Name: _____ Date: _____

The Pinhole Camera

Circle group

You can make a camera from a shoebox, a sheet of thin paper, and a pin. Cut a small square out of one end of the box. Tape the paper over it to make a screen. Then poke a tiny hole in the other end. Point the hole at a bright window. Look at the screen from inside a dim room. You will see a small picture of the scene outside.

The picture shows up because light travels in straight lines. Light bounces off every part of an object in all directions. Only a few thin rays from each spot fit through the tiny hole. Rays from the top go down after they pass through. Rays from the bottom go up. They cross at the hole. So the picture on the screen is upside down.

The size of the hole matters. A very small hole lets in only a narrow beam from each spot. The picture is sharp but dim. A bigger hole lets in more light. The picture is brighter. But the beams spread over a wider patch of the screen. So the picture is blurry.

Long ago, people used dark rooms with a small hole in one wall. They watched the outdoors and used it to help them draw. Today's cameras use glass lenses. Lenses gather more light and keep the picture sharp.

Questions

1. What three things do you need for the pinhole camera?

_____

_____

2. Why is the picture upside down?

_____

_____

3. What happens to the picture when the hole is very small?

_____

_____

4. Why does a bigger hole make a blurry picture?

_____

_____

5. Why do today's cameras use glass lenses?

_____

_____

Words to know

screen: a flat surface where a picture shows up
rays: thin beams of light
sharp: clear, with the details easy to see
blurry: not clear, with fuzzy edges
lenses: curved pieces of glass that bend light

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Pinhole Camera

Triangle group

You can make a camera from a shoebox, a sheet of thin paper, and a pin. Cut a small square out of one end of the box and tape the paper over it to make a screen. Then poke a tiny hole in the opposite end. When you point the hole at a bright window and look at the screen from inside a dim room, you will see a small picture of the scene outside.

The picture appears because light travels in straight lines. Light bounces off every part of an object in all directions, but only a few thin rays from each spot can squeeze through the tiny hole. Rays from the top of the object travel downward after they pass through, and rays from the bottom travel upward. The rays cross at the hole, so the picture on the screen is upside down.

The size of the hole matters. A very small hole lets in only a narrow beam from each spot, so the picture is sharp but dim. A larger hole lets in more light, which makes the picture brighter, but the beams spread across a wider patch of the screen, so the picture turns blurry.

Long before modern cameras, people used dark rooms with a small hole in one wall to watch the outdoors and to help them draw. Today's cameras use glass lenses to gather more light while keeping the picture sharp.

Questions

1. What three things do you need to build the pinhole camera described here?

_____

_____

2. Why is the picture on the screen upside down?

_____

_____

3. What happens to the picture when the hole is very small?

_____

_____

4. Why does a larger hole make the picture blurry?

_____

_____

5. Why do modern cameras use glass lenses?

_____

_____

Words to know

screen: a flat surface where a picture shows up
rays: thin beams of light
sharp: clear, with the details easy to see
blurry: not clear, with fuzzy edges
lenses: curved pieces of glass that bend light

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Pinhole Camera

Square group

You can construct a working camera from a shoebox, a sheet of thin paper, and an ordinary pin. Cut a small square out of one end of the box and tape the paper across the opening to form a screen. Then poke a tiny hole through the opposite end. When you aim the hole at a bright window and study the screen from inside a dimly lit room, you will see a small picture of the scene outside.

The picture appears because light travels in straight lines. Light bounces off every part of an object in all directions, but only a few slender rays from each spot are able to squeeze through the tiny hole. Rays from the top of the object continue downward after they pass through, and rays from the bottom continue upward. Since the rays cross at the hole, the picture projected on the screen is upside down.

The size of the hole is important. A very small hole admits only a narrow beam from each spot, so the picture is sharp but rather dim. A larger hole lets in considerably more light, which makes the picture brighter, but the beams spread across a wider patch of the screen, and the picture turns blurry.

Long before modern cameras existed, people used darkened rooms with a small opening in one wall to observe the outdoors and to assist them with drawing. Today's cameras use glass lenses to gather more light while still keeping the picture sharp.

Questions

1. What three materials does the pinhole camera need?

_____

_____

2. Why does the picture projected on the screen appear upside down?

_____

_____

3. What happens to the picture when the hole is very small?

_____

_____

4. Why does a larger hole turn the picture blurry?

_____

_____

5. Why do today's cameras use glass lenses instead of a tiny hole?

_____

_____

Words to know

screen: a flat surface where a picture shows up
rays: thin beams of light
sharp: clear, with the details easy to see
blurry: not clear, with fuzzy edges
lenses: curved pieces of glass that bend light

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: The Pinhole Camera

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: The Pinhole Camera

Easier · 225 words · Flesch-Kincaid grade 2.8

1. A shoebox, thin paper, and a pin.
2. The rays cross at the hole, so rays from the top go low and rays from the bottom go high.
3. It is sharp but dim.
4. The beams from each spot spread over a wider patch of the screen.
5. Lenses gather more light and keep the picture sharp.

Triangle: The Pinhole Camera

This passage · 237 words · Flesch-Kincaid grade 6.8

1. A shoebox, a sheet of thin paper, and a pin.
2. The light rays cross at the hole, so rays from the top end up low and rays from the bottom end up high.
3. It is sharp but dim.
4. The beams from each spot spread over a wider patch of the screen.
5. Lenses gather more light while keeping the picture sharp.

Square: The Pinhole Camera

Harder · 248 words · Flesch-Kincaid grade 8.4

1. A shoebox, a sheet of thin paper, and a pin.
2. The rays cross at the hole, so rays from the top end up low and rays from the bottom end up high.
3. It is sharp but rather dim.
4. The beams from each spot spread across a wider patch of the screen.
5. Lenses gather more light while still keeping the picture sharp.