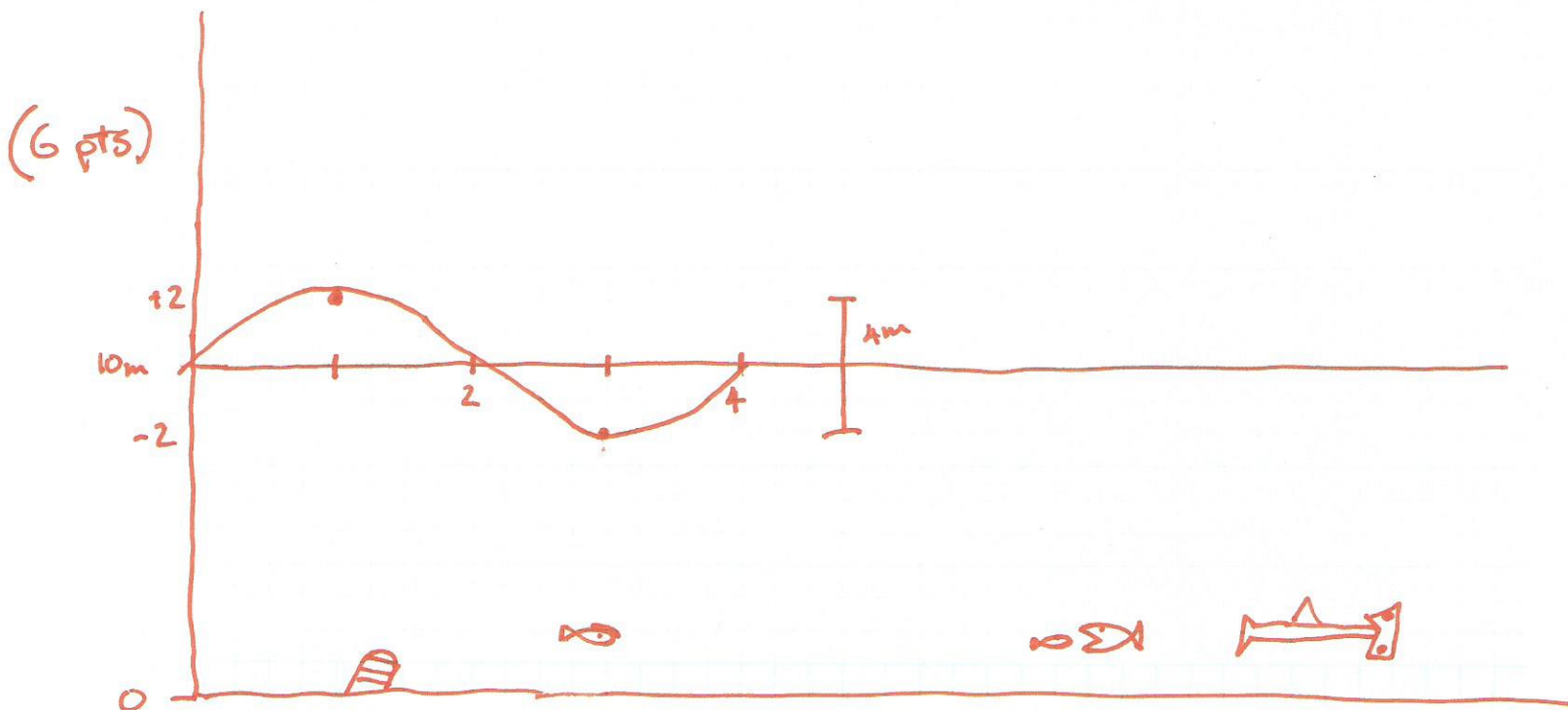


7. (16 points) A toy boat sits on the surface of lake Scappoose. On a calm day the boat would sit **10m** above the lake bottom. Today, a stiff breeze is blowing causing the boat to rise and fall regularly with the waves. The total difference in the height from the top of a wave to the bottom is **4m**. The boat bobs up and down **15** times every minute. Assume the boat begins at the calm lake level.

a) Sketch a graph that models the position of the boat in reference to the lake bottom. Only one period of the function is necessary.



(8 pts) b) Find an equation for this model.

$$h = 2 \sin 8\pi t + 10$$

$$y = 2 \sin 8\pi x + 10$$

(Handwritten annotations: 2pts above each term in the equations)

$$\frac{15 \text{ waves}}{60 \text{ sec}} = \frac{1 \text{ wave}}{4 \text{ sec}} = \text{period}$$

$$2\pi \cdot 4 = \frac{k}{2\pi} \cdot 2\pi$$

$$8\pi = k$$

c) What is the maximum displacement between the boat and the lake bottom.

