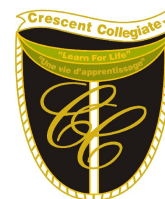
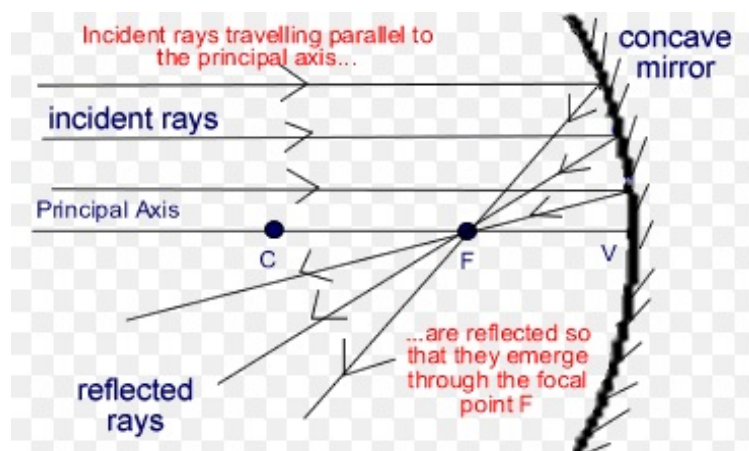


**Science 8**  
**Unit 3: OPTICS**  
**Topic 8: Reflection In A Concave Mirror**



Student Name: \_\_\_\_\_

**Concave Mirror** refers to a reflective surface that curves inwards, like the inside of a spoon. Also referred to as a converging mirror.



Examples of where concave mirrors are used:

Inside a metal spoon	Spotlights
Overhead projectors	Flashlights
Car headlights	Lighthouses
Satellite dishes	

Parts of a concave mirror:

**Centre of curvature (C):** is the imaginary center of the circle.

**Principal Axis :** line passing through the center of curvature and attaching to the mirror in the exact center of the mirror.

**Vertex:** where the principal axis meets the mirror

**Focal Point:** mid way between the mirror and the centre of curvature.

(  $f = \frac{1}{2} C$  ). When parallel light rays are shone along the principal axis, the reflected rays converge and cross at the focal point.

Find the focal length of the curved mirror.

1. Draw Principal axis on blank paper.
2. Set Ray box to three rays and obtain concave mirror.
3. Place mirror on Principal Axis and shine rays at mirror parallel to the principal axis.
4. Locate focal point along the principal axis and mark with dot on paper. Label this point F.
5. Measure the focal length of the mirror with the ruler and record in data table. Measure 2F and mark on the principal axis.

Find the image produced in curved mirrors.

1. Draw Principal axis on blank paper.
2. Set Ray box to one ray and obtain concave mirror.
3. Draw an arrow 1 cm high on the Principal Axis beyond 2F.
4. Place mirror on Principal Axis and shine ray at mirror parallel to the principal axis from the top of the arrow.
5. Mark the ray with dots showing the incident and reflected rays and draw the rays on the paper.
6. Shine the ray from the top of the arrow down through the focal point of the mirror.
7. Mark the ray with dots showing the incident and reflected rays and draw the rays on the paper.
8. Locate the image at the intersection of the two lines and record its properties (SPOT) in the data table.

Example 1: Properties of an object that is greater than the center of curvature

	Characteristics of Image
S (size)	
P (position)	
O (orientation)	
T (type)	

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Example 2: Properties of an object that is between the center of curvature and focal point 9.  
Repeat steps 1-8 and record in table.

	Characteristics of Image
S (size)	
P (position)	
O (orientation)	
T (type)	

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Example 3: Properties of an object that is between the center of curvature and focal point. Repeat steps 1-8 and record in table.

