

Tutor support material May 2008

Entry Level

Edexcel Entry Level Certificate in
Science (8938)

Unit 11: Electromagnetic Waves and
their Uses

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Introduction

This *tutor support material* accompanies the Edexcel Entry Level Certificate in Science specification and has been designed to help teachers prepare for first teaching of the qualification.

This document is for *Unit 11: Electromagnetic Waves and their Uses*, and includes worksheets to aid the teaching of this unit.

Additional documents are available for all other units within the Edexcel Entry Level Certificate in Science. There is also a *Teacher's guide* document available on the Edexcel website, which gives more information on specialist language, assessment of practical skills and information on *How Science Works*.

Attention is drawn to the need for safe practice when students carry out laboratory experiments or observe demonstrations. Centres are responsible for the overall risk assessment of experimental work undertaken by students. Reference must be made to COSHH regulations and any specific local education authority restrictions.

Relevant advice can be obtained from the following publications.

- *CLEAPSS Laboratory Handbook* (available from CLEAPSS School Science Service, website www.cleapss.org.uk)
- *Control of Substances Hazardous to Health Regulations* (HSE, 2005) ISBN 0717629813
- *Hazcards* (2004 update available from CLEAPSS School Science Service)
- *Topics in Safety, Third Edition* (ASE January, 2001) ISBN 0863573169

Worksheets for

Unit 11: Electromagnetic Waves and

their Uses

How fast does light travel?

Speed of light

Light travels very quickly.

It takes 8 minutes for light to travel from the Sun to the Earth.

That is a speed of 300 million metres per second.

- It travels much faster than sound.
Sound waves travel at 330 metres per second.
- When there is a thunderstorm have you ever tried to work out how far away the storm is?
- How do you do this?

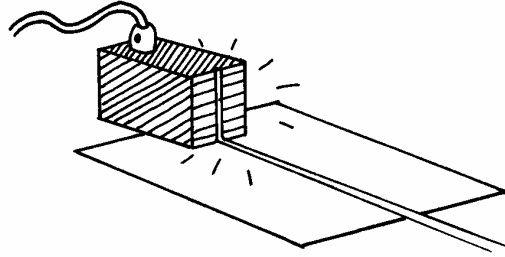
- Why do we see the lightning before we hear the thunder?

Straight lines

What you need

A ray box.

A sheet of plain paper.



What to do

1. Use a ray box to shine a narrow beam of light across a piece of paper.
2. Draw the beam on the paper.

Why do you think we cannot see around corners?

Light travels in straight lines – true/false?

Keywords

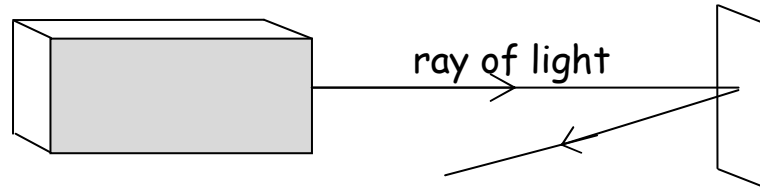
Light Ray Straight

Mirrors

What you need

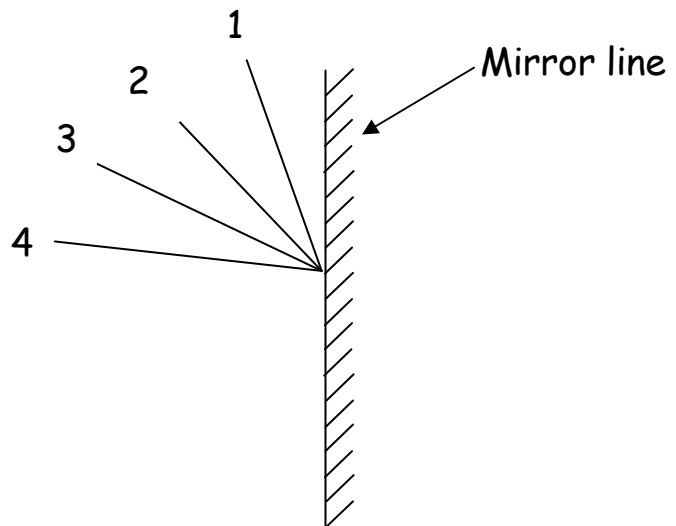
Mirror and holder.

