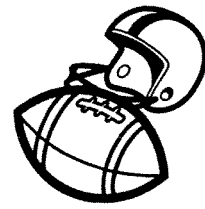


Forces & Sports



Reading for Information

Force is a word that has many different meanings and uses. Even in the field of science, the term force can be used to describe different topics. There is the nuclear force – which binds atoms together – it is also a force that is used to produce energy. There are also electrical forces, magnetic forces and gravitational forces. The type of force that is used to describe objects in motion is called the mechanical force. Remember that a force is a push or pull – put into more scientific terms – a force is anything that causes the shape or motion of an object to change.

We'll use football to provide us with some examples of forces at work. When the punter kicks the ball, he applies force to the ball – the ball changes its speed and direction of motion and even changes shape when kicked. A running back uses force to run for a touchdown, but a linebacker that applies more force to the running back can stop his motion in his tracks! The amount of force that is applied in any situation is determined by two things – mass of the player and their acceleration. A 250 lb player running 10 miles/hr can apply more force than a 125 lb player running the same speed. So it is also true that a 250 lb player running 10 miles/hr will apply more force than the same size player running at 3 miles/hr.

Force is measured in units called Newtons – which were named after the famous scientist Sir Isaac Newton. You will continue to learn more about Newton as you study science further in school and learn about his three laws of motion (force). The actual definition of a Newton is the force required to accelerate a one kilogram object 1 meter per second squared.

Remember that force depends on two things: mass and acceleration. Mass is the measurement of the amount of matter in an object. The mass of an object will never change – but that object's weight can change depending on gravity. For example, if you weigh 85 lbs. on Earth, your weight on the moon would only be about 14 lbs. Acceleration means a change in speed. Speeding up is acceleration, but so is slowing down – it has a specific term, negative acceleration or deceleration. As was mentioned earlier, force is determined by two things – mass and acceleration. A formula for calculating force is:

$$\text{Force} = \text{Mass} \times \text{Acceleration}$$

As you learned in the last activity, forces can be balanced or unbalanced. When forces are balanced, there is no change in movement. When there is an unbalance of forces, the motion of an object will change – either from rest to moving or it could be slowing down, speeding up, or just changing direction. Concurrent forces are those forces that are acting on an object at the same time. For example – when you lift a book off your desk, there are two concurrent forces – your hand lifting, and gravity wanting to pull the book back down.

So, if you ever wondered why Charlie Brown had such a hard time kicking that football – it's not just because the person holding it for him isn't nice. It takes a force to kick a football, and force is a complicated thing.

