Name _____ Hour _____

Roller Blade Lab

Purpose: Determine the relationship between force, mass, and acceleration.

$$a = \frac{\Delta x}{\frac{1}{2} \cdot \Delta t^2}$$

PART 1: Mass and acceleration

Skater #1_____

Mass = 45.5

Weight =_____

Skater #2_____

Mass = 65.9

Weight =_____

Distance (m)	Force (N)	Time (sec)	Acceleration (m/sec^2)
3	20	4.2	
6	20	6.1	
3	20	7.2	
6	20	10.3	

When the force remains constant but the mass is increased, the acceleration will:

Increase / Decrease

PART 2: Force and acceleration

Skater #1_____

Mass = 45.5

Weight =_____

Skater #2_____

Mass = 65.9

Weight =_____

Distance (m)	Force (N)	Time (sec)	Acceleration (m/sec^2)
3	30	3.2	
6	30	4.6	
3	30	5.6	
6	30	7.9	

When mass remains constant but the force is increased, the acceleration will:

Increase / Decrease

General Conclusions:

1. As mass increases, acceleration _____ (if force is constant).
2. As force increases, acceleration _____ (if mass is constant).

Analysis:

1. What happened to the **speed** of the skater as they proceeded down the track?

2. What happened to the **acceleration** of the skater as they proceeded down the track?

3. Applying a **constant force** (or as close as we could get) produced a **CONSTANT** velocity or acceleration. (**circle one**) Look at your answers to #1, 2!

4. Assume the force is constant. If the mass increases, what happens to acceleration?

5. Assume the mass of the skater is constant. If the force increases, what happens to the acceleration?

6. Mass and force are _____related.
7. Force and acceleration are _____related.
8. Mass and acceleration are _____related.

Choose either:
Directly related
Inversely related

9. Let's say a skater weighs 140 lbs. What would their weight be in Newtons?

10. Suppose a 3 N force is applied to the skater and **no movement results**. What **1 word** can be used to explain this?

11. You pulled a skater with a mass of 65 kg from rest a distance of 9.2 m in 5.0 sec.
    a. What was the skater's **acceleration**?

    b. What was the skater's **final velocity**? Solve for this using **2 different equations**!

Equation 1: **Equation 2:**

    c. Calculate the **force** that was exerted on the skater?

    d. What was the skater's **weight** in **Newtons**? _____

    e. What was the skater's **weight** in **pounds**? _____