1. Who is credited for discovering the X-ray?
2. Who is the only person to receive the Nobel Prize for science twice?
3. ALARA stand for:
4. What are radiographers trying to achieve with ALARA? Explain:
5. Which of the following are used primarily in radiography?
   1. Gamma sources
   2. Radio Waves
   3. X-rays
   4. Microwaves
   5. Both A and C
6. What are the components of an atom?
   1. Neutrinos, electrons, protons.
   2. Positrons, neutrinos, electrons.
   3. Electrons, neutrons, positrons, negatrons.
   4. Protons, electrons, neutrons,
7. The elements, Cobalt and Nickel are shown as stable elements on the periodic Table.
   1. True
   2. False
8. Radiation is defined as:
   1. Ionized Beta Alpha particles
   2. Energy in transit, either as particles or electromagnetic waves
   3. Heat and light emitting only from gamma sources like uranium or the sun
   4. Energy that does not burn or ionize
9. An Ion:
   1. An atom or part of an atom with a + or a – charge
   2. A long, long time
   3. Is not harmful to humans
   4. None of the above
10. Two distinct types of radiation are:
    1. Alpha and Omega
    2. Particulate and Electromagnetic
    3. Positive and negative
    4. None of the above
11. An Alpha particle:
    1. Is a type of ionizing radiation
    2. Is not harmful to humans IF it remains outside the body and is not inhaled
    3. Is not considered as harmful to humans as Beta or Gamma radiation
    4. All of the above are correct
12. Alpha particles are *most* dangerous to humans when:
    1. Alpha particles come into contact with skin
    2. Operating an X-ray cabinet
    3. If Alpha particles are ingested or inhaled
    4. Alpha particles are basically harmless to humans
13. Beta Particles:
    1. Have almost zero mass and travel at almost the speed of light
    2. Travel several meters in air
    3. Has either a + or – charge
    4. All of the above are true
14. Only Gamma radiation can ionize matter.
    1. True
    2. False
15. Which of the following are examples of “non-ionizing” radiation?
    1. Near UV and radio waves
    2. Visible light and Microwaves
    3. Infrared
    4. All of the above
16. Which of the following are two types of electromagnetic radiation used for industrial radiography?
    1. X-rays and Microwaves
    2. Gamma and X-rays
    3. Gamma and Radio waves
    4. Infrared and UV
17. Which of the following type of nuclear reactions is used to create isotopes for industrial radiography?
    1. Nuclear Fission
    2. Nuclear Fusion
18. Which of the following nuclear reactions is occurring on the sun?
    1. Nuclear Fission
    2. Nuclear Fusion
19. The term used to describe the decay of an isotope to one half of the original value is:
    1. Radioactive decay
    2. Half value layer
    3. Time, Distance, Shielding
    4. Half-Life
20. The main difference between Gamma radiation and X-ray radiation is:
    1. Speed of radiation travel
    2. The source of radiation
    3. Penetrating power
    4. X-ray is not very dangerous
21. What is the safe dosage rate for the public?
    1. 2 R/hr
    2. 20 mr/hr
    3. 2 lamda per M
    4. 2 mr/hr
22. Define the R/hr explaining what it is measuring:
23. 1 Rontgen = how many mr?
24. Three factors to keep us safe in regards to working with radiation are:
    1. Time, distance and shielding
    2. Water, sunscreen, and math
    3. Inverse Square Law, OSkosh, and lead
    4. None of the above
25. Write out the Inverse Square Law and define each of the variables.
26. How do we use the inverse square law in regards to radiation safety?
27. Write the formula for solving for the New Intensity (**I2**):
28. We have 25 R/hr @ 12”, what is our intensity at 10 feet?
    1. Does the difference in units matter? Y or N?
    2. Write out the equation and Solve for our new intensity.
29. We have 37 R/hr @ 3M, what is our intensity at 75 feet?
    1. Units?
    2. What’s the intensity in mr/hr?
30. Write the formula to solve for a New Distance (D2):
31. We know that 1 ci of iridium 192 emits 5.2 R/hr @ 1ft. So a 75 ci source of IR 192 would emit how many R/hr @ 1ft?
32. Using a 75 ci source of IR 192 at 12”, Calculate the distance (D2) to the “safe for public dosage.”
    1. What is that dosage rate?
    2. **Show your work.**
33. Cobalt 60 emits 14 R/hr/ci @ 1ft.
    1. How many R/hr is emitted at 1 ft. with a 63 ci source of Co 60?
    2. Solve for D2 and assume I2 is the public safe dosage of 2 mr/hr