$\qquad$ Hour $\qquad$


1. The Carousel at Valleyfair has a radius of 3.42 m and takes 4.1 sec to circle once. What is the centripetal force you would feel if your mass was 95 kg and how many g's will you feel? (Find v first!) ( $763 \mathrm{~N}, 0.82 \mathrm{~g}$ 's)
2. Two similar trucks each having a mass of $200,000 \mathrm{~kg}$ are 40 m apart.
a. What is the gravitational force of attraction between them? (ans. 0.00167 N )
b. What is the weight (how much gravity pulls on mass) of 1 truck? $\left(1.96 \times 10^{6} \mathrm{~N}\right)$
c. Using the 2 numbers you just calculated, WHY do you think the two trucks do not become attracted to each other like a magnet?
3. Calculate the centripetal force exerted by the sun on the earth. (The radius of the earth's orbit is $1.5 \times 10^{11} \mathrm{~m}$. You will also need the mass of the earth and its period ( T ) in seconds.) (ans. $3.56 \times 10^{22} \mathrm{~N}$ )
4. 

a. Find the gravitational force between the earth and the sun. (The radius of the earth's orbit is $1.5 \times 10^{11} \mathrm{~m}$.) (ans. $3.5 \times 10^{22} \mathrm{~N}$ )
b. Compare your answers to number 3 and number $\mathbf{4 a}$. Explain what you notice.

Name $\qquad$ Hour $\qquad$
5.
a. What is the acceleration due to gravity at a point $400,000 \mathrm{~m}$ above the earth's surface? $\left(8.7 \mathrm{~m} / \mathrm{s}^{2}\right)$ Don't forget the radius of the earth!
b. What velocity must a satellite maintain to stay in orbit at the distance from part $a ?(\approx 7,676 \mathrm{~m} / \mathrm{s})$
6. How far away from the center of the Earth ( r ) would you ( 150 kg ) need to go in order for the acceleration due to gravity to be equal to $7.65 \mathrm{~m} / \mathrm{sec}^{2}$ ? ( $\approx 7,220,758 \mathrm{~m}$ )
7. What would your weight (in N ) be if acceleration due to gravity was $7.65 \mathrm{~m} / \mathrm{sec}^{2}$ ? (1147.5 N)
8. The space shuttle files at roughly 200 miles above the earth's surface. Calculate your weight in Newtons at that height if your mass is 110 kg . Don't forget the radius of the earth and to find $g$ first! (ans. 979 N ) (Find g at that location, then w=mg)
9. Use an equation to solve for the acceleration due to gravity at the earth's surface. Does this number look right?

