

Test Bank

CHAPTER 1

Multiple Choice

1. Who was awarded the first Nobel Prize for physics in 1901, for his experimental work with radiation?
 - a. W. J. Morton
 - b. O. Walkhoff
 - c. W. D. Coolidge
 - d. W. C. Roentgen
2. Who is credited with introducing the bitewing radiograph?
 - a. F. W. McCormack
 - b. H. R. Raper
 - c. G. M. Fitzgerald
 - d. C. E. Kells
3. Who developed the hot cathode ray tube?
 - a. W. D. Coolidge
 - b. W. A. Price
 - c. H. R. Raper
 - d. W. H. Rollins
4. The development of radiation protection as a science is credited to:
 - a. A. Cieszyński.

- b. W. D. Coolidge.
 - c. W. H. Rollins.
 - d. F. Mouyen.
5. What New Orleans dentist first made practical use of x-rays in the treatment of dental patients?
- a. H. R. Raper
 - b. G. M. Fitzgerald
 - c. F. Mouyen
 - d. C. E. Kells
6. Early researchers working in the field of radiography were not aware that continued exposure to x-rays produced accumulations of radiation effects in the body *because* x-rays are invisible.
- a. Both the statement and reason are correct and related.
 - b. Both the statement and reason are correct but NOT related.
 - c. The statement is correct, but the reason is NOT.
 - d. The statement is NOT correct, but the reason is correct.
 - e. NEITHER the statement NOR the reason is correct.
7. The most significant advancement in the early days of radiography came in 1913 when W. D. Coolidge:
- a. became the first to alert the profession of the dangers of radiation exposure and advocated for the science of radiation protection.
 - b. exposed a prototype of a dental radiograph, setting the stage for preventive oral health care.

- c. developed a variable, high kilovoltage x-ray machine compatible with the paralleling technique.
 - d. introduced an x-ray tube that allowed for an x-ray output that could be predetermined and accurately controlled.
8. The first dental radiograph was produced using an exposure time of:
- a. 0.5 second.
 - b. 1 minute.
 - c. 5 minutes.
 - d. 25 minutes.
 - e. 1 hour.
9. What component of the dental x-ray machine best limits the size of the x-ray beam to the approximate size of the image receptor?
- a. A pointed cone
 - b. An open round cylinder
 - c. A rectangular PID
 - d. A slit collimator
10. Panoramic radiology became popular in the:
- a. 1930s.
 - b. 1940s.
 - c. 1950s.
 - d. 1960s.
 - e. 1970s.
11. Which of the following is NOT true regarding cone beam volumetric imaging?

- a. It images a single selected plane of tissues.
- b. It is based on computed tomography.
- c. It uses less radiation than a panoramic radiograph.
- d. It is designed specifically for imaging dental applications.
- e. It is purported to become the gold standard for imaging certain oral conditions.

12. Early dental film required long exposure times because:

- a. it was hand-wrapped.
- b. the emulsion was only on one side.
- c. glass plates were used as the base.
- d. the packets were not moisture resistant.

13. Each of the following is an advantage of digital imaging EXCEPT one. Which one is the EXCEPTION?

- a. It reduces radiation over film-based radiography.
- b. It eliminates the need for the darkroom and processing chemistry.
- c. It allows the use of pointed cones without radiation hazards.
- d. It avoids the need for disposal of hazardous materials such as lead foils from film packets.
- e. It produces enhanced two- and three-dimensional images.

14. The bisecting technique was the first and earliest radiographic technique for exposing intraoral radiographs *because* the bisecting technique is based on the rule of isometry.

- a. Both the statement and reason are correct and related.
- b. Both the statement and reason are correct but NOT related.
- c. The statement is correct, but the reason is NOT.

- d. The statement is NOT correct, but the reason is correct.
 - e. NEITHER the statement NOR the reason is correct.
15. The paralleling technique is taught in all dental assisting, dental hygiene, and dental schools *because* it is the technique of choice for imaging intraoral radiographs.
- a. Both the statement and reason are correct and related.
 - b. Both the statement and reason are correct but NOT related.
 - c. The statement is correct, but the reason is NOT.
 - d. The statement is NOT correct, but the reason is correct.
 - e. NEITHER the statement NOR the reason is correct.
16. The rule of isometry is the basis for what dental radiographic technique?
- a. Bisecting
 - b. Paralleling
 - c. Panoramic
 - d. Digital
 - e. Computed tomography
17. Each of the following is a potential use of dental radiographs EXCEPT one. Which one is the EXCEPTION?
- a. Diagnosing dental caries
 - b. Evaluating development of dentition
 - c. Detecting missing teeth
 - d. Assessing patient self-care
 - e. Evaluating trauma to teeth and supporting bone

18. Producing radiographs of the teeth and/or the oral cavity is called:

- a. Radiation producing.
- b. Radiology.
- c. Roentgenograph.
- d. X-raying.
- e. Radiography.

