

## S U M M A R I E S

**INVESTIGATION 1: Exploring Forces**

In Investigation One, you explored force and mass. During this Investigation, you:

1. used a spring scale to measure the amount of force on a load.
2. lifted a load consisting of a bucket containing a 100 g weight.
3. lifted a load consisting of a bucket containing water.
4. held a bucket while your partner blew into it.
5. lifted loads consisting of buckets containing different masses.
6. measured the force applied in each trial.

Through these experiments, you concluded that:

1. force is the effort needed to lift or move a load.
2. as the mass of a load increases, you need to exert more force to lift it.
3. all three states of matter (solids, liquids, and gases) exert force.

**INVESTIGATION 2: Understanding Work**

In Investigation Two, you explored the concept of work. During this Investigation, you:

1. used a spring scale to measure the amount of force exerted to lift a load.
2. lifted a load a certain distance.
3. calculated the amount of work done to lift the load.
4. lifted the same load different distances to determine whether distance can change the amount of work done to lift a load.
5. lifted loads of different masses the same distance to determine whether a change in mass can change the amount of work done to lift a load.
6. measured the force required to lift the load in each trial and the distance the load was lifted.
7. used the formula for work to calculate the work performed to lift the load in each trial.

Through these experiments, you concluded that:

1. work can be calculated using a formula ( $\text{Work} = \text{Force} \times \text{distance}$ ).
2. as the distance a load is lifted increases, the work exerted to lift the load increases.
3. as the mass of a load increases, the force on the load increases.
4. as the force exerted on the load increases, the work done to lift the load increases.

## S U M M A R I E S

**INVESTIGATION 3: Simple Machines: The Pulley**

In Investigation Three, you explored a simple machine known as the pulley. During this Investigation, you:

1. sketched and labeled the effort arm and load arm of a pulley.
2. lifted a load without a pulley, then lifted the same load with a pulley.
3. lifted loads of different masses with a pulley.
4. lifted the same load different distances with a pulley.
5. measured the force required to lift the load in each trial.
6. used the formula for work to calculate the work done to lift the load in each trial.

Through these experiments, you concluded that:

1. a pulley makes work feel easier by changing the direction force is applied to a load.
2. a pulley does not decrease the amount of work done.
3. a simple machine often makes work feel easier.

**INVESTIGATION 4: Simple Machines: The Lever**

In Investigation Four, you explored a simple machine known as the lever. During this Investigation, you:

1. constructed a lever, then sketched and labeled the load arm, effort arm, and fulcrum.
2. measured the mass of a load consisting of a bucket and its contents.
3. applied effort at different positions on the effort arm to lift the same load.
4. measured the mass of the effort bucket for each trial.
5. constructed another lever, then measured effort force and the distance the effort was applied.
6. changed the position of the fulcrum and measured the effort force and the distance the effort was applied.

Through these experiments, you concluded that:

1. as the length of an effort arm decreases, the force needed to lift a load increases.
2. changing the position of a fulcrum changes the distance over which a force is applied and the amount of force exerted on the effort arm.
3. as the distance over which force is applied decreases, the force exerted to lift the load increases.
4. the work done on the effort arm of a lever does not change when the position of the fulcrum changes.
5. The work done on the effort arm of a lever equals the work done on the load arm.

## S U M M A R I E S

**INVESTIGATION 5: Simple Machines: The Inclined Plane**

In Investigation Five, you explored a simple machine known as the inclined plane. During this Investigation, you:

1. determined the effort to lift a load 8 cm.
2. created three inclined planes that had three different lengths but a height of 8 cm.
3. measured the effort needed to lift the load 8 cm high using the three different inclined planes.
4. calculated the work done to lift the load 8 cm high using the three different length inclined planes.

Through these experiments, you concluded that:

1. less effort is needed to lift a load using an inclined as opposed to lifting the load vertically.
2. changing the length of an inclined plane does not change the amount of work done when lifting a load a specific height.
3. As the steepness of an inclined plane increases, the effort needed to lift the load increases.