



# DENTAL RADIATION CERTIFICATION

UNIT 2: Fundamentals of Radiation  
TOPIC: A: Physics & Characteristics of Radiation

1. Radiation is \_\_\_\_\_ in \_\_\_\_\_.
2. The three harmful types of radiation are:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
3. An atom is the basic/fundamental unit of \_\_\_\_\_.
4. All atoms have three components:
  - a. \_\_\_\_\_ = negative energy
  - b. \_\_\_\_\_ = positive energy
  - c. \_\_\_\_\_ = no energy
5. An equal amount of protons and electrons gives us \_\_\_\_\_ energy.
6. When we unbalance an atom, it is called \_\_\_\_\_.
7. An ion is an atom with \_\_\_\_\_.
8. Ionizing radiation is radiation that is \_\_\_\_\_. Not all radiation is harmful. True False
9. Gamma rays and x-rays are ionizing / non-ionizing radiation. (Circle one)
10. The stronger the radiation is, the more harmful it is. True False
11. Radiation travels in straight lines. True False
12. \_\_\_\_\_ wave radiation is harmful (has high frequency and energy), whereas \_\_\_\_\_ wave radiation is not harmful.
13. The sun has both long and short wave radiation. True False
14. By wave length, we mean the distance between the \_\_\_\_\_ of the wave.
15. Dental radiation is produced in the \_\_\_\_\_. The part of the x-ray head that directs the radiation beam is commonly called a \_\_\_\_\_ but is properly called a PID which stands for:  
\_\_\_\_\_
16. The outer case of the x-ray head is made of \_\_\_\_\_. On the inside there is a glass \_\_\_\_\_ tube.
17. The negative side of the glass vacuum tube is \_\_\_\_\_ charged and is called the \_\_\_\_\_.
18. The positive side of the glass vacuum tube is \_\_\_\_\_ charged and is called the \_\_\_\_\_.
19. The electrons created by electricity gather on the \_\_\_\_\_ and are released when we \_\_\_\_\_ to expose the image.

20. Why don't we want the electrons to marry ☹️ the protons? \_\_\_\_\_
21. The metal plate attached to the anode which turns the \_\_\_\_\_ into \_\_\_\_\_ is called a \_\_\_\_\_ target.
22. The purpose of the \_\_\_\_\_ filter is to keep the weak radiation in the x-ray head and allow the strong/useful radiation to go through.
23. The lead washer is called the \_\_\_\_\_. It's purpose is to restrict the \_\_\_\_\_ beam so that it is \_\_\_\_\_ inches wide at the end of the PID.
24. The "danger zone" is \_\_\_\_\_ - meaning that dental radiation can NOT travel outside of 6 feet.
25. The beam aimed at the patient is useful and is called the \_\_\_\_\_ or \_\_\_\_\_ beam – also called the \_\_\_\_\_ ray.
26. The ray that bounces off of the patient and bounces around is called \_\_\_\_\_ radiation.
27. Radiation that bounces around until it loses its energy is called \_\_\_\_\_ radiation.
28. Leakage radiation is from \_\_\_\_\_ and is NOT strong enough to be harmful.

Match each of the following terms with the correct definition.

- |                        |       |  |
|------------------------|-------|--|
| A. Cathode             | _____ | The beam of radiation that is most useful and is aimed at the patient.               |
| B. Anode               | _____ | Also called the cone. It directs the central ray towards the receptor.               |
| C. Electrons           | _____ | The negative side of the tubehead.   |
| D. Tungsten target     | _____ | A "lead washer" used to restrict the width of the main beam.                         |
| E. Photons             | _____ | The radiation beam that bounces off of the patient's face.                           |
| F. Primary beam        | _____ | The ray that is produced by the electrons striking the tungsten target.              |
| G. Aluminum filter     | _____ | The negatively charged particle of an atom.  |
| H. Collimator          | _____ | The radiation beam that bounces around until it loses its energy.                    |
| I. Secondary radiation | _____ | The positive side of the tubehead.   |
| J. Scatter radiation   | _____ | A thin piece of metal used to only allow strong radiation from leaving the tubehead. |
| K. PID                 | _____ | The piece of metal attached to the anode that turns electrons into photons.          |

29. \_\_\_\_\_ is the difference in the degrees of blackness between adjacent areas on \_\_\_\_\_ x-ray.
30. Very dark areas and very light areas on the same film is called \_\_\_\_\_.
31. Low contrast shows \_\_\_\_\_ shades of \_\_\_\_\_ instead of a lot of black and white.
32. Optimal contrast is \_\_\_\_\_.
33. The **SPEED** of the electrons is the \_\_\_\_\_ and this setting affects the contrast.
34. Low kVps produce \_\_\_\_\_ contrast. High kVps gives produces an image with \_\_\_\_\_ contrast.

35. Decay is best diagnosed on an image with \_\_\_\_\_ contrast.
36. Periodontal disease is best diagnosed with an image with \_\_\_\_\_ contrast.
37. The overall blackness or darkness of a dental radiograph is called \_\_\_\_\_. This is comparing \_\_\_\_\_ image with \_\_\_\_\_ image.
38. Density is controlled by \_\_\_\_\_ (MAs) – which is the \_\_\_\_\_ of electrons moving from the cathode to the anode.
39. The more electrons released from the \_\_\_\_\_, the more / less (circle one) dense the image.
40. The higher the setting of the MAs the more / less (circle one) dense the image.
41. What should we do with our exposure time if we turn UP the MAs? \_\_\_\_\_
42. There are \_\_\_\_\_ basic settings on all control panels:
  - a. \_\_\_\_\_ = speed of the electrons – controls the contrast
  - b. \_\_\_\_\_ = amount of the electrons – controls the density of the image
  - c. \_\_\_\_\_ = length of time of the exposure
43. The common settings for a short cone (PID) = \_\_\_\_\_ MAs and \_\_\_\_\_ kVps
44. The common setting for a long cone (PID) = \_\_\_\_\_ MAs and \_\_\_\_\_ kVps
45. Metal is a \_\_\_\_\_ object and will show \_\_\_\_\_ on an x-ray and is called \_\_\_\_\_.
46. An abscess is an area where the bone is gone and shows up \_\_\_\_\_ on an image and is therefore called \_\_\_\_\_.

Match each term with the correct definition.

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|---------------------|-------|--|
| A. Milliampere (mA) | _____ | Negatively charged particles of an atom.                                 |
| B. Kilovolt (kVp)   | _____ | A range – as in the range of types of radiation.                         |
| C. Density          | _____ | Electromagnetic radiation.   |
| D. Spectrum         | _____ | The ray produced when the electrons hit the tungsten target.             |
| E. Protons          | _____ | An atom that has lost an electron and is therefore electrically charged. |
| F. Electrons        | _____ | The overall darkness of a dental image.                                  |
| G. Atom             | _____ | A setting which controls the amount of the electrons.                    |
| H. EMR              | _____ | The fundamental unit of matter.  |
| I. Ion              | _____ | The positive particles of an atom.                                       |
| J. Photons          | _____ | A setting which controls the speed of the electrons.                     |

**NEXT UP: Unit 2 Topic B: Biological Effects of Radiation  
and Radiation Safety**