Light
&
Beyond

Name……

Class ……

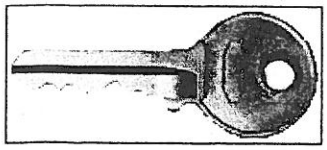
CfE Topic Light & Beyond Learning Outcomes

Having finished this topic:
r y g

- ○ I can identify the main parts of the eye and describe what each part does.
- ○ I can describe how the pupil reacts to different light levels.
- ○ I can explain, using a ray diagram, how light is focussed on the retina to give a sharp image.
- ○ I can explain to others why animals have either front-facing or side-facing eyes.
- ○ I can state the Law of Reflection and use it to explain how mirrors work.
- ○ I can state the Law of Refraction and use it to show how light 'bends' when it enters a different material like glass prisms of different shapes.
- ○ I can describe how white light from the Sun or a lamp can be split up into a spectrum of colours, including red, orange, yellow, green, blue, indigo and violet.
- ○ I can explain why different objects, e.g. clothes, appear as a particular colour using the ideas of absorption or reflection of different colours.
- ○ I can state that other types of light exist which are not visible to the human eye.
- ○ I can give examples of these other invisible light waves and describe their uses in everyday life.

During this topic:

- ○ I have used video clips and computer programs to learn about how the eye works.
- ○ I have worked in a group to find out how contact lenses work and to research the most up to date developments.
- ○ I have worked with my group to find out, using ray-boxes, how the laws of RELECTION and REFRACTION are used in everyday appliances e.g. mirrors & cameras.
- ○ I have investigated sunlight or lamplight to discover what colours are present.
- ○ I have learned about 'invisible' types of light using books and the internet to discover how they are used in everyday life.



Words

Light and Beyond

Blind Spot the part of the retina that cannot detect light

Cornea clear part in the front of the eye, lets light enter

Concave Lens Block of glass that curves **in** at centre

Convex Lens Block of glass that curves **out** at centre

Electro Magnetic radiation includes visible light and others e.g. X rays, ultra violet, infrared, microwaves etc

Eye Lens small ball of jelly that focuses light on to retina

Iris ring of coloured muscle controls the size of pupil

Optic Nerve carries information from retina to brain

Opaque. Does not let light pass through it

Pupil hole in the iris which lets light in

Prism a regular shaped block of glass e.g. triangular

Reflection when light bounces off an object

Refraction a ray of light passing from one substance into another usually changes direction

Retina layer at back of eye which has light sensitive **cells.**

Spectrum the range of colours of light

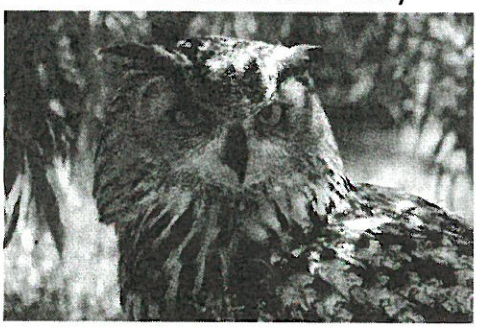
Translucent allows light through it but object cannot be seen

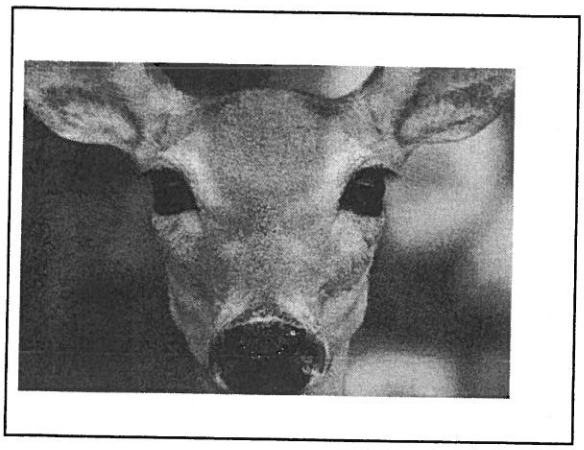
Transparent allows light through and object can be clearly seen

