9 The diagram shows the main components of the electromagnetic spectrum.

P	X-rays	Q	visible light	infra-red	R	radio waves

What are the components P, Q and R?

	P	Q	R
A	gamma-rays	microwaves	ultra-violet
B	gamma-rays	ultra-violet	microwaves
C	microwaves	gamma-rays	ultra-violet
D	microwaves	ultra-violet	gamma-rays

10 Radio waves, visible light and X-rays are all part of the electromagnetic spectrum.

Which is the correct order of increasing wavelength?

	shortest wavelength →		longest wavelength
A	visible light	radio waves	X-rays
B	visible light	X-rays	radio waves
C	X-rays	radio waves	visible light
D	X-rays	visible light	radio waves

11 Which type of electromagnetic radiation travels at the highest speed through a vacuum?

A gamma-rays

B light waves

C radio waves

D none – all have the same speed

LIVEWORKSHEETS

13 Some types and features of waves and their descriptions are shown in Fig. 12.1.

Draw **one** straight line from each description to a correct type or feature of a wave.

description	type or feature
wavelength less than visible light	amplitude
wavelength greater than visible light	frequency
the distance between the peak and the equilibrium point	X-ray
the number of oscillations every second	longitudinal
oscillations are parallel to the direction of the wave	radio
	transverse

Fig. 12.1

[5]

17 Some of the components of the electromagnetic spectrum are shown in Fig. 15.1.

radiowaves	**A**	infra-red	visible light	ultraviolet	**B**	gamma-rays

Fig. 15.1

(a) Name components **A** and **B**.

A .....

B .....

[2]

(c) Some light has a frequency of 4.0×10^{14} Hz and a wavelength of 5.0×10^{-7} m in glass.

Calculate the speed of this light in glass.

speed = ... m/s [2]

LIVEWORKSHEETS

18 Use words or numbers from the list to complete the sentences about electromagnetic waves.

Each word or number may be used once, more than once, or not at all.

3×10^8	3×10^6	gamma	longitudinal	radio	transverse

All electromagnetic waves are ..... .

The electromagnetic wave with the longest wavelength is ..... .

They travel through a vacuum at a speed of ..... m/s

[2]

19 Fig. 12.1 shows how the displacement of particles in a wave varies with distance along the wave.

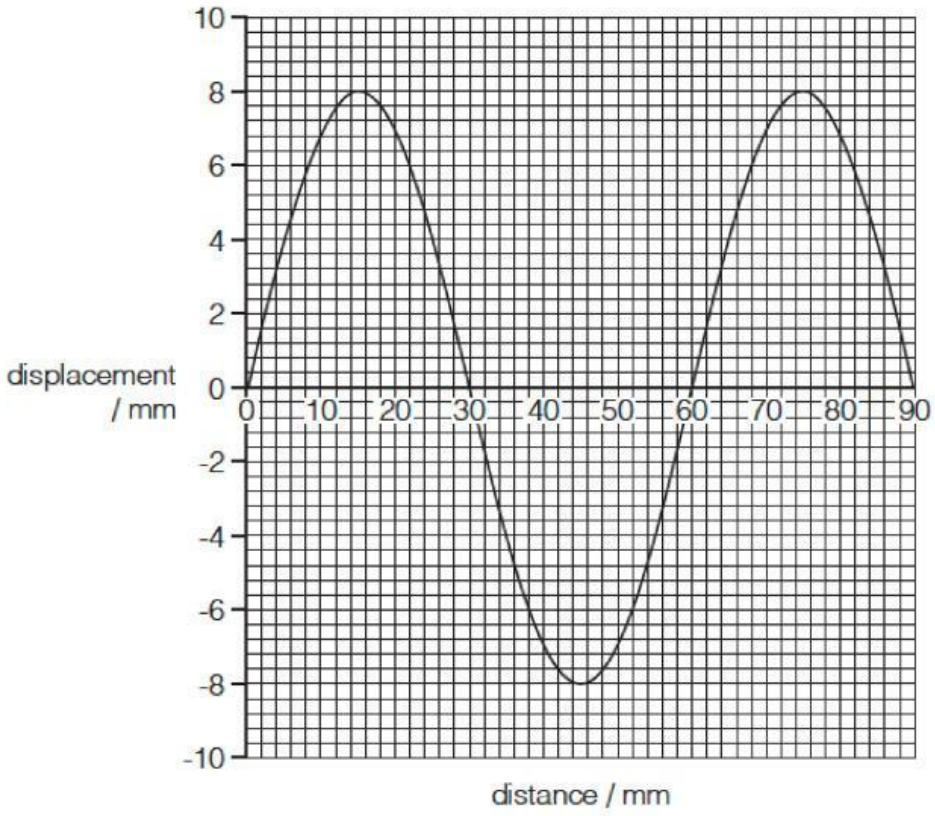


Fig. 12.1

(a) Use Fig. 12.1 to determine for this wave

(i) the wavelength, ... mm [1]

(ii) the amplitude. ..... mm [1]

(b) Waves on the surface of water are transverse waves.

What is meant by a *transverse* wave?

.....

.....[2]

LIVEWORKSHEETS