

Name: _____ Period: _____

Rollercoaster Screencast Whiteboard Checklist

1. Choose your Amusement Park Ride. It has to be about circular motion, energy conservation, or free fall acceleration.
2. Research your ride to acquire the necessary information about the ride.
3. Find a video clip of the ride that will allow you to collect the necessary data for the ride.
4. Draw a labeled diagram of the ride. Include any necessary measurements to your diagram.
5. Take the necessary data for the ride.
6. Answer the appropriate questions for your selected type of ride.

Circular Motion Ride

The following information needs to be acquired for a circular motion ride:

Radius of ride

Period of the ride

Mass of passenger

Answer the following questions about your circular motion ride:

1. What is the ride's circumference?
2. What is the rider's tangential speed?
3. What is the rider's centripetal acceleration?
4. What is the centripetal force exerted on the rider?

Energy Conservation Ride

The following information needs to be acquired for an energy conservation ride:

Height of first hill from the ground

Height of bottom of first drop from the ground

Length of one car in the train

Number of cars in the train

Mass of one car

Time for entire train to pass the top of the first hill

Time for entire train to pass the bottom of first drop

Answer the following questions about your energy conservation ride:

1. What is the train's velocity at the top of the hill?
2. What is the train's velocity at the bottom of the first drop?
3. What is the train's gravitational potential energy at the top of the first hill?
4. What is the train's kinetic energy at the top of the first hill?
5. What is the train's gravitational potential energy at the bottom of the first drop?
6. What is the train's kinetic energy at the bottom of the first drop?

Free Fall Acceleration Ride

The following information needs to be acquired for a free fall acceleration ride:

Height of the ride

Length of free fall

Time it takes the ride to reach the top

Time it the ride is in free fall

Answer the following questions about your free fall acceleration ride:

1. What is the ride's velocity as it goes to the top? Assume zero acceleration.
2. What is the free fall acceleration of the ride?
3. What is the ride's velocity at the end of it's free fall?

Free fall acceleration

$$v_2 = v_1 + at$$
$$x_2 = x_1 + v_1t + \frac{1}{2}at^2$$
$$v_2^2 = v_1^2 + 2a(x_2 - x_1)$$

x_1 = initial position v_2 = final velocity
 x_2 = final position a = acceleration
 v_1 = initial velocity t = time

Rollercoaster

$$v = \frac{(\text{length of one car})(\# \text{ of cars})}{(\text{time to pass a single point on the track})}$$
$$U_g = mgh \quad KE = \frac{1}{2}mv^2$$

Momentum

$$p = mv \quad J = \Delta p = Ft$$

elastic collision

$$m_a v_{1a} + m_b v_{1b} = m_a v_{2a} + m_b v_{2b}$$

inelastic collision

$$m_a v_{1a} + m_b v_{1b} = (m_a + m_b)v$$

Circular Motion

$$Circ = 2\pi r \quad v = \frac{2\pi r}{T}$$
$$a_c = \frac{v^2}{r} \quad F_c = ma_c$$