

Lab KHM 1.1A

Using the MIRA Reflecting Tool

Name _____

Date _____ Period _____

Kaleidoscopes, Hubcaps, and Mirrors Unit



Materials: MIRA reflecting tool, sharp pencil, ruler, colored pencils or markers (optional), two (2) paper clips



Key Learning: Develop concepts of congruence, parallelism, correspondence and symmetry. Learn to use the MIRA reflective tool.



Background



this is a
GROUP
ACTIVITY

The MIRA is a “hands-on” approach for learning about symmetry and geometry.

the lab develops the key concepts on its or per own desk. Under these conditions the student can work successfully through results. It is important to work on one sheet of paper plus that on the on a flat (uncluttered) desk in a well-lit room it will produce excellent. The MIRA is a very accurate geometric construction device, and it used

Activities 1 thru 8 are provided on separate sheets of paper (not stapled as a packet) so as to make it easier to manipulate the MIRA. Each student is responsible for each page of the lab. If you do not have all eight of the activity sheets, it is your responsibility to obtain them.

For this lab, it is **VERY IMPORANT** that you **follow the directions** on each page. You should **work individually** on each exercise, conferring with your lab partners only after you have made several attempts to get something to work on your own.

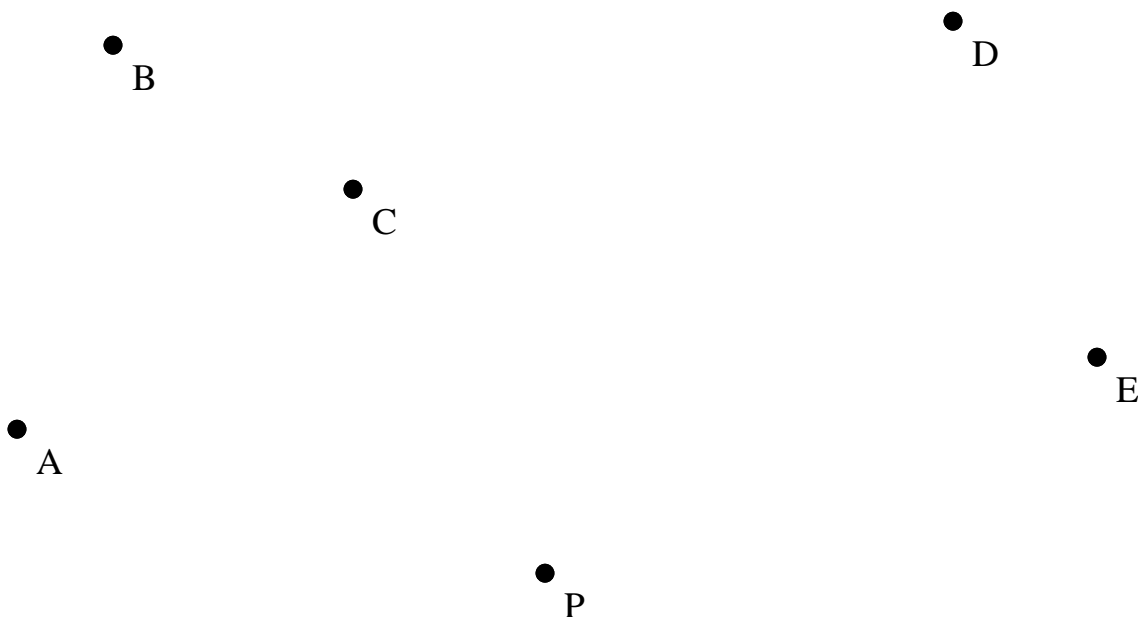
Reflected text from page 1 😊

The MIRA is a very accurate geometric construction device, and if used on a flat (uncluttered) desk in a well-lit room it will produce excellent results. It is important to work on one sheet of paper lying flat on the desk. Under these conditions the student can work successfully through this lab developing the key concepts on his or her own.

Lab KHM 1.1A – Using the MIRA
Activity 1

Name _____

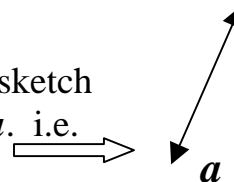
1



(see *TIPS* for using the *MIRA* below)

Place your MIRA between the point P and the point A. Move the MIRA about until the image of point P maps onto point A.

