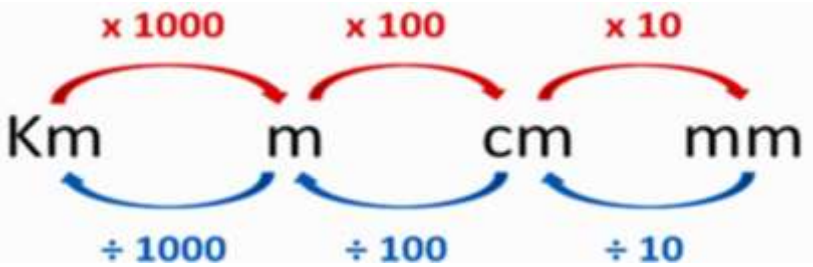
أكاديمية
الجزيرة
Al Jazeera
Academy

Year 10

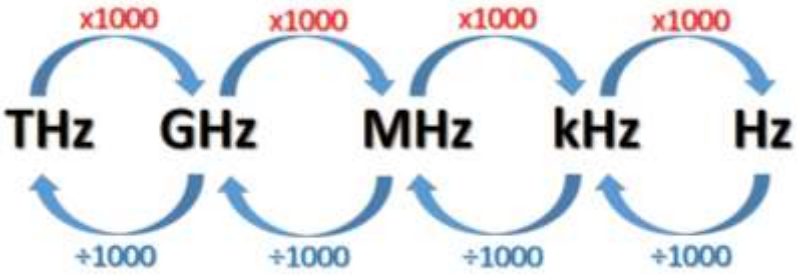
Physics Practice questions

UNIT 3: WAVES - UNIT CONVERSION CHART

λ = Wavelength (m)



f = frequency



v = speed of a wave/velocity (m/s)

Combination of the units above

Section 1

Waves questions

The speed of a wave through a particular substance is determined by its frequency and wavelength.

$$v = f\lambda$$

Equation to calculate wave speed Unit	Equation to calculate frequency Unit	Equation to calculate wavelength Unit

Remember to follow these steps;

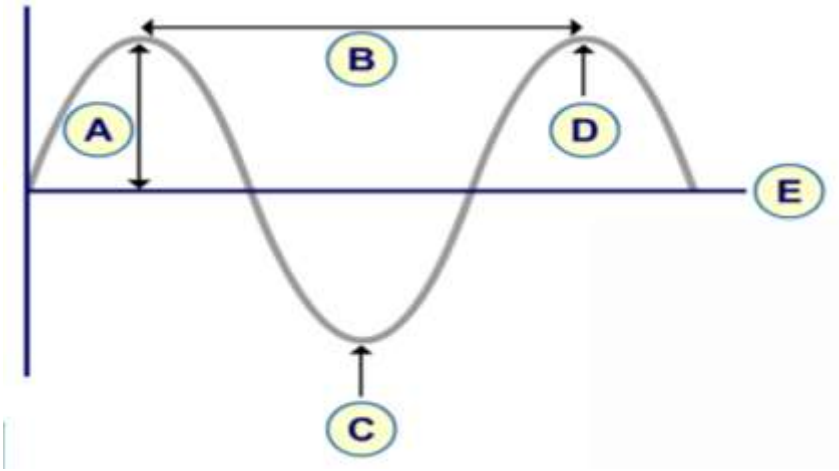
- Write out the equation you are using
- Convert any units if necessary
- Show your working out
- Write the answer with the correct units

Complete the following calculations in your exercise book;

1. Calculate the speed of a wave that has a frequency of 5 kHz and a wavelength of 4 m
2. Calculate the speed of a wave that has a frequency of 5 Hz and a wavelength of 50 cm
3. Calculate the speed of a wave that has a frequency of 2 M Hz and a wavelength of 4 m
4. Calculate the frequency of a radio wave of speed 300 000 000 m/s and wavelength 1500 m.
5. Calculate the frequency of a sound wave of speed 1500 m/s and wavelength 6 km.
6. Calculate the frequency of a light wave of speed 300 000 000 m/s and wavelength 0.0005 mm.
7. Calculate the period of a wave that has speed 50 m/s and wavelength 10 m.
8. Calculate the period of a wave that has speed 400 m/s and wavelength 5 m.
9. Calculate the period of a wave that has speed 5 m/s and wavelength 20 m.

