Mirror Practice Problems

1. A small object is placed 50 cm from a concave mirror with a focal length of 20 cm.
   a) How far is the image from the mirror? **+33.33cm**
   b) Is the image on the same side of the mirror as the object? **YES BK d, is positive**
   c) Is the image upright or inverted? **Inverted bk it is a real image**
   d) Is the image real or virtual? **Real bk on some side of object (di =ve)**
   e) If the object is 8 mm tall, how tall is the image?

-0.53cm

$$\frac{1}{f} = \frac{1}{do} + \frac{1}{di}$$
$$\frac{1}{20cm} = \frac{1}{50cm} + \frac{1}{di}$$
$$\frac{5}{100cm} - \frac{2}{100cm} - \frac{1}{di}$$
$$\frac{3}{100cm} = \frac{1}{di}$$
$$di = \frac{100cm}{3}$$
$$di = 33.33cm$$

$$\frac{hi}{ho} = \frac{-di}{do}$$
$$\frac{hi}{0.8cm} = -\frac{33.33cm}{50cm}$$
$$hi = -0.53cm$$

2. A 6.0 cm pin is located 20 cm from a 25 cm focal length concave mirror. Determine the location, size, nature and orientation of the image of the pin. **S- larger (5x) A- upright (hi=ve) L- behind mirror T- virtual (di=ve)**

$$\frac{1}{f} = \frac{1}{do} + \frac{1}{di}$$
$$\frac{1}{25cm} = \frac{1}{20cm} + \frac{1}{di}$$
$$\frac{4}{100cm} - \frac{5}{100cm} = \frac{1}{di}$$
$$\frac{-1}{100cm} = \frac{1}{di}$$
$$di = -100cm$$
$$m = \frac{-di}{do}$$
$$= \frac{-(-100cm)}{20cm}$$
$$=5$$

3. A concave mirror produces a real, inverted image of an object. The image is half the size of the object. If the object is 40 cm from the mirror, what is its focal length? **13.33cm**

$$\frac{1}{f} = \frac{1}{40cm} + \frac{1}{20cm}$$
$$\frac{1}{f} = \frac{3}{40cm}$$
$$f = 13.33cm$$

4. A dentist uses a small mirror of radius 40mm to locate a cavity in a patient's tooth. The mirror is concave and held 16mm from the tooth.
   a) What is the magnification of the image? **5 x**
   b) What is the mirror's focal length? **20 min**
   c) What is the distance of the image from the mirror? **-80mm**
   d) Is the image real or virtual? **virtual**
   e) Is the image upright or inverted? **Upright**

$$\frac{1}{20mm} = \frac{1}{16mm} + \frac{1}{di}$$
$$\frac{1}{20mm} = \frac{1}{16mm} = \frac{1}{di}$$
$$\frac{4}{80mm} - \frac{5}{80mm} = \frac{1}{di}$$
$$\frac{-1}{80mm} = \frac{1}{di}$$
$$di = -80mm$$

$$radius = C = 2f$$
$$40mm = 2f$$
$$f = 20m$$

M = 5
NOT .5

$$m = \frac{-di}{do} = \frac{-(-80mm)}{16mm}$$
$$.5$$

5. A production line inspector wants a mirror that produces an upright image with a magnification of 7.5 when it is located 14.0 mm from a machine part.
   a) What kind of mirror would do this job? **Concave since M is +ve**
   b) What is the radius of curvature? **C=2f= 32.4 mm**

+m so must be concanve

$$\frac{1}{f} = \frac{1}{do} + \frac{1}{di}$$
$$= \frac{1}{14mm} + \frac{1}{-105mm}$$
$$\frac{1}{f} = \frac{13}{20} \quad f = 16.2mm$$

$$m = \frac{-di}{do}$$
$$7.5 = \frac{-di}{14mm} \quad -di = 105mm$$