LESSON 9:
MAKING A SPY SCOPE

Students will create their own spy scope, understanding how the angles of mirrors affects their view.

SUPPLIES

PENCIL BOX

- Scissors (12)
- Scotch Tape (2)
- Markers
- Glue Sticks (6)

GADGET BOX

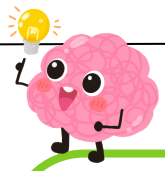
- Mirrors, 2" square (30)
- Masking Tape (2)

FOLDER

- Cardstock Spy Scope Templates (20)
- Printer Paper

REMEMBER

Some supplies (like tape) may need to be replenished if it's late in the semester or you share your bin with another teacher!



MEET SPECIAL AGENT

Specialty: Espionage and intelligence gathering

Agent Mirror, is a highly skilled spy specializing in espionage and intelligence gathering. With their sharp senses and stealthy movements, they excel at infiltrating high-security locations and extracting classified information without leaving a trace. They possess an uncanny ability to blend into the shadows and go unnoticed, making them the perfect spy for covert missions.

OBJECTIVES

- ☑ To create a spy scope using a template and mirrors.
- ☑ To understand how the angle of the mirrors allows for different images and views.

HOOK

3-5 min

- How can a spy follow a suspect and gather intelligence information without being seen?
- What ways can they watch someone and track their movements?
- Let students suggest their ideas.
- A spy scope is a device used by spies to see others, without being seen themselves.

iSTEAM After School

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DISCUSSION

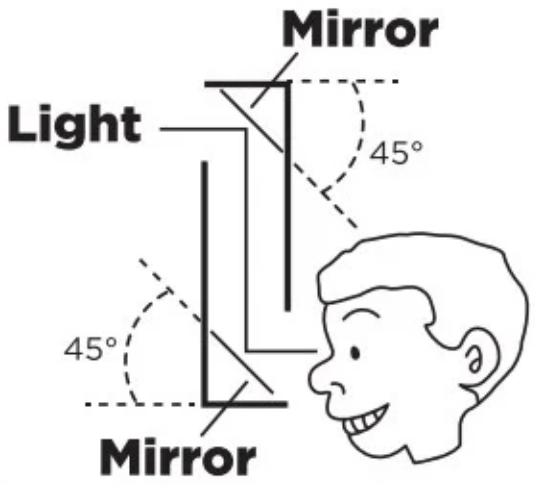
3-5 min

Explain that spies often want to see what someone else is doing, without being seen. By using a device, they can see further away, around corners or even through keyholes in doors!

A spy scope, sometimes known as a periscope is a device that uses mirrors. The placement of the mirrors allows someone to see things without being seen themselves.

Periscopes are also used on submarines. Which part of a submarine do you think is a periscope? (The part the sticks up out of the water).

Today, we will learn about how mirrors work in order to create our own spy scope.



FUN FACT

A periscope is an instrument people use to look at things from a hidden position. The device has a long tube with parallel mirrors situated at both ends at a 45-degree angle. However, some periscopes opt for prisms rather than mirrors, such as those in submarines.

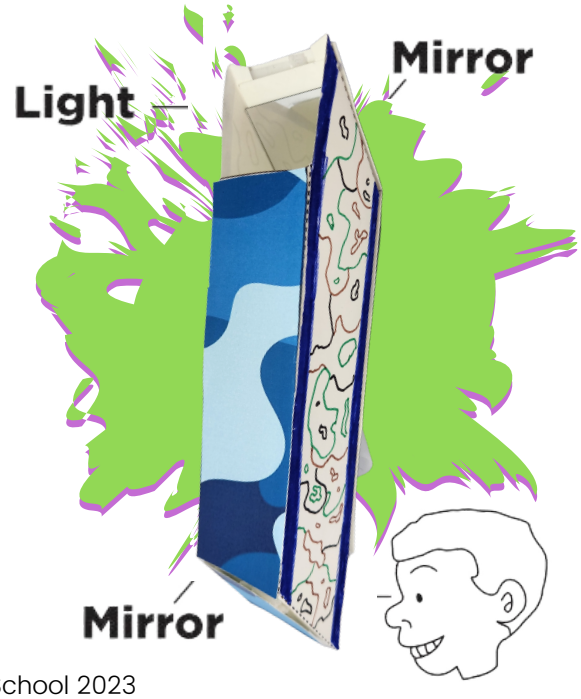
- The word periscope derives from two Greek words. “Peri” means “around,” and “scopus” means "to look.”

