

# S U M M A R I E S

## **INVESTIGATION 1: The Force of Gravity**

In Investigation One, you explored the force required to hold an object stationary in the air. During this Investigation, you:

1. measured the force of gravity acting on an object.
2. compared the mass of the object to the force of gravity.
3. used a spring scale to measure forces in Newtons.

Through these experiments, you found that:

1. the force of gravity on an object depends on the mass of the object.
2. the force of gravity is equal to an object's weight.
3. forces are measured in Newtons.
4. when balanced forces act on a stationary object, the object will remain stationary.

## **INVESTIGATION 2: Acceleration Due to Gravity**

In Investigation Two, you explored the rate at which two objects with different masses, accelerate when dropped from different heights. During this Investigation, you:

1. created objects of varying masses.
2. varied the height from which each object was released.
3. measured the time taken for each object to hit the ground.

Through these experiments, you found that:

1. learned that if forces are unbalanced, an object will accelerate (speed up, slow down, change direction).
2. discovered that the higher the point at which an object is released, the faster it is traveling when it hits the ground.
3. used your data to calculate acceleration of the objects.
4. discovered that the rate of acceleration due to gravity is  $9.8 \text{ m/s}^2$ .
5. discovered that the rate of acceleration due to gravity does not change for objects of differing masses.

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## **INVESTIGATION 3: The Force of Friction**

In Investigation Three, you were introduced to the concept of frictional force and normal contact force. During this Investigation, you:

1. created different surfaces for an object to roll over.
2. compared the difference in texture between three surfaces.
3. measured the distance traveled when an object rolled over these surfaces.
4. investigated the effects of friction on an object's motion.

Through these experiments, you found that:

1. frictional force can lead to unbalanced forces that act on an object.
2. unbalanced forces will accelerate an object (in this case, slow it down).
3. the interaction between surface types is related to the distance an object will travel.
4. rough surfaces result in a higher force of friction than smooth surfaces.

## **INVESTIGATION 4: Measuring the Force of Friction**

In Investigation Four, you explored a method of measuring the force of friction. During this Investigation, you:

1. pulled an object over three different surfaces.
2. measured the frictional force of objects with different weights when pulled over a surface.
3. measured the weight of an object using a spring scale.

Through these experiments, you found that:

1. frictional force can be measured as the force required to pull an object at a constant speed over a surface.
2. balanced forces on an object that is moving, mean that the object continues to move at the same speed and in the same direction.
3. weight is related to the amount of frictional force.
4. weight can be measured using a spring scale because weight is equal to the force of gravity that acts on an object.

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## **INVESTIGATION 5: Force, Mass and Acceleration**

In Investigation Five, you explored how changing forces create acceleration in objects of a particular mass. During this Investigation, you:

1. measured the size and direction of force needed to accelerate a stationary object upwards and downwards
2. measured the size and direction of force required to slow a moving object down when it was previously moving upwards and downwards.
3. measured the size and direction of force required to maintain an object's motion at a constant speed.
4. examined the forces involved in horizontal and vertical motion.

Through these experiments, you found that:

1. unbalanced forces are needed in order to accelerate a stationary object upwards and downwards.
2. unbalanced forces are needed in order to accelerate a stationary object horizontally.
3. the direction of the unbalanced force matches the direction of acceleration.
4. balanced forces cause an object to continue to move horizontally or vertically, at a constant speed.
5. the acceleration of an object can be calculated as the difference in forces (also called the sum of the forces) divided by the mass of the object.