Light box.



What to do

1. Shine a ray of light at the mirror.
The mirror reflects the ray of light.
2. Now place your mirror on the line marked 'mirror line' below.
3. Then shine a ray of light along line 1.
4. Mark and draw in the reflected ray.
5. Repeat this for lines 2, 3 and 4.



Keywords

Mirror

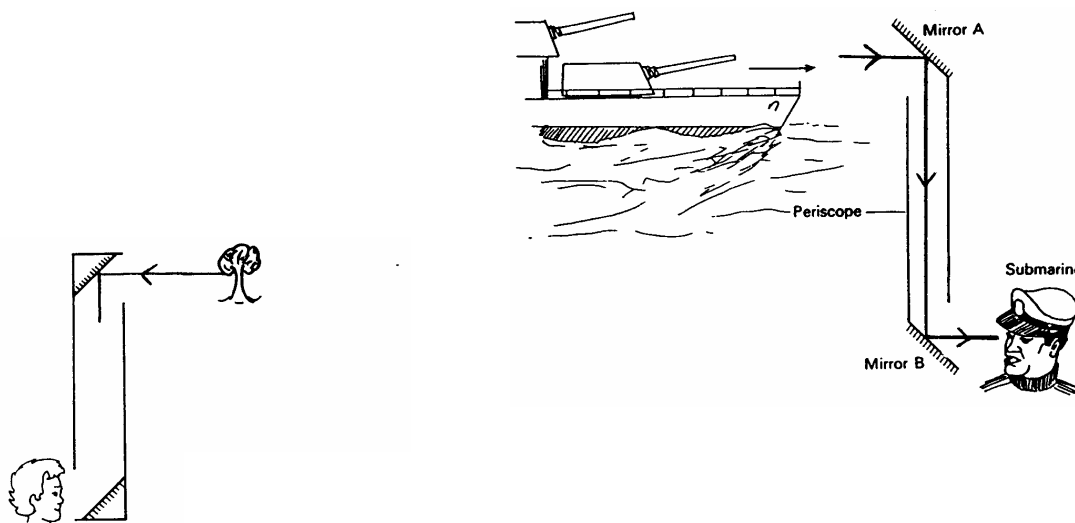
Reflected

Ray

Light

Using mirrors — 1

- A **periscope** uses two mirrors to be able to look at something high up.



1. Complete the drawing to show how the person can see the tree.
2. Why might it be useful to use a periscope
 - a) when watching a football match

- b) when swimming under water

- c) to look round a corner?

Keywords

Periscope

Mirrors

Using mirrors — 2

When you look into a mirror you see a picture or **image** of yourself.

What you need

A mirror.

What to do

1. Look in the mirror and wink with your left eye.
2. Which eye does your image wink? - left or right? _____
 - You should find that if you wink left your image winks right.
 - A mirror swaps over left and right.
3. On which emergency vehicle would you see this word written?

eamdulA

-
4. Hold the word up to a mirror to read it the right way round.
 5. Why is the word written backwards?

-
6. Hold these words up to a mirror and then write them down backwards.

