

### Quiz #3

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Name: \_\_\_\_\_

For a single run of a cart on an inclined air track, you have made 74 measurements of position vs time. The units of position were in cm, and the units of time were in seconds. You've already entered the data into Excel and used `Linest` to determine the best fit parabola. Here is a screen shot of the results:

x vs. t	a	b	c
value:	33.71434	1.231769	-0.18541
uncert:	0.67037	0.93672	0.273124

1. What was the position of the cart when the time was  $t = 0$ ? \_\_\_\_\_ cm

2. What was the corresponding uncertainty of the initial position?  $\pm$  \_\_\_\_\_ cm

3. What was the acceleration of the cart during this experiment? \_\_\_\_\_ cm/s<sup>2</sup>

*Hint: see 4a on page 9 of the lab manual!*

4. What is the corresponding uncertainty in the acceleration?  $\pm$  \_\_\_\_\_ cm/s<sup>2</sup>

5. This question won't use any of the linest results... it's a fresh start. Prior to the experiment, you measured that  $\theta = (4.50 \pm 0.30)^\circ$ . Using this measurement, and knowing that  $g \approx 980 \text{ cm/s}^2$ , determine the expected acceleration of the cart (see page 10) \_\_\_\_\_ cm/s<sup>2</sup>

6. To determine the uncertainty associated with question #7, we use  $\Delta a = |g \Delta \theta \cos \theta|$ , where  $\Delta \theta$  MUST be in radians. First convert  $\Delta \theta$  to radians:  $\Delta \theta =$  \_\_\_\_\_ rad

7. Now, determine  $\Delta a$  based on only the initial angle measurement given in question #7.  
 $\Delta a = \pm$  \_\_\_\_\_ cm/s<sup>2</sup>

8. Questions (3 with 4) and (5 with 7) represent two conclusions about the same quantity. Compare the quality and the level of agreement of these two results:

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9. Interpret the reason that your answer #1 was negative.

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10. You expected answer #1 to be zero. Knowing this, how reasonable is the actual result?

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