**Newton’s Second Law of Motion Problems Worksheet**

**Newton’s Second Law of Motion**, sometimes called the **law of force and motion** or **law of acceleration**, states that:

**An object acted on by an unbalanced force will accelerate in the direction of that force, in direct proportion to the strength of the force, and in inverse proportion to the mass of the object.**

In maths… these mean the following formula – which can be written three ways:

F

m

a

x

**÷**

**÷**

force = mass x acceleration

or

mass = force ÷ acceleration

or

acceleration = force ÷ mass

Remember that - m, mass, must always be in kilograms

* f, force, must always be in Newtons
* a, acceleration, must always be in m/s/s (m/s2, or m.s-2)

***In the problems below, you will be given the mass and the acceleration, and need to solve for force, using the equation F = ma****.*

Write your answer here, with the correct units.

1. An object with a mass of 2.0 kg accelerates 2.0 m/s2 when an unknown force is applied to it. What is the the force?
2. An object with a mass of 5.0 kg accelerates 8.0 m/s2 when an unknown force is applied to it. What is the force?
3. An object with a mass of 1500 g (grams) accelerates 10.0 m/s2 when an unknown force is applied to it. What is the force?

**In the second set of problems below, you will be given the force and the acceleration, and then need to solve for mass.**

Write your answer here, with the correct units.

1. An object accelerates 3.0 m/s2 when a force of 6.0 newtons is applied to it. What is the mass of the object?
2. An object accelerates 12.0 m/s2 when a force of 6.0 newtons is applied to it. What is the mass of the object?
3. An object accelerates 5.0 m/s2 when a force of 20.0 newtons is applied to it. What is the mass of the object?
4. An object accelerates 2.0 m/s2 when a force of 12.0 newtons is applied to it. What is the mass of the object?

***In the third set of problems below, you will be given the force applied to an object and the mass of that object, and then will need to solve*** *for acceleration.*

Write your answer here, with the correct units.

1. An object with a mass of 2.0 kg has a force of 4.0 newtons applied to it. What is its acceleration ?
2. An object with a mass of 5.0 kg has a force of 20.0 newtons applied to it. What is the acceleration?
3. An object with a mass of 2300 g has a force of 6.2 newtons applied to it. What is the acceleration?

***In the following problems, solve for the missing variable, using the two variables provided.***

Write your answer here, with the correct units.

1. An object accelerates 8.2 m/s2 when a force of 20.1 newtons is applied to it. What is the mass?
2. An object with a mass of 6.3 kg has a force of 7.1 newtons applied to it. What is the acceleration?
3. An object with a mass of 6.5 kg accelerates 12.3 m/s2 when an unknown force is applied to it. What is the force?