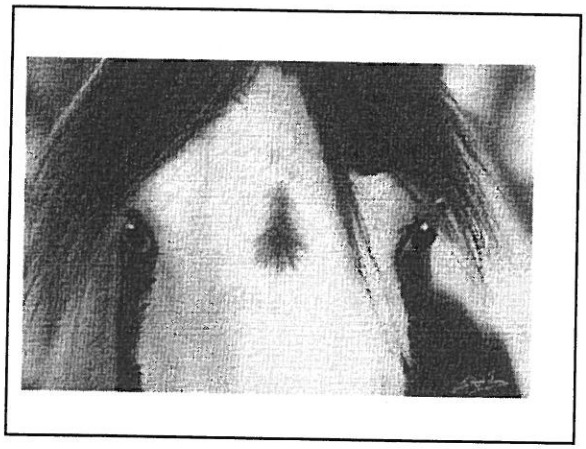
Judgement of Distance

- 2 eyes better than 1
- Each eye sees a slightly different view.
- The brain puts these 2 "pictures" together to form a 3-D view
- This helps with judging distances
- Known as BINOCULAR VISION

Predators and Prey



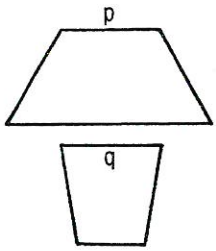




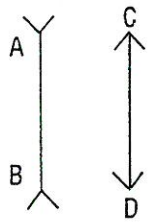
8a Optical illusions

Extension Sheet

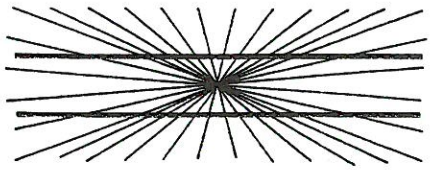
For each question 1–6, decide the answer first by looking, and then by measuring.



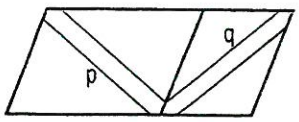
1 Which is longer, p or q?



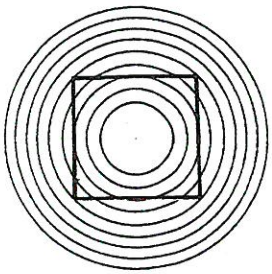
2 Which is longer, AB or CD?



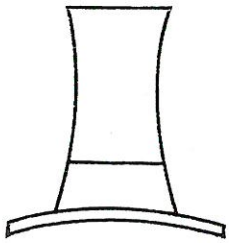
3 Are the thick lines really parallel or not?



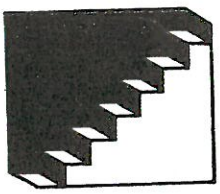
4 Which is longer, p or q?



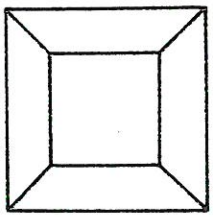
5 Do the thick lines make a square, or not?



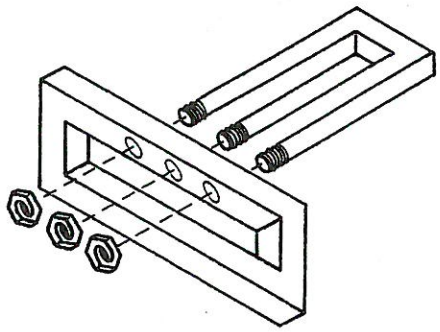
6 Which is longer – the height of the hat or the width of the brim?



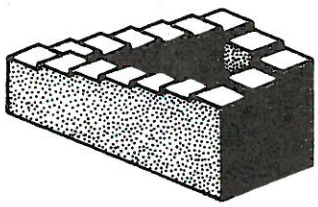
7 Are you looking at white stairs against a black wall or looking up at the underneath of a staircase against a white wall? (Try turning the page.)



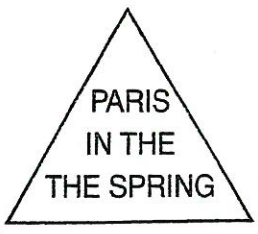
8 Which is nearer to you – the small square or the large one?



