

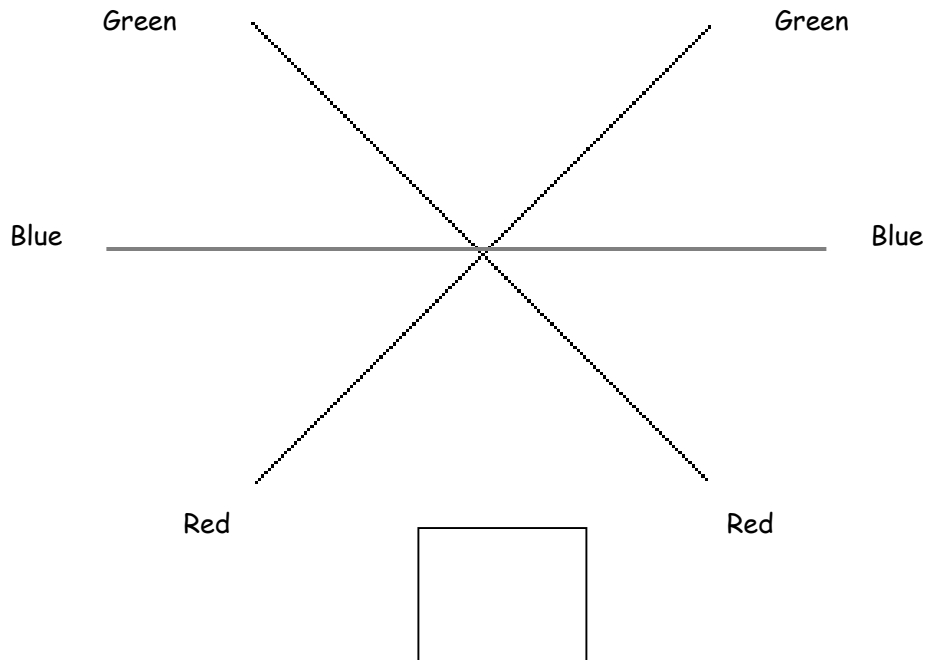
Name: _____

Date: _____

Zigzag Rays

Student Data Sheet

Color the lines as marked. Place a bear in the box with its feet facing you.



1. Stand a mirror up on the blue line. What part of the bear do you see in the mirror? _____

2. Working with a partner, place two mirrors on the red lines making them touch where the two red lines intersect. How many bears do you see? Why?

3. Place two mirrors on the green lines, making them touch where the two green lines intersect. How many bears do you see? Why?

Working with a partner, construct a system that allows you to see around corners!

Instructions:

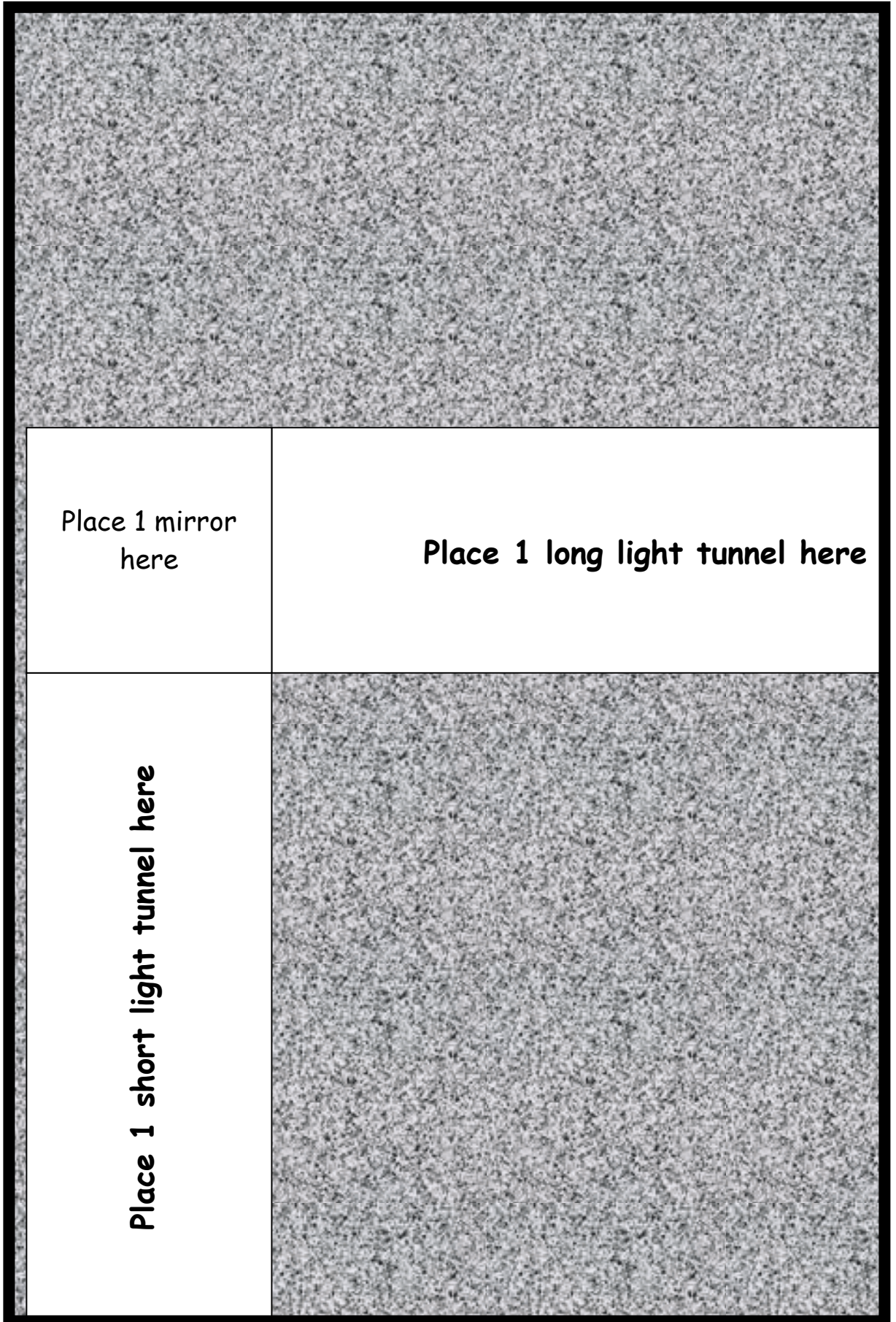
1. To make mat: Find the page marked "left side" and fold under its right margin on the dark line. Lap the "left side" on top of the "right side" so that the white tunnel spaces matches up on both sheets.
2. Tape or glue the "left side" onto the "right side" of the mat.
3. Trim around the two short tunnel patterns, roll into the size of a toilet paper tube, and tape along the edges.
4. Trim around the long tube, roll into the size of a paper towel tube, and tape on the edge.
5. Place the tubes in the labeled areas on the mat.
6. Place a counting bear in front of one of the short tunnel tubes just off the mat. Have one partner place his/her eye at the end of the other short tunnel.
7. Can you see the bear? Why or why not? _____

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8. Place a mirror in each marked area moving them until you can see the bear through the tubes.
 9. Draw the position where the mirrors were placed in the corners of the diagram.

Draw the system you have created in the box below. **Label** all parts including the position of the **mirrors**.



Left Side

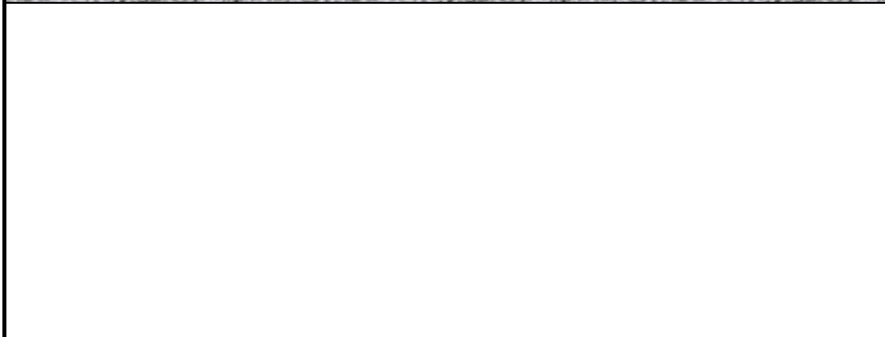


Right Side

Lap left side on top of this one before taping or gluing.



