Forces and Motion – Physical Science Unit

Newton's First Law of Motion:

The first law is known as the law of inertia. Inertia is the tendency of all objects to continue doing what they are doing. An object that is moving will keep moving, and an object that is not moving will not begin moving, unless an outside force acts on that object.

Inertia – An object at rest stays at rest, and an object in motion stays in motion, unless the motion is acted on by an outside force.

Force – a push or a pull on an object

Balanced Force – equal forces – NO movement

Unbalanced Force – one force is larger than the other – movement occurs

Gravity – a force that pulls everything toward the center of the Earth. On Earth, gravity causes everything to eventually come down.

Friction – the force that acts against two objects that rub together. Friction causes all objects to slow down, and eventually stop.

Newton's Second Law of Motion:

The second law of motion states that the acceleration of an object is dependent upon the force acting on the object and the mass of an object. If two objects have the same mass and are hit with the same force, their movement will be the same. If two objects have a different mass and are acted on by the same force, the object with less mass will move farther. If two objects have the same mass and are acted on by different forces, the object acted on by the greater force will move farther.

Speed – the measure of how fast an object moves. Speed can be calculated by using distance divided by time. (Distance ÷ Time = Speed)

Velocity – speed with direction. (Example 3 miles per hour to the east.)

Acceleration – rate of increased speed.

Momentum – force or speed of movement. (the mass of an object x velocity = momentum)

Newton's Third Law of Motion

The third law of motion states that actions come in pairs. For every action, there is an equal and opposite reaction.

Physical and Chemical Changes

Physical changes are changes in an object or substances appearance. Examples include folding paper, freezing water, dissolving sugar in water, ice melting, and tearing paper. No new substance is formed.

Chemical changes are when a new substance is formed. Chemical changes can be caused by burning, cooking, rusting, and mixing two chemicals to make a new substance.

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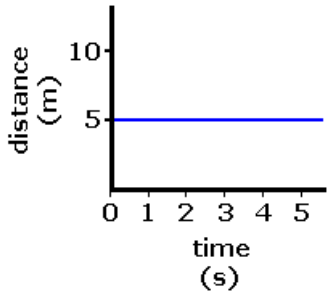
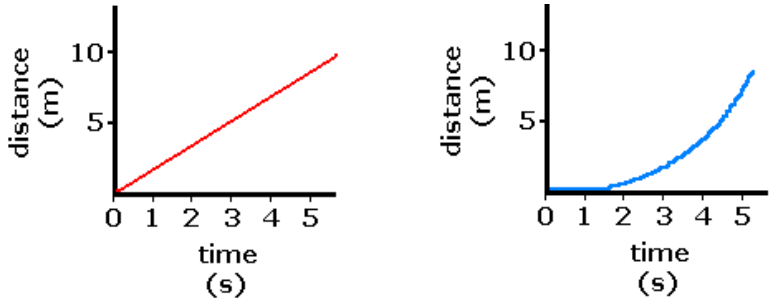
Distance Time Graphs

Distance time graphs are used to show the motion of an object.

Lines on distance-time graphs represent speed. If the line is completely horizontal, this means the object is standing still as you see in the example below. The object is the same distance for five seconds, so no movement occurs.

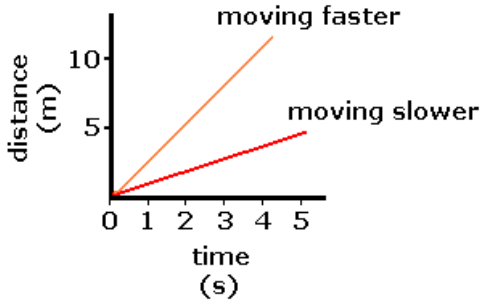


If the line has a positive slope, meaning the line is continuing to go up, the speed is positive. The object is moving away from its origin.



If the line is straight, as in the graph on the left, the object has a constant positive speed. If the line is curved, as in the graph on the right, the object has a non-uniform, or changing, positive speed.

If a graph shows that an object is in motion, then the slope will tell you how fast the object is moving. **The steeper the slope, the greater the speed.**



The coordinates at any point on a distance-time graph tell the object's position at the corresponding time.