9 Could you make these?



10 Keep on walking up.



11 What's wrong with this?

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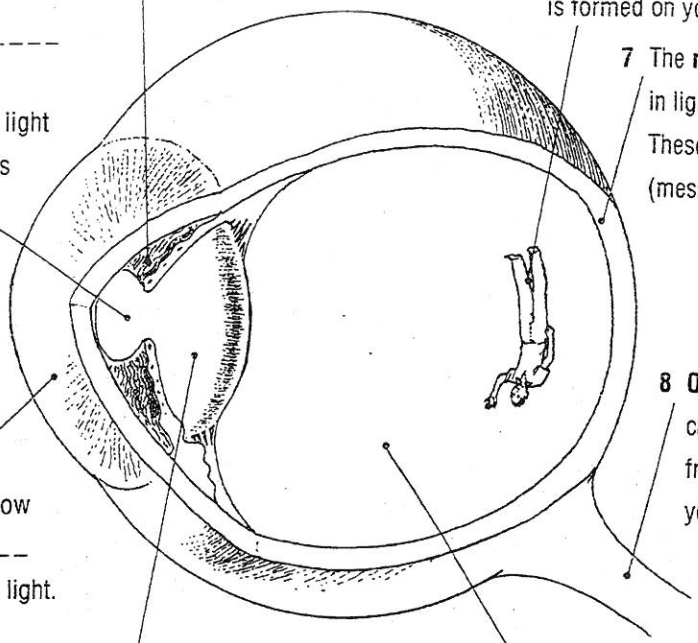
Parts of the Eye	Function



1 The coloured part of the eye is called the _____

2 The dark hole in the centre is called the _____ This is where the light enters your eye. If the light is bright, the pupil gets _____ in size.

3 The clear front window is called the _____ It helps to focus the light.

4 The **lens** helps to bend and focus the light so that it forms a picture or _____ on the back of your eye. The lens can change its shape, to focus on near or far objects.

5 This jelly helps to keep your eye in shape.

6 A picture or _____ is formed on your retina.

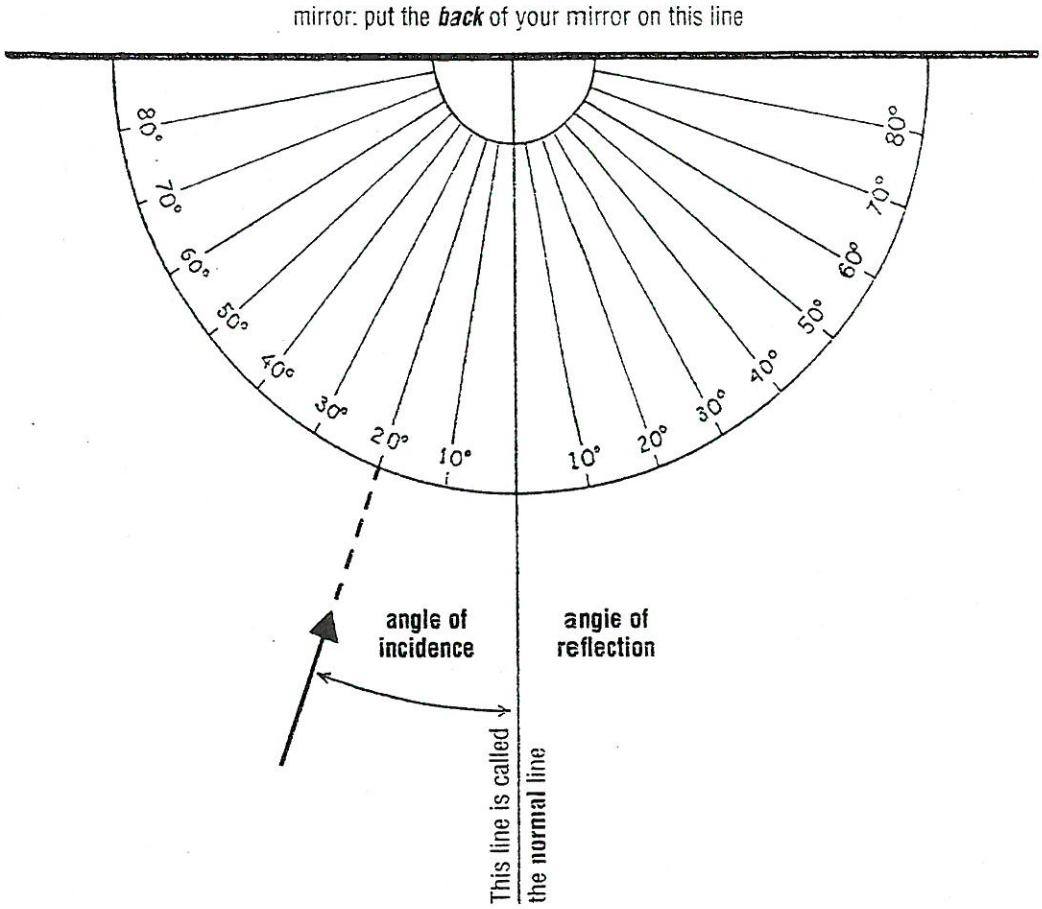
7 The **retina**. This is covered in light-sensitive cells. These cells send signals (messages) to your brain.

