

Year 9

Physics booklet

Topic 2 - waves

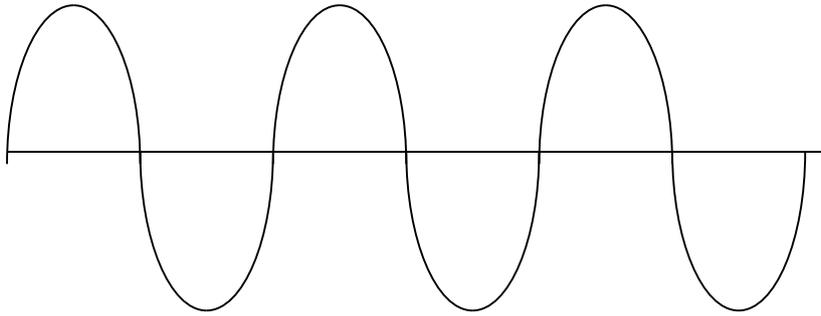
Name: \_\_\_\_\_

# Waves

Give a definition for each of these key words:

Wave	
Transverse	
Longitudinal	
Amplitude	
Frequency	
Wavelength	
Time period	
Wave speed	
Reflection	
Refraction	
Source	
Detector	
Transmission	
Absorption	

Label the amplitude and wavelength for the wave below:



Sketch a transverse wave in the box below:

	Examples:
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Sketch a longitudinal wave in the box below:

	Examples:
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What is the difference between a transverse wave and a longitudinal wave?

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## Measuring waves

**Wave speed = frequency x wavelength**

(metres per second, m/s)      (hertz, Hz)      (metre, m)  
(v)                                      =                      (f)                      x                      ( $\lambda$ )

1. By varying the depth of the water, a student uses a wave table to produce waves with different frequencies and wavelengths.

Using the equation above, fill in the table to calculate the different wave speeds

Remember to change units of wavelength into meters if they are in cm.

Frequency (Hz)	Wavelength (cm)	Wavelength (m)	Wave speed (m/s)
10 Hz	10 cm	0.1	
2.5 Hz	10 cm		
30 Hz	2 cm		
50 Hz	1 cm		

2. The student then keeps the wave speed constant and varies the frequency.

i) Rearrange the equation at the top of the page so you can calculate wavelength from frequency and wave speed.

ii) Use your re-arranged equation to calculate the wavelength of the waves and fill in the table.

Wave speed (m/s)	Frequency (Hz)	Wavelength (m)
0.6	24	
0.6	30	
0.6	12	
0.6	20	

## Electromagnetic spectrum.

Complete the table below by matching the types of radiation with its **effect on living tissue** and **its use**.

Type of radiation	Effects on living tissue	Used for...
<b>Gamma</b>	High doses can kill living cells. Lower doses can cause cancer in cells	Treating tumours Sterilising hospital equipment.
<b>X-Ray</b>		
<b>UV</b>		Fluorescent tubes Security marking
<b>Visible</b>		
<b>Infrared</b>		
<b>Microwave</b>	Heating of water in tissues can cause burning	Satellite communication. Cooking
<b>Radio</b>		