	Characteristics of Image
S (size)	
P (position)	
O (orientation)	
T (type)	

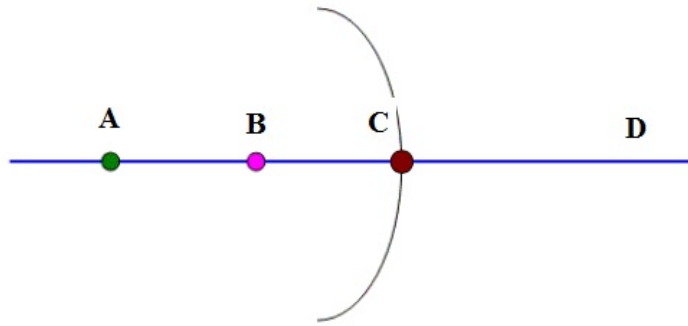
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**PART A: MULTIPLE CHOICE.**

Instruction: Circle the correct answer below each question. Also, transfer your answers to the bubble sheet provided.

1. What is another name for a concave mirror  
  - (A) Converging mirror
  - (B) Convex mirror
  - (C) Diverging mirror
  - (D) Plane mirror
  
2. Cosmetic mirrors, flashlights, reflecting telescopes, and the headlights in a car are all examples of practical applications for these type mirrors ...  
  - (A) Concave mirror
  - (B) Convex mirror
  - (C) Diverging mirror
  - (D) Plane mirror
  
3. Which of the following can be used to describe an image produced by a concave mirror?  
  - (A) Virtual
  - (B) Upright
  - (C) Magnified
  - (D) All of them
  
4. Which of the following refers to a line passing through the center of curvature and attaches to the mirror in the exact center of the mirror?  
  - (A) Center of curvature
  - (B) Focal point
  - (C) Principal axis
  - (D) Vertex

Use the diagram below to answer questions 5 to 8:



5. What is labelled A?
  - (A) Center of curvature
  - (B) Focal point
  - (C) Principal axis
  - (D) Vertex
6. What is labelled B?
  - (A) Center of curvature
  - (B) Focal point
  - (C) Principal axis
  - (D) Vertex
7. What is labelled C?
  - (A) Center of curvature
  - (B) Focal point
  - (C) Principal axis
  - (D) Vertex
8. What is labelled D?
  - (A) Center of curvature
  - (B) Focal point
  - (C) Principal axis
  - (D) Vertex
9. When parallel rays of light hit the surface of this type of mirror, they are reflected back to a focal point in front of the mirror. The type of mirror that does this is called a ...
  - (A) Bubble mirror
  - (B) Convex mirror
  - (C) Concave mirror
  - (D) Plane mirror
10. If an object is placed far away from the focal point in a concave mirror, it will appear ...
  - (A) Inverted and smaller
  - (B) Inverted and larger
  - (C) Upright and smaller
  - (D) Upright and larger
11. If an object is placed between the focal point in a concave mirror and the mirror itself, the image will appear ...
  - (A) Upright and smaller
  - (B) Upright and larger
  - (C) Inverted and smaller
  - (D) Inverted and large

**PART B: FILL IN THE BLANK**

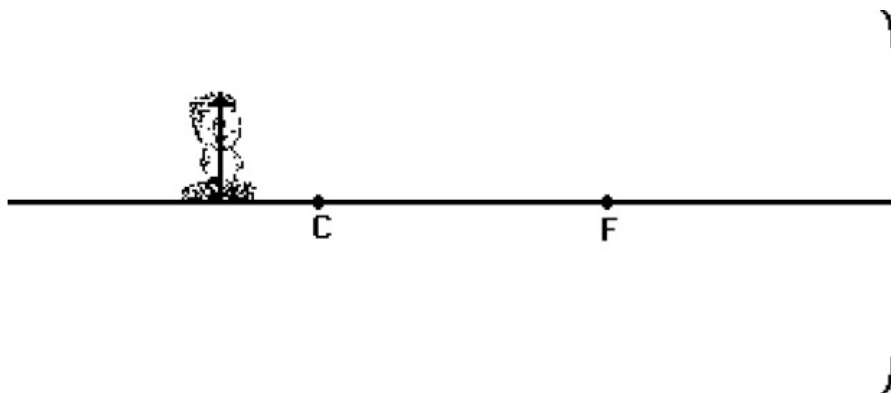
Use the terms below to fill in the blanks. Use each term only once.