Section 2

Waves properties



Label all the parts of a transverse wave

A =

B =

C =

D =

E =

Label all the parts of a longitudinal wave

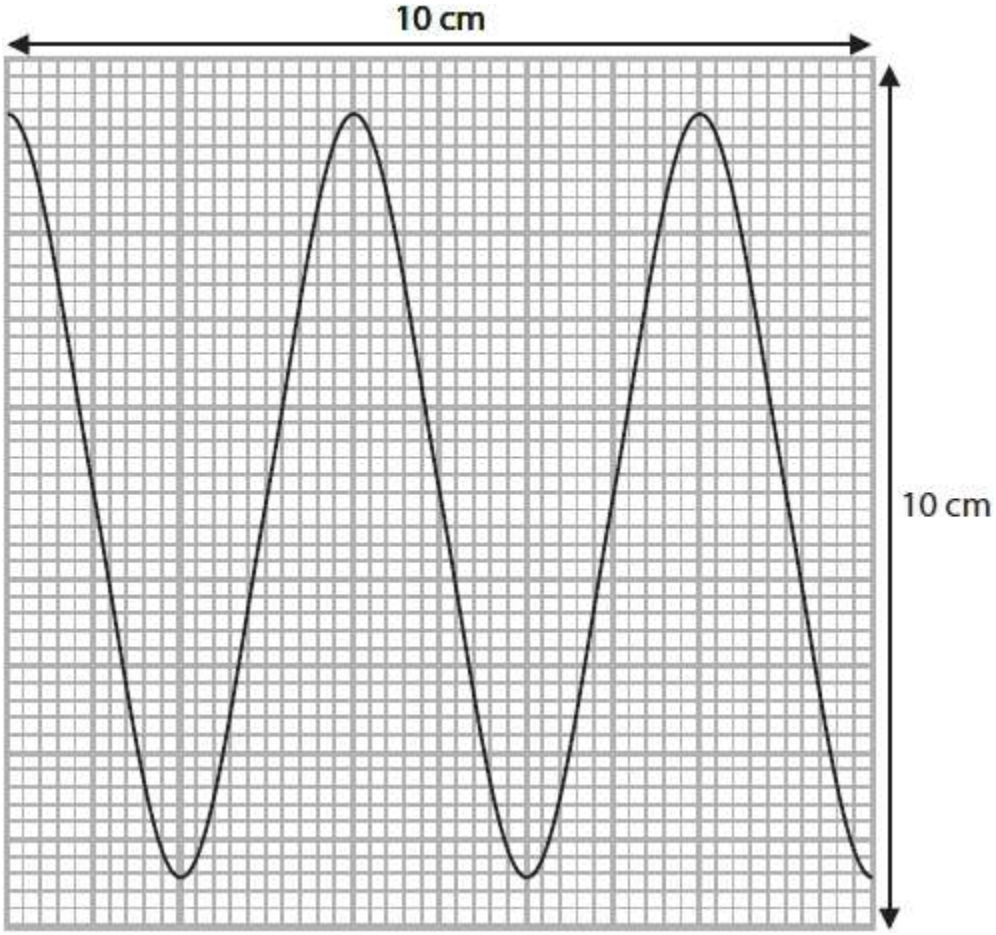
Write definitions for the following key words

Key word	Definition
Transverse wave	
Longitudinal wave	
Wavelength	
Frequency	
Amplitude	
(Wave) speed	
Period (T)	

Q1.

This question is about waves.

(a) The diagram shows a wave.



(i) What is the wavelength of the wave?

(1)

- ☒ **A** 4.0 cm
- ☒ **B** 4.4 cm
- ☒ **C** 5.0 cm
- ☒ **D** 8.8 cm

(ii) What is the amplitude of the wave?

(1)

- ☒ **A** 4.0 cm
- ☒ **B** 4.4 cm
- ☒ **C** 5.0 cm
- ☒ **D** 8.8 cm

Q2.

Sound travels as a wave.

(a) Which of these statements about sound waves is **incorrect**?

(1)

- ☒ **A** they can be reflected
- ☒ **B** they can travel through a vacuum
- ☒ **C** they can be refracted
- ☒ **D** they transfer energy

(b) Sound waves are a type of wave known as longitudinal waves.

(i) Name the other type of wave.

(1)

.....

(ii) Give **one** example of this other type of wave.

(1)

.....

(c) A buzzer produces a sound wave of frequency 2.9 kHz and wavelength 12 cm.