Place 1 short light tunnel here



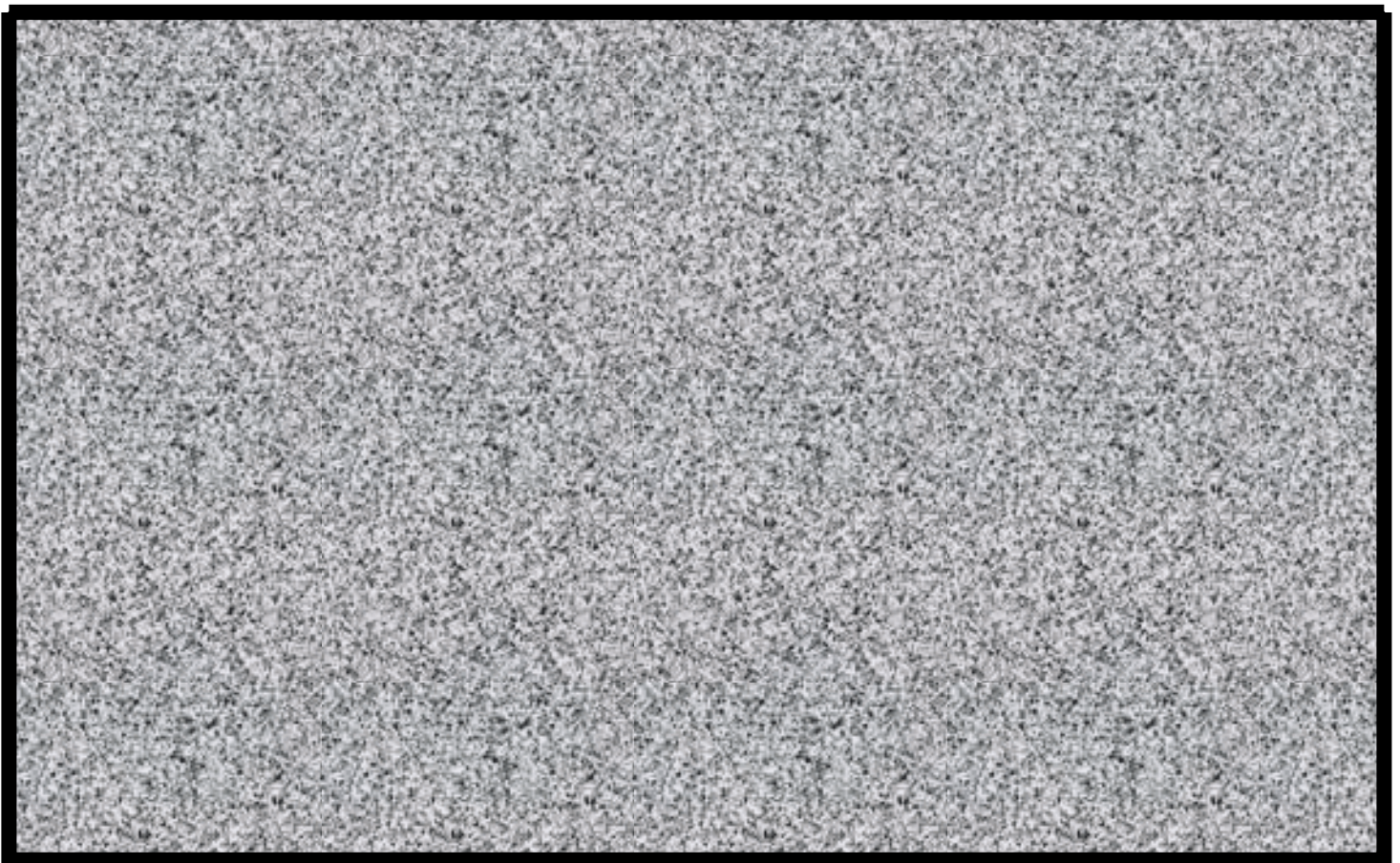
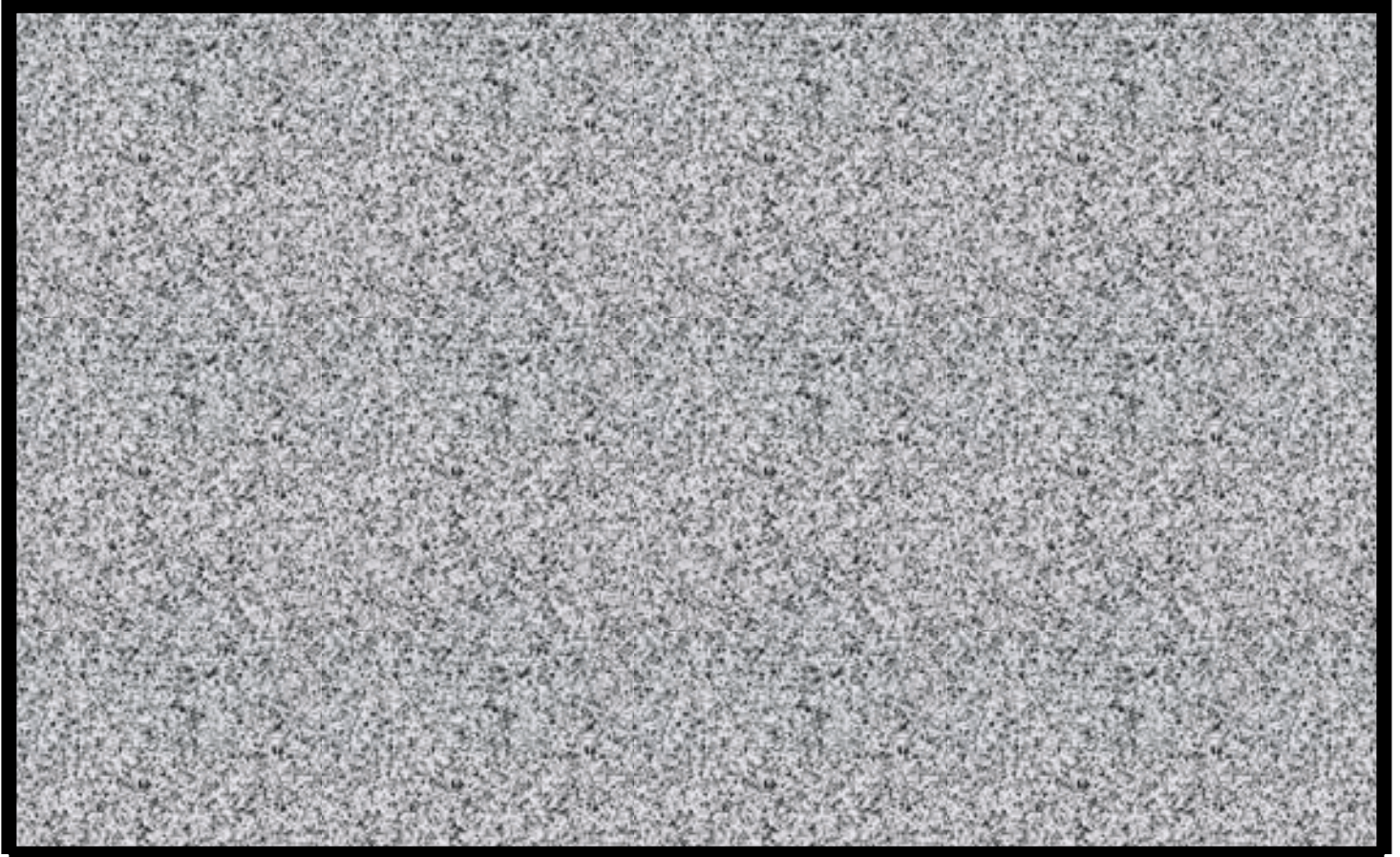
Place 1 mirror here