- diverging
- plane mirror
- reflect
- concave mirror
- inverted
- converging
- focal point
- images
- virtual
- convex mirror

1. All mirrors \_\_\_\_\_ light.
2. There are three types of mirrors. All three types reflect light rays to form \_\_\_\_\_.
3. A \_\_\_\_\_ is a mirror that is flat and smooth. It produces an image that is the same as the object and appears to be the same distance from the mirror as the object.
4. A \_\_\_\_\_ is a mirror that curves inward. The image formed by this type of mirror depends on how far away the object is from the \_\_\_\_\_.
5. Light rays that come together at the focal point are described as \_\_\_\_\_.
6. If the object is far from a concave mirror, the image is small and \_\_\_\_\_.
7. If the object is close to a concave mirror, then the image appears to be larger than the object and is \_\_\_\_\_.
8. A \_\_\_\_\_ is a mirror that curves outwards.
9. Light rays that spread apart after reflecting are described as \_\_\_\_\_.

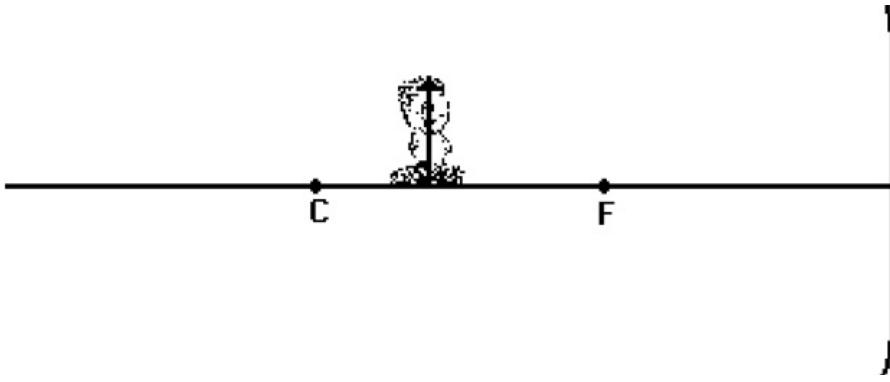
**PART C: WRITTEN RESPONSE**

1. For the following mirrors and corresponding object positions, construct ray diagrams. Then describe the Location of the image, Orientation (upright or inverted) of the image, the relative Size of the image (larger or smaller than object), and the Type of image (real or virtual).
  - A) the object is located "beyond" the center of curvature.



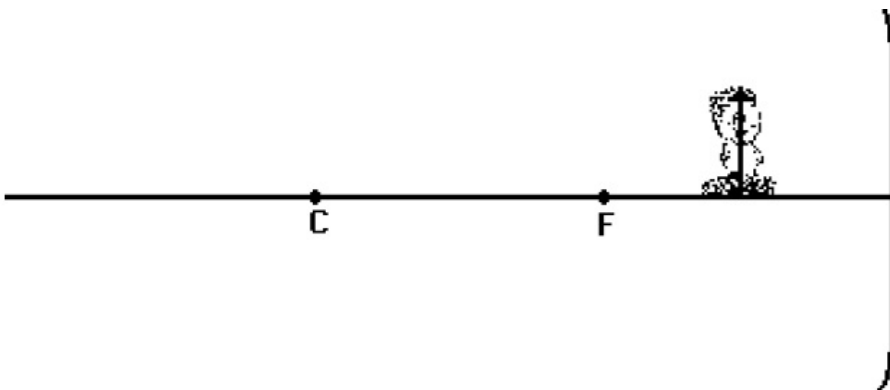
Property	Image

B) If the object is located between the center of curvature and the focal point.



Property	Image

C) the object is located between the focal point and the mirror.



Property	Image