Chapter 3

1. What term best describes two variables in an equation that move opposite to each other up or

down, but by the same magnitude - that is, when one goes up, the other goes down by the

same degree:

a. directly related

b. directly proportional

c. inversely related

d. inversely proportional

d. exponentially related

2. The value 0.72 expressed as a percentage is:

a. 0.0072%

b. 0.72%

c. 7.2%

d. 72%

e. 720%

3. In algebra problems, the first operation is always to calculate the:

a. exponents

b. additions and subtractions

c. multiplications and divisions

d. factors outside of parentheses

4. To multiply numbers with exponents:

a. multiply the exponents

b. divide the exponents

c. add the exponents

d. subtract the exponents

5. Any number can be converted into scientific notation without even moving the decimal place

by simply adding the phrase:

a. “X 101 ”

b. “X 100 ”

c. “X 11 ”

d. “X 110 ”

e. “X 10 ”

6. When using dimensional analysis to make unit conversions, a critical rule to remember is that:

a. the top unit must become the bottom unit in the next expression

b. the same units always stay on top

c. the top units are multiplied, the bottom ones are divided

d. the top units are added, the bottom ones are subtracted

7. When calculating for areas, both units and calculations must be:

a. done in scientific notation

b. squared

c. cubed

d. multiplied

e. done in systeme international (SI) units

8. Because the *areas* of surface change *less drastically* (by the square) than the *volumes* of objects,

a. small insects can float on water

b. larger potatoes take longer to cook

c. thicker x-ray tube anodes take longer to cool down

d. a & c only

e. all of the above

9. As the distance from the x-ray tube to the image receptor plate changes, the intensity of

radiation changes:

a. proportionately to the distance

b. by inverse proportion to the distance

c. according to the square of the distance

d. according to the inverse square of the distance

10. Graphs must use in order to accurately represent data.

a. a best fit line

b. a straight line

c. a logarithmic scale

d. a proportional scale

e. curved plotted points

11. Milliamperage (mA) is a rate just like kilometers-per-hour, only it describes how many electrons are traveling down a wire per second. If you used 60 mAs for an x-ray exposure, and the exposure time was 0.2 seconds, what mA station did you use?

a. 12 mA

b. 120 mA

c. 200 mA

d. 300 mA

e. 30 mA

12. What is 8 X 108 divided by 4 X 10-2 ?

a. 0.5 X 10-10

b. 2 X 104

c. 2 X 1010

d. 2 X 10-16

e. 2 X 106

13. How many cubic centimeters are there in 10 cubic meters?

a. 100 cc

b. 1000 cc

c. 100,000 cc

d. 1,000,000 cc

e. 10,000,000 cc

14. X-rays, gravity, electrical charge attraction, magnetism and other radiations all follow the

inverse square law *because*:

a. they lose energy with increasing distance

b. forces spread out over increasing areas with increasing distance

c. they are absorbed by more air molecules at increasing distances

d. forces are scattered in random directions with increasing distances

15. If a beam of radiation containing 1000 x-rays is spread out over a square field that measures

10 cm long and 10 cm wide, what is the concentration of x-rays per square centimeter?

a. 1 x-ray/cm2

b. 10 x-rays/cm2

c. 100 x-rays/cm2

d. 1000 x-rays/cm2

e. 10,000 x-rays/cm2

16. When the distance between two masses is cut in half, the force of gravity attracting them

together is changed to a value:

a. twice as large as before

b. four times as large as before

c. one-half of the original

d. one-fourth of the original

e. the same as before

17. Radiographer *A* receives 5 mGy per second of scatter radiation standing 3 feet from the patient. What rate of radiation does Radiographer *B* receive standing 7 feet away?

a. 2.14 mGy/sec

b. 1.12 mGy/sec

c. 27.2 mGy/sec

d. 0.92 mGy/sec

e. 4.6 mGy

18. A four-meter cube contains how much more volume than a two-meter cube?

a. 2 times more

b. 4 times more

c. 6 times more

d. 8 times more

e. 16 times more

19. Solve for X: X + 22 = -8

a. 14

b. -14

c. 30

d. -30

20. Solve for X: X = 144

3 12

a. 36

b. 576

c. 48

d. 4

21. Solve for X: X = 3(8 + 7)2  - 62

42

a. -54.1

b. 54.94

c. -19.8

d. -49.8

22. In full scientific notation, the number 0.0081 is:

a. 8.1 X 10 -3

b. 8.1 X 103

c. 0.81 X 104

d. 0.81 X 10-4

e. 8.1 X 102

23. What is the “long-hand” expression for 4.2 X 104 :

a. 420

b. 4,200

c. 42,000

d. 420,000

e. 4,200,000

24. Solve (2.6 X 103 ) / (9.3 X 10 -4 ) =

a. 0.28 X 10 -1

b. 2.8 X 10 -1

c. 24.2 X 107

d. 2.8 X 106

25. Convert 1700 ms into hours:

a. 0.00047 hrs

b. 0.047 hrs

c. 0.47 hrs

d. 2.1 hrs

e. 6,120 hrs

26. How many square centimeters are there within 4 square meters?

a. 400 cm2

b. 40,000 cm2

c. 4,000 cm2

d. 4 million cm2

27. If the radiation dose to a patient was 8 mGy at a 180 cm distance from the x-ray tube, what

would the dose be if the distance were reduced to 100 cm?