8 **Optic nerve**. This carries the signals from your retina to your brain.

8b The Law of Reflection

Help Sheet

Name _____ Class _____



Results:

Angle of incidence *i*	*Angle of reflection* *r*
20°	

What we did: _____

_____

_____

_____

_____

Conclusion: _____

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The Periscope

Total Internal Reflection

8b Symmetry and images

Extension Sheet

Think about all the capital letters A, B, C, ..., X, Y, Z

1 Use the letter A to explain what you mean by 'symmetry'.

2 Write down which of the 26 letters have:
- symmetry about a vertical axis (like A)
- symmetry about a horizontal axis (like B).

3 Use a plane mirror to test each of the 26 letters.
Were your answers correct?

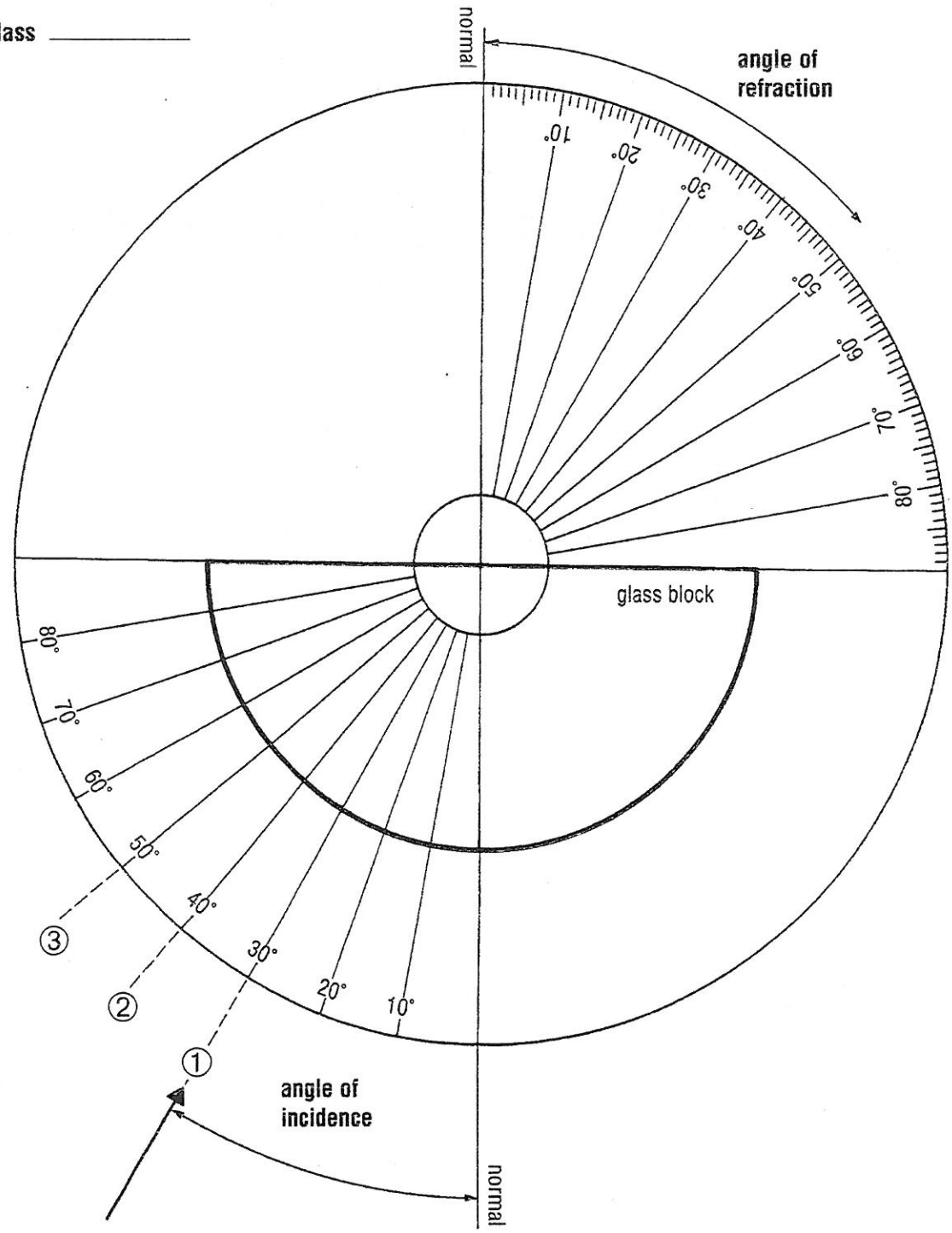
4 Which of the 'lower case' letters (a, b, c, ...) have symmetry about:
- a vertical axis?
- a horizontal axis?

