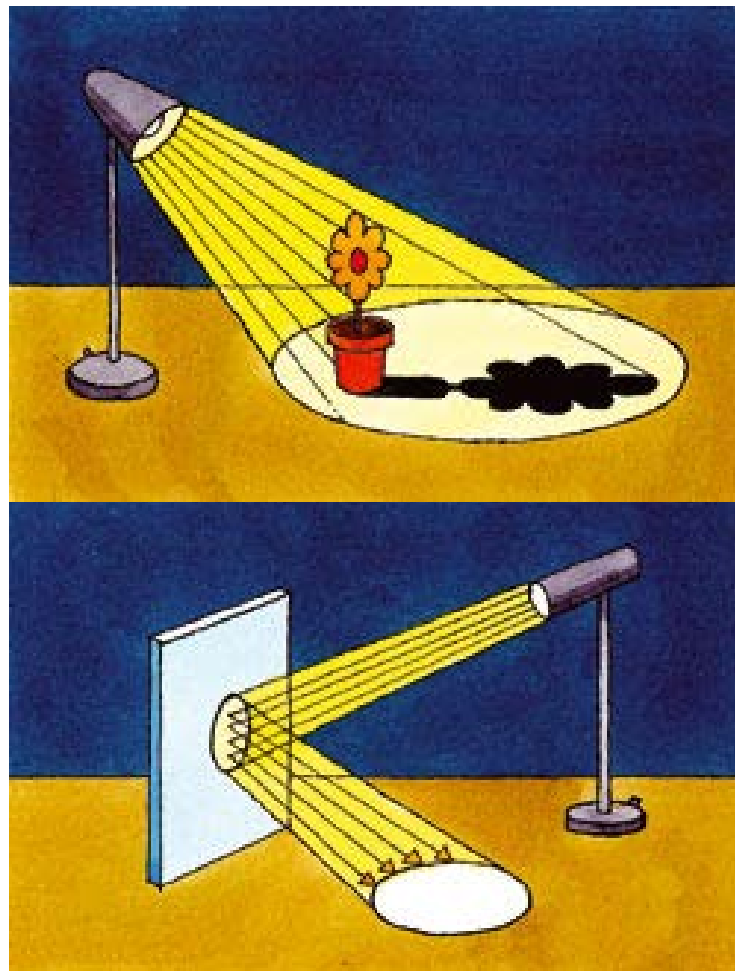


Mirrors and Shadows

Academic Content Standards

- Grasp the properties of a mirror by observing target images reflected in a mirror.
- Compare the shadows of a variety of objects and understand the mechanism of shadow formation.
- Understand that the size of a shadow differs depending on the distance between the light source and the object.
- Find appropriate examples of using mirrors and/or shadows in everyday life.



Name: _____

Student Number: _____

Homeroom: _____



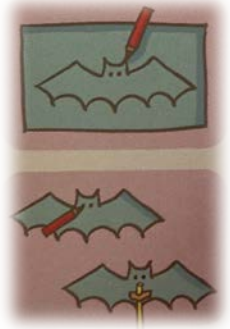
What makes a shadow?



Write and/or draw pictures to show what you already know about this question.



1. Draw the outline of a ghost or monster on some thin card. Carefully cut around your drawing. Then cut out some holes for its eyes and put transparent plastic on them. Tape your picture to a chopstick.
2. Hold your picture in front of a wall. Can you see your picture on the wall?
3. Keep holding your picture in front of the wall and get a friend to shine a flashlight towards it. Can you see your picture on the wall? What does it look like?



Take notes of what you saw. Draw pictures to help show your observations.



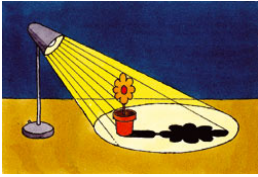
Share Your Results.

Discuss your ideas and findings with your classmates. Were there any interesting observations?