1 Long Light Tunnel



2 Short Light Tunnels



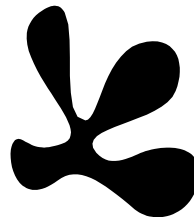
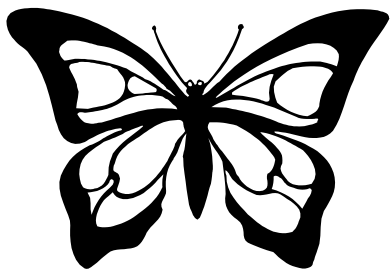
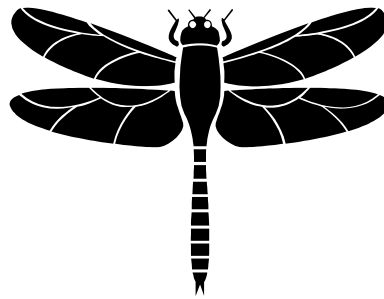
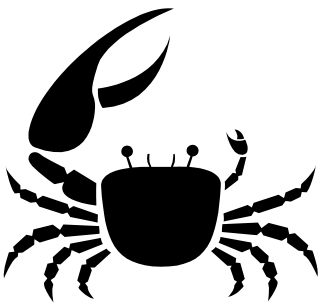
Symmetry

Student Data Sheet

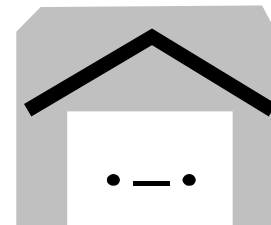
1. Draw a dotted line showing the area where the picture was cut into two parts. This is the line of reflection or symmetry. Test the pictures below for symmetry by placing the Mira on the line of reflection and drawing the missing part of the picture. The object is symmetrical if the drawn part "mirrors" the first half and completes the picture. Trace each completed picture with patty paper and use it to discover another test for symmetry.



