Newton's 2nd Law Practice Problems

For use with Video 2 – The Law of Acceleration (F = ma)

Doktor Kaboom – It's *Just* Rocket Science™

GLOSSARY

Acceleration (a) – any change in the speed and/or direction of movement of an object as a result of force. It is measured in meters per second per second or meters per second squared (m/s^2).

Force (F) – anything that acts on a body to change its rate of acceleration or alter its momentum. It is measured in Newtons (N).

Mass (m) – the amount of matter in an object. It is measured in kilograms (kg).

PROBLEMS (and answers)

Find the acceleration of an object with 1 kg and 1 N.
A: 1 m/s^2

A force of 20 N acts upon a 5 kg block. Calculate the acceleration of the object.
A: 4 m/s^2

Find the force of an object with 8 kg and 3 m/s^2.
A: 24 N

Find the mass of an object with 10 N and 1 m/s^2.
A: 10 kg

Aliya kicks a soccer ball with a mass of 0.5 kg. It accelerates with a rate of 5 m/s^2.
Doktor Kaboom kicks a bowling ball with a mass of 5 kg. It accelerates at 2 m/s^2.
What are the Forces on the two balls? Whose foot do you think hurts more? Why?
A: Soccer Ball: 2.5 N Bowling Ball: 10 N
A: Doktor Kaboom's foot probably hurts more. Newton's third law means the Force is acting on the balls, but also on the feet doing the kicking.

Miguel uses 3000 Newtons to push Ted in a wheelchair. Ted accelerates at 50 m/s^2 before slowing down to turn a corner. What is the mass of Ted and the wheelchair?
A: 60 kg

What is the acceleration of a 50 kg object pushed with a force of 500 Newtons?
A: 10m/sec^2

Find the acceleration of an object with 4 N and 0.2 kg.
A: 20 m/s^2

The mass of a young elephant is 100 kg. How much force would be required to accelerate the elephant at a rate of 3 m/s^2?
A: 300 N

An object of mass 300 kg is observed to accelerate at the rate of 4 m/s^2. Calculate the force required to produce this acceleration.
A: 1200 N

Find the mass of an object with 17 N and an acceleration of 1.7 m/s^2.
A: 10 kg

Doktor Kaboom is skiing. He is not a good skier. If he has a mass of 103 kg, and an acceleration of 14m/s^2, what is the Force Doktor Kaboom feels when he skis into a tree?
A: 1442N **(KABOOM!)**

Problems provided by Doktor Kaboom!