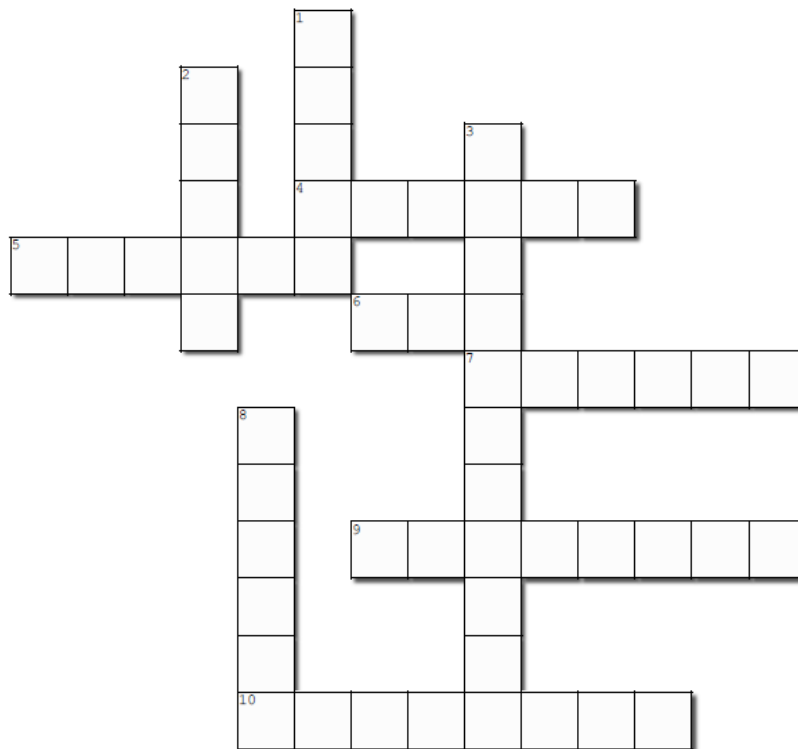
Light is a form of energy. Most of the light on Earth comes from the sun. Light comes from other places too, such as electric lights or fires.

Light always travels in straight lines. If light hits an object that's not see-through, it can only shine past it. The area behind the object appears black because no light can get to it. This black area is called a shadow. The shape of the shadow takes the shape of the object that is blocking the light.



Objects that are opaque create shadows. Opaque means that light cannot go through the object. Objects that are transparent let light go through them. Transparent means you can see through it. In the activity that we did, your monster was opaque, so it created the shadow, but its eyes were transparent, so you could see light spots where the eyes were.

Use the information above and the clues to complete the crossword.



Across

- 4. Light is a form of _____.
- 5. An object makes a shadow if it _____ the light.
- 6. Most of Earth's light comes from the _____.
- 7. The black area behind an object because light can't reach it.
- 9. Light travels in _____ lines.
- 10. Light can come from _____ lights.

Down

- 1. These also make light.
- 2. The color of shadows.
- 3. Light can pass through these kinds of objects.
- 8. Light can't pass through these kinds of objects.



What makes a shadow?



Why do shadows change sizes?



Write and/or draw pictures to show what you already know about this question.



1. Make the following shapes with your hands. Try some original ideas too.
2. Have a friend shine a light close to your hands. Observe the shadow.
3. Keep doing the same hand shape and ask your friend to shine the torch a little further back. Observe what happens to the shadow.



Take notes of what you saw. Draw pictures to help show your observations.



Share Your Results.

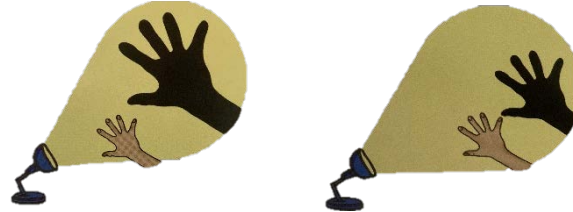
Discuss your ideas and findings with your classmates. Were there any interesting observations?



A shadow is made when an opaque object blocks the light. The shape of the shadow looks like the object that is blocking the light.

Shadows are the absence of light. When you hold up your hands in front of a light, you block out the light in the same shape of your hands. This makes the shadow appear.

Light moves in straight lines. When an object is close to the light, it blocks a lot of light, and the shadow looks big. As an object moves away from the light, the object blocks less light, so the shadow gets smaller.



Use the information above and the clues to complete the wordsearch.

1. This is a form of energy.
2. This is made when an object blocks the light.
3. Light travels in ___ lines.
4. These kinds of objects block light.
5. These kinds of objects let light go through them.
6. When an object is close to the light, its shadow will be ___.
7. When an object is further away from the light, its shadow will be ___.
8. This is the color of shadows.
9. You used this part of your body to make shadows in this activity.

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



Why do shadows change sizes?



