

Work and Power Activity

Overview

Work is a quantity that measures the effects of a **force** acting over a distance and is calculated as force times distance ($W = Fd$). **Power** is a quantity that measures the rate at which work is done and is calculated as work divided by time ($P = W/t$). Power increases when work is done faster and decreases as work is done more slowly. This activity demonstrates these relationships and illustrates that the amount of work done is independent of time and that power output is dependent on time.

Objectives

Students will:

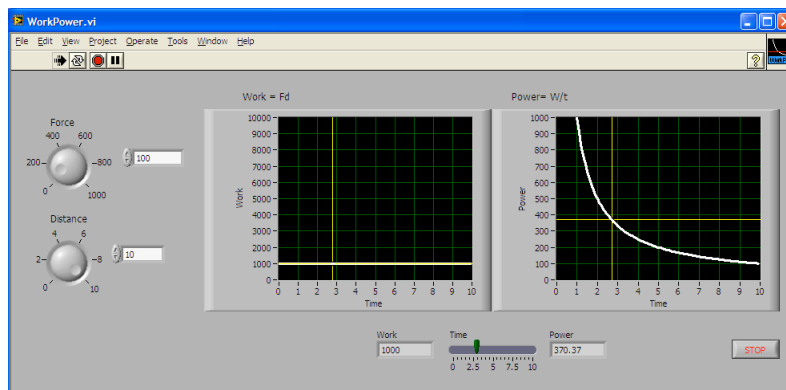
- Explain the difference between work and power.
- Create statements of real-world examples.

Standards (TEKS)

IPC 4A

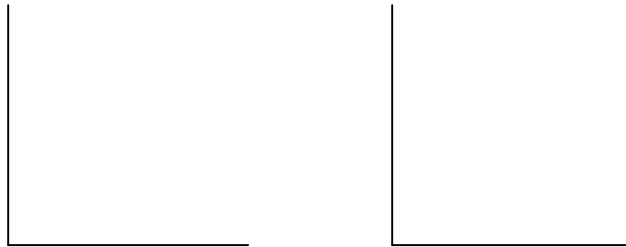
Activity

- 1) Open and run the VI.
- 2) Notice the slope of the **work** vs. time graph. How would you describe the slope qualitatively (increasing, decreasing, or constant)? How would you describe the slope quantitatively (what is the value of the slope)?



- 3) Notice the shape of the **power** vs. time graph. What happens to the power output as time increases?
- 4) Let's explore:
 - a) Change the force and/or distance value inputs. What happens to the slope of the work vs. time graph? How do these changes affect the power vs. time graph?
 - b) Can you make a combination of work and distance that changes the slope of the work vs. time graph? Why not?

- 5) State the relationship between work and power.
- 6) Let's explore some more:
- Determine your weight in Newtons and record _____.
 - Measure the height of a flight of stairs in meters and record _____.
 - Enter the values into the VI.
 - Make a sketch of both graphs.



Two blank coordinate planes are provided for sketching graphs. Each plane consists of a vertical y-axis and a horizontal x-axis, forming an L-shape. The axes are solid black lines, and the interior of the L-shape is empty, intended for a student to draw a graph.

- 7) Which requires more work, walking or running up a flight of stairs? Explain your answer.
- 8) Which requires more power, walking or running up a flight of stairs? Explain your answer.
- 9) Provide a real-world example stating the relationship between work and power. For example, "It takes the same amount of work to walk or run a mile; however, it requires more power to run a mile."