RIGHT _____

LEFT _____

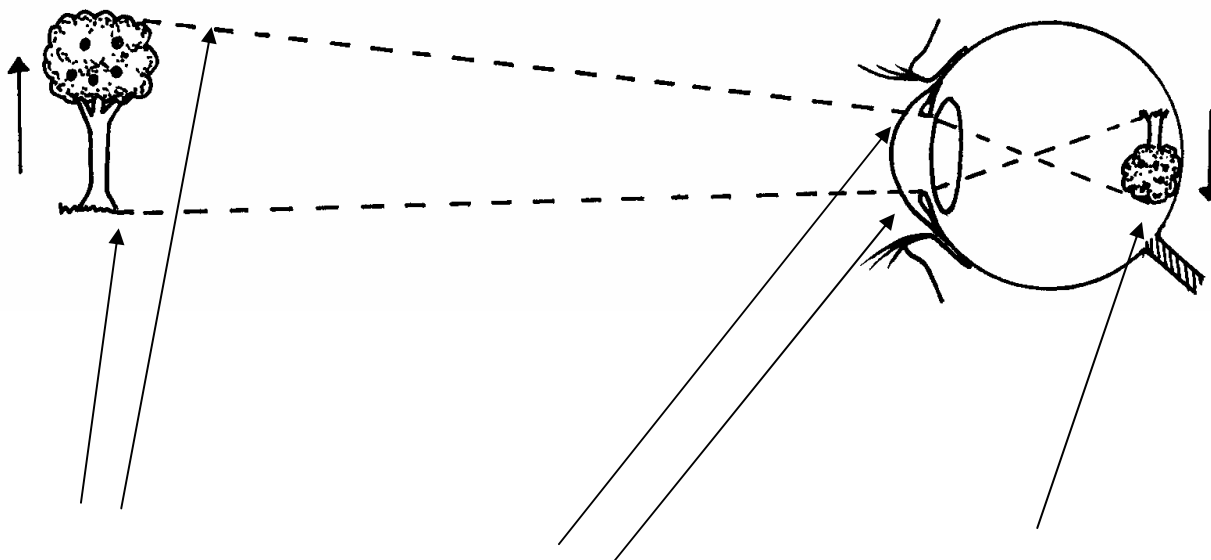
You can make up your own words too and put them on a poster.

Keywords

Mirror Image Backwards

Seeing things

- We see an object because light reflects off the object and into our eyes.



Light rays from the object (tree).

Light rays enter the eye. Their direction is changed by the **eye lens**.

Image formed at the back of the eye (on the retina). Then the message is sent to the brain by the **optic nerve**.

- The image on the retina is upside down (inverted).
- Your brain has learned to turn the image the right way up.

Keywords

Reflect

Retina

Optic nerve

Light rays

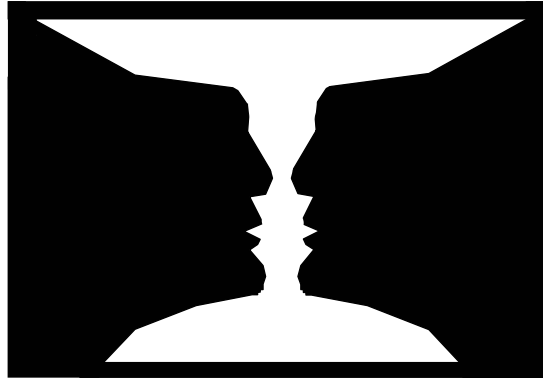
Eye

Image

Lens

Optical illusions – 1

There are two ways of looking at this picture.



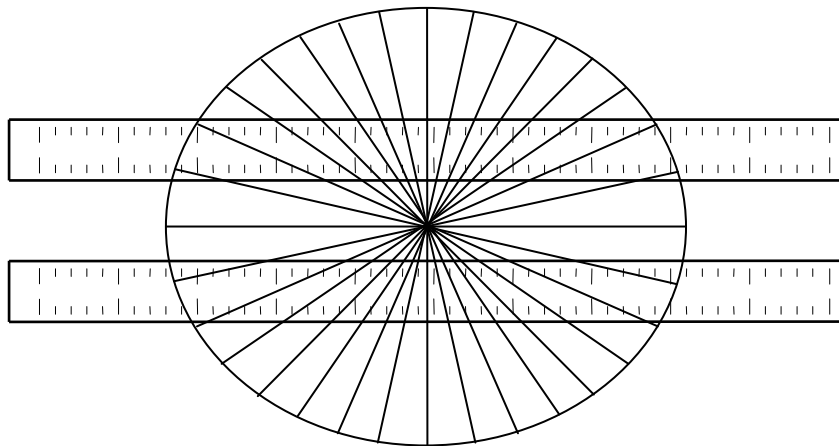
1. Stare at the black parts of the picture.