What happens to a shadow if light hits an object at an angle?



Write and/or draw pictures to show what you already know about this question.



1. Use a permanent marker to draw the outline of a character on a clear transparency.
2. On a large piece of white paper, draw a background scene for your character.
3. Put the background on the wall. Hold your character in front of the torch so that its picture projects onto your background. Can you move your character around to make a story?



Take notes of what you saw. Draw pictures to help show your observations.



Share Your Results.

Discuss your ideas and findings with your classmates. Were there any interesting observations?



Shadows can be used in different ways. One way that shadows are used is to project a word or picture on a screen. The images we see when light passes through movie film are actually shadows.



In this activity, as you brought your character on the laminate up to the light, the lines on the drawing blocked the light and made shadows or images on the wall. As the drawing was brought closer to the light, all the shadows on the wall became bigger. As the drawing moved further away from the light, all the shadows on the wall became smaller.

When light shines at an angle, the shape of the shadow changes and stretches because of the way light is blocked.

Have more fun! Make a different mini background setting below and complete the activity again on a smaller scale.



What happens to a shadow if light hits an object at an angle?



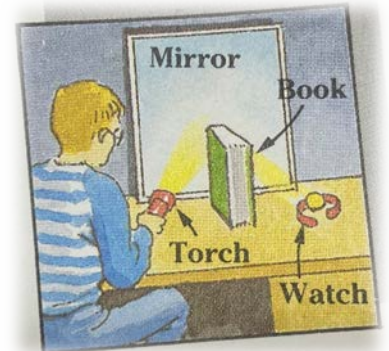
How does light bounce?



Write and/or draw pictures to show what you already know about this question.



1. Cover the end of a torch with foil and use a pencil to make a small hole for the light to shine through.
2. Set up a mirror, book, and an object like shown in the picture.
3. Darken the room and try to make the light hit the object on the other side of the book.
4. Move the object to different positions. Try to hit it with the light. What do you notice about the angles?



Take notes of what you saw. Draw pictures to help show your observations.



Share Your Results.

Discuss your ideas and findings with your classmates. Were there any interesting observations?

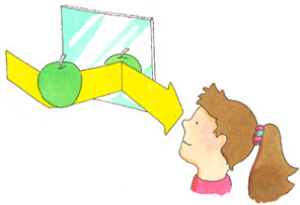


Although you cannot see it, light is always moving. Each tiny part of light goes along a straight line. These lines are called rays.



When light meets a shiny surface like a mirror, it bounces off it. Light always bounces off in the same way. Whatever the angle at which it hits the mirror, it will bounce off at the same angle. The scientific word for "bounce off" is called reflect.

When you look into a mirror you see things. The things you see in a mirror are called reflections. This happens because light rays bounce off something and on to a mirror. The light rays bounce off the mirror and into your eyes. This is what makes you see the reflection.