While point P is mapped onto point A, use the “MIRA line” to sketch a short reflection line between the two points. Label this line, *a*. i.e.



Try to map the image of point P onto each of the other points (B, C, D, and E), one point at a time. Use the MIRA to draw a line of reflection (with P) for each point. Label the lines **b**, **c**, **d**, and **e** respectively.

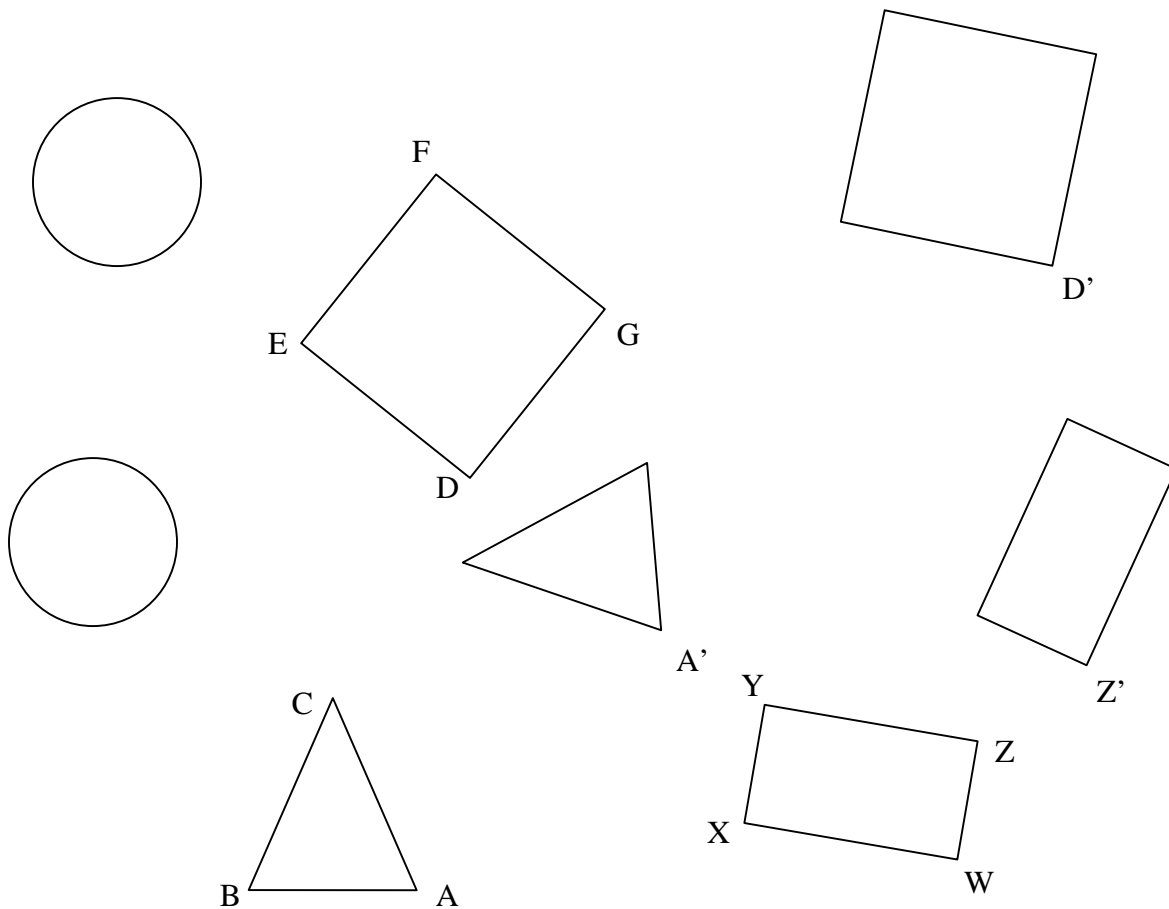
Were you able to map each point and draw a line of reflection?

