Science 8

Optics 5

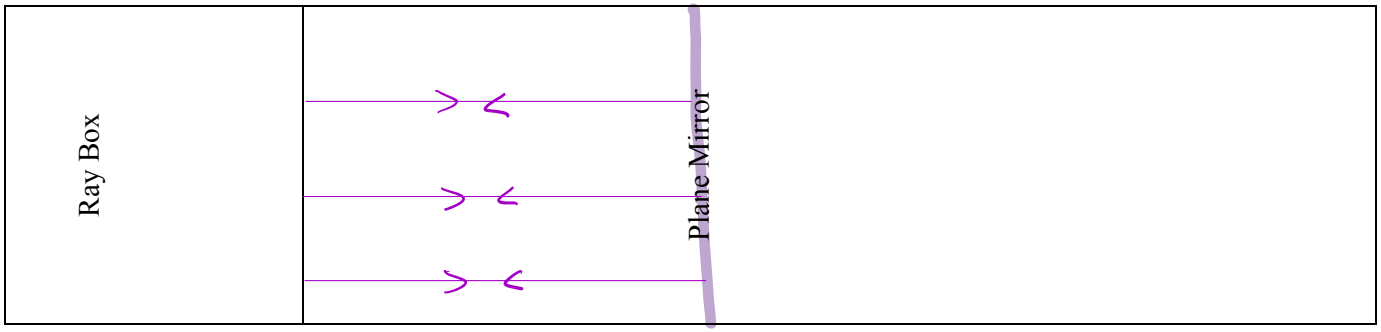
Name: Key
Date:
Block:

1. Plane Mirrors
2. Concave & Convex Mirrors

Lab Activity

For the following, draw the rays that emerge from the ray box as they hit a plane, convex and concave mirror. Make sure to use a ruler for all straight lines.

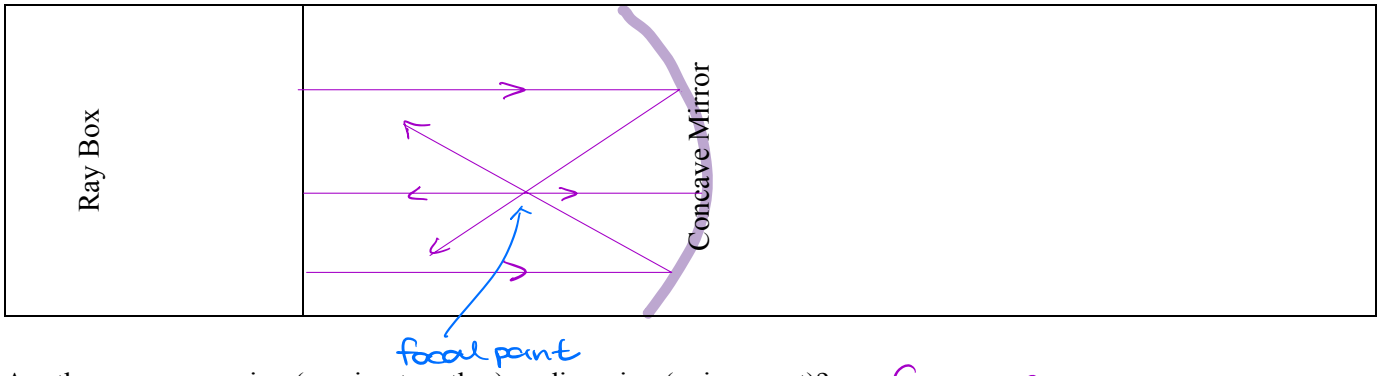
Plane Mirror



Are the rays converging (coming together) or diverging (going apart)? Neither (Reflect back)

