Word Problems with Sine and Cosine

Mark Twain sat on the deck of a river steamboat. As the paddlewheel turned, he noticed a dead fish caught on one of the paddles. As the wheel turned, the distance, d, that the fish was from the water's surface was a periodic function of time. When his stopwatch read 4 seconds, the fish was at its highest, 16 feet above the water's surface. It took another 10 seconds before the fish reached that height again. The diameter of the wheel was 18 feet.

(a) Sketch a graph.

(b) Write an equation.

(c) How far above the surface was the fish when Mark's stopwatch read 5seconds? 17 seconds?

(d) What is the first positive value of time at which the fish was at the water's surface?

The depth d in feet of the water in a bay at any time is given by $d(t) = \frac{3}{2}\sin(\frac{5\pi}{31}t) + 23$, where t is the time in hours.

Describe what each represents in context:

Amplitude:

Period:

Midline:

Max/Min:

You try:
Sean got a new yo-yo and noticed that the height of the yo-yo can be modeled by a periodic function. At time $t = 3$ seconds, the yo-yo is at its lowest height of 40 cm above the ground. The string is 62 cm long and one cycle takes 2 seconds. Find an equation that will determine the height of the yo-yo at any time t.