

Forcing the Issue of Force

Purpose

To understand that force is needed to do work

Procedure

1. In your science journal, define work.
2. Discuss your definition with your group and reach a consensus.
3. Discuss lifting the weight, using an inclined plane, a pulley, and rope.
4. Predict which way of lifting the weight will require the most force and record in data chart.
5. Loop one end of the rope through the hook of the weight and tie a knot to secure the weight to the rope.
6. Loop the other end of the rope through the spring scale hook and secure with a knot. See diagram 1.
7. Hold the spring scale in one hand until the rope is taut and the weight is resting on the floor. The spring scale should read "0."
8. Have your partner hold the meter stick with one end on the floor next to the rope and weight. Slowly lift the weight 30 cm from the surface.
9. Read the spring scale and record the amount of force in data chart.
10. Place the weight at the bottom of the inclined plane and place the meter stick along the side of the inclined plane.
11. Holding the spring scale in one hand, slowly pull the weight 30 cm up the inclined plane.
12. Read the spring scale and record the force.
13. Untie the spring scale from the rope and loop the rope through the pulley.
14. Reattach the spring scale to the rope.
15. Hang the pulley from the hook designated by your teacher. See diagram 2.
16. Place the meter stick so that you can measure the distance to lift the weight.
17. Hold the spring scale in one hand and slowly pull down, lifting the weight 30 cm. Record the force.
18. Compare the amount of force needed for each test and discuss the results.

Conclusion

1. How did the force that was needed to lift the weight compare with the rope, the inclined plane, and the pulley?
2. Was your prediction correct? Why or why not?
3. Which simple machine do you think the tree house detectives should use to get Jacob into the tree house? Why?
4. Why do people use simple machines?
5. How can you use this information to help solve problems in your daily life?

	Force	Distance
Rope Only		
Inclined Plane		
Pulley		

Materials (per group)

- 1 pulley
- hook setup for pulley
- 1 inclined plane (40 cm)
- 1 rope
- 1 2.1 kg weight with hook
- 1 spring scale
- meter stick
- calculator (optional)
- science journals