Tips for using the MIRA reflecting tool: The **drawing edge** of a MIRA is the edge with a slight slant. Always place your MIRA on the paper with the drawing edge down. Sometimes you will find it easier to sketch a line with the drawing edge facing you, or sometimes facing away (then you must reach around the MIRA to sketch the line). This is *your* choice.

Lab KHM 1.1A – Using the MIRA

Activity 2

Name _____



Place your MIRA between the two circles above and move it until the image of one circle maps onto the other circle.

Use the pencil against the drawing edge of your MIRA to sketch the line of reflection between the two circles.

Label the line c .

Find the line of reflection for each pair of congruent shapes. Label the lines as line s for the squares, line r for the rectangles, and line t for the triangles.

For the triangle, square and rectangle, label the corresponding vertices on the images as follows: Triangle: A' , B' and C' ("A-prime", "B-prime", etc.)

Square: D' , E' , F' , G'

Rectangle: W' , X' , Y' , Z'

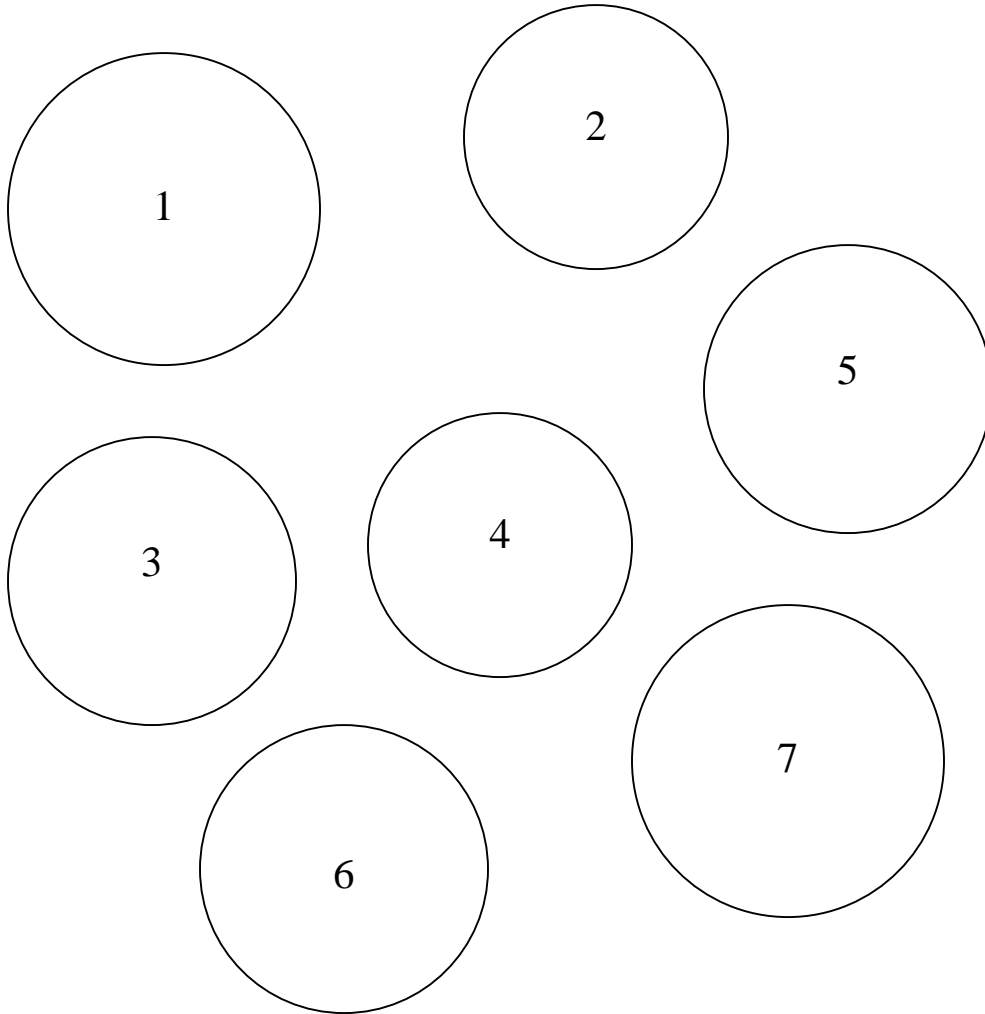
USING A RULER, connect **each pair of corresponding vertices** with a line segment. *What do you notice about the family of line segments for each shape?*

Which pair of shapes could not be mapped? Why do you think this is so?

