

Chapter 01: Essential Concepts of Radiologic Science

Bushong: Radiologic Science for Technologists: Physics, Biology, and Protection, 11th Edition

MULTIPLE CHOICE

1. Matter is measured in _____.
a. kilograms
b. joules
c. electron volts
d. rems

ANS: A

Matter is measured in kilograms.

DIF: Easy

REF: p. 3

OBJ: Recognize the unit of measurement for matter.

2. Energy is measured in _____.
a. kilograms
b. joules
c. electron volts
d. B or C

ANS: D

Energy is measured in joules or electron volts.

DIF: Moderate

REF: p. 4

OBJ: Recognize the unit of measurement for energy.

3. Atoms and molecules are the fundamental building blocks of _____.
a. energy
b. radiation
c. matter
d. gravity

ANS: C

Atoms and molecules are the fundamental building blocks of matter.

DIF: Moderate

REF: p. 3

OBJ: List the fundamental building blocks of matter.

4. Ice and steam are examples of two forms of _____.
a. matter
b. radiation
c. energy
d. work

ANS: A

Ice and steam are examples of two forms of matter.

DIF: Difficult

REF: p. 4

OBJ: Describe states of matter.

5. The formula $E=mc^2$ is the basis for the theory that led to the development of _____.

- a. x-rays
- b. electromagnetic radiation
- c. nuclear power
- d. cathode ray tubes

ANS: C

The formula $E=mc^2$ is the basis for the theory that led to the development of nuclear power.

DIF: Difficult REF: p. 5 OBJ: Understand the theory of energy-mass equivalence.

6. Radio waves, light, and x-rays are all examples of _____ energy.
- a. nuclear
 - b. thermal
 - c. electrical
 - d. electromagnetic

ANS: D

Electromagnetic energy includes radio waves, light, and x-rays as well as other parts of the spectrum.

DIF: Difficult REF: p. 4 OBJ: List types of electromagnetic energy.

7. A moving object has _____ energy.
- a. potential
 - b. kinetic
 - c. nuclear
 - d. electromagnetic

ANS: B

A moving object has kinetic energy.

DIF: Moderate REF: p. 4 OBJ: Identify various forms of energy.

8. What is the removal of an electron from an atom called?
- a. Ionization
 - b. Pair production
 - c. Irradiation
 - d. Electricity

ANS: A

The removal of an electron from an atom is called ionization.

DIF: Moderate REF: p. 5 OBJ: Understand ionization of matter.

9. Ionizing radiation is capable of removing _____ from atoms as it passes through the matter.
- a. neutrons
 - b. protons
 - c. electrons
 - d. ions

ANS: C

Ionizing radiation is capable of removing electrons from atoms as it passes through the matter.

DIF: Moderate REF: p. 5

OBJ: Describe the process of ionization by ionizing radiation.

10. The energy of x-rays is _____.
- a. thermal
 - b. potential
 - c. kinetic
 - d. electromagnetic

ANS: D

X-rays are a form of electromagnetic energy.

DIF: Difficult

REF: p. 5

OBJ: List the category of energy of x-rays.

11. The biggest source of man-made ionizing radiation exposure to the public is _____.
- a. atomic fallout
 - b. diagnostic x-rays
 - c. smoke detectors
 - d. nuclear power plants

ANS: B

Medical x-ray exposure is the biggest source of man-made radiation.

DIF: Difficult REF: p. 6

OBJ: Understand the relative intensity of ionizing radiation from various sources.

12. In the United States, we are exposed to _____ mR/year of ionizing radiation from the natural environment.
- a. 0–5
 - b. 5–20
 - c. 20–90
 - d. 100–300

ANS: C

We are exposed to 20–90 mR/yr of ionizing radiation from natural environmental sources in the United States.

DIF: Difficult REF: p. 6

OBJ: Understand the amount of natural environmental ionizing radiation to which the public is exposed in the United States.

13. The basic quantities measured in mechanics are _____, _____, and _____.
- a. volume, length, meters
 - b. mass, length, time
 - c. radioactivity, dose, exposure
 - d. meters, kilos, seconds

ANS: B

The basic quantities measured in mechanics are mass, length, and time.

DIF: Easy

REF: p. 12

OBJ: List the basic quantities measured in mechanics.

14. An example of a derived quantity in mechanical physics is a _____.
a. meter
b. second
c. dose
d. volume

ANS: D

Volume is a derived unit.

DIF: Moderate REF: p. 12 OBJ: Recognize an example of a derived quantity.

15. _____ is a special quantity of radiologic science.
a. Mass
b. Velocity
c. Radioactivity
d. Momentum

ANS: C

Radioactivity is a special quantity of radiologic science.

DIF: Easy REF: p. 14

OBJ: Recognize radioactivity as a special quantity of radiologic science.

16. Exposure is measured in units of _____.
a. becquerel
b. sieverts
c. meters
d. grays

ANS: D

Exposure is measured in units of grays.

DIF: Moderate REF: p. 14 OBJ: Understand units of radiation measurement.

17. Today, radiology is considered to be a(n) _____ occupation.
a. safe
b. unsafe
c. dangerous
d. high-risk

ANS: A

Today, radiology is considered to be a safe occupation because of effective radiation protection practices.

DIF: Moderate REF: p. 10 OBJ: Understand the risk of an occupation in radiology.

18. What does ALARA mean?
a. All Level Alert Radiation Accident
b. As Low As Reasonably Achievable
c. Always Leave A Restricted Area
d. As Low As Regulations Allow

ANS: B

ALARA means As Low As Reasonably Achievable.

DIF: Moderate

REF: p. 10

OBJ: Understand the meaning of ALARA.

19. Computed tomography was developed in the _____.
a. 1890s
b. 1920s
c. 1970s
d. 1990s

ANS: C

Computed tomography was developed in the 1970s.

DIF: Moderate

REF: p. 10

OBJ: Relate history of the development of computed tomography.

20. Filtration is used to _____.
a. absorb low-energy x-rays
b. remove high-energy x-rays
c. restrict the useful beam to the body part imaged
d. fabricate gonadal shields

ANS: A

Filtration is used to absorb low-energy x-rays.

DIF: Moderate

REF: p. 12

OBJ: Relate history of the development of computed tomography.