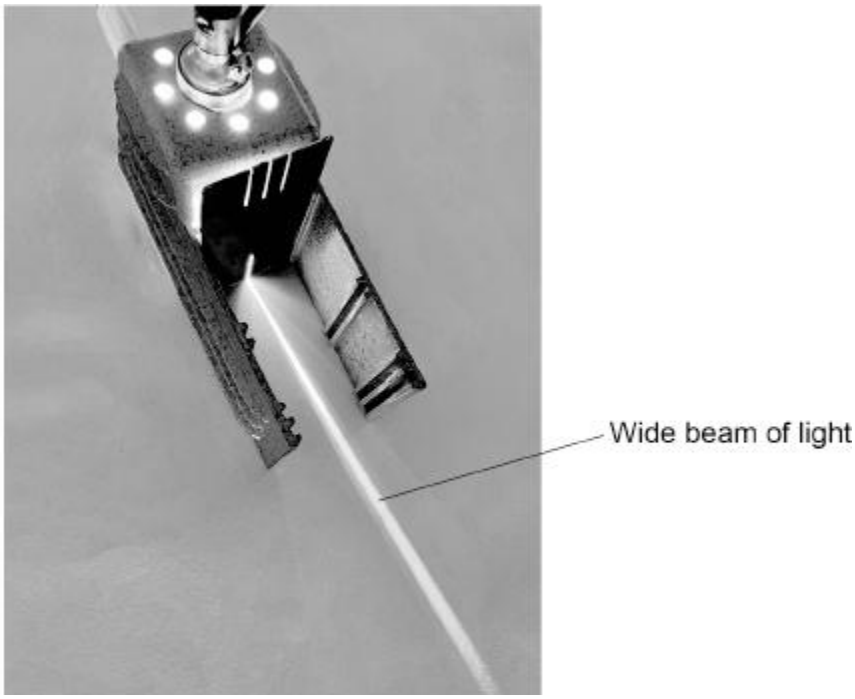
A student investigated the refraction of light through a glass block.

Figure 1 shows the ray box used.

The student aimed the beam of light from the ray box towards a glass block.

The student measured the angle of incidence at the point where the light entered the glass block.

Figure 1



(a) Why is using a wide beam of light less likely to give accurate results than using a narrow beam?

Tick (✓) **one** box.

It will be harder to judge where the centre of the beam is. ☐

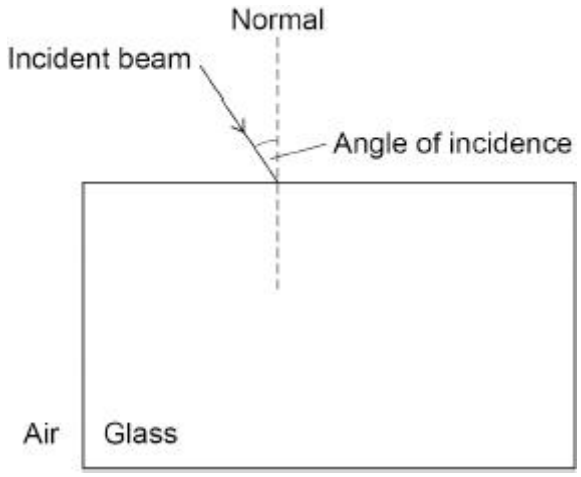
It will cause a smaller uncertainty in the measurements. ☐

The angle of refraction will be larger than it should be. ☐

(1)

(b) **Figure 2** shows the beam of light incident on the glass block.

Figure 2

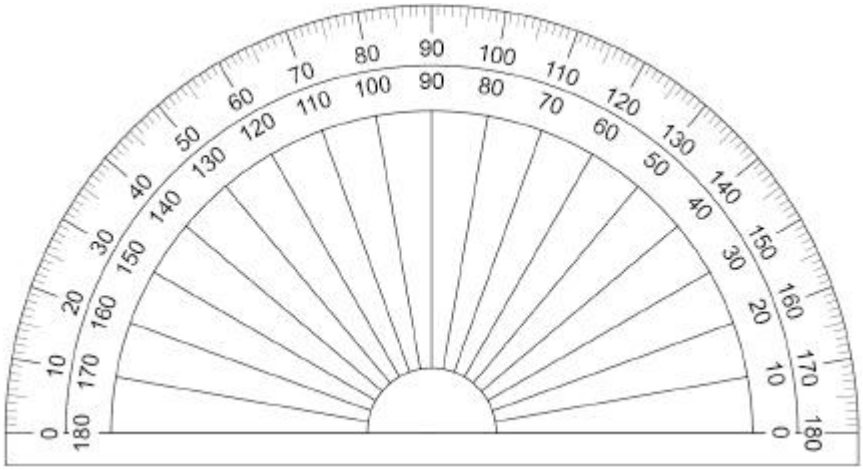


Complete **Figure 2** to show the path taken by the beam of light through the glass block and back into the air.

(3)

Figure 3 shows the protractor used by the student.

Figure 3



(c) What is the resolution of the protractor?

Tick (✓) **one** box.

1 degree ☐

10 degrees ☐

180 degrees ☐

(1)

(d) For one angle of incidence the student measured the angle of refraction three times.

The three measurements were:

35° 31° 33°

Calculate the mean angle of refraction.

_____

_____

Mean angle of refraction = _____ °

(1)

The student placed a red filter in front of the white beam of light.

Only red light passes through the filter.

(e) Complete the sentence.

When white light is incident on the red filter, all colours except for red are

_____ by the filter.

(1)

Use the Physics Equations Sheet to answer parts (f) and (g).

(f) Write down the equation which links frequency (*f*), wave speed (*v*) and wavelength (*λ*).

_____

(1)

(g) Light has a wave speed of 3.0×10^8 m/s in air.

The frequency of the red light is 4.0×10^{14} Hz.

Calculate the wavelength of the red light in air.

_____

_____

_____

_____

_____

Wavelength = _____ m

(3)

(Total 11 marks)