19. Dental assistants and dental hygienists meet an important need by providing each of the following EXCEPT one. Which one is the EXEPTION?

- a. Exposing radiographs
- b. Processing radiographs
- c. Mounting radiographs
- d. Prescribing radiographs
- e. Interpreting radiographs

20. The positioning indicating device (PID) is sometimes called a “cone” *because* the PID of early dental x-ray machines was of a pointed shape.

- a. Both the statement and reason are correct and related.
- b. Both the statement and reason are correct but NOT related.
- c. The statement is correct, but the reason is NOT.
- d. The statement is NOT correct, but the reason is correct.
- e. NEITHER the statement NOR the reason is correct.

True/False

1. William Herbert Rollins was awarded the first Nobel Prize for physics.
2. C. Edmund Kells encouraged the practical use of radiographs in dentistry.
3. The radiographer should help the patient hold the image receptor in place during exposure.
4. In the early 1900s dental patients would have to be sent to hospitals or a physician's office to have a dental radiograph exposed.
5. Early dental x-ray machines were an electrical hazard.
6. Pointed cones should be used to direct radiation from the x-ray tube to the patient.
7. Dental x-ray film available today is coated with emulsion on both sides.
8. The bisecting technique is the technique of choice for intraoral radiography.
9. Dental radiography supplements visual and physical examination to provide a quality evaluation of a patient.
10. Digital imaging systems can reduce radiation dosage more than film-based radiography.
11. A radiograph is an image produced by exposure to x-rays.
12. Computed tomography eliminates the use of radiation to produce an image.
13. Digital imaging replaces the conventional dental x-ray machine.
14. The paralleling technique is based on the rule of isometry.
15. The PID is used to direct the useful beam of radiation.
16. X-radiation was discovered when Roentgen was working with a Crookes tube.

17. Roentgen named his discovery the roentgen ray.
18. The x-radiation output of the Crookes tube (named after the English chemist William Crookes) could be predetermined and accurately controlled.
19. Early scientists and researchers working in the field of radiography were not aware that continued exposure produced accumulations of radiation effects in the body.
20. In the early 1900s, it was common practice for the radiographer to help the patient hold the film in place while making the exposure.

Short Answer

1. Who first determined that x-rays would play a role in dentistry?
2. Who is considered to be the first advocate for the science of radiation protection?
3. Who developed the hot cathode ray tube?
4. Which radiograph displays the entire dentition and surrounding structures?
5. What is the technique of choice for intraoral radiography?
6. In dental digital imaging systems, what replaces film?
7. What medical imaging modality records a selected plane of tissues?
8. What is the name of the device that functions to direct the x-ray beam toward the patient?
9. What is the purpose of studying the history of radiography and dental radiography?
10. What are the two techniques for exposing intraoral dental radiographs?

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Answer Key

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1. d. Wilhelm Conrad Roentgen discovered the x-ray on November 8, 1895, when he noted that a fluorescent screen near a Crookes vacuum tube began to glow when an electric current was passed through the tube.
2. b. Howard Riley Raper wrote the first dental radiology textbook, *Elementary and Dental Radiology*, and introduced bitewing radiographs in 1925.
3. a. William David Coolidge developed the shockproof hot cathode tube while working for the General Electric Company in 1913.
4. c. William Herbert Rollins was one of the first to alert the profession to the need for radiation hygiene and protection, and is considered by many to be the first advocate for the science of radiation protection.
5. d. C. Edmund Kells took the first dental radiograph on a living subject in the United States. He was the first to put the radiograph to practical use in dentistry. Dr. Kells made numerous presentations to organized dental groups and was instrumental in convincing many dentists that they should use oral radiography as a diagnostic tool.
6. a. Because x-rays are invisible, scientists and researchers working in the field of radiography were not aware that continued exposure produced accumulations of radiation effects in the body and therefore could be dangerous to both patient and radiographer.
7. d. The introduction of the Coolidge tube allowed for an x-ray output that could be predetermined and accurately controlled.

8. d. Dr. Otto Walkhoff, a German physicist, was the first to expose a prototype of a dental radiograph. This was accomplished by covering a small, glass photographic plate with black paper to protect it from light and then wrapping it in a sheath of thin rubber to prevent moisture damage during the 25 minutes that he held the film in his mouth.
9. c. A rectangular position indicating device (PID) limits the size of the x-ray beam that strikes the patient to the actual size of the image receptor.
10. d. Panoramic radiography became popular in the 1960s with the introduction of the panoramic x-ray machine.
11. c. While cone beam volumetric imaging dedicated to dental applications produces less radiation doses than conventional CT scans, the dose is still 4 to 15 times that required for a panoramic radiograph.
12. b. Early film had emulsion on only one side and required long exposure times.
13. c. Pointed cones are no longer acceptable because x-rays are scattered through contact with the material of pointed cones.
14. b. The bisecting technique is based on the rule of isometry, but this is not the reason that it was the first and earliest radiographic technique for exposing intraoral radiographs.
15. a. Because the newer technique of paralleling improved on the older bisecting technique, it is the technique of choice and taught in all dental assisting, dental hygiene, and dental schools.
16. a. In 1907, A. Cieszyński, a Polish engineer, applied the “rule of isometry” to dental radiology and is credited for suggesting the bisecting technique.
17. d. Home care is best determined during a visual clinical examination that would assess the presence of biofilms and the condition of the gingival tissues.