Lab KHM 1.1A – Using the MIRA
Activity 3

Name _____

3



Place your MIRA between any two circles and try to map the image of one circle onto another.

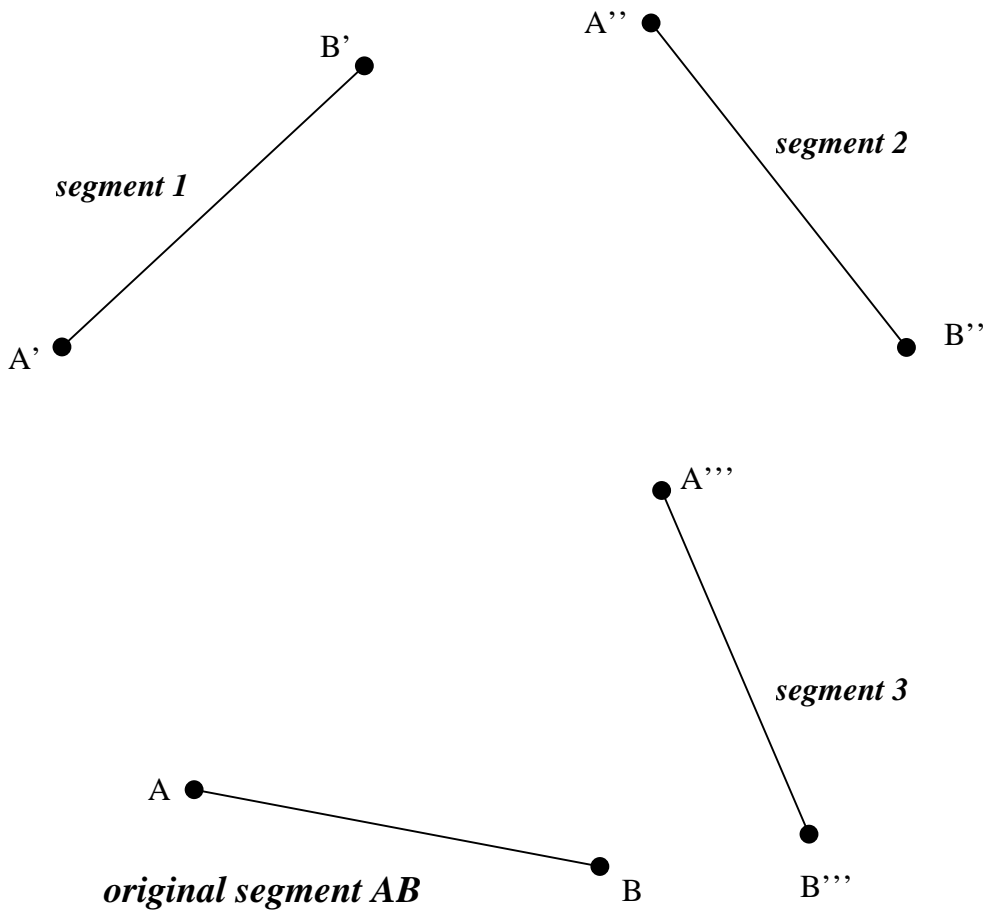
Do this for various pairs of circles until you find all of the pairs that match.

How many such pairs can you find? Which ones are they?

What do you think is true about the sizes of circles that match up in this way?

Lab KHM 1.1A – Using the MIRA
Activity 4

Name _____



There are four line segments drawn above. They are all the same length.

Try to map segment AB onto each of the other *image* segments. Draw the lines of reflection (i.e. mirror lines) and label them r1, r2, and r3 respectively.

Can you find a line that cannot be reflected from the original segment AB?

