Name _____ Date _____ Class _____

MATH SKILLS TRANSPARENCY WORKSHEET 5

Interpreting Waves

Use with Chapter 5, Section 5.1

1. Look at the two waves shown. What is the speed of each wave?

All electromagnetic waves travel at the speed of light (3.00×10^8 m/s)

2. Look at the two waves shown. Which wave has a higher frequency? Which wave has a longer wavelength?

B has higher Frequency
A has a longer wavelength

3. Assume that wave A has a wavelength of 699 nm. Calculate the frequency of the wave. Show your work.

Given: $\lambda = 699\text{nm}$, $c = 3.00 \times 10^8$ m/s, $v = ?$

Soln: $\left(\frac{699\text{nm}}{1}\right)\left(\frac{1\text{m}}{1\times10^9\text{nm}}\right) = 6.99 \times 10^{-7}$ m

$c = \lambda v$

$v = \frac{c}{\lambda} = \frac{3.00\times10^8\text{ m/s}}{6.99\times10^{-7}\text{m}}$

$v = 4.29 \times 10^{14}$ Hz

4. Assume that wave B has a wavelength of 415 nm. Calculate the frequency of the wave. Show your work.

Given: $\lambda = 415\text{nm}$, $c = 3.00\times10^8$ m/s, $v = ?$

Soln: $\left(\frac{415\text{nm}}{1}\right)\left(\frac{1\text{m}}{1\times10^9\text{nm}}\right) = 4.15 \times 10^{-7}$ m

$c = \lambda v$

$v = \frac{c}{\lambda} = \frac{3.00\times10^8\text{ m/s}}{4.15\times10^{-7}\text{m}}$

$v = 7.23 \times 10^{14}$ Hz

5. Compare your calculations in question 4 with your answer to question 3. Do your calculations support your answer in question 2?

Wave B has a higher higher frequency and longer wave length than A

6. If wave A has a frequency of $4.60 \times 10^{14}\ s^{-1}$, what is its wavelength in nanometers? Show your work.

Given: $\lambda = ?$, $c = 3.00\times10^8$ m/s, $v = 4.60\times10^{14}$ Hz

Soln: $c = \lambda v$

$\lambda = \frac{c}{v} = \frac{3.00\times10^8\text{ m/s}}{4.60\times10^{14}\text{ Hz}}$

$\lambda = 6.52\times10^{-7}$ m or 652 nm