LIGHT, COLOUR AND THE EYE

UNIT OVERVIEW

In this illuminating science unit, students discover the exciting topic of light and the human eye. The unit employs student overhead notes to convey much of the knowledge-based material of the unit combined with exciting student activities which relate to the topic of each lesson. The two parts, "Light and Colour" and "The Human Eye" can be taught separately or together.

LESSON TOPICS AND STUDENT ASSIGNMENTS

PART I - LIGHT AND COLOUR

1. **Light - Introduction** - Students are introduced to the topic learning about luminous and illuminated objects then complete questions and a "**Wordsearch**".

2. **Properties of Light** - Students learn about transparent, translucent and opaque objects and investigate light's property of travelling in straight lines with the activity "**Building a Working Sundial**".

3. **White Light and the Spectrum** - Students use prisms to "break" white light into the colours of the rainbow (the spectrum) in the activity "**Breaking Up Is Hard To Do**".

4. **Reflection - Mirror Images** - Students investigate mirror images in the hilarious activity "**The Amazing Mirror Hockey Shootout**".

5. **Reflection - Measuring Angles** - Students study the law of reflection and compare incident and reflected rays by measuring in the experiment "**Measuring Reflection**".

6. **Refraction** - Students examine refraction and the bending of light by making a Babyfood Jar Magnifying Glass. The worksheet is "**Refraction and Bending Light**".

7. **Colour and Pigments** - In this optional lesson, students learn the difficult concepts relating to colour and complete the colour absorbtion worksheet "**Blinded By The Light**".

PART II - THE HUMAN EYE

1. **The Human Eye** - Students learn about the parts of the human eye, experiment with pupil size and find their blind spot. The worksheets are "**Pupil's Pupils**", "**Make Your Homework Disappear**" and "**Crossword Puzzle**".

2. **Optical Illusions** - Students examine many classic optical illusions including the perplexing "**Old Woman/Young Woman**" illusion.

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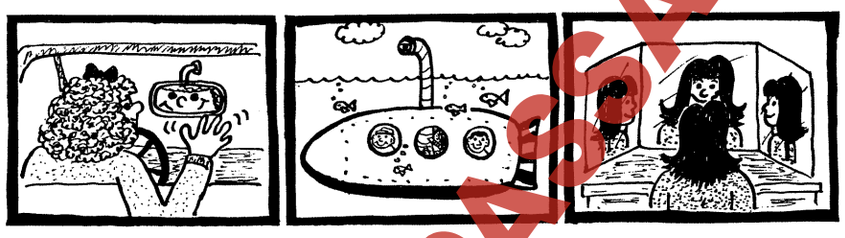
Reflection

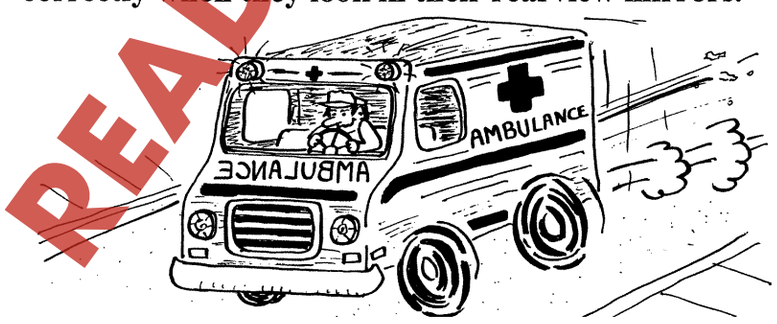
Light travels in straight lines but it can be made to turn a corner - reflection. Special types of materials that are shiny will cause light to change its direction and reflect. Mirrors are made by painting a piece of glass on one side with a shiny coating that reflects. Reflection of light is used for rearview mirrors in cars, periscopes in submarines and bathroom mirrors to help comb your hair in the morning.



Reversed Images

When light reflects, everything is the same except for one thing - right and left are reversed. This reversal of right and left makes it very hard to read handwriting that is held in front of a mirror.

An ambulance will often have reversed writing on the front so that drivers will be able to see the word "ambulance" correctly when they look in their rearview mirrors.



ACTIVITY #2 - BUILDING A WORKING SUNDIAL

Name: _____

Sundials were one way that people used to keep track of time before watches and clocks were invented. (The Flintstones use sundials to tell time) Too bad sundials don't work when it's cloudy out!

Instructions

1) A sundial uses shadows to tell time. The things you need to build your own sundial are bristolboard or cardboard, tape, scissors, ruler and gluestick.

