

"To Make the Best Better"

4-H Youth Development



Discipline: All
Age Level: Volunteers
Time: 30 minutes

Next Generation Science
Standard :

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Teaching Helps

Not everyone has a physical science background, which can make some STEM lessons seem a little over the top! This is a handy reference with links to videos explaining many of the concepts that we use in shooting sports. While you may apply some of these principles every time you shoot, explaining them to 4-H members can be more difficult. Use this reference to help you!

Glossary of Terms with YouTube Illustrations:

Drag– Drag force is always opposite to the object's motion, and unlike friction between solid surfaces, the drag force increases as the object moves faster. Air resistance, also known as drag, is a force that is caused by air, the force acts in the opposite direction to an object moving through the air.

[wiki.kidzsearch.com/wiki/Drag_\(physics\)](http://wiki.kidzsearch.com/wiki/Drag_(physics))

<https://www.youtube.com/watch?v=Ftj6A2P7lmw>

Forces and Interactions A force is anything that can change the state of motion of an object, like a push or a pull. You use force when you push a letter on the computer keyboard or when you kick a ball. Forces are everywhere. Gravity acts as a constant force on your body, keeping you secure on planet Earth so you don't float away.

To describe a force we use the direction and strength. For example when you kick a ball you are exerting force in a specific direction. That is the direction the ball will travel. Also, the harder you kick the ball the stronger the force you place on it and the farther it will go.

Read more at: http://www.ducksters.com/science/laws_of_motion.php

Kinetic Energy is energy that is in motion. Moving water and wind are good examples of kinetic energy. Electricity is also kinetic energy because even though you can't see it happen, electricity involves electrons moving in conductors.

https://www.enwin.com/kids/electricity/types_of_energy.cfm

<https://www.youtube.com/watch?v=lqV5L66EP2E>



Kinetic energy is the energy an object has due to its motion. As long as an object is moving at the same velocity, it will maintain the same kinetic energy. How is it different from potential energy? Kinetic energy is due to an object's motion while potential energy is due to an object's position or state. When you calculate an object's kinetic energy, its velocity is an important factor. Velocity, however, has nothing to do with an object's potential energy.

Read more at: http://www.ducksters.com/science/physics/kinetic_energy.php

<https://www.youtube.com/watch?v=bDgnOmjCKNQ>

Laws of Motion A scientist named Isaac Newton came up with three Laws of Motion to describe how things move scientifically. He also described how gravity works, which is an important force that affects everything.

Read more at: http://www.ducksters.com/science/laws_of_motion.php

<https://www.youtube.com/watch?v=8iKhLGK7HGk>

First Law of Motion —The first law says that any object in motion will continue to move in the same direction and speed unless forces act on it. That means if you kick a ball it will fly forever unless some sort of forces act on it! As strange as this may sound, it's true. When you kick a ball, forces start to act on it immediately. These include resistance or friction from the air and gravity. Gravity pulls the ball down to the ground and the air resistance slows it down.

Read more at: http://www.ducksters.com/science/laws_of_motion.php

<https://www.youtube.com/watch?v=7Ix-eywqUOg>

Second Law of Motion —The second law states that the greater the mass of an object, the more force it will take to accelerate the object. There is even an equation that says Force = mass x acceleration or $F=ma$. This also means that the harder you kick a ball the farther it will go. This seems kind of obvious to us, but having an equation to figure out the math and science is very helpful to scientists.

Read more at: http://www.ducksters.com/science/laws_of_motion.php

<https://www.youtube.com/watch?v=9XewqINSvJE>

Third Law of Motion —The third law states that for every action, there is an equal and opposite reaction. This means that there are always two forces that are the same. In the example where you kicked the ball there is the force of your foot on the ball, but there is also the same amount of force that the ball puts on your foot. This force is in the exact opposite direction.

Read more at: http://www.ducksters.com/science/laws_of_motion.php

<https://www.youtube.com/watch?v=5eirTBW0rpl>

Momentum is a term that describes the strength of a moving object. Objects that are not moving, do not have any momentum. Things that are moving have less momentum if they are lightweight or moving slowly and the opposite is true if they are moving fast or are heavy. An example of this might be tested at a bowling alley. Imagine trying to knock the pins down with a ping pong ball. The ball is too light, even if it is going fast. The bowling ball is heavier and has more momentum.

Read more at <http://www.scienceforkidsclub.com/momentum.html>

<https://www.youtube.com/watch?v=2eSy3tdANH8>

Potential energy is the stored energy an object has because of its position or state. A bicycle on top of a hill, a book held over your head, and a stretched spring all have potential energy. How is it different from kinetic energy? Potential energy is stored energy while kinetic energy is the energy of motion.

When potential energy is used it is converted into kinetic energy. You can think of potential energy as kinetic energy waiting to happen.

Read more at: http://www.ducksters.com/science/physics/potential_energy.php

<https://www.youtube.com/watch?v=ASZv3tIK56k>

The **speed** of an object is how fast or slow it's moving. You can calculate speed using the equation 'speed = distance/time'. Distance-time graphs illustrate how an object moves. They show how the distance moved from a starting point changes over time.

Read more at www.bbc.co.uk/schools/gcsebitesize/science/add_gateway_pre.../speedrev1.shtml

https://www.youtube.com/watch?v=_DtDCBHEM1k

Velocity is considered to be a 'vector' and so momentum is also a vector. What this means is that in addition to the value of the momentum, it also has a direction and the momentum direction is expressed by an arrow or 'vector'.

Read more at <http://www.scienceforkidsclub.com/momentum.html>

https://www.youtube.com/watch?v=_DtDCBHEM1k

- Certain objects, such as planets or stars, have momentum in space that allow them to continue to go in the same direction unless something comes along to push in another direction or stop it all together.
- In our Milky Way galaxy, the sun continues to go around and the earth continues to go around the sun. On earth, we have friction with the air or water that gradually pushes an object to make it slow down or stop.