Describe what you see _____

2. Now stare at the white part of the picture.

Describe what you see _____

Have these two rulers got straight edges? Yes/No



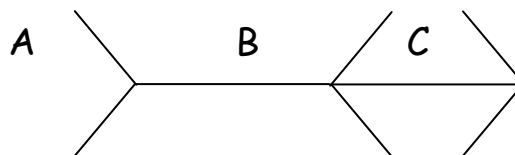
Optical illusions – 2

3. Which looks longer - the line from A to B, or the line from B to C?

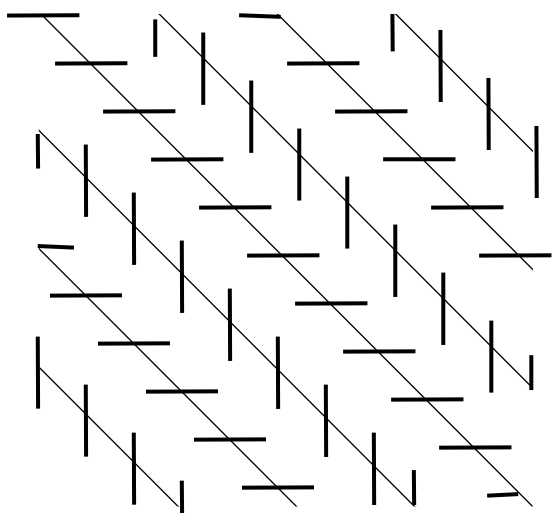
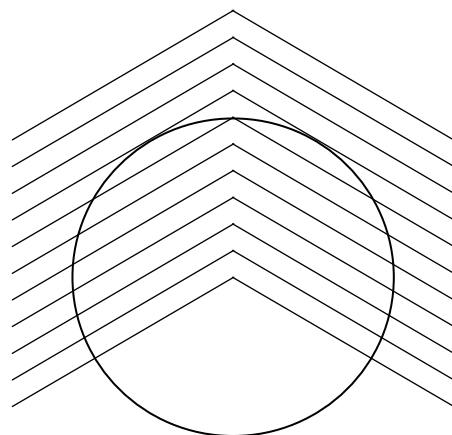
Check your answer with a ruler.

A-B measures _____.

B-C measures _____.



4. Is this circle flat at the top? Yes/No



5. Are the thin lines parallel, like the rails on a railway track?
Yes/No

Light revision

Use the words in the box to complete the sentences below.

energy	infrared	light
Earth's	glass	opaque
frosted glass	transparent	wood

Light is a type of _____.

_____ reflects, or bounces, off things into our eyes.

We cannot see radio waves or _____ light.

_____ light comes from the sun.

We cannot see through things which are solid like _____.

These things are _____.

We cannot see through some objects like _____.

Things that we cannot see through are _____.

Word search

blue	retina
eye	shadow
light	spectrum
optic nerve	straight
prism	sun
red	visible

A	V	F	I	X	W	O	D	A	H	S	L
M	S	P	E	C	T	R	U	M	I	Z	P
P	B	T	Y	N	V	P	G	O	D	E	R
R	H	P	R	I	S	M	N	P	H	A	N
I	C	A	R	E	M	A	C	T	S	N	V
M	S	F	I	B	W	Y	M	I	T	I	I
A	G	N	S	D	L	G	M	C	D	T	S
R	Y	T	E	X	Q	U	S	N	L	E	I
Y	C	V	F	L	P	N	E	E	Z	R	B
L	I	G	H	T	Q	U	S	R	E	T	L
H	Z	T	L	C	V	S	F	V	D	Y	E
T	H	G	I	A	R	T	S	E	I	X	E

Letter ladder

The crossword puzzle grid contains the following letters:

- 1 Down: T
- 2 Across: C, E
- 3 Down: I
- 4 Across: R
- 5 Down: O
- 6 Down: A
- 7 Across: I, R, D
- 8 Down: L
- 9 Across: N, G
- Other letters: N, A, D, E, S

Letter ladder clues

Across

- 2 You use this to take photographs.
- 4 Use this to look at something that is high up.
- 7 We cannot see this type of light.
- 9 Light is a type of _____ .

Down

- 1 Things that we see through are _____.
- 3 This reflects light.
- 5 Light travels faster than _____.
- 6 Things that we cannot see through.
- 7 This is a formed in a mirror.
- 8 This is found in the eye.

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