Name: _____ Period: _____ Date: _____

Using the position formula

When an object is in uniform motion (moving with a constant velocity), we can use this formula to describe its position at different times:

$$x_f = x_i + v\,\Delta t$$

Here x_i is the object's initial position, v is velocity, Δt is the time interval since it was in its initial position, and x_f is the final position (where it is "now").

Work these problems on a separate piece of paper. Please start EVERY problem by writing the position formula using only letters <u>like you see it above</u>, then filling in the values that you know and working from there to get the variable that you need.

Problems with $x_i = 0$

1. Suppose a buggy is released from the 0 cm mark on a long road. It moves with a velocity of 36 cm/s. Where will it be after 7 seconds?
2. A bowling ball on a hard tile floor makes a great approximation of uniform motion. Suppose Mr. Stonebraker pushes a bowling ball and you make measurements while it rolls. The ball moves a total of 3.86 m in 4.04 s. What was its velocity?
3. The "Looping Chariot", a space-age moon buggy – blasts off at a velocity of 54 cm/s. How long would it take for the Chariot to drive 5.5 m?

Problems with nonzero x_i

4. For her morning run, Xueli got on the running trail at the 12 km marker. Her average speed is about 5.4 km/h. She wants to run for 35 minutes before turning around to go back to her car. According to the markers on the trail, where will she be when she turns around?
5. If Xueli runs the other direction on the trail instead, where will she be after her 35 minutes are up?
6. After her run, Xueli is resting at the 12 km marker before she heads to school. Her friend Sydney comes riding down the trail on her bike, moving toward the lower-numbered markers. Sydney says she's been riding for 50 minutes at about 20 km/h. After Sydney rides away, Xeuli wonders where Sydney got on the trail.
7. A tiny caterpillar is walking along a palm leaf. When you first started watching, it was 3.21 cm from the stem of the leaf. 90 seconds later, it was 12.80 cm from the stem. What is the caterpillar's velocity?
8. The Interstate-95 exit for New Haven Ave (route US-192) in Melbourne is at mile marker 180. The nearest Fort Lauderdale exit is at mile 29. If you drive with a velocity of -70 miles/hr (negative because you're going south), how much time would it take you to reach Fort Lauderdale?