Warm Up

1. A student drops a ball from a window 3.5 m above the sidewalk. How fast is it moving when it hits the sidewalk?
2. How far from the base of a 750. m tall bridge did a ball land if it was kicked horizontally at a speed of 4.55 m/s?
3. How fast is a car going if it was going 15.0 m/s and accelerated by 2.24 m/s^2 for 135 m?

Targets

- I can apply Newton's Laws of Motion to the real world.

Newton's Laws

Newton's First Law

- It states: objects in motion will remain in motion, and objects at rest will remain at rest unless an outside force acts on the objects.

- The first law is sometimes referred to as the law of inertia.
- Inertia is the tendency of an object to resist a change in its motion.
- It tends to remain in motion with the same direction and speed.

Newton's Second Law

- Mass is a measure of the inertia of an object and depends on the amount of matter the object contains.
- F = ma
- There is a relationship between mass and acceleration.

Practice

1. What is the mass of an object that is accelerated to 3.0 m/s^2 with a force of 175 N?
2. What is the acceleration of a 15 kg mass with 195 N of force applied to it?
3. What is the mass of a ball that accelerated at 8.0 m/s^2 with an applied force of 25 N?

Weight

- Weight is the force of gravity acting on an object.
- Weight = Mass x Acceleration of gravity
- Weight can change if there is a change in the acceleration.

- Mass is a measure of the inertia of an object; weight is a measure of the force of gravity acting on an object.
- Astronaut on Earth; mass = 88 kg; weight = 863 N
- Astronaut on Moon; mass = 88 kg; weight = 141 N
- What is the gravity on the moon?

Newton's Third Law

- It states: for every action, there is an equal and opposite reaction.
- Forces exist in pairs.
- These two forces are called action and reaction forces.
- $F_A = ^-F_R$

Summary

- Newton's 1st law describes inertia.
- Newton's 2nd law relates mass and acceleration.
- Newton's 3rd law relates interactive forces.

Assignment

- Force Calculations