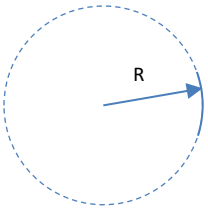
CONCEPT: MIRROR EQUATION



- All we are going to worry about are SPHERICAL MIRRORS – mirrors that are cut from a sphere
  - This means that the mirror has a RADIUS OF CURVATURE
  - The radius of curvature, R, of a mirror determines the focal length: $\boldsymbol{f = \frac{R}{2}}$

- For any spherical mirror, we have a MIRROR EQUATION to determine the image location:

$$\frac{1}{s_o} + \frac{1}{s_i} = \frac{1}{f}$$

s_o is the object distance and s_i is the image distance

- There are important sign conventions for the mirror equation:

TYPE OF MIRROR	FOCAL LENGTH	IMAGE
Concave mirror	$f > 0$	$s_i > 0$ or $s_i < 0$
Convex mirror	$f < 0$	$s_i < 0$
Plane mirror	$f = \infty$	$s_i < 0$

- There are important interpretations for the image distance:
  - If $s_i > 0$ → The image is [REAL / VIRTUAL] and [UPRIGHT / INVERTED]
  - If $s_i < 0$ → The image is [REAL / VIRTUAL] and [UPRIGHT / INVERTED]

- One can also easily find the magnification of the image formed by the mirror: $\boldsymbol{m = -\frac{s_i}{s_o}}$
  - The negative sign is to show whether an image is inverted or not

EXAMPLE: A 1.4 m tall person stands 1 m in front of a plane mirror. Where is the person's image located? How tall is it?

EXAMPLE: OBJECT IN FRONT OF CONVEX MIRROR

A 5 cm tall object is placed 10 cm in front of a convex mirror. If the radius of curvature of the mirror is 2 cm, where is the image located? Is the image real or virtual? Is the image upright or inverted? What is the height of the image?

PRACTICE: OBJECT IN FRONT OF A CONCAVE MIRROR

A 4 cm tall object is placed in 15 cm front of a concave mirror with a focal length of 5 cm. Where is the image produced? Is this image real or virtual? Is it upright or inverted? What is the height of the image?

PRACTICE: DESIGNING A MIRROR

You want to produce a mirror that can produce an upright image that would be twice as tall as the object when placed 5 cm in front of it. What shape should this mirror be? What radius of curvature should the mirror have?