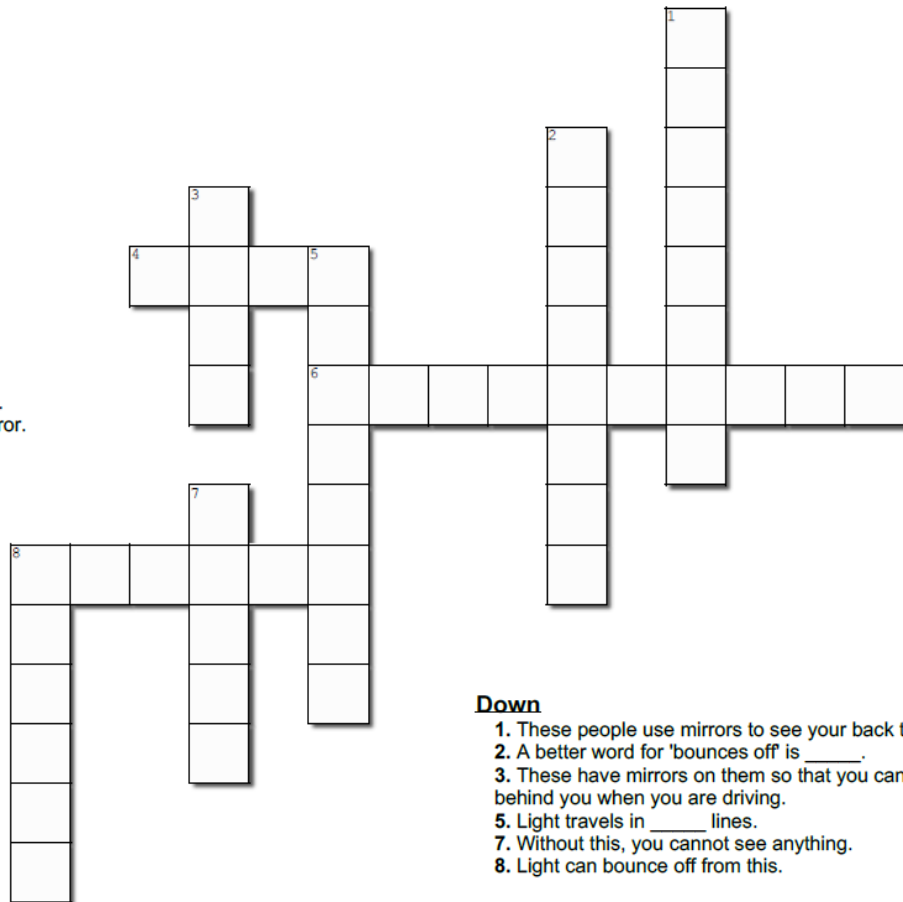


You will see mirrors everywhere. You probably use one when brushing your hair. Dentists use them to see your back teeth. Mirrors are also used in cars for safety reasons so that you can see things behind you.

Use the information above and the clues to help you complete the crossword.

Across

- 4. The lines of light are called _____.
- 6. This is the image you see in a mirror.
- 8. Light is always _____.



Down

- 1. These people use mirrors to see your back teeth.
- 2. A better word for 'bounces off' is _____.
- 3. These have mirrors on them so that you can see behind you when you are driving.
- 5. Light travels in _____ lines.
- 7. Without this, you cannot see anything.
- 8. Light can bounce off from this.



How does light bounce?



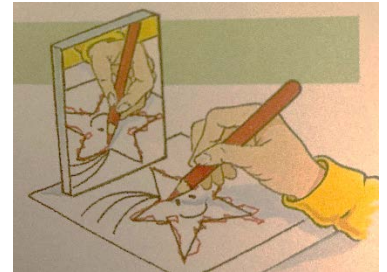
What does the image look like in a mirror?



Write and/or draw pictures to show what you already know about this question.



1. Look at your reflection in a mirror. Hold up your left hand. Observe what happens. Try your right hand.
2. Draw half a circle on a piece of paper and try to make it whole by using a mirror. Try other shapes.
3. Try writing a message in English so that when you hold it up to a mirror, it can be read the right way.
4. Draw a star on a piece of paper and stand a mirror up behind it. Look at the mirror and try to draw over the star shape.



Take notes of what you saw. Draw pictures to help show your observations.



Share Your Results.

Discuss your ideas and findings with your classmates. Were there any interesting observations?



Did you know that you never really see your own face? What you have seen have always been images of your face in photographs or reflected from mirrors.



When you held up your left hand in this activity, the reflection in the mirror held up its right hand. Reflections are always the wrong way around like this.

When you drew your half circle, the mirror showed the half circle back-to-front, so it looked like the other half of the circle. This concept works with any image that can be split into two halves that are exactly the same. Things like this are called symmetrical.

When you tried to trace over the star you drew by looking in the mirror, the top of your picture became the bottom. This made it difficult to draw around, especially when the lines changed direction.

Use the information above and the clues to help you complete the wordsearch.

1. You can see your image in this.
2. You have never really seen this.
3. If you hold up your left hand, the image in the mirror will hold up its ____ hand.
4. This is what you see in a mirror.
5. This travels in straight lines.
6. If you only draw half a picture, a mirror can make it look whole, if the picture is ____.
7. The top of the star you drew was the ____ of the star in the image you saw in the mirror.

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



What does the image look like in a mirror?

Main Ideas – Review Questions



After completing this unit, you should be able to answer these questions. Write your answers in complete sentences.

1) What makes a shadow?

2) Why do shadows change sizes?

3) What happens to a shadow if light hits an object at an angle?

4) How does light bounce?

5) What does the image look like in a mirror?

6) CHALLENGE: Try to write all the capital letters of the English alphabet that are symmetrical. Write half of the letter below and reflect it in a mirror to check.