Answer on Question #83573 - Physics - Mechanics – Relativity

Your floating in the sea, measuring waves (as you do). You time 5 seconds between one crest passing and the next.

a) What is the period of this wave ?

b) what is the frequency of this wave?

c) by watching the waves move along a breakwater you estimate that the distance that the distance between 10 crests is 30m. Calculate the average wavelength of the waves.

d) How far have the waves traveled each time a crest passes you?

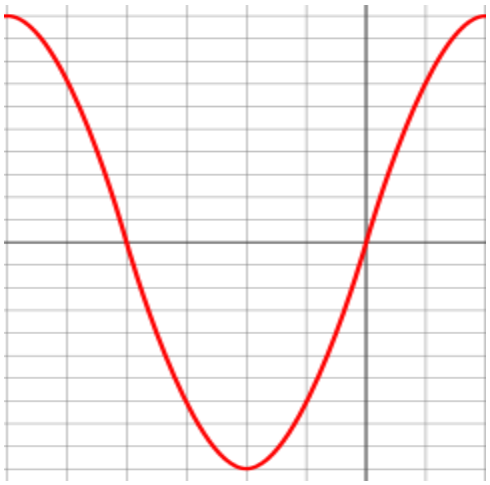
e) how long does it take the wave to pass you

f) how far does the wave travel in one second?

g) what is the speed of the wave?

h) which way do you move as the wave passes through you?

Solution



a) The period is $T = 5$ s since you measure 5 seconds between two crests.
b) Frequency is $\nu = T^{-1} = 5^{-1} = 0.2$ Hz.
c) 10 crests – 3 m, 1 crest – 10 times less, i.e. the average wavelength is 3 m. Thus $\lambda = 3$ m.
d) Each time one crest passes $s = 3$ m.
e) Its period: $t = T = 5$ s.
f) For a 3 m wave it takes 5 s to pass you, therefore in 1 second $v = s/t = 3/5 = 0.6$ m.
g) By analogy: $v = \lambda/T = 3/5 = 0.6$ m/s.
h) Up and down since the waves do not move you in horizontal direction.

Answer

a) 5 s; b) 0.2 Hz; c) 3 m; d) 3 m; e) 5 s; f) 0.6 m, g) 0.6 m/s, h) Up and down.