Name _____   Date _____
Honors Physics   Gravity and Circles WS #6H
Period _____   Mrs. Nadworny
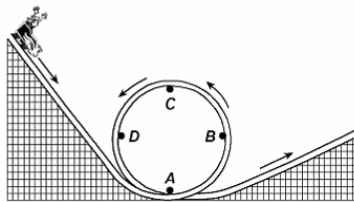
Vertical Circles

Directions – Solve the following problems using the GUESS method and correct significant figures. Be sure to show ALL work!

Questions 1 and 2 refer to the following:

A roller coaster cart starts from rest and accelerates, due to gravity, down a track. The cart starts at a height that enables it to complete a loop in the track. [Neglect friction.]

1. Which diagram best represents the path followed by an object that falls off the cart when the cart is at point D?

    A)   B)   C)   D)

2. The magnitude of the centripetal force keeping the cart in circular motion would be greatest at point

    A) A   B) B   C) C   D) D

3. A child with a mass of 40.0 kilograms rides on a Ferris wheel as shown below. The child moves in a vertical circle of radius 14.8 m at a constant speed of 3.10 m/s. Calculate the magnitude of the Ferris wheel's supportive force on the child at the top AND bottom.

<u>Top</u>

$$F_{net} = F_c = \frac{mv^2}{r}$$

$$F_N = F_g - \frac{mv^2}{r}$$

$$F_N = mg - \frac{mv^2}{r}$$

$$F_N = (40.0 \text{ kg})(9.81 \text{ m/s}^2) - \frac{(40.0 \text{ kg})(3.10 \text{ m/s})^2}{14.8 \text{ m}}$$

$$F_N = 366 \text{ N}$$

<u>Bottom</u>

$$F_{net} = F_c = \frac{mv^2}{r}$$

$$F_N - F_g = \frac{mv^2}{r}$$

$$F_N = \frac{mv^2}{r} + mg$$

$$F_N = \frac{(40.0 \text{ kg})(3.10 \text{ m/s})^2}{14.8 \text{ m}} + (40.0 \text{ kg})(9.81 \text{ m/s}^2)$$

$$F_N = 418 \text{ N}$$

Answers in size order: 366, 418