LESSON 17 Forces at Work: Good or Bad?

Grade Level: 7-10

1. Grades 7-10

2. Overview In its simplified form, a force is regarded as anything that can cause change on objects. There are different kinds of forces which have been described as "contact" and "non-contact" forces. These forces have very unique properties which can be put to advantage in both science and technology.

3. Purpose The purpose of this lesson is to provide information that can distinguish one type of force from the other. The contact forces are easier to notice than the non-contact forces.

4. Objectives Students will be able to:

i. Define what is meant by a force
ii. Distinguish between "contact" force and "non-contact" force.
iii. Describe how forces have been useful to us.

5. Resources/materials

- Plasticine, modelling clay, foam sponge
- Tennis ball and racket, screw driver
- Magnets, batteries and bulbs.

6. Activities and Procedures This lesson has a lot of implications in our daily lives. Forces affect our lives. The students would have experienced and applied forces before they undertake this formal study of forces. Forces should be simply defined first:

- Forces cause change.
- Forces can change the shape of an object
- Forces can move or stop an object
- Forces can change the direction of a moving object.

The teacher can demonstrate and guide the students to experience all of the above.

In the second part of the lesson, the teacher should introduce the terms-- **"contact and non-contact" forces**. The terms themselves appear self explanatory. Contact forces must touch an object before they can make something happen. The students

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are already familiar with what forces can do. The students should now be guided to give several examples of contact forces. These could be put under two broad groups- **Push and Pull**. When we apply a force away from our body, a **push** is said to have taken place. And when we apply a force towards our body, a **pull** is said to have taken place. One example of a contact force a bit remote but always in use when we walk is frictional force. This too is an example of a contact force.

There are nevertheless some forces which can act from a distance. Such forces are called *non-contact forces*. The students may not be very familiar with non-contact forces. Examples of non-contact forces are gravity, electricity and magnetism. The teacher should now demonstrate non-contact forces.

Both contact and non-contact forces are useful to us. Frictional force as a good example of contact force can be both bad and good. It is here that the teacher needs to explore with the students what is friction. The Poem on friction should be read to the students. Friction in moving engine parts could be harmful. On the other hand, without friction, walking on any surface will be almost impossible. Force in the form of friction therefore could at times be good and at times be bad. Other uses of force that could be discussed are:

- Roller coaster-free fall due to gravity
- Force of the wind to generate electricity-in a wind mill
- Force of water to generate electricity-in hydro-electric generators
- Force in various types of levers

A useful application of force in Integrated Science is to consider biological force-muscle force. The muscles of parts of the body are able to carry out certain functions by the contraction and expansion of the muscles. This extension of force to include biological force is a good point to emphasise. Movement of our body depends on two muscle sets at each joint. While one muscle contracts(shortens) to pull a bone, the other muscle relaxes. Muscles always work in pairs like this because they can only provide a pulling force. They never push.

7. Tying it all together Force is a very useful topic in science. It is perhaps important at this point to mention how force is measured. It is useful to draw attention to the fact that force is measured in *newtons*. A close look at a spring balance will show calibrations in newtons. That is why the weight of an object (the gravitational force on an object) is given in the unit of force, the newton. Forces are useful to us.

8. Assessment The students should be asked to give simple every day examples of the use of force.

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10. References Les Cross and John Sellers (1994). **Understanding Science for Zimbabwe**. London: John Murray Ltd. in association with Academic Books (Pvt)

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