

**Reading Hospital School of Health Sciences  
Medical Imaging Program**

MI132 – Imaging Principles and Equipment  
Unit 6 Study Guide  
2022-2023

*This study guide is recommended to be completed but is not required. If you want faculty to review your answers, please submit to Course Faculty (Stacy Oskam) via e-mail. This must occur by 12:00 PM the day prior to the exam.*

1. List the qualities of an image and identify which affect visibility and which affect sharpness.
  
2. Describe how to assess receptor exposure in digital imaging.
  
3. Explain the difference between radiographic contrast and subject contrast and how they relate to one another.
  
4. What factors determine the amount of subject contrast?
  
5. Describe low-contrast vs high contrast radiographic images and how grayscale relates to it.
  
6. How does an **increased kVp** level effect:
  - a. Beam attenuation?
  
  - b. Beam transmission?
  
  - c. Differential absorption?
  
  - d. Subject contrast?
  
  - e. Radiographic contrast?
  
  - f. Grayscale?
  
7. Anatomic tissues that attenuate the beam much different from one another would be described as having **low subject contrast / high subject contrast**.

8. What is spatial resolution?
9. Motion will cause a(n) **increase** / **decrease** in spatial resolution.
10. How does distortion affect spatial resolution?
11. Distortion can be broken down into \_\_\_\_\_ and \_\_\_\_\_ distortion.
12. Explain the difference between foreshortening and elongation. What causes foreshortening to occur? What causes elongation to occur?
13. Scatter reaching the image receptor, **increases** / **decreases** radiographic contrast.
14. Quantum noise is a result of \_\_\_\_\_ and **improves** / **degrades** image quality.
15. How does an **increase** in mAs effect:
  - a. Receptor exposure?
  - b. Radiographic Contrast?
  - c. Spatial resolution?
  - d. Distortion?
16. What type of relationship exists between mA and time in order to maintain the same receptor exposure?
17. 200 mA and 40 ms = \_\_\_\_\_ mAs
18. Explain the reciprocity law as it relates to mAs?
19. You need to use 6 mAs for an x-ray but want to use 0.01 seconds of time. What mA needs to be used?

20. Why is it typically best to use the highest mA and the shortest time possible?
21. How does resulting receptor exposure (minimal under / over exposure) affect the visibility factors of a digital image? How does gross over-exposure affect the visibility factors of a digital image?
22. If repeating an image for technical factor adjustments, a minimum change of at least \_\_\_\_\_ the mAs must be made.
23. If using equipment in which the EI is directly related to receptor exposure, how would you adjust your mAs if the acceptable range is 100-300 and your exposure produced an exposure indicator of 75?
24. How would you adjust your technique if you used 20 mAs @ 80 kVp and your exposure indicator was 800 and it should be between 300 and 600 on an indirect system?
25. How does an **increase** in kVp effect: (increase/decrease/not applicable)
- Receptor exposure?
  - Radiographic Contrast?
  - Spatial resolution?
  - Distortion?
26. What is optimal kVp?
27. What is the '15% rule'?
28. Explain how you would adjust mAs to maintain original receptor exposure when you increase/decrease kVp by 15%

29. To maintain receptor exposure – 2 mAs @ 65 kVp changed to 4 mAs @ \_\_\_\_\_ kVp
30. How does a higher kVp affect the amount of Compton scatter as compared to photoelectric effect? How does this effect radiographic contrast?
31. How does changing from a **small to a large focal spot** effect: (increase/decrease/not applicable)
- Receptor exposure?
  - Subject Contrast?
  - Spatial resolution?
  - Distortion?
32. How does a **decrease in SID** effect: (increase/decrease/not applicable)
- Receptor exposure?
  - Radiographic Contrast?
  - Spatial resolution?
  - Distortion?
33. If you take an x-ray using 10 mAs, 70 kVp at 40 inch SID but repeat it at 66 inch SID, what new technical factors should you use to maintain the receptor exposure?
34. What is the direct square law (or exposure maintenance formula) and how do we apply it?
35. How does an **increase in OID** effect: (increase/decrease/not applicable)
- Receptor exposure?
  - Radiographic Contrast?
  - Spatial resolution?
  - Distortion?

36. Define SID, SOD and OID.
37. What is the magnification factor of an imaged object if it was imaged at a 36 inch SID and there was a 2 inch OID?
38. What is an object's true size if it measures 2" on the image and the mag factor was 1.4?
39. What will be the projected image size for an object which is 2.1" and the mag factor was 1.6?
40. Explain why off-centering causes distortion?
41. How does an **increase in beam restriction** effect: (increase/decrease/not applicable)
- Receptor exposure?
  - Radiographic Contrast?
  - Spatial resolution?
  - Distortion?
42. How does an **increase in filtration** effect: (increase/decrease/not applicable)
- Receptor exposure?
  - Radiographic Contrast?
  - Spatial resolution?
  - Distortion?
43. If using 3 mAs for a PA hand image using a single phase generator, what mAs would you use on a high frequency unit?
44. If the technique book called for 20 mAs for a lateral L-spine on a patient that measured 18 cm. What mAs value would you use on a patient that measured 22 cm?

45. If you would typically use 1 mAs for a PA hand image using DR, what mAs must you use if converting to Computed Radiography?

46. How does an **increase in patient thickness** effect: (increase/decrease/not applicable)

- a. Receptor exposure?
- b. Radiographic Contrast?
- c. Spatial resolution?
- d. Distortion?