8c Investigating refraction

Help Sheet

Name _____

Class _____



Results:

Angle of incidence	*Angle of refraction*
30°	
40°	

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8c Using refraction

Extension Sheet

A Lenses

Use a ray-box to send 3 rays of light into a ***convex lens***:

- Draw the rays after they have passed through the lens.
- What happens if you use a ***thicker*** convex lens?
- What happens if you use a ***concave*** lens?
- Write a report on what you have discovered.
  Try to use these words:

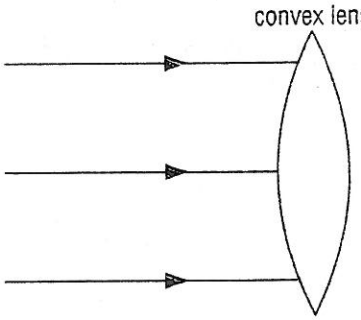
convex lens	**converging**	**focus**
concave lens	**diverging**	**refracted**

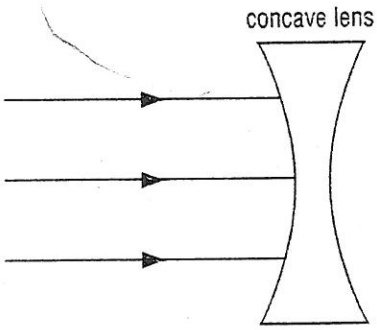
8c Using refraction

Extra Help

Name _____ Class _____

- Look at the 2 lenses below.
  Using a ruler, draw the rays carefully to show what happens when they pass through each lens. Add arrows to each ray.





- Fill in the spaces below using the words in the box.

diverging	converging	convex	focus	refracted	concave

When light rays pass through a glass lens they are r _ _ _ _ _ _ _ _ _. This means that they change their direction.

A c _ _ _ _ _ _ lens is fat in the middle. It brings the rays of light closer together.

The rays of light are c _ _ _ _ _ _ _ _ _ _.

The rays meet at a point which is called the f _ _ _ _ _.

A c _ _ _ _ _ _ _ lens is thin in the middle. It makes the rays of light spread out.

The rays of light are d _ _ _ _ _ _ _ _ _.

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8d The visible spectrum

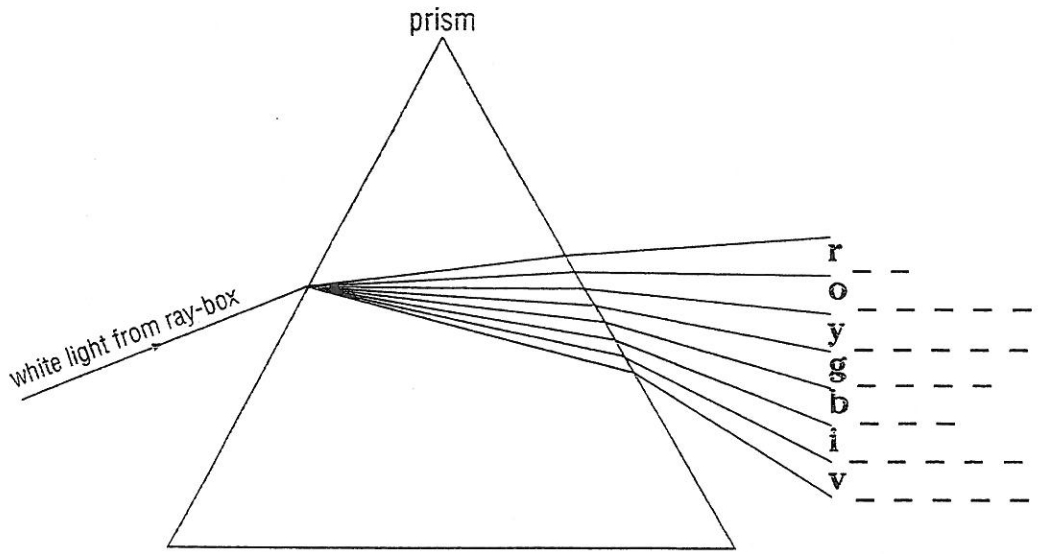
Extra Help

Name _____ Class _____

When you shine white light through a prism, it is split up into different colours. The colours are listed in the box here.

green	orange	indigo	yellow	blue	violet	red

- Finish off the diagram below by writing in the names of the colours in the order that they come out of the prism.
- Colour in the seven different light beams.