Where is the focal point? None

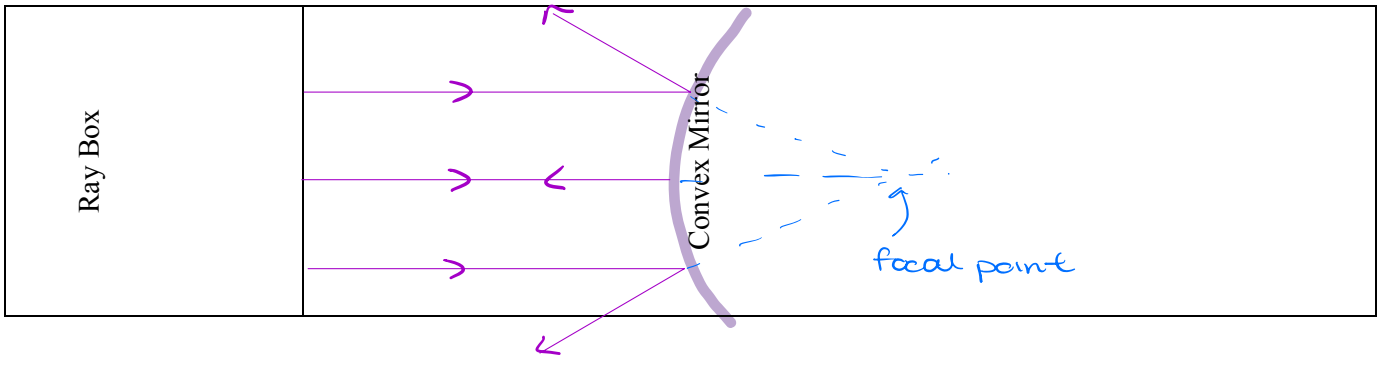
Concave Mirror



Are the rays converging (coming together) or diverging (going apart)? Converge

Where is the focal point? _____

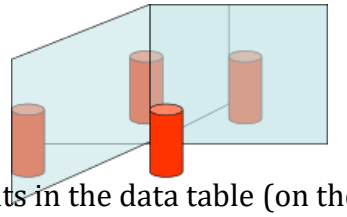
Convex Mirror



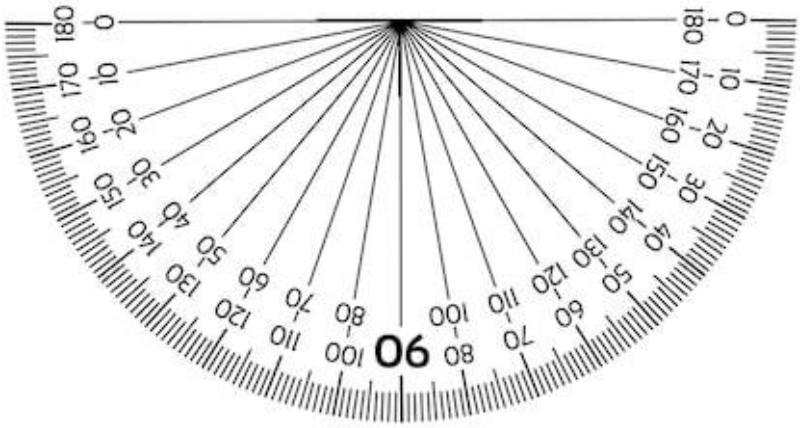
Are the rays converging (coming together) or diverging (going apart)? Diverge

Where is the focal point? _____

Activity:



1. Take two plane (flat) mirrors and a given object.
2. Line up the two mirrors so they make the angle measurements in the data table (on the next page).