HYPOTHESIS

3-5 min

Show students the spy scope template. Ask students:

- Where do you think the mirrors will go?
- How do you think the mirrors will let you see something around a corner?
- You can use Dry Eraser Board to draw a prototype.



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ACTIVITY PART 1

15-20 min

1. Hand out Periscope template to students and be sure not give out scissors yet
2. Read through instructions with the students (Located on the Spy Scope Print Template Print out)
3. Have students cut out the template on card.
4. Next, instruct students to fold the paper on the dotted lines. Put glue or tape on the tabs to glue/tape the periscope together
5. Now, attach a mirror to the squares at each end.
    - **Make sure the mirrors are facing in towards each other.**

Once students have built their spy scope, encourage them to use it in the classroom. Ask them to observe:

- What can they see in front of them without the periscope?
- What can they see when looking ahead with the periscope?
- How do they think the view changes?
- What is the role of the mirrors?

Decorate it with markers and pencils! Who has the best design?

ACTIVITY PART 2

10-15 min

Now that your Spy scope are made encourage students to decorate them however they will like.

Make printer paper, markers, glue sticks, scissors, available for students to choose from.

Tips: be careful not to break your spy scope. It is easier to cut out and decorate blank printer paper and than glue it to the spy scope than trying to paint directly on the spy scope.

Have fun with it and share your creations with the class!

OBSERVATION & EXPLANATION

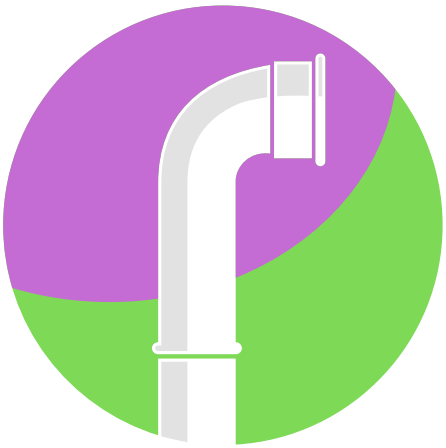
5-7 min

Ask students to discuss:

- How did your view change when you looked through the periscope?
- How do you think the periscope works?

Review with students that they should have been able to see things that were out of view. This worked because in the periscope, the mirrors were placed at 45-degree angles, facing each other. Light hits the top mirror at a 45-degree angle and reflects the image at a 45-degree angle, bouncing onto the second mirror. The image hits the second mirror at a 45-degree angle, which then reflects the image into your eye.

In the extension activity, the marble changes the light coming towards you, so the image might look slightly stretched. Sometimes, the image may even look upside down because the marble is curved. Therefore, the light has to travel through two convex lenses. This causes the light to be flipped upside down, showing you an upside down image.



Exit Ticket

Ask each student one of the following questions as they walk out the door.

