EXPLORATION 1

The Powerful Pulley

Understand how a pulley helps lift objects.

If you want to lift a very heavy weight, you can use a simple machine called a pulley to help you. A pulley helps make our work of lifting things easier. The basic pulley has a load on one end of a rope that runs inside the groove of a wheel; the other end of the rope is left free to apply force.

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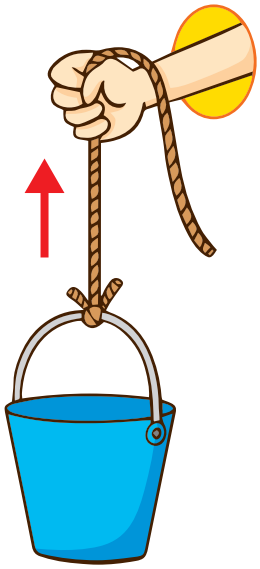
Try these activities to see how pulleys help us lift objects.

Activity 1

Put 20 marbles in a pail. Tie one end of a piece of string to the handle of the pail. Then lift it.

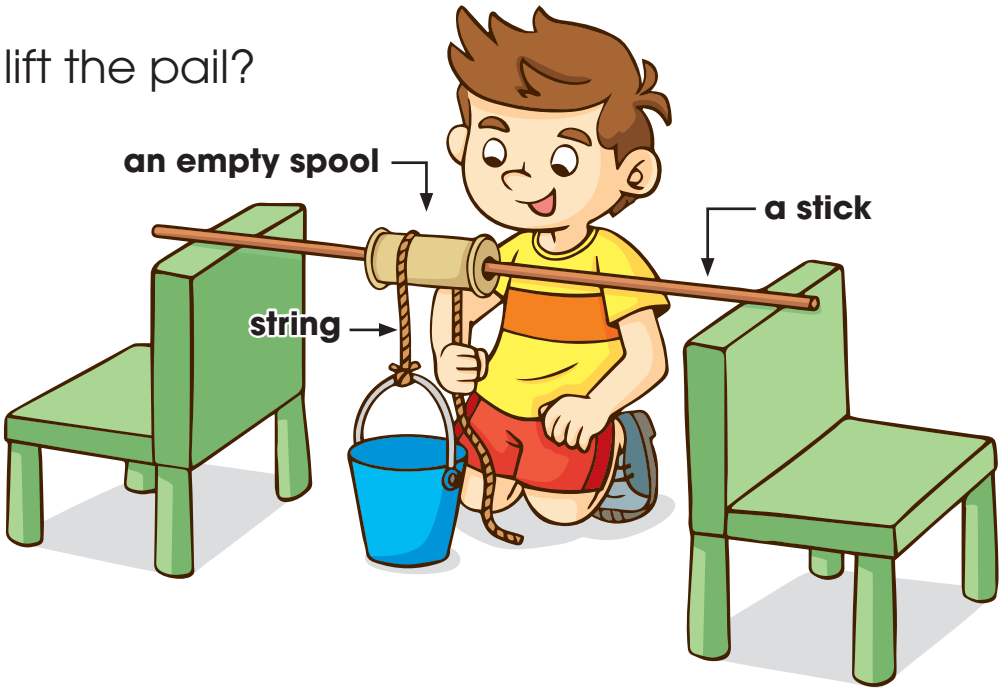
Was it easy to lift the pail?



Activity 2

Set up the pulley as shown. Then lift the pail with 20 marbles in it by pulling the string.

Was it easier to lift the pail?



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Explanation:

Through these two activities, you should have noticed that it was easier to lift the pail using the pulley that you made. However, the amount of force needed in both activities was actually the same. Do you know why it felt easier?

This is because one of the ways a pulley makes work easier is by changing the direction of exerted force. In general, it is easier to pull something downward than it is to pull it upward. So, instead of pulling up the string to lift the pail, you pulled down when using the spool, which required less effort.