a. 2.47 mGy

b. 6.9 mGy

c. 14.28 mGy

d. 25.92 mGy

28. According to the graph below, how much radiation was required to cause 65% of a

population of rats to develop leukemia?

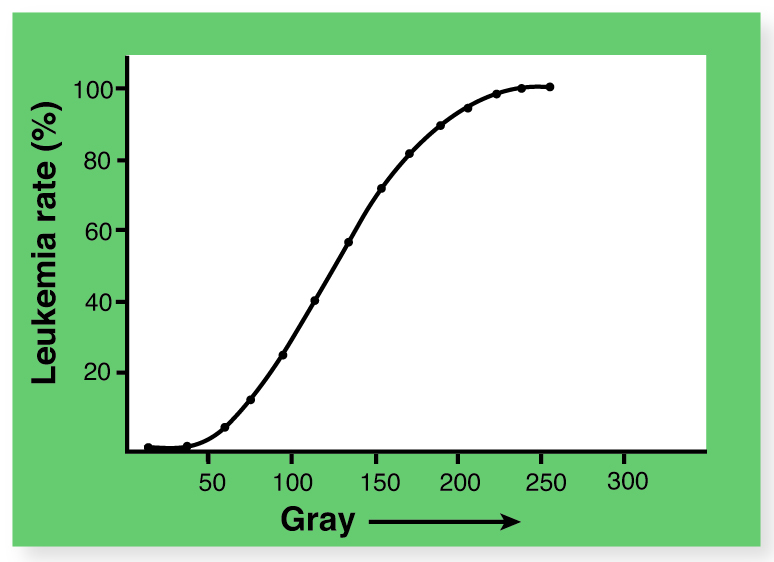
a. 8 Gray

b. 127 Gray

c. 140 Gray

d. 152 Gray

e. 165 Gray



29. According to the graph below, which of the following accurately describes the x-rays in this

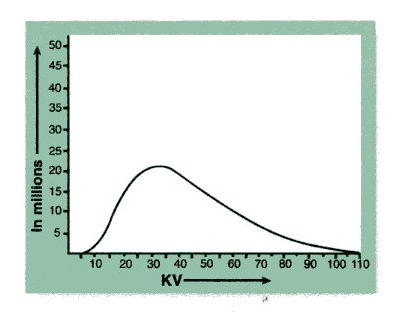
beam of radiation?

a. There are 12 million x-rays having 3 kV of energy

b. There are 3 million x-rays having 74 kV of energy

c. There are 55 million x-rays having 74 kV of energy

d. There are 12 million x-rays having 55 kV of energy



30. According to the histogram graph below, how many pixels in this digital image hold a pixel

value of 1280?

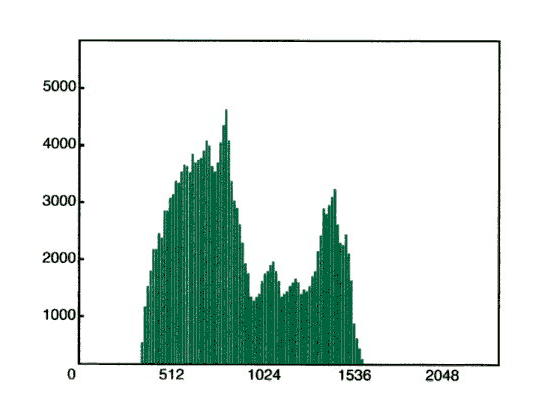
a. 352

b. 768

c. 1100

d. 1700

e. 2900



31. Digital processing and the calculation of the exposure indicator depend upon the

identification of key landmarks, “troughs” or “peaks”, in the \_\_\_\_\_\_\_\_ curve that is

plotted by connecting the uppermost points of each bar in the graph of the acquired histogram:

1. Response
2. Exponential
3. Average
4. Best-fit

32. For a radiograph of a normal knee without any metal devices implanted, the acquired digital histogram will have two lobes. The second, more narrow “tail lobe” at the right represents \_\_\_\_\_\_ in the image:

1. “Raw” background x-ray exposure
2. Soft tissues of the knee
3. Bony tissues of the knee
4. Scatter radiation