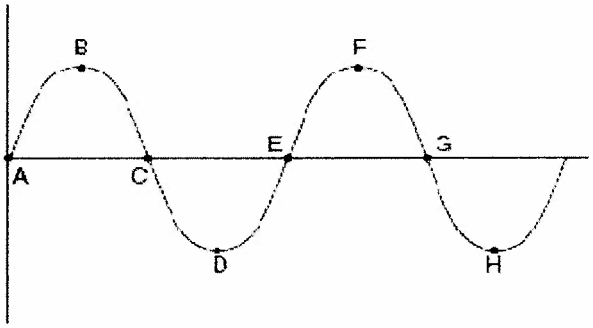
SPH3U0 **Wave Characteristics and Speed Problems** Date:_____

1. a) What is the wavelength and amplitude of the transverse wave shown at right? Mark the appropriate distances on the diagram and use a ruler to determine their values to the nearest millimetre.



Wavelength: _____ **Amplitude:** _____

b) What point(s) are in phase with point C: _____

How does the phase of points B and F compare? _____

How does the phase of points D and F compare? _____

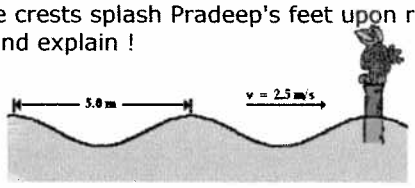
Period and Frequency:

2. A pendulum is swinging with a period of 0.280s. what is its frequency?
3. A wave has a frequency of 18.3 Hz. What is its period?

Universal Wave Equation Problems:

4. A wave on a lake has a cycle length of 0.620 m and a period of 0.300 s. What is the speed of the wave?
5. A wave has a frequency of 15.0 Hz and a wavelength of 65.0 cm. What is its speed?
6. If a wave has a speed of 1500 m/s and a frequency of 11 Hz, what is its wavelength?
7. If a wave has a speed of 405 m/s and a wavelength of 250.0 cm, what is its frequency?

8. The water waves below are traveling along the surface of the ocean at a speed of 2.5 m/s and splashing periodically against Pradeep the Pelican's perch. Each adjacent crest is 5.0 meters apart. The crests splash Pradeep's feet upon reaching his perch. How much time passes between each successive drenching? Answer and explain !



9. Spongebob and Patrick are resting on top of the water near the end of the pool when Patrick creates a surface wave. The wave travels the length of the pool and back in 15.0 seconds. The pool is 25.0 meters long. Find the speed of the wave.

10. While at the beach, you observe that 4.0 waves lap against the shore every 10.0 seconds. You also observe that the wave crests are separated by a distance of 5.0 m. Find the speed of the wave.

Ans: 2) 3.57 Hz 3) 0.0546 s 4) 2.07 m/s 5) 9.75 m/s 6) 140 m 7) 162 Hz 8) 2.0 s 9) 3.33 m/s 10) 2.0 m/s

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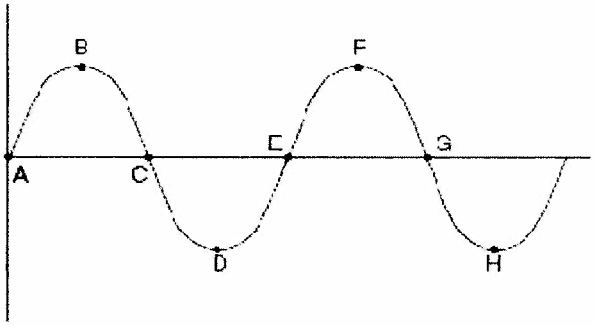

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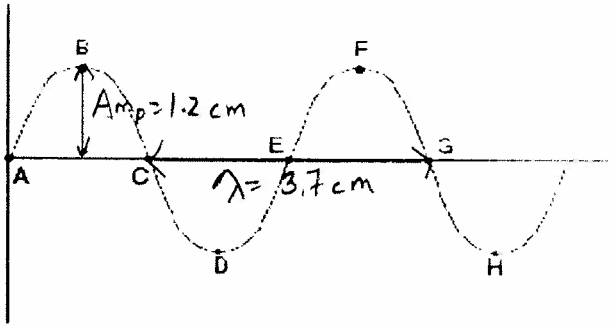

Wavelength: 3.7 cm **Amplitude:** 1.2 cm

b) What point(s) are in phase with point C: G

How does the phase of points B and F compare? same phase

How does the phase of points D and F compare? opposite phase (one half cycle out of phase)

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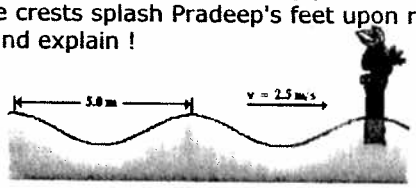

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2] $T = 0.280\,s$ $\quad f = ?$ $\quad f = \frac{1}{T} = \frac{1}{0.280\,s} = 3.57\ Hz$

3] $f = 18.3\,Hz$ $\quad T = \frac{1}{f} = \frac{1}{18.3\,Hz} = 0.0546\,s$

4] $\lambda = 0.620\,m$ $\quad T = 0.300\,s$ $\quad v = \frac{\lambda}{T} = \frac{0.620\,m}{0.300\,s} = 2.07\ m/s$

5] $f = 15.0\,Hz$ $\quad \lambda = 65.0\,cm = 0.650\,m$ $\quad v = f\lambda = (15.0\,Hz)(0.650\,m) = 9.75\,m/s$

6] $v = 1500\,m/s$ $\quad f = 11\,Hz$ $\quad \lambda = ?$ $\quad \lambda = \frac{v}{f} = \frac{1500\,m/s}{11\,Hz} = 136.3\,m \sim 140\,m$

7] $v = 405\,m/s$ $\quad \lambda = 250.0\,cm = 2.500\,m$ $\quad f = ?$ $\quad f = \frac{v}{\lambda} = \frac{405\,m/s}{2.500\,m} = 162\ Hz$

8] $v = 2.5\,m/s$ $\quad \lambda = 5.0\,m$ $\quad T = ?$ $\quad T = \frac{\lambda}{v} = \frac{5.0\,m}{2.5\,m/s} = 2.0\,s$

The time between splashes represents the interval between successive crests which would be the time for one full cycle.

9] $\Delta t = 15.0\,s$ $\quad \Delta d = 25.0\,m \times 2 = 50.0\,m$ $\quad v = ?$ $\quad v = \frac{\Delta d}{\Delta t} = \frac{50.0\,m}{15.0\,s} = 3.33\,m/s$

10] $\lambda = 5.0\,m$ $\quad N = 4.0$ $\quad \Delta t = 10.0\,s$ $\quad f = ?$ $\quad v = ?$

$f = \frac{N}{\Delta t} = \frac{4.0}{10.0\,s} = 0.400\ Hz$

$v = f\lambda = (0.400\,Hz)(5.0\,m)$

$= 2.0\,m/s$