- Fill in the spaces below using the words in the box.

spectrum	seven	dispersed	prism

White light is really a mixture of s _ _ _ _ _ colours. The colours are split up by the p _ _ _ _ _.

The white light has been d _ _ _ _ _ _ _ _ _ to form a s _ _ _ _ _ _ _ _.

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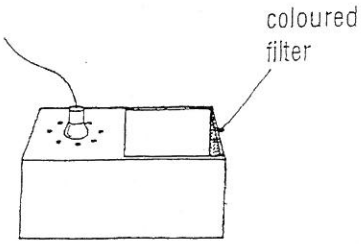
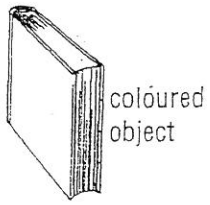
8d Objects in coloured lights

Help Sheet

n a dark room:





Colour of object in daylight	**Colour of objects in coloured lights**			
	Colour of light shining on it			
	white	red	green	blue
white	white			
red				
green				
blue				

8e Electromagnetic waves

Extra Help

- Finish the table below by matching each wave from this box with the correct description.

gamma-rays	**X-rays**	**visible light**	**radio waves**
ultra-violet rays		**infra-red rays**	

Wave	*Description*
	These are the waves that give you a sun-tan. They can damage your skin and cause skin cancer.
	These are the waves that we can see. There are seven colours.
	These are given out by radioactive substances. They are very dangerous to humans.
	You can feel these as warmth. Every warm or hot object gives them out.
	These waves pass through skin but they do not pass through bone so easily. Doctors and dentists use them to check bones and teeth.
	There are several kinds of these. They are used to send messages.

Topic 1.4 Light & Beyond — *Summary V2*

Complete the following summary by filling in the missing words.

Light enters my eye through a black hole called the P _ _ _ _ which gets smaller when the light gets B _ _ _ _ _ _ _.
A material letting most light pass through it is said to be T _ _ _ _ _ _ _ _ _ _ _.
A material letting some light pass through it is said to be T _ _ _ _ _ _ _ _ _ _ _.
A material letting no light pass through it is called O _ _ _ _ _.
A flat mirror is called a plane mirror. A mirror curving out the way is called a C _ _ _ _ _ mirror and one curving inwards is a C _ _ _ _ _ _ mirror.
When a ray of light goes from air into glass the light changes direction (bends); this is called R _ _ _ _ _ _ _ _ _ _.
A C _ _ _ _ _ lens brings all the rays to a focus and a C _ _ _ _ _ lens spreads the rays of light further apart.
White light can be split up into S _ _ _ _ colours; these are R _ _, O _ _ _ _ _, Y _ _ _ _ _ , G _ _ _ _, B _ _ _ , I _ _ _ _ _ and V _ _ _ _ _.
A red filter only lets R _ _ light pass through it and a blue shirt appears B _ _ _ in colour because it R _ _ _ _ _ _ _ blue light and absorbs all the other colours.
In red light a yellow shirt will appear to be B _ _ _ _.
The electromagnetic spectrum is made up of different types of light waves, most of which are invisible to the eye. Some of these are:

X-_ _ _ _
G _ _ _ _ - R _ _ _
M _ _ _ _ _ _ _ _ _ _
R _ _ _ _ W _ _ _ _
U _ _ _ _ - V _ _ _ _ _
I _ _ _ _ - R _ _
V _ _ _ _ _ _ L _ _ _ _

Topic: _____ Name: _____

Result: /15

S1/S2 Target Setting Sheet

For each of the following, rate how you feel you performed by ticking the appropriate box.

Behaviour					
Drawing diagrams / graphs					
Homework					
Working with other pupils					
Using sentences					
Doing experiments					
Revising for tests					
Following instructions					

From your responses to the areas listed above pick out two strengths and write down **why** they are strengths.

1.

2.

From your responses to the areas listed above pick out two areas which you think you could improve on.

1.

2.

In this topic I enjoyed _____ .

In this topic I didn't enjoy _____ .

Teacher's signature: Parent's signature: