

How Can I Win a Game of Flashlight Tag?

Level: Grades K-4

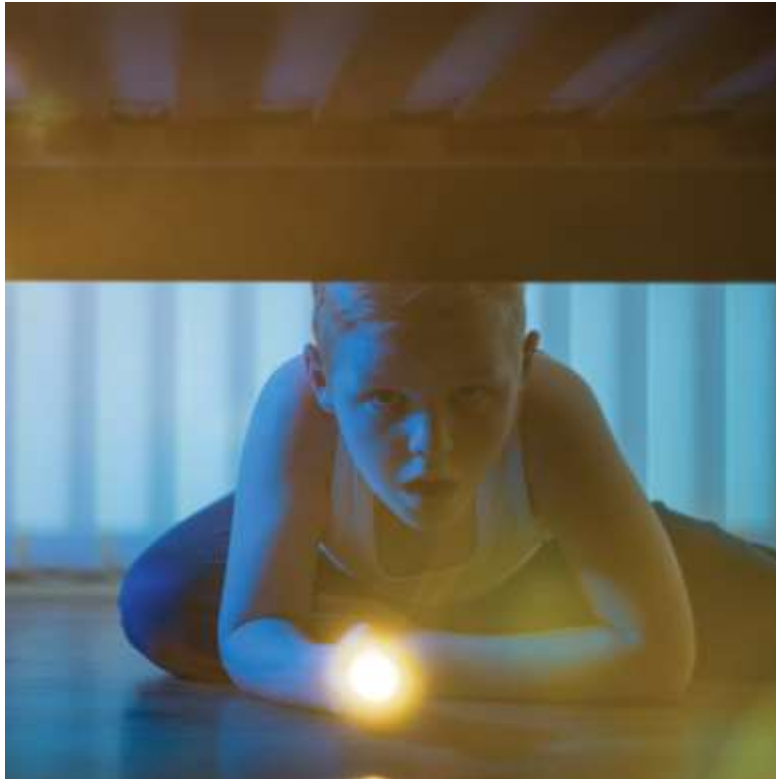


Image: Viacheslav Peretiatko/iStock/Getty Images Plus

Your challenge

Learn about what happens when light shines on different objects. Become a flashlight tag master!



Handy Hint

Use the glossary at the end of this activity to look up any words you don't understand. Words in the glossary are in **bold**.

Part 1: How do you win flashlight tag?

You will need:

- Smithsonian Science Stories: *Shining the Light*
- Paper and pencil

Steps:

1. Have you ever used a flashlight to play tag? Find the story “Seeing Underground” in Smithsonian Science Stories: *Shining the Light*. Read the first section, Hide-and-Seek in the Dark, or have someone read it to you.
2. Make up some rules for a game of flashlight tag. Write or draw your rules. Explain the rules to a family member or friend.
3. What safety rules did you include? You should never shine a light into a person’s or animal’s eyes. You should get permission from an adult before playing outside in the dark.
4. What are some tips for winning the game?
 - a. Can you think of some important things to do to stay hidden during flashlight tag?
 - b. Can you think of some important things to do to find people if you are “It” in flashlight tag?
5. Move on to Part 2. Explore what happens when a flashlight **beam** hits different objects.



Take It Further

Do you want to learn more about what happens when light shines in different places? Check out these Smithsonian resources:

Smithsonian Science Stories: *Shining the Light*

Reading 1 starts with a game like flashlight tag. Read the rest of the story, which is about dark places such as tunnels and mines. Reading 5 is about how light keeps students safe on their way to and from school.

Light Up the Cave simulation

What happens when objects are brought into a dark cave? Are all of the objects light sources? Which object is the best choice to help you find hidden treasure in the cave?

Part 2: Flashlight exploration

You will need:

- Flashlight
- About 10 small, flat things from around your home like tissue paper, foil, a DVD or CD, cardboard, a small mirror, a plastic bag, construction paper, a plastic container
- A solid color wall or table top
- Paper and pencil
- Ruler (optional)
- A helper (optional)

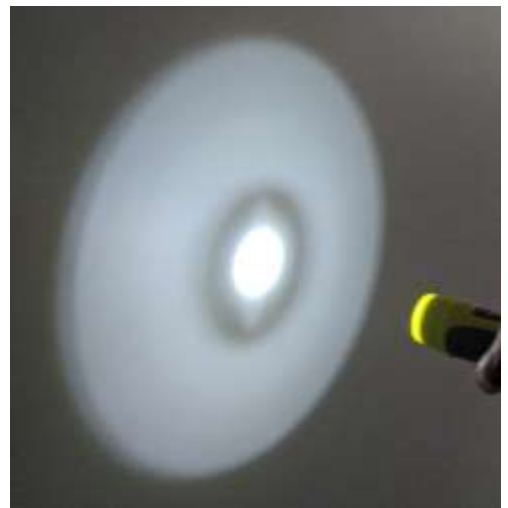


Safety Alert

Don't shine the flashlight in anyone's eyes, including your own.

Steps:

1. Ask an adult for permission to use things from around the house. Find about 10 items like those above.
2. Hold the light end of a flashlight about 15 centimeters (6 inches) away from a table top or wall. Turn the light on so that the light beam shines on the table or wall. What does the light look like?





3. Ask a helper to hold the flashlight for you, the same way you did in Step 2. Hold one item halfway between the flashlight and the table or wall.
 - a. Can you see the light shining on the table or wall? Does it look the same as it did before? Write or draw what you see.
 - b. Can you see the light shining on the item? What does it look like? Write or draw what you see.
4. Repeat Step 3 using the other items.
5. Did the same thing happen when the flashlight beam hit every item? Put your items in piles based on what happened when the light hit them. You may want to test some items again.
6. How would you describe what happens when light hits the items in each pile?
7. Keep the piles for Part 3.



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Part 3: Light effects tour

You will need:

- Flashlight
- Piles of items from Part 2
- What you wrote or drew in Part 2
- Objects in different parts of your home like furniture, windows, a bathroom mirror

Steps:

1. Read “Light Effects” on the next page or have someone read it to you.
2. Look at your piles of items from Part 2. Do your piles match up with the categories in “Light Effects”? Do some of your items fit in more than one category?
3. Prepare a light effects tour of your home for a family member or friend. Look around your house for objects that are transparent, translucent, opaque, and reflective.
4. Take your flashlight and lead another person on your tour. Show them what happens when the flashlight beam hits different objects and share the category word or words. For example, a window might be both transparent and reflective.



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Light Effects

The things used to make objects are called **materials**. A crayon is an object. The material a crayon is made of is wax. Paper, wood, rock, and fabric are other examples of materials. Can you think of an object made of paper? As you have seen, different things happen when light shines on different materials. The words below are used to describe different materials based on what happens when light shines on them.

Transparent

When a light shines on some materials, most or all of the light shines through. You can see where the light hits something on the other side of the material. These materials are described as transparent or clear. Some examples of transparent materials are thin glass and thin plastic like a plastic bag.

Translucent

When a light shines on some materials, some of the light shines through. You can see some light shining on the material. You can see where some of the light hits something on the other side of the material, but it isn't as bright as with transparent materials. The light that shines through might look cloudy or fuzzy. These materials are described as translucent. Some examples of translucent materials are tissue paper and thick plastic.



Reading Tip

The prefix trans- means “on the other side, through, or beyond.” Does it make sense that both transparent and translucent start with trans?

Opaque

When a light shines on some materials, none of the light shines through. You can see where the light hits the material. You can see a **shadow** on the other side of the light. These materials are described as opaque. Some examples of opaque materials are heavy cardboard and wood.

Reflective

When a light shines on some materials, some or all of the light bounces back off the material, or reflects. You can see where the light hits the material and if you look around you may be able to find where it hits some other surface. These materials are described as reflective. Some examples of reflective materials are mirrors and foil.

Transparent, translucent, and opaque materials can also be reflective. Can you find an example of a material like this?

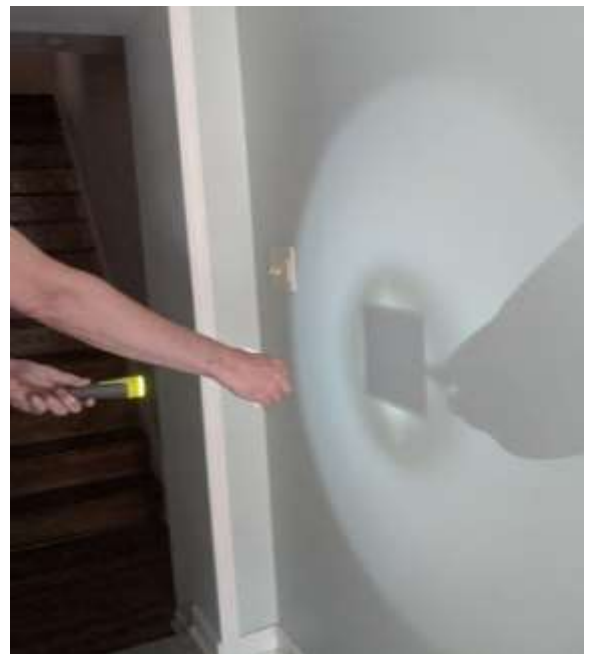
Part 4: Shadow challenge

You will need:

- Flashlight
- Square piece of cardboard, about 7 cm × 7 cm (3 in × 3 in)
- Something to use to hold the cardboard like tweezers, kitchen tongs, or a clothespin (optional)
- Paper and pencil
- A wall in a room that is not too bright
- Tape (optional)
- A helper

Steps:

1. Think about questions a and b below. Write or draw your answers on paper or explain them to someone.
 - a. Have you ever seen your shadow? Why do you have a shadow sometimes and not other times?
 - b. Is your shadow always the same size and shape?
2. Find a wall in a room that is not too bright. Both you and your helper will need to be near the wall at the same time. If you are allowed, tape a piece of paper, like copy paper, to the wall.
3. Ask the person with the flashlight to hold it about 1 meter (3 feet) away from the wall. Have them turn the light on and shine it onto the piece of paper (or just the wall).
4. Hold the cardboard square in the beam of light so that its shadow falls on the paper (or just the wall). Move the cardboard square around in the light. Can you do each of the following challenges? If you have paper on the wall, trace the shape for each challenge.
 - a. Make the smallest square shadow you can.
 - b. Make the largest square shadow you can. Make sure it fits on the paper.
 - c. Use the cardboard square to make a different shaped shadow. Do not cut or fold the cardboard.
5. Explain to the person holding the flashlight how you met each of the challenges.





Part 5: How do you win flashlight tag?

You will need:

- Paper and pencil

Steps:

1. Think about everything you have discovered about how light acts when it hits different materials. Think about hiding during a game of flashlight tag. Think about being “It” with a flashlight. Think about questions a and b. These are the same questions from Part 1. How might you change your answer?
 - a. Can you think of some important things to do to stay hidden during flashlight tag?
 - b. Can you think of some important things to do to find people if you are It in flashlight tag?
2. Write or draw your answers on paper or explain them to someone.

Glossary

beam	a tight, focused light
materials	things used to make objects
opaque	being able to block all light from passing through
reflective	being able to redirect light
shadow	an area of darkness made from blocking a light source
translucent	being able to block some light from passing through
transparent	allowing all or most light to pass through