

# SNC2D PHYSICS

LIGHT & GEOMETRIC OPTICS

☞ Diverging Mirrors  
(P.426-427)

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## Diverging Mirrors

As you recall, a **diverging** or **convex mirror** is created when you make the outer surface of a sphere reflective. The centre of a convex mirror bulges towards you and causes parallel light rays approaching it to diverge or spread out from a focal point.

convex mirror

centre of sphere

F

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## Diverging Mirrors

**DIVERGING (or CONVEX) MIRROR**

- ❖ centre bulges towards you
- ❖ causes light to diverge or spread out from a focal point (F)
- ❖ focus (F) is behind the mirror (virtual)

F

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### Diverging Mirrors

Diverging mirrors can be small, such as those used in rear-view mirrors. They can also be large, such as Chicago's bean statue.



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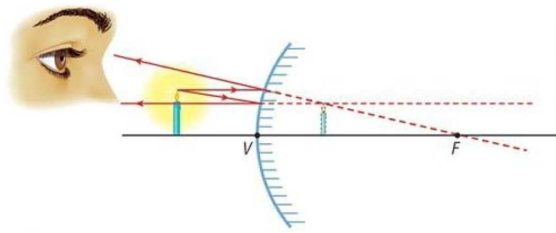
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### Locating Images in Diverging Mirrors

The parts of a diverging mirror and the imaging rules for a diverging mirror are similar to those for a converging mirror. The difference is that  $F$  and  $C$  are behind the mirror and light rays seem to come from an apparent light source behind the mirror.



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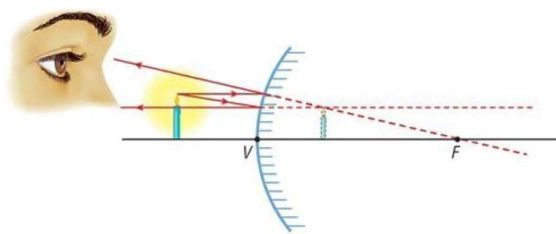
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### Activity: Curved Mirror Terminology for ...

**INSTRUCTIONS (2DPHYS - WS3)**  
A. Complete Part 1 (Diverging Mirror Terminology).



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### Drawing Ray Diagrams for Diverging Mirrors

1. A light ray parallel to the principal axis (PA) is reflected as if it had come through the focus (F).

The diagram shows a concave mirror with its principal axis (PA) as a horizontal line. The vertex (V) is on the left, the focus (F) is in the middle, and the center of curvature (C) is on the right. A red ray, labeled with a circled 1, is parallel to the PA and approaches the mirror from the left. Upon reflection, the ray diverges away from the mirror. A dashed line is drawn from the focus (F) through the point where the ray appears to originate, indicating that the reflected ray is as if it came from the focus.

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### Drawing Ray Diagrams for Diverging Mirrors

2. A light ray aimed at the centre of curvature (C) is reflected back upon itself.

The diagram shows a concave mirror with its principal axis (PA) as a horizontal line. The vertex (V) is on the left, the focus (F) is in the middle, and the center of curvature (C) is on the right. A blue ray, labeled with a circled 2, is directed towards the center of curvature (C) and strikes the mirror. The reflected ray is shown as a dashed line that retraces the path of the incident ray back towards the center of curvature.

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### Drawing Ray Diagrams for Diverging Mirrors

3. A light ray aimed at the focus (F) is reflected parallel to the principal axis (PA).

The diagram shows a concave mirror with its principal axis (PA) as a horizontal line. The vertex (V) is on the left, the focus (F) is in the middle, and the center of curvature (C) is on the right. A green ray, labeled with a circled 3, is directed towards the focus (F) and strikes the mirror. The reflected ray is shown as a dashed line that is parallel to the principal axis.

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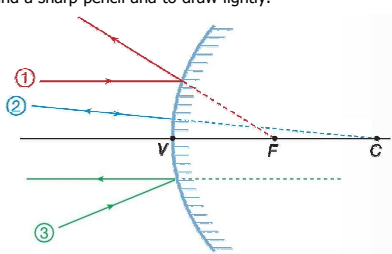
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**Activity: Drawing Ray Diagrams for ...**

**INSTRUCTIONS (2DPHYS - WS3)**

A. Complete Part 2 (Diverging Mirror Ray Diagram Rules). Be sure to use a ruler and a sharp pencil and to draw lightly.



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**Activity: Drawing Ray Diagrams for ...**

**INSTRUCTIONS (2PPHYS - WS3)**

B. Complete Part 4 (Ray Diagrams for Diverging Mirrors).

**NOTE!**

When drawing ray diagrams, remember the following:

- the object (real) is always shown as a solid erect arrow.
- a real image is always drawn as a solid arrow (because real rays were used to help locate it).
- a virtual image is always shown as a dotted arrow (because virtual rays were used to help locate it).

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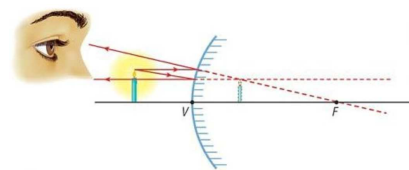
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**Activity: Drawing Ray Diagrams for ...**

**PART 4: DIAGRAM ①**

A diverging mirror, regardless of the object's position, always produces the same type of image:

- smaller
- upright
- behind the mirror between F and V
- virtual



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### Applications of ... – Security Mirror

Store owners often use diverging mirrors similar to the one shown below. These large security mirrors allow the store owner to watch for shoplifters in many parts of the store at once. Diverging mirrors are also used in some automatic teller machines so users can see what is happening behind them while they are facing the screen.



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### Applications of ... – Vehicle Side-View Mirror

Another example of a diverging mirror is the side-view mirror on a vehicle. This mirror lets a driver see an image of objects behind the car. A drawback of side-view mirrors is that the images of other vehicles are small. This sometimes makes drivers think that cars behind them are further away than the vehicles really are.



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### Applications of Diverging Mirrors

**NOTE!**  
Diverging mirrors can be used for a multitude of applications including:

- security mirrors
- side-view and rear-view mirrors



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 Applications of Diverging Mirrors

**DIVERGING MIRRORS**

- ✦ can be used for a multitude of applications including:
  - security mirrors
  - side-view and rear-view mirrors
  - ...

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 ✓ Check Your Learning

1. Describe the shape of a diverging mirror.

centre of mirror bulges toward you (i.e. like the bottom of a spoon)

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 ✓ Check Your Learning

2. You want to spread the light from a single light bulb across the backyard. What kind of mirror would be most effective? Explain.

diverging mirror – spreads light rays apart

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 **Check Your Learning**

3. (a) What would happen to the size of the image formed by a diverging mirror as the object moves away from the mirror?

(a) image would get smaller

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 **Check Your Learning**

3. (b) Does the image ever become larger than the actual object? Explain.

(b) no – the image will always be smaller

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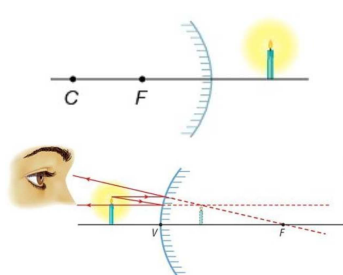
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 **Check Your Learning**

4. Look at the following diagrams and describe how the arrangements are different from each other?

while the orientation of the objects are reversed each diagram shows an object located in front of a diverging mirror



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 Check Your Learning

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**WIKI (PHYSICS)**  
..... 2DPHYS - QUIZ2 (Mirrors & Reflection)

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