

Physics 10154 - Exam #7A

Answer the following two questions. Be sure to clearly indicate your answer with a circle or box. Show all work. If I cannot see how you arrived at an answer, I will deduct points!

1. A rocket is launched into the air with some initial speed and is then in free-fall. Ignoring friction, suppose the rocket reaches a maximum altitude above the Earth's surface of 1200 miles. What must be the initial velocity of the rocket?

Hint: You may not use mgh for gravitational potential energy, nor can you assume constant acceleration since gravitational force gets weaker as you move further from the Earth.

2. A child stands at the rim of a merry-go-round of radius 2.2 meters. The merry-go-round starts from rest and accelerates uniformly at a tangential rate of 1.4 m/s^2 .

a) At what time, t , does the tangential acceleration equal the centripetal acceleration?

b) How much angular distance (in radians) has the merry-go-round moved through during its acceleration?

c) Assuming the merry-go-round continues rotating at a constant speed (from part b) after the initial period of acceleration, what must be the coefficient of static friction between the child's shoes and the merry-go-round if he is on the verge of slipping during this period of constant motion?