Name_____ Date_____ Period_____

Worksheet 5.5B—Xtra Practice

Show all work on a separate sheet of paper. A calculator **is permitted**. Report <u>three decimals and units</u> in all final answers.   **NO ROUNDING ERROR, EVER, AT ALL. Store intermediate values or use exact values.**

Rock-in-the-Tire Problem
As Norman drives into his garage at night, a tiny stone becomes wedged between the treads in one of his tires. As he drives to work the next morning in his Toyota Corolla , as his tires make 10 rotations every second, the distance of the stone from the pavement, in inches, varies sinusoidally with the time he spends traveling.   Assume that his wheel has a radius of 12 inches and that at $t = 0$ seconds, the stone is at the bottom of the tire.

(a) Sketch a graph of the stone's distance from the pavement, in inches, as a function of time, in seconds. Show at least one cycle and at least one critical value less than zero.

(b) Determine the equation that most closely models the distance of the stone, in inches, from the pavement, $h(t)$, as a function of time, in seconds, t.

(c) How much time has passed when the stone is 9 inches from the pavement going TOWARD the pavement for the SECOND time?

(d) If Norman works precisely 3 miles from his house, how high is the stone from the pavement when he gets to work? Is it on its way up or down? How can you tell?

(e) If Norman's cat is riding in the car with him to work, how fast is Norman's cat travelling down the road in Norman's car? Show the work that leads to your answer *meow*.

(f) If on the way to Norman's work , Norman's cat spots a dog riding a bicycle, Norman's cat is looking out the window out of what type of car?