(i) State the equation relating wave speed, frequency and wavelength.

(1)

.....

(ii) Calculate the speed of the sound wave.

(3)

speed = ...m/s

Section 3

The Electromagnetic spectrum

Q1.

This question is about parts of the electromagnetic spectrum.

radio waves	A	infrared	visible light	ultraviolet	B	gamma rays

(a) The names of two parts of the electromagnetic spectrum are missing.
Complete the table with the names of the missing parts.

(2)

	Name
A	
B	

(b) The Sun emits different types of electromagnetic waves.

(i) Which of these is the same for all the waves?

(1)

- ☒ **A** amplitude
- ☒ **B** frequency
- ☒ **C** speed
- ☒ **D** wavelength

(ii) Which type of electromagnetic wave causes sunburn and snow blindness?

(1)

- ☒ **A** gamma rays
- ☒ **B** infrared
- ☒ **C** radio waves
- ☒ **D** ultraviolet

(Total for question = 4 marks)

Q2.

The Sun emits visible light, infrared and ultraviolet that travel through space and reach the surface of the Earth.

(a) State two similarities between visible light, infrared and ultraviolet.

(2)

1 .....

2 .....

(b) Too much exposure to infrared and ultraviolet can cause damage to the human body.

State the damage that each can cause.

(2)

infrared .....

.....

ultraviolet .....

.....

(c) Seven colours can be seen in the visible light spectrum.

Which colour has the longest wavelength?

(1)

.....

(Total for question = 5 marks)

Q3.

The Earth receives different types of electromagnetic wave from the Sun.

These include

- infrared
- ultraviolet
- visible light

(a) Complete the table by arranging these three types of electromagnetic wave in order of decreasing wavelength.

(1)

longest wavelength →		shortest wavelength

(b) Name two other types of electromagnetic wave.

(2)

1.....

2.....

(c) Ultraviolet waves are useful, but they can be dangerous.

(i) State two uses of ultraviolet waves.

(2)

1.....

.....

2.....

.....

(ii) State two dangers of ultraviolet waves.

(2)

1.....

.....

2.....

.....

(Total for question = 7 marks)

Q4.

This question is about electromagnetic waves.

(a) (i) Which of these has the shortest wavelength?

(1)

- ☒ **A** infrared
- ☒ **B** microwaves
- ☒ **C** ultraviolet
- ☒ **D** visible light

(ii) Which of these statements is **not** correct?

(1)

- ☒ **A** electromagnetic waves are longitudinal
- ☒ **B** electromagnetic waves can transfer energy
- ☒ **C** electromagnetic waves can travel between stars
- ☒ **D** electromagnetic waves travel at the same speed in free space

(iii) Which of these is a use for x-rays?

(1)

- ☒ **A** broadcasting television
- ☒ **B** cooking a potato
- ☒ **C** looking at the internal structure of objects
- ☒ **D** looking through night vision goggles

(b) Gamma radiation is used in hospitals even though it can be dangerous.

(i) Describe one use of gamma radiation in hospitals.

(2)

.....

.....

.....

.....

(ii) Explain the risks to patients and doctors of using gamma radiation.

(2)

.....

.....

.....

.....

(iii) State one way of reducing the risks to a doctor who uses gamma radiation.

(1)

.....

(Total for question = 8 marks)

Q5.

This question is about radiations in the electromagnetic spectrum.

radio waves	microwaves	infrared	A	ultraviolet	B	gamma rays

(a) The names of two parts of the electromagnetic spectrum are missing.

Complete the table below, with the names of the missing parts.

(2)

	Name
A	
B	

(b) Which electromagnetic radiation is used for heating and night vision equipment?

(1)

- ☒ **A** radio waves
- ☒ **B** microwaves
- ☒ **C** infrared
- ☒ **D** ultraviolet

(c) Which electromagnetic radiation is used for cooking and satellite transmissions?

(1)

- ☒ **A** radio waves
- ☒ **B** microwaves
- ☒ **C** infrared
- ☒ **D** ultraviolet

(d) The list of electromagnetic radiations, from radio waves to gamma rays, is in order of

(1)

- ☒ **A** decreasing frequency
- ☒ **B** decreasing wavelength
- ☒ **C** increasing amplitude
- ☒ **D** increasing time period

(e) Exposure to excessive electromagnetic radiations can be harmful to the human body.