2) Glue the following page to a piece of bristolboard or thin cardboard. (Cereal-box cardboard works great)

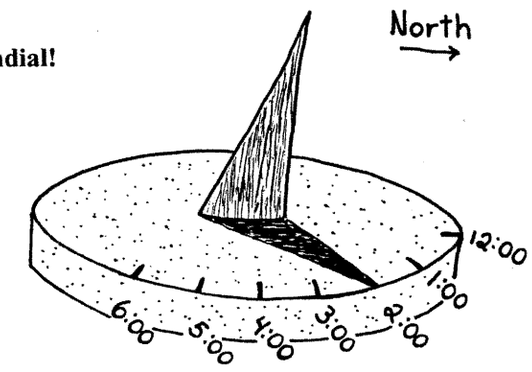
3) When the glue is dry, cut out the round base and the triangle shaped gnomen. ("gnomen" rhymes with "snowman")

4) Tape the gnomen to the base on the thick dotted line. *Be sure that the gnomen is standing straight up and down and is not tilting over.*

5) At exactly 12:00 noon on a clear, sunny day, take your sundial to a flat, open place where it will be in the sun all day. Move the sundial until the shadow from the gnomen is as thin as possible and points straight at 12:00 noon. (The top of the sundial should now be pointing towards the North)

6) Tape the sundial down so that it will not move or be blown away by the wind.

7) Presto, one working sundial!



ACTIVITY #6 - REFRACTION AND BENDING LIGHT

Name: _____

PART 1 - THE BENT PENCIL

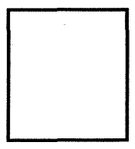
1) Fill a babyfood jar or beaker half full with water and put a pencil into it.

2) Look at the jar from the side and draw what you see.

PART 2 - BABYFOOD JAR MAGNIFYING GLASS

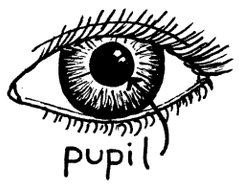
1) Fill a babyfood jar with water and put the lid back on.

2) Put the babyfood jar on its side and use it to magnify the small dinosaur picture below. Draw the enlarged dinosaur in the box.



Question: In this experiment, the water is refracting (bending) the light like the lens in a magnifying glass. List two other places where lenses are used to bend light.

1) _____ 2) _____

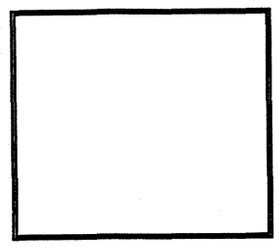


ACTIVITY #8 - PUPIL'S PUPILS

Name: _____

Instructions

1) Draw your partner's eye very carefully in two different kinds of light. *Pay special attention to the black dot in the middle of the eye.* This black part is called the "pupil" and is really a hole that lets the proper amount of light into the eye.



Classroom Lights Off (Dim Light)

Classroom Lights On (Normal Light)

2) If you have been sitting in the dark for a while, what happens to the size of the pupil when the teacher suddenly turns on the lights?

_____

3) Explain why the pupil gets smaller when the lights are turned on.

_____

_____

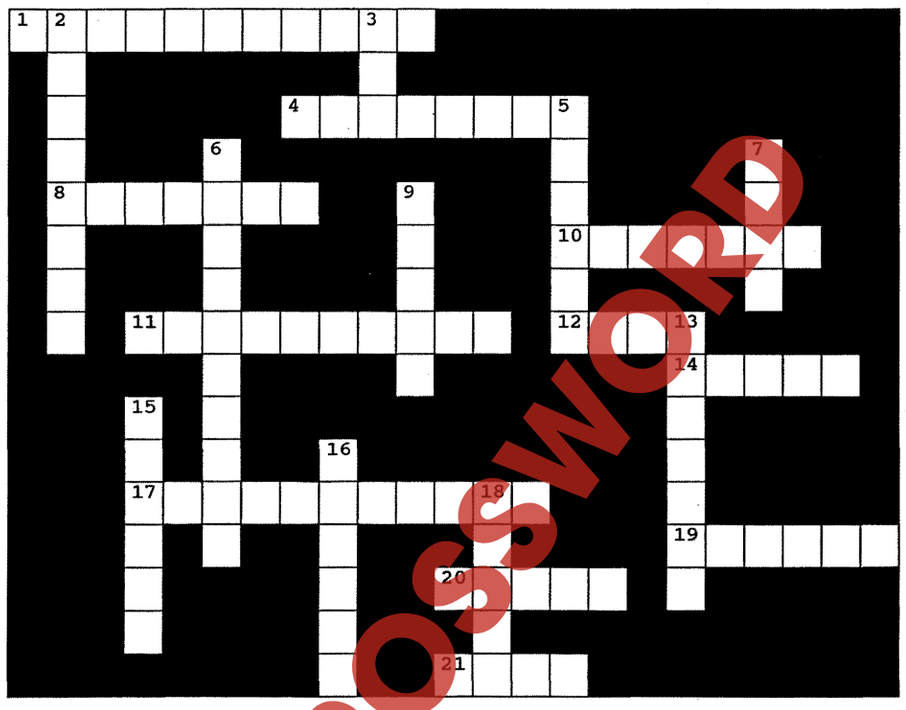
4) When you first turn off the lights in your bedroom at night, it is very dark and you can't see anything. Why is it that after a few minutes, you can start to see some shapes in the room?

