

Name:

Solution

Quiz #9

(10 points; 5 minutes)

Full credit will be given if you get the correct answer, regardless of method.**Partial Credit may given only if you follow the methods from class.****Use at least 3 sig-figs throughout.**

17. A train is rounding a circular curve of radius 220 m. At a certain instant, the angular acceleration of the train is $1.3 \times 10^{-3} \text{ rad/s}^2$, and its angular speed is 0.040 rad/s. Find the magnitude of the total acceleration of the train.

$$a_c = \frac{v^2}{R} = R\omega^2$$

$$a_T = R\alpha$$

$$a = \sqrt{a_c^2 + a_T^2}$$

$$a = \sqrt{R^2\omega^4 + R^2\alpha^2}$$

$$a = R\sqrt{\omega^4 + \alpha^2}$$

Your answer:

$$|a| = 0.4535 \text{ m/s}^2$$

Name:

Soltan

Quiz #9

(10 points; 5 minutes)

Full credit will be given if you get the correct answer, regardless of method.**Partial Credit may given only if you follow the methods from class.****Use at least 3 sig-figs throughout.**

14. A ball of radius 0.2m rolls along a horizontal table with constant speed 3.5 m/s. The ball rolls off the edge and falls a vertical distance of 1.8m before hitting the floor. What is the angular displacement of the ball while it is in the air?

I. $v_{cm} = \omega R$, so $\omega = \frac{v_{cm}}{R}$

II. Free fall, Eq 1: $0 = h + v_{y0}t - \frac{1}{2}gt^2$

$$t = \sqrt{\frac{2h}{g}}$$

III. $\omega = \frac{\Delta\theta}{t}$, so

$$\Delta\theta = \omega t = \left(\frac{v_{cm}}{R}\right) \left(\sqrt{\frac{2h}{g}}\right)$$

(1.69 revs)

Your answer:

$$\Delta\theta = 10.6 \text{ rad}$$