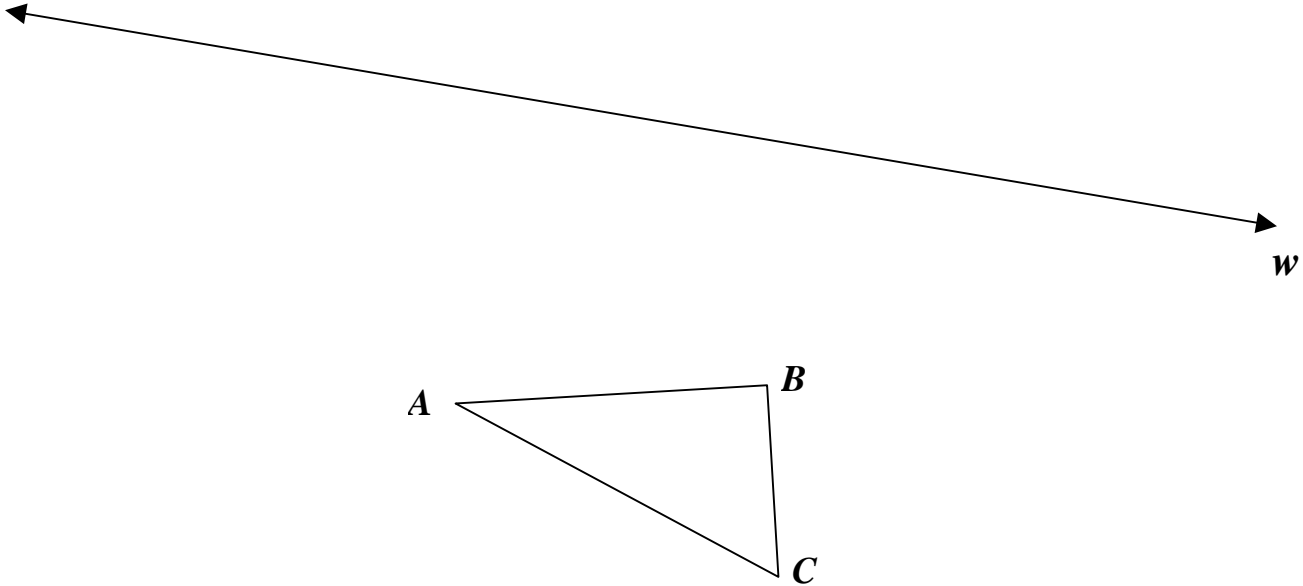
NEXT, use a **RULER** to connect points A and B to the **corresponding endpoints** of each of the other line segments (i.e. A' and B'). If available, *use different color pencils/markers* for each pair of lines.

What difference do you see between the lines that work and the one that does not?

Lab KHM 1.1A – Using the MIRA
Activity 5

Name _____

5



Place your MIRA between the triangle ABC and the line w .

Move the MIRA about until you have mapped the image of **side AB** onto line w . With side AC on line w , and holding the MIRA steady, mark the vertices of the image triangle. Then remove the MIRA and use a ruler to connect the image vertices. Label it **A' B' C'**.

Be careful to mark the corresponding vertices: A to A', B to B', and C to C'.

Next, move the MIRA until you have mapped the image of **side BC** onto line w . With side BC on line w , sketch the image triangle. Label it **A'' B'' C''**.

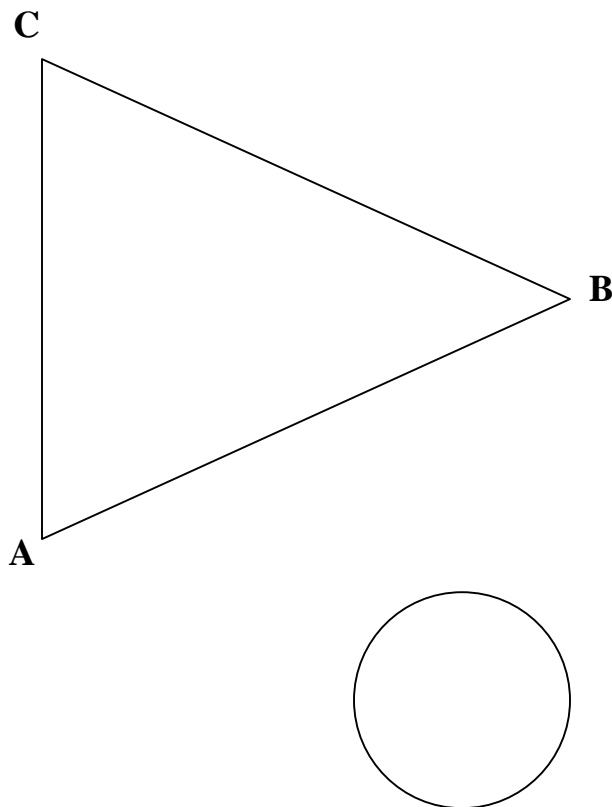
Finally, move the MIRA until you have mapped the image of **side AC** onto line w . With side AB on line w , sketch the image triangle. Label it **A''' B''' C'''**.

