

Distortion

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 1. The misrepresentation of the size of an object is:
- shape distortion.
 - magnification.
 - foreshortening.
 - elongation.
- ___ 2. In order to image a structure that is located anteriorly in the body, it is best radiographed to minimize magnification by doing a(n) _____ projection.
- posterior-anterior
 - anterior-posterior
 - lateral
 - oblique
- ___ 3. Magnification is affected by:
- focal spot size.
 - OID.
 - SID.
 - B and C.
- ___ 4. If the image size measures 4.6 in, and the magnification factor is 1.42, what is the size of the object?
- 2.43 in
 - 3.24 in
 - 5.63 in
 - 6.53 in
- ___ 5. Shape distortion can be created by:
- off-centering the central ray.
 - angling the central ray.
 - increasing the SID.
 - A and B only.
- ___ 6. The SOD can be determined by:
- adding SID and OID.
 - adding the MF to the OID.
 - subtracting the OID from SID.
 - subtracting the SID from the MF.
- ___ 7. Using a higher SID:
- increases magnification
 - decreases magnification
 - increases size distortion
 - none of the above

- ___ 8. _____ SID is typically used to image the chest so that the heart is seen with minimal magnification.
- 30 inches
 - 40 inches
 - 72 inches
 - 90 inches
- ___ 9. The distance between the object being imaged and the image receptor is the:
- OID
 - SID
 - MF
 - SOD
- ___ 10. The distance between the x-ray focal spot and the image receptor is the:
- OID
 - SID
 - MF
 - SOD
- ___ 11. The indication of how much magnification is seen on a radiograph is:
- OID
 - SID
 - MF
 - SOD
- ___ 12. The distance between the x-ray focal spot and the object being imaged is the:
- OID
 - SID
 - MF
 - SOD
- ___ 13. When OID cannot be reduced, it is possible to reduce size distortion by:
- increasing mAs
 - increasing SID
 - using a small focal spot size
 - decreasing SID
- ___ 14. The only factor that affects exposure to the image receptor, size distortion, and image contrast is:
- SID
 - mAs
 - focal spot size
 - OID
- ___ 15. Which of the following is the formula to determine magnification factor?
- $MF = SID/OID$
 - $MF = SID/SOD$
 - $MF = SOD/SID$
 - $MF = OID/SID$

- ___ 16. When a patient cannot fully extend his or her leg for a knee image, resulting in the knee being 4 inches away from the image receptor, what is the MF if the SID is 40 inches?
- 0.1
 - 0.9
 - 1.11
 - 10
- ___ 17. If the magnification factor is 1.25, the image is _____ than the object.
- 25% smaller
 - 125% smaller
 - 25% larger
 - 125% larger
- ___ 18. The formula that can be used to calculate the object size when the image size and MF are known is:
- object size = MF/image size
 - object size = image size/MF
 - object size = image size \times MF
 - none of the above
- ___ 19. What is the size of the object when the MF is 1.3 and the image size is 3 cm?
- 0.43 cm
 - 1.3 cm
 - 2.3 cm
 - 3.9 cm
- ___ 20. Whenever magnification is increased:
- recorded detail is decreased
 - recorded detail is increased
 - recorded detail stays the same
 - exposure to the image receptor increases
- ___ 21. _____ SID and _____ OID results in increased magnification.
- increased; increased
 - decreased; decreased
 - increased, decreased
 - decreased; increased

True/False

Indicate whether the statement is true or false.

- ___ 1. As the SID increases, the x-ray photons in the beam become less perpendicular to the object being imaged.
- True
 - False
- ___ 2. A magnification of factor of 1 cannot be achieved with radiographic imaging.
- True
 - False

- ___ 3. Shape distortion is only due to misalignment of the tube or part.
 - A. True
 - B. False

- ___ 4. Tube angulation may result in elongation and reduced exposure to the IR.
 - A. True
 - B. False

Distortion Answer Section

MULTIPLE CHOICE

1. ANS: B
One aspect of distortion is magnification, or size distortion.

PTS: 1 REF: p.161
2. ANS: A
The posterior-anterior (PA) projection will put the anterior surface of the body closest to the image receptor, reducing OID and magnification.

PTS: 1 REF: p.164
3. ANS: D
Both the OID and SID affect magnification, although OID has the greatest effect.

PTS: 1 REF: p.165
4. ANS: B
In order to determine object size, the image size is divided by the magnification factor; in this case 4.6 in is divided by 1.42.

PTS: 1 REF: p.165
5. ANS: D
Shape distortion results from misalignment or angulation of the tube, part, or image receptor.

PTS: 1 REF: p.165
6. ANS: C
The source-to-object distance (SOD) can be calculated by subtracting the OID from the SID.

PTS: 1 REF: p.163
7. ANS: B
Using a higher SID decreases magnification (size distortion).

PTS: 1 OBJ: 9
8. ANS: C
An SID of 72 inches is typically used with chest imaging to reduce magnification. An SID of 90 inches would further reduce magnification, but it is not a standard SID.

PTS: 1 OBJ: 9
9. ANS: A
The OID is the distance between the object being imaged and the image receptor.

PTS: 1 OBJ: 11
10. ANS: B
The SID is the distance between the x-ray focal spot (source of radiation) and the image receptor.

- PTS: 1 OBJ: 11
11. ANS: C
The indication of how much magnification is seen on a radiograph is the magnification factor.
- PTS: 1 OBJ: 11
12. ANS: D
The SOD distance between the x-ray focal spot (source of radiation) and the object being imaged.
- PTS: 1 OBJ: 11
13. ANS: B
An increase in SID can, to some extent, compensate for an increase in OID.
- PTS: 1 OBJ: 11
14. ANS: D
OID is the only factor that affects exposure to the image receptor, size distortion, and image contrast.
- PTS: 1 OBJ: 11
15. ANS: B
The formula for magnification factor (MF) is $MF = SOD/SID$.
- PTS: 1 OBJ: 11
16. ANS: C
The MF equals the SID (40) divided by the SOD (36). It is important to recall that it is impossible to have a MF of less than 1.
- PTS: 1 OBJ: 11
17. ANS: C
A MF of 1.25 indicates that the image is 25% larger than the object. The image can never be smaller than the object.
- PTS: 1 OBJ: 11
18. ANS: B
The formula $object\ size = image\ size/MF$ can be used to calculate image size, object size, or magnification when two of the variables are known.
- PTS: 1 OBJ: 11
19. ANS: C
Using the formula, $object\ size = image\ size (3\ cm)/MF (1.3)$.
- PTS: 1 OBJ: 11
20. ANS: A
Increased magnification results in poorer recorded detail.
- PTS: 1 OBJ: 11
21. ANS: D
Decreased SID and increased OID results in increased magnification.
- PTS: 1 OBJ: 11

TRUE/FALSE

1. ANS: F
As the SID increases the x-ray photons in the beam become more perpendicular to the object being imaged, decreasing size distortion.

PTS: 1 OBJ: 9
2. ANS: T
A MF of 1 indicates there is absolutely no magnification, a situation that is not possible with radiographic imaging.

PTS: 1 OBJ: 11
3. ANS: F
Shape distortion is due to misalignment of the tube, part, or image receptor.

PTS: 1 OBJ: 9
4. ANS: T
Tube angulation may result in elongation (shape distortion) and reduced exposure to the IR if the SID is not adjusted.

PTS: 1 OBJ: 11