Name: _____

Newton's Laws of Motion Webquest

The motion of an aircraft through the air can be explained and described by physical principles discovered over 300 years ago by _____. Newton worked in many areas of mathematics and physics. He developed the theories of gravitation (←click link & answer the questions) in 1666, when he was only 23 years old.

Question 1: What is weight?

Question 2: Label the following plane

Some twenty years later, in 1686, he presented his three laws of motion in the "Principia Mathematica Philosophiae Naturalis." The laws are shown above, and the application of these laws to aerodynamics are given on separate slides.

Newton's first law (←click on this link) states that every object will remain at _____ or in uniform motion in a _____ line unless compelled to _____ its state by the action of an external force. This is normally taken as the definition of _____. The key point here is that if there is **no** _____ _____ acting on an object (if all the external forces cancel each other out) then the object will maintain a **constant** _____. If that velocity is zero, then the object remains at rest. If an external force is applied, the velocity will change because of the force.

First Law states that:

_____

Give an example of Newton's First Law with respect to airplane motion.

_____

Give an example of Newton's First Law with respect to a kite's motion.

_____

The second law explains how the _____ of an object changes when it is subjected to an external force. The law defines a _____ to be equal to change in **momentum** (mass times velocity) per change in time. Newton also developed the calculus of mathematics, and the "changes" expressed in the second law are most accurately defined in differential forms. (Calculus can also be used to determine the velocity and location variations experienced by an object subjected to an external force.) For an object with a constant mass **m**, the second law states that the force **F** is the product of an object's mass and its acceleration **a**:

Write the equation for force: _____

What does each letter stand for: **F** = _____ **m**= _____
a=_____

For an external applied force, the _____ in velocity depends on the _____ of the object. A force will cause a change in velocity; and likewise, a change in velocity will generate a force. The equation works both ways.

Question 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 amount of the force? _____

Questions 2: 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? _____

Question 3: An object with a mass of 3.0 kg has a force of 9.0 newtons applied to it. What is the resulting acceleration of the object? _____

The third law (←click on this link) states that for every _____ (force) in nature there is an _____ and _____ reaction. In other words, if object A exerts a force on object B, then object B also exerts an equal force on object A. Notice that the forces are exerted on different objects. The third law can be used to explain the generation of lift by a wing and the production of thrust by a jet engine.

Explain one of the three examples that explain Newton's Third Law.

_____

View a short movie of "Orville and Wilbur Wright" explaining how Newton's Laws of Motion described the flight of their aircraft. Type 3 facts that you learned from this video about Newton's Laws of Motion.

1. _____

2. _____

3. _____