

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

Graded problems are worth 2 points each. This assignment is graded out of **22** points.

- 1) List the six major regions of the EM spectrum in order, beginning with the EM waves that have the greatest wavelengths and ending with those that have the shortest wavelengths.
  
- 2) **Graded.** Which of the following lists of EM waves is sorted correctly from **shortest to longest wavelength**?
  - a. radio, infrared, yellow light, ultraviolet
  - b. green light, infrared, orange light, ultraviolet
  - c. gamma, x-ray, infrared, blue light
  - d. x-ray, blue light, infrared, radio
  
- 3) **Graded.** Two EM photons strike a sensor in a lab. The first one has a greater wavelength. Which photon has more energy?
  - a. the first one
  - b. the second one
  - c. they must have the same amount of energy
  - d. there is not enough information to tell
  
- 4) **Graded.** The ozone layer in our atmosphere is essential for filtering out \_\_\_\_ radiation.
  - a. infrared
  - b. ultraviolet
  - c. gamma
  - d. microwave
  
- 5) Which types of EM waves are most likely to be used in cancer therapy (treating people who have cancer)? Explain why.

Perform the following mathematical operations. You should convert any answers greater than or equal to 1000 or less than or equal to 0.001 should be converted to scientific notation.

6)  $(3.5 \times 10^5) \times (9.3 \times 10^2) =$

7)  $(1.23 \times 10^8) \times (2.2 \times 10^5) =$

8) **Graded.**  $(3.1 \times 10^5) \times (4.6 \times 10^{-2}) =$

9) **Graded.**  $(7.5 \times 10^{-5}) \times (4.8 \times 10^{-6}) =$

10)  $(-7.5 \times 10^4) \times (3.2 \times 10^{-3}) =$

11)  $(-5.9 \times 10^{-15}) \times (-2.4 \times 10^{-13}) =$

12) **Graded.**  $(-8.3 \times 10^{-8}) \times (-3.0 \times 10^6) =$

13) **Graded.**  $(-3.5 \times 10^5) \times (-9.3 \times 10^2) =$

14)  $\frac{2.5 \times 10^6}{5.4 \times 10^7} =$

15)  $\frac{9.5 \times 10^{13}}{1.2 \times 10^6} =$

16) **Graded.**  $\frac{2.9 \times 10^3}{1.1 \times 10^7} =$

17) **Graded.**  $\frac{-8.14 \times 10^6}{2.78 \times 10^{14}} =$

18)  $\frac{2.5 \times 10^{-6}}{5.4 \times 10^4} =$

19)  $\frac{7.3 \times 10^{-10}}{3.3 \times 10^{-14}} =$

20) **Graded.**  $\frac{8.83 \times 10^{-4}}{5.4 \times 10^{-4}} =$

21) **Graded.**  $\frac{4.3 \times 10^4}{8.3 \times 10^{-4}} =$

## Selected Answers

- 1) List the six major regions of the EM spectrum in order, beginning with the EM waves that have the greatest wavelengths and ending with those that have the shortest wavelengths.

*radio, infrared, visible light, ultraviolet, x-rays, gamma rays.*

- 5) Which types of EM waves are most likely to be used in cancer therapy (treating people who have cancer)? Explain why.

*See pp. 534 of textbook.*

*If you are having problems with doing the scientific notation problems, I recommend seeking extra help from either myself or your math teacher.*

***All answers here have been rounded to 2 decimal places.***

6)  $(3.5 \times 10^5) \times (9.3 \times 10^2) = 3.26 \times 10^8$

7)  $(1.23 \times 10^8) \times (2.2 \times 10^5) = 2.71 \times 10^{13}$

10)  $(-7.5 \times 10^4) \times (3.2 \times 10^{-3}) = -240$  or  $-2.40 \times 10^2$  if you converted to scientific notation.

11)  $(-5.9 \times 10^{-15}) \times (-2.4 \times 10^{-13}) = 1.42 \times 10^{-27}$

14)  $\frac{2.5 \times 10^6}{5.4 \times 10^7} = 0.05$  or  $4.63 \times 10^{-2}$  if you converted to scientific notation.

15)  $\frac{9.5 \times 10^{13}}{1.2 \times 10^6} = 7.92 \times 10^7$

18)  $\frac{2.5 \times 10^{-6}}{5.4 \times 10^4} = 4.63 \times 10^{-11}$

19)  $\frac{7.3 \times 10^{-10}}{3.3 \times 10^{-14}} = 2.21 \times 10^4$