Ch 32 Light: Reflect & Refraction

Objective:

- Familiarize ourselves with the **mirror equation** and **magnification equation**

  By identifying what each variable means and its sign convention ($\pm$)

- Create **ray diagrams** to illustrate how images are formed

  By drawing the 2 **principal rays** (technically there's 3)

Content Review: [5mins]

- The **mirror equation** is given by

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$

- The **magnification equation** is given by

$$m = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

Group Activity (student - student) [30mins]

Spherical Mirrors:

1. In your groups, create a copy of the Google Slides

2. Analyze the 3 special cases when working with spherical mirrors
   - By labeling the variables and drawing the principal rays

3. Fill in the contents of the table at the end of the Google Slides

   Tip: You may find this optics simulation to be helpful. Make sure to click the option to replace the lens with a mirror. Feel free to play around with the settings and observe how they draw the principal rays.

Things to Consider:

- What seems to be the **critical point** that distinguishes Case 1a from Case 1b?

- Try drawing **Principal Ray #3** and see if it converges to the same point as **Principal Rays #1 and #2**
  - ☐ My guess is that we have to draw it super on point in order for it to converge at the same point, but I'm not sure about this.

- What's the difference between **a real image** and **a virtual image**?

- Can a **convex mirror** ever create an inverted and real image?

Group Activity (leader - student) [10mins]

Application of Spherical Mirrors:

You look at yourself in a shiny $9.2\,\mathrm{cm}$ diameter Christmas-decoration ball. Your face is located $25.0\,\mathrm{cm}$ away from the ball's front surface. Make sure to draw a diagram!

a) Determine the location of your image i.e. solve for d_i

b) Is it real or virtual? Is it upright or inverted?

Solution

(a) $d_i = -2.1\,\mathrm{cm}$, we want this negative sign since the image appears "within" the Christmas ball

(b) The image is virtual and upright.