APPH 226: Size Distortion Formulas and Calculations

Magnification or Size Distortion can be assessed by calculating the magnification factor.

$$\textbf{MF} = \frac{\textbf{SID}}{\textbf{SOD}}$$

*** SOD = SID – OID

Example:

If the SID is 40 inches, and the SOD is 30 inches, what is the magnification factor?

$$\frac{40 \text{ inches}}{30 \text{ inches}} = 1.33$$

The magnification factor is 1.33

The magnification will be 33% or the image will be 133% of the object size.

1. What is the magnification factor if the SID is 40 inches and the OID is 6 inches?

2. What is the magnification factor if the SOD is 72 cm and the OID is 6 cm?

3. What is the magnification factor if the SID is 72 inches and the SOD is 68 inches?

4. What is the magnification factor is the OID is 5 cm and the SID is 115 cm?

5. What is the magnification factor if the SOD is 48 inches and the OID is 2 inches?

6. What is the magnification factor if the SOD is 85 cm and the SID is 100 cm?

The magnification factor permits calculation of the actual size of an image using this formula:

$$\textbf{Object size} = \frac{\textbf{Image}}{\textbf{Magnification Factor}}$$

Example:

If an object is 2 inches in diameter on the image, and is measured to be 3 inches away from the IR, what is its actual size if the SID used is 40 inches?

This is the information given: Image size = 2 inches SID = 40 inches OID = 3 inches

Step 1. Solve for the magnification factor first.

Step 2. Solve for the object size

1. If the image size is 24 inches, and there is a magnification factor of 2, what is the size of the object that was x-rayed?

2. If a phalange having an area of 2 inches is x-rayed with a 4 inch OID using a 40 inch SID, what would be the size of the phalange on the image?

3. If the object is 13 cm and the image size is 15cm, what is the magnification factor?

4. If the SID is 50 inches, the object is 2 inches and the OID is 2 inches, what is the image size?

Percent of Magnification can be found when we know the image and object size.

% Magnification of Object = $\frac{I-O}{O}$ x 100

Example:

The image of a calcaneus measures 6 cm across, and the actual size of the calcaneus is 5 cm. What is the percent magnification of the object?

$\frac{6cm-5cm}{5cm}$ x 100 = 20 % magnification of the object

1. What is the percent magnification if the object is 11 inches long, and the image is 14 inches long?

2. If the object measures 12 inches and shows up on the image as 24 inches, what is the magnification factor?

3. What is the percent of magnification in Question 2 (above question)?

Practice Questions

1. Image size = 13 cm Magnification factor (MF) = 1.7
   Calculate the object size.

2. Image size = 8 inches Object size = 5 inches
   Calculate the magnification factor

3. SID = 40 inches Image size = 9 inches Object size = 7.5 inches
   Calculate the SOD

4. Object size = 13 cm Magnification Factor (MF)= 1.19
   Calculate the image size

5. A mass measures 1.2 cm on an image. The OID is 8 cm, and the SID is 110 cm. What is the actual size of the mass?

6. SID = 50 inches Object size = 3 inches OID = 4 inches
   Calculate the image size.

7. Image size= 26 cm Object size = 21 cm
   Calculate the percent magnification

8. Image size = 16 cm Magnification Factor (MF) = 1.8
   Calculate the percent magnification

9. Image size = 26 cm Magnification factor (MF) = 1.3
   Calculate the object size.

10. A gallbladder stone measures 2 cm on the radiograph. The SID is 100cm and the SOD is 90 cm. What is the actual size of the stone?