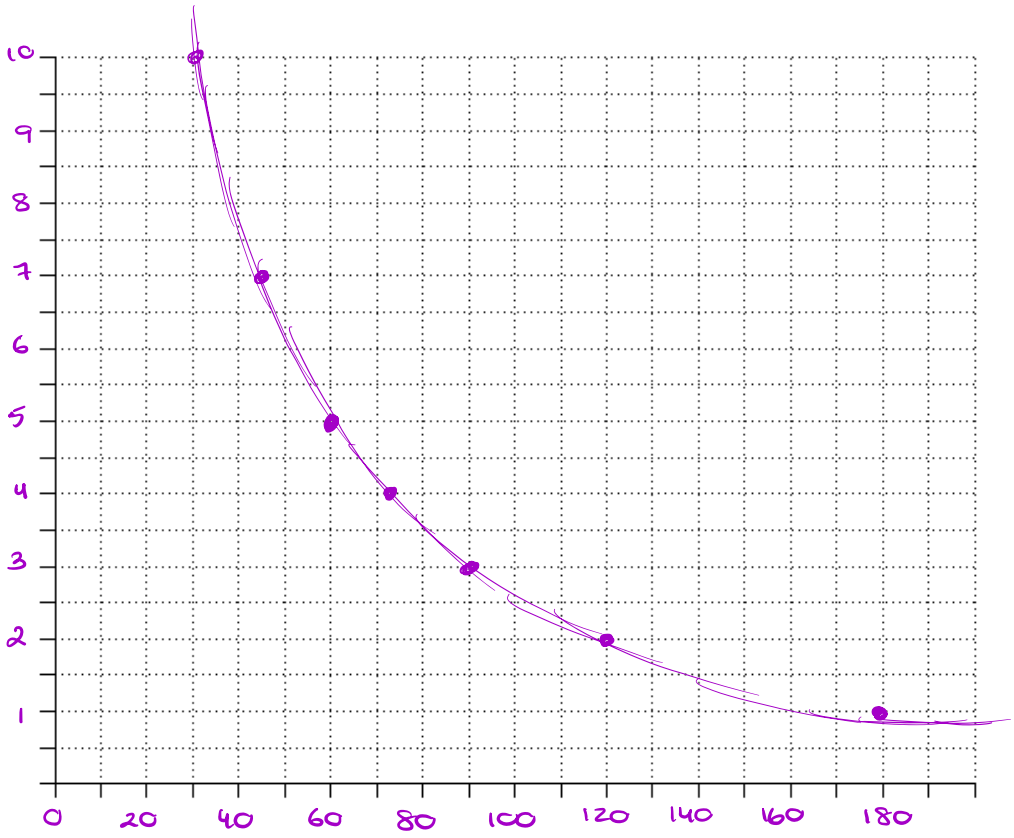


3. Ensure that the object is in the middle of the two mirrors!
4. Fill out the data table below:

Data Table:

Angle Measurement	Number of Images (not including object)
180°	1
120°	2
90°	3
72°	4
60°	5
45°	7
30°	10

Graph:



Questions:

1. How could you place the two mirrors to create an infinite (endless) number of images?

   If the two mirrors are facing each other

2. Predict the angle between the mirrors if six images were visible.

   ~52°

3. Predict the number of images you would see if the angle between the mirrors was 20°.

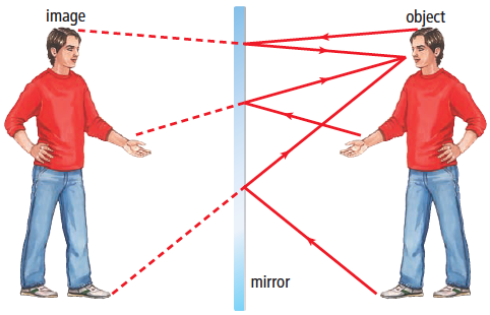
   More than 11 images

Plane Mirrors

A plane mirror is a ___flat___ mirror.

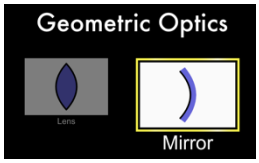
The distance from object to mirror ___equals___ the distance from image to mirror.

Left and right appear to be ___switched___.

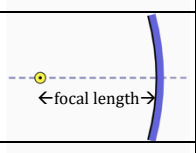


Concave & Convex Mirrors

Go to: https://phet.colorado.edu/en/simulations/geometric-optics

1. Hit the arrow to launch the simulation.
2. Select "Mirror" 

3. A curved-in mirror should appear. This is called a **concave** mirror. 
4. Move the object left and right and observe how the faded virtual image changes.