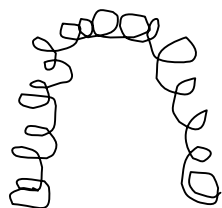
2. Use the Mira or your patty paper test to determine if each of the objects below is symmetrical. Draw a dotted line to show the line of symmetry.



3. Move the Mira in a straight line to park the car in the garage. Show the direction you had to glide the reflected image of the car with a line and an arrow.



4. Move the Mira in a straight line to place hair on the person's head. Show the direction you had to glide the reflected image of the face with a line and an arrow.



5. Create your own drawings to use with a Mira in the space below. Show the direction to slide the Mira with a line and an arrow.

Name: _____

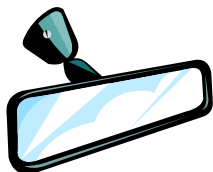
Date: _____

Reflection and Symmetry Assessment

1. Rank the objects below according to how much light they will reflect. A rank of 1 is most reflective, and a 3 is least reflective. List two **reflective** properties of each object that helped you to rank them.

Rank

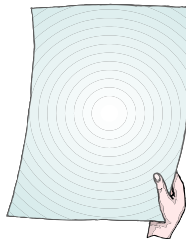
List Two Properties of Object



mirror

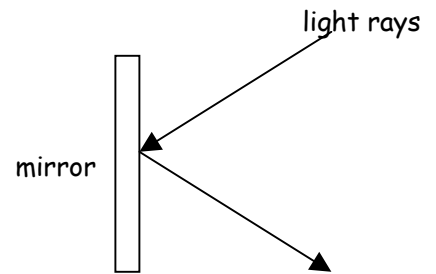
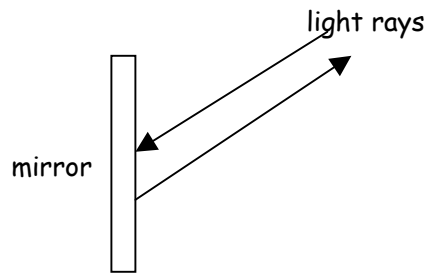
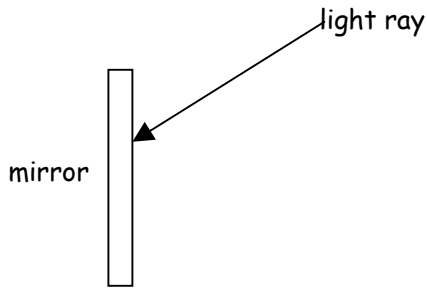


black cloth



white paper

2. Which diagram below shows how light is reflected off a mirror? Bubble the letter of the correct choice.



3. Draw a picture of a symmetrical object in the box. Show the line of symmetry with a dotted line.



4. Use two mirrors and any of the materials provided to make a sturdy model of a periscope that can be used to see around corners. The periscope must be portable, and will be tested to see around a corner. Use the white space below to plan your periscope. For safety, please ask for help when you are ready to cut holes in the container.

Reflection and Symmetry Assessment

Scoring Rubric

TASK	CRITERIA	1	2	3	4
Identify Properties & Patterns	1. Ranks and lists light reflective properties of surfaces	Ranks two surfaces out of order, lists no properties	Ranks one surface out of order, lists properties	Ranks surfaces 1, 3, 2 and lists most properties	Ranks surfaces 1, 3, 2 and lists all properties
	2. Identifies patterns of mirror/light reflection	Identifies light ray absorbed by mirror	Identifies light ray reflecting back to light	Identifies light ray reflecting straight off mirror	Identifies correct direction of light ray reflecting off mirror
Communicate understanding through drawing	3. Draws symmetrical object, with line of symmetry & congruent sides	Attempts to draw symmetrical object, no line of symmetry	Draws fairly symmetrical object with nearly congruent sides, no line of symmetry	Draws fairly symmetrical object with congruent sides, shows line of symmetry	Clearly draws symmetrical object, showing line of symmetry and congruent sides
Analyze parts of a system	4. Constructs and presents a portable, durable, operating periscope that can be used to see around a corner. Chooses materials suited for the task.	Attempts to construct an operating periscope that can be used to see around a corner. Poor choice of materials and improper placement of mirrors are design flaws.	Constructs and presents a somewhat portable, operating periscope that can be used to see around a corner. Acceptable choice of materials.	Constructs and presents a portable, somewhat durable, operating periscope that can be used to see around a corner. Good choice of materials.	Constructs and clearly presents a portable, durable, operating periscope that can be used to see around a corner. Excellent choice of materials.