Name _____ Date _____ Class _____

Math Skills LESSON 3

Newton's Second Law Equation

Newton's second law of motion states that the acceleration of an object equals the net force on the object divided by the object's mass. This can be shown by the equation below, where a = acceleration (in m/s^2), F = net force (N), and m = mass (in kg).

$$a = \frac{F}{m}$$

You can rearrange the equation to solve for force or mass.

$$F = m \times a \qquad m = \frac{F}{a}$$

If a **4.5**-kg bowling ball is rolled down the bowling lane with a force of **15** N, what is the acceleration of the ball?

Step 1 Identify the variable you will solve for and choose the appropriate equation. You are solving for a, the acceleration.

$$a = \frac{F}{m}$$

Step 2 Substitute the known values to solve the equation.

$$a = \frac{15\ \text{N}}{4.5\ \text{kg}}$$

$$a = 3.3\ \text{m/s}^2$$

Practice

1. If a 6-kg bowling ball is rolled down the bowling lane with a force of 12 N, what is the acceleration of the ball?

2. If a 16-N net force makes an object accelerate at 8 m/s^2, what is the mass of the object?

3. A 25-N net force is applied to a rolling cart and produces an acceleration of 5 m/s^2. What is the cart's mass?

4. A 0.5-kg ball accelerated at 50 m/s^2. What force was applied?

Name _____ Date _____ Class _____

Key Concept Builder LESSON 3

Newton's Second Law

Key Concept What is Newton's second law of motion?

Newton's Second Law Equation

$$\text{Acceleration (in m/s}^2) = \frac{\text{net force (in N)}}{\text{mass (in kg)}}$$

$$a = \frac{F}{m}$$

$$F = m \times a$$

$$m = \frac{F}{a}$$

Directions: *Use the equation to answer each question.*

1. A boy throws a 1-kg rock with a force of 5 N. What is the acceleration of the rock when he lets go of it?

_____

2. A toy boat accelerates through calm water at 2.5 m/s^2 powered by a motor exerting a net force of 5 N. What is the mass of the boat?

_____

3. A net force pushing a 15-kg wagon on a level road results in an acceleration of 2 m/s^2. What is the net force?

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