High does can kill living cells.  
Lower doses can cause cancer

Communication  
RADAR

Probably none

Creating images of the inside of the body

Causes burning of tissues

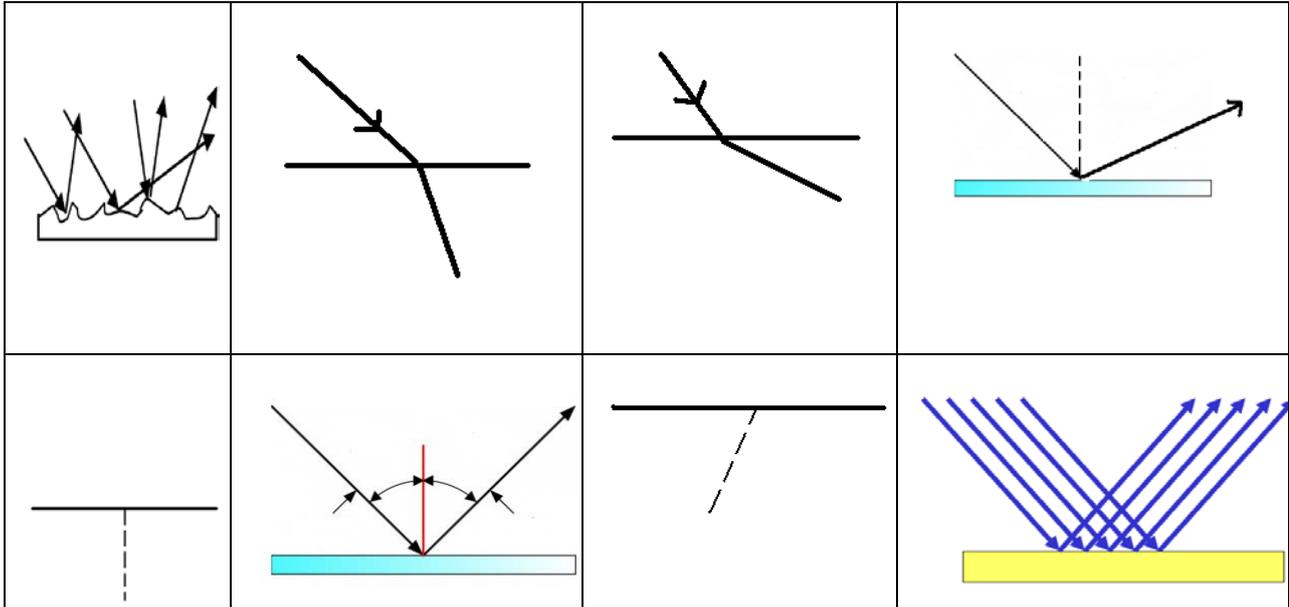
High doses can kill living cells.  
Lower doses can cause cancer.

Seeing optical fibres and communications

Remote controls and thermal imaging

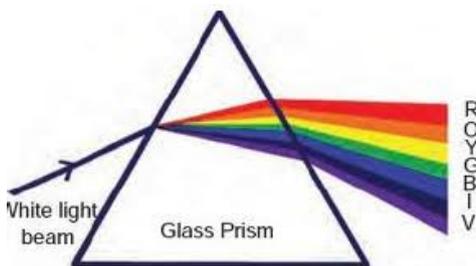
Activates sensitive cells in the retina.

**Match each diagram with the phrase which best describes it. Two of the diagrams match two of the phrases.**

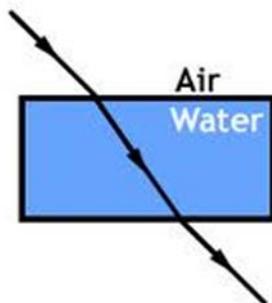


- Mirror with correct Normal marked
- Law of Reflection incorrectly shown
- Light refracted from glass to air
- Clear reflection
- Light speeding up

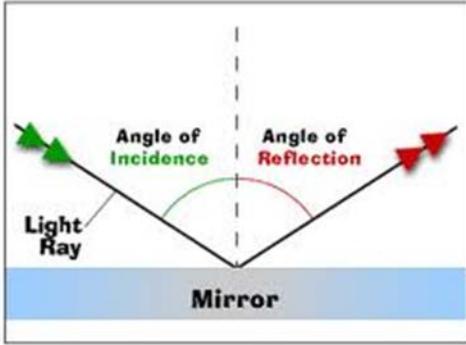
- Law of Reflection correctly shown
- Light refracted from air to glass
- Diffuse reflection
- Light slowing down
- Normal marked incorrectly



This picture shows..... of white light into a ..... of 7 colours. This is achieved using a ..... The primary colours of light are red, ..... and .....



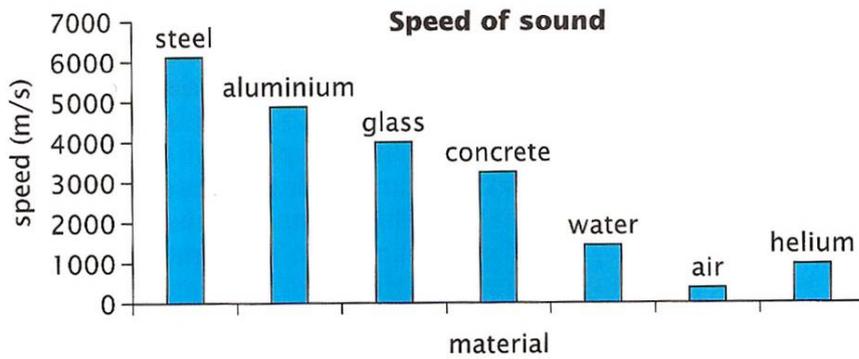
This picture shows..... This occurs when a light ray travels through a material with a different ..... to air. It causes the light ray to change ..... and therefore direction. The angle of incidence is ..... to the angle of .....



This picture shows .....

This occurs when you use a ..... The angle of incidence is ..... to the angle of ..... This is known as the law of .....

Sound Travels at different speeds in different mediums. This is displayed in the bar chart below.



