

PHYS 1150: Quiz #2

/10 **Problem 1:** A dentist uses a spherical mirror to examine a tooth. The tooth is 1.0 cm in front of the mirror, and the image is formed 4.0 cm *behind* the mirror.

(a) Determine the focal length of the mirror.

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$$p = 1.0 \text{ cm}$$

$$q = -4.0 \text{ cm (negative because behind mirror)}$$

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f} \Rightarrow \frac{1}{1} + \frac{1}{-4} = \frac{1}{f} \Rightarrow f = \left(1 - \frac{1}{4}\right)^{-1} = \frac{4}{3} \approx \boxed{1.3 \text{ cm}}$$

(b) Is the mirror concave or convex? Why?

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Concave, because $f > 0$.

(c) Determine the radius of curvature of the mirror.

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$$f = \frac{R}{2} \Rightarrow R = 2f = \frac{8}{3} \approx \boxed{2.7 \text{ cm}}$$

(d) Determine the magnification factor, M .

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$$M = -\frac{q}{p} = -\frac{(-4.0)}{1.0} = \boxed{4.0}$$

(e) Draw a principal ray diagram with enough rays to show why the image appears where it does.

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