For **two** named types of electromagnetic radiation, describe

- a harmful effect
- how the risks of exposure can be reduced.

(4)

Name of radiation .....

.....

.....

.....

.....

.....

Name of radiation .....

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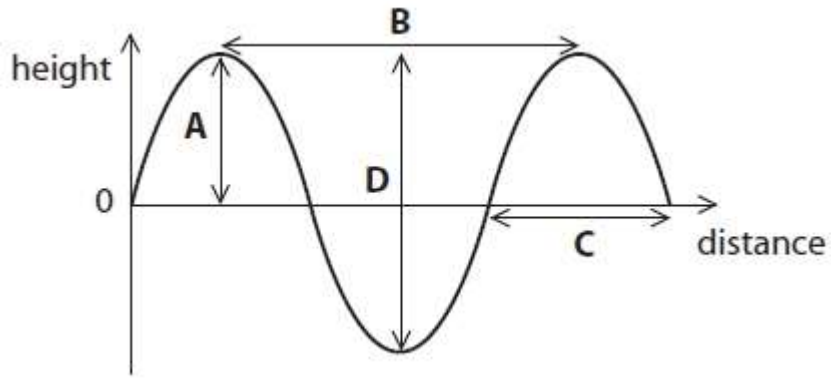
(Total for question = 9 marks)

Q6.

The diagram shows part of a water wave.



(a) (i) Which letter represents the wavelength?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(ii) Which letter represents the amplitude?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(iii) This water wave is transverse. Other waves can be longitudinal.

State a similarity and a difference between a transverse wave and a longitudinal wave.

(2)

similarity

.....

.....

difference

.....

.....

(b) A student writes some sentences about electromagnetic waves.

His teacher circles a mistake in each sentence.
In the table, write a suitable correction for each mistake.

The first one has been done for you.

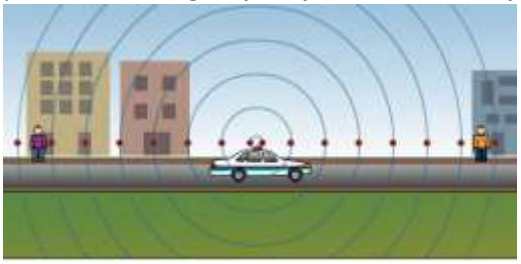
(5)

Sentence	Correction
Electromagnetic waves travel at $3 \times (10^2)$ m/s in a vacuum.	10^8
(Sound) waves are electromagnetic.	
(Infra-red) waves are the most harmful to people.	
(Gamma) waves are used for heating up food.	
(Radio) waves have the highest frequency.	
(Gamma) waves have a very long wavelength.	

(Total for question = 9 marks)

Section 4 - Doppler Effect

The Expanding Universe - Describe what is happening in the pictures below, in as much detail as possible, using key Physics vocabulary.



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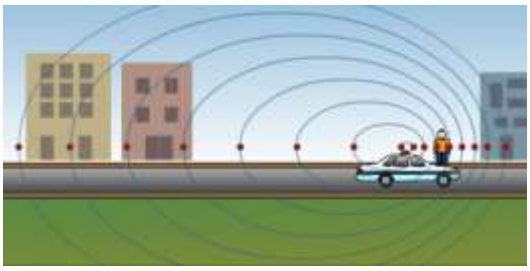

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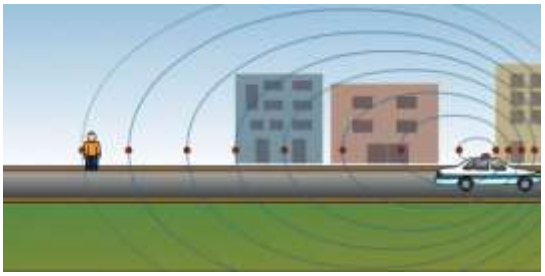

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Section 5

Youtube videos

Freesciencelessons

Fuseschool

Khanacademy

BBCbitesize - Website

Types of waves - https://www.bbc.com/bitesize/guides/zq7ycdm/revision/1

Features of a wave - https://www.bbc.com/bitesize/guides/z8dp34j/revision/1

Sound - https://www.bbc.com/bitesize/guides/zwjsgk7/revision/1

The electromagnetic (EM) spectrum - https://www.bbc.com/bitesize/guides/z66g87h/revision/1

Doppler effect - https://www.bbc.com/bitesize/guides/zphppv4/revision/1