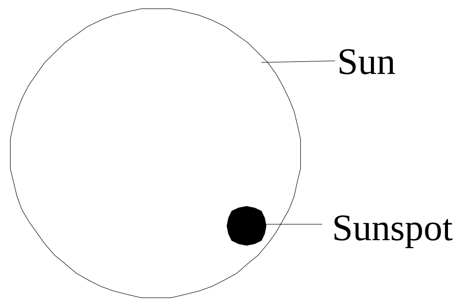
Name: ______________________

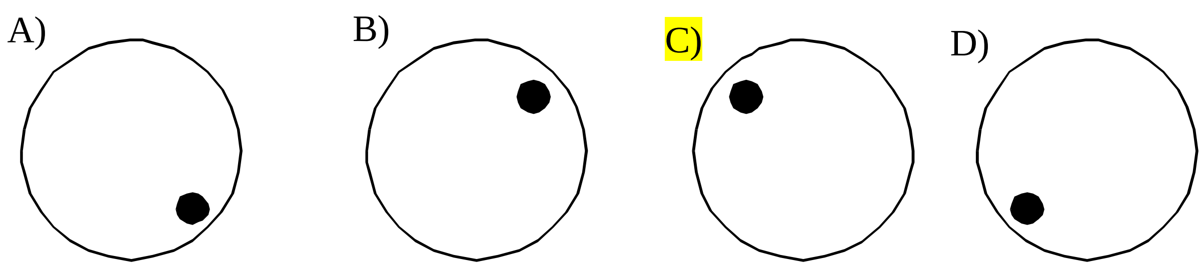
Magnification, Pinhole Camera and Review Worksheet

1 To avoid causing damage to her eyes, Virginia observed a sunspot by having the sun's light pass through a pinhole and observing it on a screen as shown here:

If the sunspot is observed directly (not through a pinhole) it appears as shown below:



In which position will the sunspot appear on the screen?



2 A pencil is held 30 cm from the front of a pinhole camera. The length of the camera is 20 cm.

Which of the following describes the image of the pencil seen inside the pinhole camera?

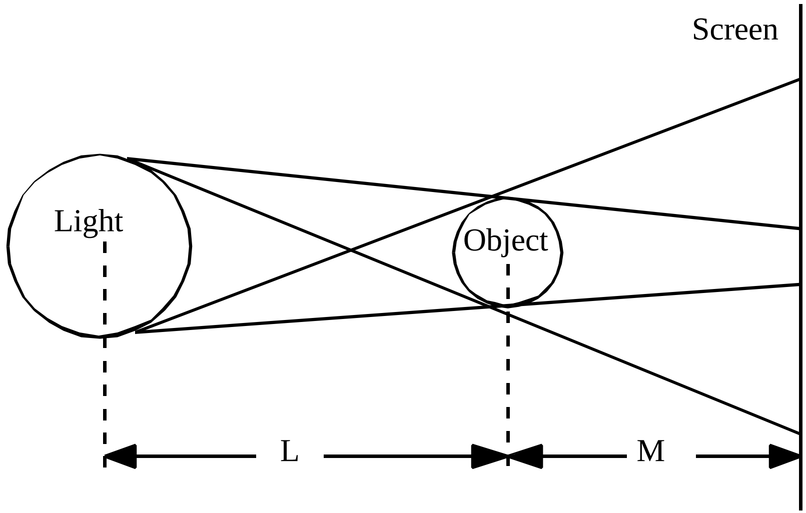
A) Inverted and larger than the pencil

B) Inverted and smaller than the pencil

C) Upright and larger than the pencil

D) Upright and smaller than the pencil

3 Look at the diagram below.



Which of the following statements is FALSE? Should Say TRUE

A) When «M» is constant and «L» increases, the area of total shadow increases.

B) When «L» is constant and «M» increases, the area of total shadow increases.

C) When «L» is constant and «M» decreases, the area of total shadow increases.

D) When «M» is constant and «L» decreases, the area of total shadow decreases.

4 Mar is 206 620 000 km from the sun, how long does the light from the Sun take to reach Mars?

t=c/d where c = $3x10^8$ m/s

206 620 000 km = 206 620 000 000 m

t= $3x10^8$ m/s ÷ 206 620 000 000 m

t= 0.0015 s

5 When light travels through a diamond, it travels much slower than in air. Light can travel through a 6.0 mm diamond in 4.834×10^{-11} seconds. What is the speed of light in diamond?

$v = \frac{d}{t}$ 6.0 mm = 0.006 m

$v = \frac{0.006\ m}{4.834 \times 10-11\ s} = 1.2\ x\ 10^8\ m/s$

6 A pinhole camera produces an image that is inverted and 4 times smaller than the object. Given that the object is located 2.0 m away, how long is this pinhole camera?

$$M = \frac{H_i}{H_o} = \frac{D_i}{D_o}$$
$$M = 0.25 = \frac{D_i}{2\ m}$$
$$D_i = 0.50m$$

7 A house that is 6.0 m high is viewed through a pinhole camera. The house is 40 m away from the camera and the camera is 20 cm long. Describe the image viewed in the pinhole camera (give it's height and orientation).

$$M = \frac{H_i}{H_o} = \frac{D_i}{D_o}$$
$$M = \frac{H_i}{6.0\ m} = \frac{0.2m}{40m} = 0.005$$

$$H_i = 0.005\ x\ 6.0\ m = 0.03m$$

8 You look at a light bulb through a 15 cm pinhole camera. What is the magnification of this camera if you see an image of the light bulb when you place the camera 3.0 m away?

$$M = \frac{H_i}{H_o} = \frac{D_i}{D_o}$$
$$M = \frac{H_i}{H_o} = \frac{0.15\ m}{3.0\ m}$$
M=0.05

9 Using a pinhole camera that is 30 cm, you observe a firefly. The image of the fly on the screen is twice as large as the actual firefly. How far from the pinhole of the camera is the firefly located?

$$M = \frac{H_i}{H_o} = \frac{D_i}{D_o}$$
$$M = \frac{H_i}{H_o} = \frac{0.3m}{D_o} = 2$$
$$2D_o = 0.3m$$
$$D_o = 0.15m$$

10 A filter only allows light that has a frequency of 4.615×10^{14} Hz. Given the following table, determine the colour of the filter.

Color	Wavelength interval
violet	~ 430 to 380 nm
blue	~ 500 to 430 nm
cyan	~ 520 to 500 nm
green	~ 565 to 520 nm
yellow	~ 590 to 565 nm
orange	~ 625 to 590 nm
red	~ 740 to 625 nm

$$c = f\lambda\ where\ c = 3x10^8 m/s$$
$$\frac{3x10^8 m}{s} = 4.615 \times 10^{14}\text{Hz}\ (\lambda)$$
λ =650 nm

The colour of the filter is red.