

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 _____.
- kilograms
 - joules
 - electron volts
 - 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 _____.
- kilograms
 - joules
 - electron volts
 - 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 _____.
- energy
 - radiation
 - matter
 - 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 _____.
- matter
 - radiation
 - energy
 - 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 _____.
- thermal
 - potential
 - kinetic
 - 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 _____.
- atomic fallout
 - diagnostic x-rays
 - smoke detectors
 - 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.
- 0–5
 - 5–20
 - 20–90
 - 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 _____.
- volume, length, meters
 - mass, length, time
 - radioactivity, dose, exposure
 - 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 _____.
- meter
 - second
 - dose
 - 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.
- Mass
 - Velocity
 - Radioactivity
 - 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 _____.
- becquerel
 - sieverts
 - meters
 - 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.
- safe
 - unsafe
 - dangerous
 - 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?
- All Level Alert Radiation Accident
 - As Low As Reasonably Achievable
 - Always Leave A Restricted Area
 - 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 _____.
- 1890s
 - 1920s
 - 1970s
 - 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 _____.
- absorb low-energy x-rays
 - remove high-energy x-rays
 - restrict the useful beam to the body part imaged
 - 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.