_____

_____

ACTIVITY # 10 - CROSSWORD PUZZLE

Name: _____



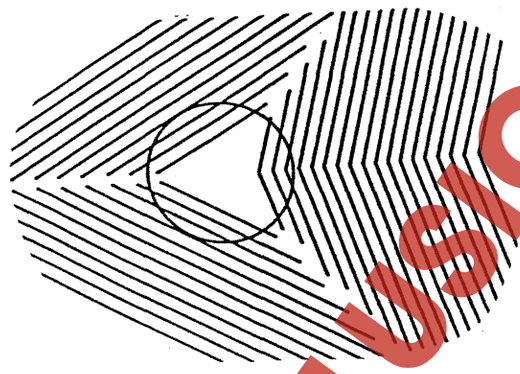
ACROSS

1. Something that is lit up by another object.
4. The colours of the rainbow.
8. Fireflies make this kind of light
10. A guy that really knows his colours well.
11. Bending of light.
12. See light and dark and are used mainly in the night.
14. Cells in the eye that see colour and are used in the day.
17. See-through like glass.
19. Protective covering for eye.
20. A triangular piece of glass that can break-up white light.
21. This is found in cameras and glasses.

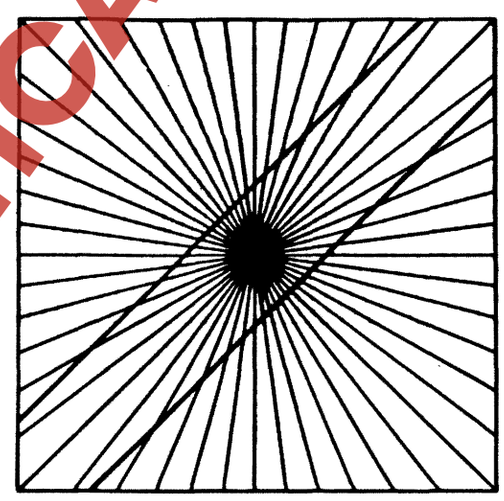
DOWN

2. Something that makes its own light.
3. Keep this on the ball.
5. The witch in Snow White used one of these to find out who was the fairest of them all.
6. A lightbulb makes this type of light.
7. Muscles that let more or less light into the eye.
9. Black hole of the eye.
13. What is your favorite subject?
15. The "screen" in the back of the eye.
16. Not see-through.
18. The optic _____ sends messages from the eye to the brain.

IS THIS CIRCLE ROUND?



ARE THESE RAILWAY TRACKS PARALLEL OR WILL THERE BE A TRAIN DERAILMENT?



LIGHT, COLOUR AND THE EYE REVIEW

Name: _____

Match

a) a guy that helps remember the colours of the spectrum	___ luminous
b) a black hole in the center of the eye	___ illuminated
c) an object that makes its own light	___ translucent
d) a see-through object (plexiglass)	___ transparent
e) an object that you can only see through a little bit (wax paper)	___ opaque
f) an object that you cannot see through (wood)	___ prism
g) muscles that let the proper amount of light into the eye	___ spectrum
h) used to break white light into the colours of the spectrum	___ ROY G. BIV
i) light sensitive cells that see colour and are used in the day	___ reflection
j) the name for the colours of the rainbow	___ refraction
k) when an object is lit up by another object	___ blind spot
l) "screen" at the back of the eye	___ rainbow
m) what happens when light hits a mirror and turns a corner	___ cornea
n) carries messages from the eye to the brain	___ pupil
o) light sensitive cells that see light and dark	___ iris
p) a part of a magnifying glass, a telescope and an eye	___ retina
q) this part of the eye has no rods or cones and "can't see"	___ lens
r) refraction of sunlight causes this after a rainstorm	___ rods
s) protective covering for the eye	___ cones
t) when light is "bent" going from one material to another	___ optic nerve

LIGHT EXAM

Name: _____

True or False

1. _____ Light is a type of energy.
2. _____ A firefly gives off artificial light.
3. _____ White light can be split up into the colours of the rainbow.
4. _____ In a mirror, everything looks the same except right and left are reversed.
5. _____ The sun makes its own light and is said to be illuminated.