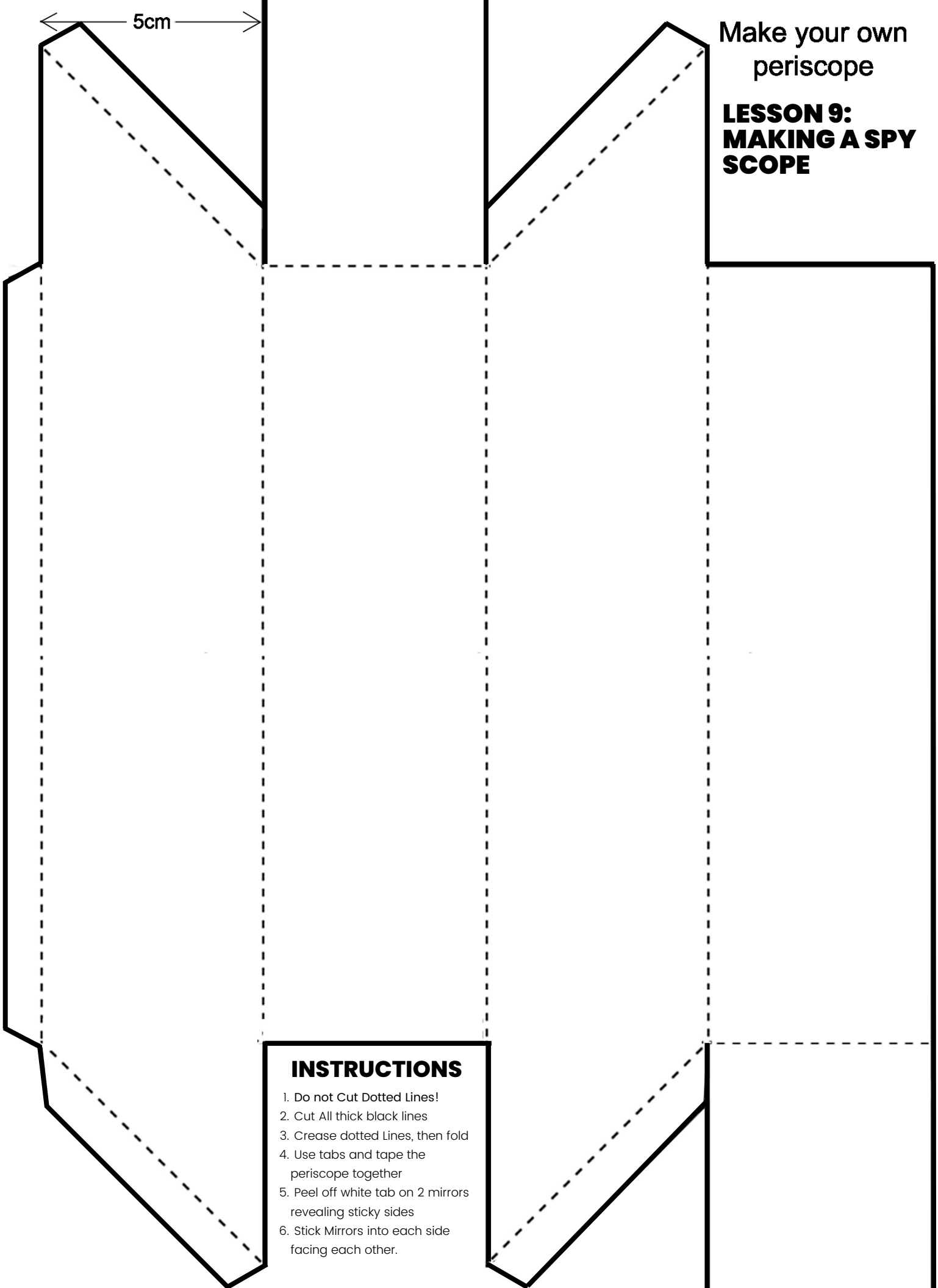
- Why do spies use periscopes? (To see things that are out of view, without being seen themselves).
- How do the mirrors work in a periscope? (They are at 45-degree angles. The top mirror reflects an image to the bottom mirror, which then reflects it to your eye.)
- How does the marble keyhole telescope work? (The lenses reflect the light, stretching the image. The marble has curved lenses which can make the image appear upside down.)

CONCLUSION

3 min

Complete Exit Ticket Activity

Instruct students to clean their stations. Make sure to leave the classroom the way you found it.



Make your own periscope

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INSTRUCTIONS

1. Do not Cut Dotted Lines!
2. Cut All thick black lines
3. Crease dotted Lines, then fold
4. Use tabs and tape the periscope together
5. Peel off white tab on 2 mirrors revealing sticky sides
6. Stick Mirrors into each side facing each other.