

Answer Key

Popcorn, Get Your Popcorn Up Here!

1. The screw lifted the popcorn when it changed the rotation or twisting of the dowel into upward movement.
2. This device would be used today as a simple and inexpensive way to irrigate crops by using river and lake water. It is also used in combine harvesters to lift grain into storage containers.
3. Answers will vary.

Keeping It Simple

Inclined Plane

1. Yes.
2. The 30-degree ramp used the least amount of force to lift the weight. When you increase the height of the ramp, you increase the amount of force necessary to move the weight. For example, if you have a 500-g weight at a 30-degree angle, it might take 125 g to move it up the ramp. However, when the ramp is set at 60 degrees, you have to overcome more height, which results in using more force.
3. The length of the ramp increased as the angle became smaller.
4. Answers will vary but might include that ramps can be used to move furniture, help make places accessible to people in wheelchairs, and help cars go up steep mountains.

Wedge

1. The banded blocks could not be separated with the smaller block of wood.
2. The wedge was able to get between the banded blocks and separate them unlike the block. The wedge is thinner on one end and that allows it to fit in small, tight places.
3. Answers will vary but might include splitting firewood, loosening boards on a fence, and prying hubcaps off a tire.

Wheel and Axle

1. The screwdriver with the larger handle.
2. The ratio between the handle (wheel) and the shaft (axle) is larger on the larger handled screwdriver. With a larger ratio, you divide the weight by a larger number and get a smaller amount of force needed.
3. Answer will vary but might include a Ferris wheel, wheelbarrow, and moving boxes on rollers.

Screw

1. Unlike the screws, the nail was unable to go into the wood.
2. Screw B went into the wood easier than screw A.
3. The difference between the two screws was the distance between the threads. Screw B's threads had a smaller distance between them.

4. It took more turns to get screw B into the wood because you had to turn it over a longer distance since the pitch was smaller. Even though you had to turn Screw B more times, it made the force less. That is called a tradeoff.
5. Answers will vary, but might include securing items to a wall, connecting the stems of eye glasses to the frames, and putting machines together.

Lever

1. Yes. The farther away from the dictionary the fulcrum was moved, the more grams of force it took to lift it.
2. To lift a heavy load, place the fulcrum close to the load.
3. Answers will vary, but might include a seesaw, moving large rocks, and lifting a heavy item to slide something under it.

Pulley

1. No. The amount of grams (force) used was the same.
2. The amount of force needed to move the load decreased when using the two-pulley system.
3. You can use one pulley to change the direction of the force. It is easier to pull down than to lift up, so this makes work easier.
4. Answers will vary, but might include loading containers on and off boats, lifting heavy objects up to a second story building, and taking a motor out of a car.