Fill in the Blanks

6. Objects that let all the light through are _____.
7. Objects that do not let any light through are _____.
8. This forms behind an object when light is blocked. _____
9. Wax paper is an example of an object that is _____.
10. This triangle shaped piece of glass is used to break light into the colours of the rainbow. _____
11. The name for the colours of the rainbow is the _____.
12. Another word for the bending of light rays is _____.
13. A curved piece of glass that bends light in ways that can help us is a _____.
14. When sunlight passes through water droplets in the air, you might get this to form. _____
15. This was used to tell time before watches were invented. _____

ACTIVITY #1 - WORDSEARCH

NAME: ______________________

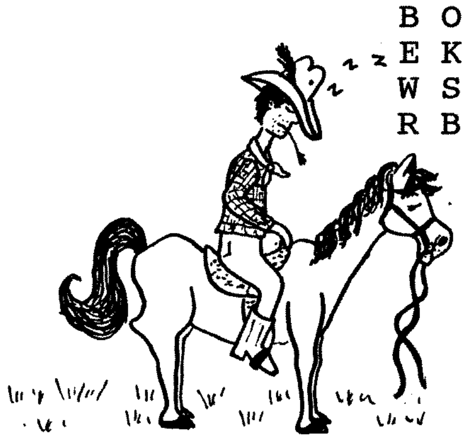
Find These Words:

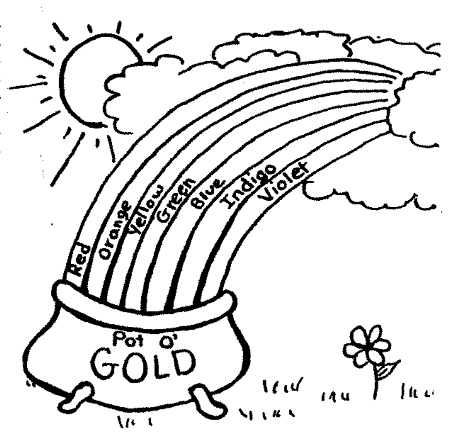
LUMINOUS
ILLUMINATED
SHADOW
TRANSPARENT
TRANSLUCENT
OPAQUE
PRISM
WHITE LIGHT
SPECTRUM
BLIND SPOT

ROYGBIV
MAGNIFIYING GLASS
PIGMENT
REFLECTION
REFRACTION
MIRROR
PERISCOPE
RAINBOW
SUNDOG

LENS
COLOUR
CORNEA
PUPIL
IRIS
RETINA
RODS
CONES
OPTIC NERVE

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





ON #1 - AN INTRODUCTION TO LIGHT (1 Class)

t Objectives, Activities and Assignments

Students are introduced to the topic of light and complete a wordsearch that highlights important vocabulary words.

Students complete overhead notes that explain light as a type of energy. They learn the terms luminous (gives off light or makes its own light) and illuminated (is lit up by light from another source).

ted Teaching Strategies

Begin the unit by challenging students to guess the new topic in science by solving the following riddle:

"What word goes with all of these clue words?
night, day, house, bulb, spot, weight, brite"

Give the clues one at a time until students have the answer. (night**light**, day**light**, **light**house, **light**bulb, spot**light**, **light**weight, **Lite** Brite)

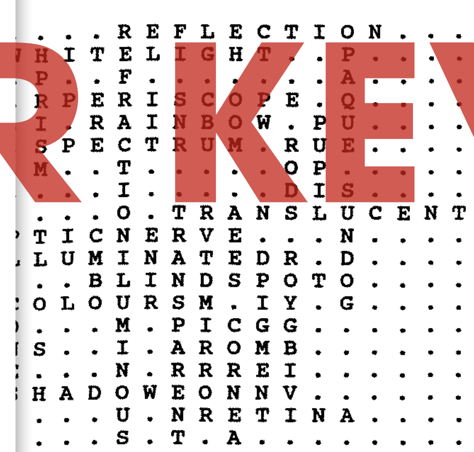
Outline what will be covered in the unit, the marking format and teacher expectations.

Students copy notes which have been photocopied onto overhead transparencies.

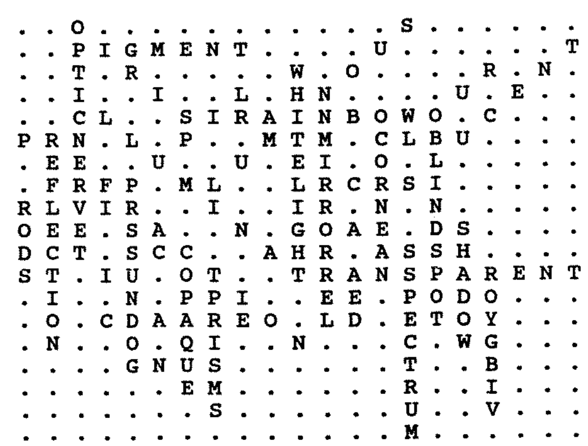
...t the worksheet "**Wordsearch**" and read through the words. Students should work on this wordsearch individually at first and may be allowed to team up with a partner towards the end of the class if all class members are working.

Answers

(Easy)



(Hard)



te ***
An easy and hard wordsearch (diagonal words) have been included.