Holding the film in the patient's mouth exposes the radiographer to unnecessary radiation.

18. e. Radiography is defined as the making of radiographs by exposing and processing x-ray film.

19. d. Dentists have the authority and responsibility for prescribing and diagnosing conditions from dental radiographs. Dentists, dental assistants, and dental hygienists can expose, process, mount, and interpret (read) dental radiographs.

20. a. Because cones were used for so many years, many still refer to the open cylinders or rectangular tubes as cones.

True/False

1. False. William Conrad Roentgen was awarded the first Nobel Prize for physics in 1901 for the discovery of the x-ray.

2. True. C. Edmund Kells took the first dental radiograph on a living subject in the United States. He made many presentations to organized dentistry advocating the use of dental radiographs as a diagnostic tool.

3. False. Continued exposure results in the accumulation of radiation effects in the body that can be dangerous to the radiographer.

4. True. It was customary to send the patient to a hospital or physician's office on those rare occasions when dental radiographs were prescribed.

5. True. Dental x-ray machines manufactured before 1920 were an electrical hazard because of open, uninsulated, high-voltage supply wires.

6. False. Pointed cones allow x-ray scatter to reach the patient through contact with the material of the cone.

7. True. Early x-ray films were single emulsion only and required long exposure times.

Today's films are double emulsion and require much shorter exposure times.

8. False. The paralleling technique is less complicated and produces better radiographs more consistently than the bisecting technique.

9. True. Many conditions may go undetected without radiographic examination.

10. True. Digital sensors that replace film are more sensitive to x-rays, allowing for a reduction in radiation dose, one of the biggest advantages of digital imaging over film-based radiographs.

11. True. The definition of radiograph is an image produced on photosensitive film by exposure to x-rays.

12. False. Computed tomography or CT scans deliver high radiation doses, sometimes up to 600 times more than a panoramic radiograph.

13. False. In digital radiography a sensor replaces film. The conventional dental x-ray machine is used for both digital and film-based imaging.

14. False. The bisecting technique is based on the rule of isometry.

15. True. PID stands for position indicating device, which means that the PID is used to direct the useful beam of radiation toward the patient and the image receptor.

16. True. Roentgen discovered x-radiation while working with a Crookes tube (named after William Crookes, an English chemist). The Coolidge tube is named after William David Coolidge who, while working for the General Electric Company, introduced the hot cathode tube that allowed x-ray output to be predetermined and accurately controlled.

17. False. Roentgen reported his finding at a scientific meeting, he spoke of it as an x-ray because the symbol x represented the unknown. After his findings were reported and published, fellow scientists honored him by calling the invisible ray the roentgen ray.
18. False. The x-ray output of the Coolidge tube could be predetermined and accurately controlled.
19. True. Because x-rays are invisible, scientists and researchers working in the field of radiography were not aware that continued exposure produced accumulations of radiation effects in the body, and therefore could be dangerous to both patient and radiographer.
20. True. When radiography was in its infancy, it was common practice for the dentist or dental assistant to help the patient hold the film in place while making the exposure.

Short Answer

1. Dr. Otto Walkhoff. Dr. Walkhoff held a small photographic plate in his mouth for a 25-minute exposure to demonstrate that radiographs of the teeth could be made.
2. Dr. William Herbert Rollins. Dr. Rollins was one of the first to alert the profession to the need for radiation hygiene and protection.
3. In 1913, William David Coolidge, working for the General Electric Company, designed the hot cathode tube in which the tube and high-voltage transformer were placed in an oil-filled compartment that acted as a radiation shield and electrical insulator.
4. A panoramic radiograph displays a broad area of the mandible and maxilla on a single image receptor.
5. The paralleling technique is the technique of choice because it is less complicated and more consistently produces better radiographs than the bisecting technique.

6. Sensors are comparable to film in dimensions and nearly comparable in radiographic quality.
7. A computed tomography (CT) scan images a single selected plane of tissues.
8. A position indicating device (PID) is used to direct the x-ray beam.
9. Through familiarity with the evolution of concepts and theories, investigators gain knowledge about current practices and appreciate future advancements. Radiography plays an important role in the diagnostic process in the modern oral health care practice. To appreciate the role of dental radiography in the diagnostic process, it is important to understand the nature of x-rays and how the early researchers supplied us with the fundamental concepts and techniques we use in practice today.
10. The bisecting technique, the first and earliest technique, and the par technique, the technique of choice that is taught in all dental assisting, dental hygiene, and dental schools.