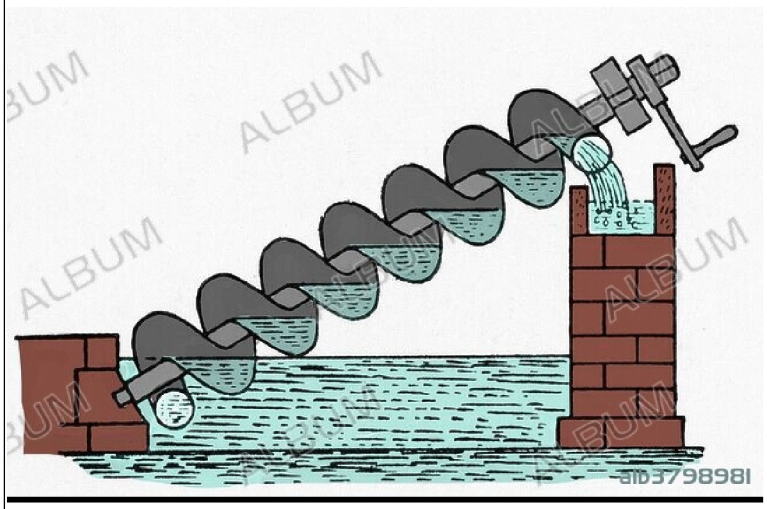
Force, Work, Energy
The Explorer's Sheet



This is Archimedes' Screw. Find out who invented it? Why and where? How is it used? Is it still useful in modern world scenario? How?

Image courtesy- https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.album-online.com%2Fdetail%2Fen%2FOTMwMTYyMA%2Farchimedes-screw-also-called-archimedean-screwpump-is-a-machine-historically-alb3798981&psig=AOvVaw0XWBjkIACfIFSvjxEEc6sA&ust=1721200768448000&source=images&cd=vfe&opi=89978449&ved=0CBEQjRxqFwoTCOCWivyCq4cDFQAAAAAdAAAAABAE

- Can you have work without force? Explain your answer.

- A person is pushing a heavy box across the floor with a constant force. Is work being done on the box if it doesn't move? Why or why not?

- Compare the energy transformations in a battery-operated toy car and a wind-up toy car. How are they similar and different?

- Explain how a seesaw illustrates the concept of balance of forces and energy transfer.

- If you push a shopping cart with a force of 10 Newtons for 5 meters, and your friend pushes the same cart with a force of 5 Newtons for 10 meters, who does more work? Justify your answer.

- How does the use of gears in bicycles and watches illustrate the principles of work, force, and energy transfer?

- Describe a situation where an object is moving, but no work is being done on it. Explain your reasoning.

- A person lifts a heavy box straight up at a constant speed. How does the work done by the person compare to the gravitational potential energy gained by the box? Explain.

- How can a lever be used to lift an object that is heavier than the force you apply to the lever? Provide an example.

- Why is it important to consider both the magnitude and direction of a force when calculating work done? Provide an example to support your explanation.