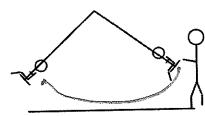Name: _____ Class: _____ Date: _____

PQ3: Circular motion

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1. An object moves at a constant speed in a circular path. Which of the following statements are true?
1. The velocity is changing. Y
2. The velocity is constant. No
3. The magnitude of angular acceleration is constant. y
4. The magnitude of angular acceleration is changing N

a. 2, 3   c. 2,4
b. 1,3   d. 3,4

A little girl is on a swing when her dad lifts her up and pushes her. The swing rotates 100° in 2 seconds. The length of the rope holding the swing is 2.7m long. answer the following questions. All questions will only refer to a 1/2 swing from her dad to the farthest point she reaches. as seen in picture

_____ 2. Based upon normal frame of reference, how would you describe the sign of the angular velocity and the angular acceleration as the kid swings up the back side of the ride?
a. - /-   c. +/+
b. +/-   d. -/+

_____ 3. As the girl kept swinging, the swing radians reduced to 1.0 rad but the time it took to complete the swing stayed the same. (2 seconds). How far did the girl swing in that half of her swing.
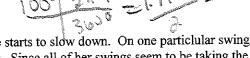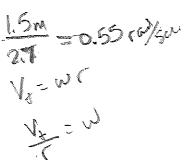a. 1.0m   c. 2.7m
b. 10m   d. 3.4m

$d = \theta r$

_____ 4. What is the magnitude of the angular velocity over the course of the swing described in the picture?
a. 0.87   c. 50
b. 1.74   d. 100

$\frac{100°}{360°} \cdot 2\pi\ rad = 1.74\ rad$ $\frac{1.74\ rad}{2} = .87$

_____ 5. The girls top speed occurs at the very bottom of the swing, after which she starts to slow down. On one particlular swing her top tangental velocity is 1.5m/s and she stops at the top of every swing. Since all of her swings seem to be taking the exact same time what is the average angular acceleration of her swing on the up and downward halves?
a. 1.1   c. 0.55
b. 2.7   d. 1.5

$\frac{1.5m}{2.7} = 0.55\ rad/sec$

$V_t = \omega r$

$\frac{V_t}{r} = \omega$

Name: _____

Short Answer

$$30$$

$$d = 2\pi r \quad 2\pi 30 =$$

6. Miranda drives her car clockwise around a circular track of radius 30m. she completes 10 laps around the track in 2 minutes. Find Miranda
   a. Total distance traveled. $188m \cdot 10 = 1880m$
   b. Angular displacement $2\pi \cdot 10 = 20\pi$
   c. V tangential
   d. RPM
   $10/2 = 5RPM$ $V_t = wr$ $.52 \cdot 30 = \boxed{15.7 m/s}$

   $w = \dfrac{\Delta\theta}{t}$ $\dfrac{20\pi}{120sec} = .52$

7. A student jumps rope for 30 seconds while another student counts the number of revolutions at 80. The student is about 1.8m tall and the rope just misses her head. Answer the following questions.

   a. What is the angular velocity? $\dfrac{2\pi \cdot 80}{30} = 16.7 \dfrac{rad}{sec}$

   b. How many RPM does the rope make?
   $\dfrac{80}{.5} = 160 RPM$

   c. If the farthest point of the rope hits the other student, how fast woudl the rope hit her?
   $V_t = wr$ $16.7 \cdot .9 = \boxed{15 m/s}$

   d. The farthest point of the rope travels how far?
   $d = \theta r$ $2\pi \cdot 80 \cdot .9 = 452m$

   $0.9m$

   e. The student's hands travel little to no distance... Why?
   — Short Radius