That was FUN, wasn't it?!

Lab KHM 1.1A – Using the MIRA
Activity 6

Name _____

6



Place your MIRA between the circle and the triangle ABC.

Adjust the position of your MIRA until the image circle just touches sides AB and AC at the same time. Hold the MIRA steady and **MARK THE LINE OF REFLECTION** for the image circle and label it *line a*. Then sketch the image circle. You might find it easier to “dash” a few points on the image circle and sketch the circle freehand. ***BE as neat as you can – don’t worry about perfection!***

Repeat this exercise, adjusting your MIRA so that the image of the circle touches sides AB and BC. Hold the MIRA steady and **MARK THE LINE OF REFLECTION** for the image circle and label it *line b*. Then sketch the image circle.

Next:

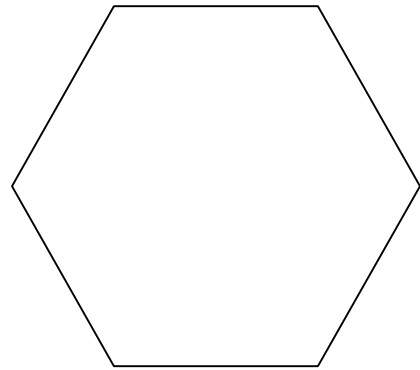
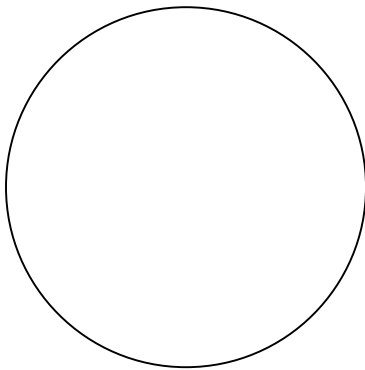
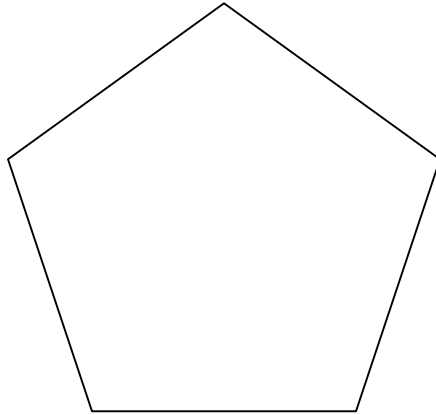
- 1) Mark the center of each circle with a dot
- 2) Draw two line segments connecting the centers of the image circles with the center of the original circle

Question: What do you notice about the line segments relative to the reflection lines?

Your answer:

Lab KHM 1.1A – Using the MIRA
Activity 7

Name _____



In how many positions may the MIRA be placed so that the image of one half of the circle maps onto the other half? Draw a few of the lines. Do these lines have a special name?

In how many positions may this be done for the PENTAGON? _____
Draw each line of reflection for the pentagon.

In how many positions may this be done for the HEXAGON? _____
Draw each line of reflection for the hexagon.

Where do your lines intersect for each figure?

Lab KHM 1.1A – Using the MIRA
Activity 8

Name _____

8

Place two identical paper clips on this page, separated by at least an inch or two.
Position your MIRA between the two paper clips.

Try to adjust the MIRA so that the image of the clip on one side matches the image
on the other side.

Without touching the MIRA, move the clip on the far side of the MIRA so that it
coincides with the image of the clip in front.

Repeat the above with any pair of small identical objects.