When the object moves…	Orientation (circle one)	Size (circle one)
Further away from the mirror	upright // inverted	smaller // larger //same
Closer to the mirror but still at least one focal length away 	upright // inverted	smaller // larger //same
Closer to the mirror and within one focal length (really close to the mirror)	upright // inverted	smaller // larger //same

5. Select the curved-out mirror. This is called a **convex** mirror. 
6. Move the object left and right and observe how the faded virtual image changes.

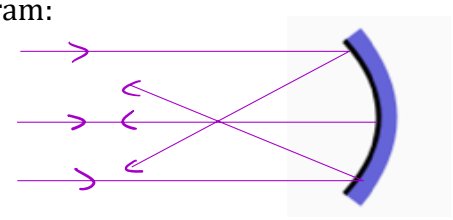
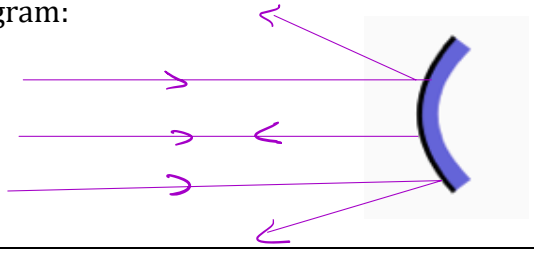
When the object moves…	Orientation (circle one)	Size (circle one)
Further away from the mirror	upright // inverted	smaller // larger // same
Closer to the mirror	upright // inverted	smaller // larger // same

7. Select the flat mirror. This is called a **plane** mirror.
8. Move the object left and right and observe how the faded virtual image changes.

When the object moves…	Orientation (circle one)	Size (circle one)
Further away from the mirror	upright // inverted	smaller // larger //same
Closer to the mirror	upright // inverted	smaller // larger //same

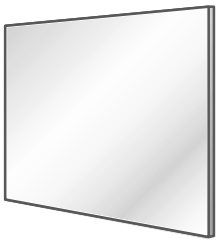
9. Determine whether the following is a characteristic of a concave, convex and/or plane mirror:
   a) Concave Rays converge (come together)
   b) Convex Rays diverge (go in different directions)
   c) Concave Image is larger when object is closer to mirror
   d) Concave Image is inverted when object is further from mirror
   e) Concave Image size changes depending on distance from mirror
   f) Plane Image size does not change depending on distance from mirror
   g) Convex Image is always smaller than object
   h) Plane Image is always upright

Summary:

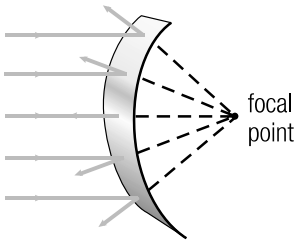
Concave Mirrors	**Convex Mirrors**
• Light rays converge	• Light rays diverge
Ray diagram: 	Ray diagram: 
When object is close, the image is: Upright + larger When object is far, the image is: Inverted + smaller	When object is close, the image is: Upright + smaller When object is far, the image is: Upright + smaller

Mirrors

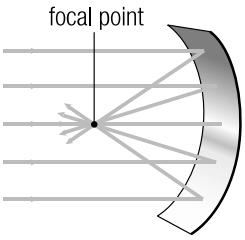
Examine these diagrams. Then fill in the chart.



plane mirror

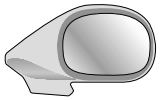
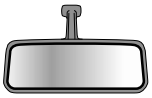
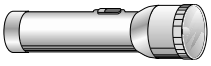
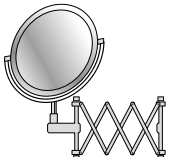
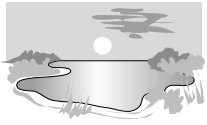


convex mirror



concave mirror

On the first line, identify whether the mirror is plane, convex, or concave.
On the second and third lines, briefly explain how the mirror is used to see images.

1. full-length bedroom mirror  Plane	**6.** jeweller's mirror  Concave
2. make-up mirror  Concave	**7.** car side-view mirror  Convex
3. car rear-view mirror  Convex	**8.** mirror in flashlight  Concave
4. dental mirror  Concave	**9.** shaving mirror  Concave
5. store security mirror  Convex	**10.** surface of a lake  Plane