1. Which materials in the bar chart are solids, liquids and gases?

Solids .....

Liquids .....

Gases .....

2. In which material does sound travel fastest? In which material does sound travel most slowly?

Fastest ..... Slowest .....

3. Write a general conclusion about the results

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4. Explain why sound travels faster in solids using these words: density, particles, forces.

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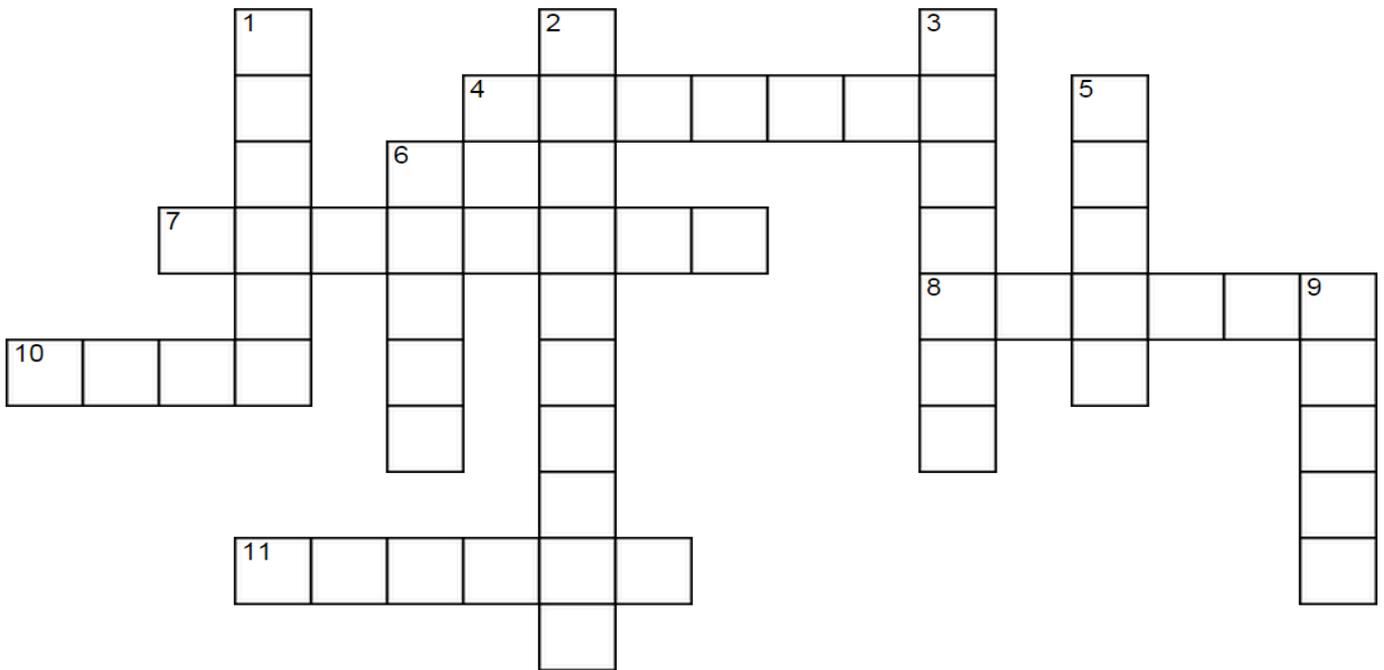


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## Uses and dangers of EM waves



### CLUES

- 4 across EM waves used for illumination, optical fibres and photography (7).
- 7 across EM waves used in heaters and night vision equipment (5-3).
- 8 across Exposure to gamma rays can lead to DNA mutation or \_\_\_\_\_ (6).
- 10 across Ultraviolet radiation can damage cells in the skin and \_\_\_\_\_ (4).
- 11 across Ultraviolet is used for fluorescent lamps, in nightclubs, and to detect banknotes that have been \_\_\_\_\_ (6).
- 1 down Microwaves are used for satellite transmissions, mobile \_\_\_\_\_ and cooking (6).
- 2 down EM waves that can cause internal heating of body tissue (10).
- 3 down Gamma rays can be used to sterilise food and \_\_\_\_\_ equipment (7).
- 5 down Infrared radiation can cause heat stroke and skin \_\_\_\_\_ (5).
- 6 down EM waves used to observe the internal structure of objects and materials and medical applications (1-4).
- 9 down EM waves used for broadcasting and communications (5).

**WORD BANK:** XRAYs, VISIBLe, RADIO, PHONES, MICROWAVES, MEDICAL, INFRARED, FORGED, EYES, CANCER, BURNS