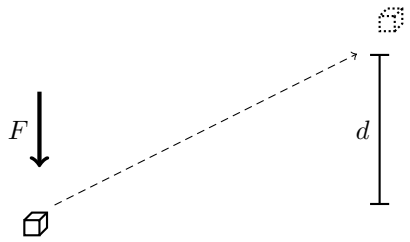
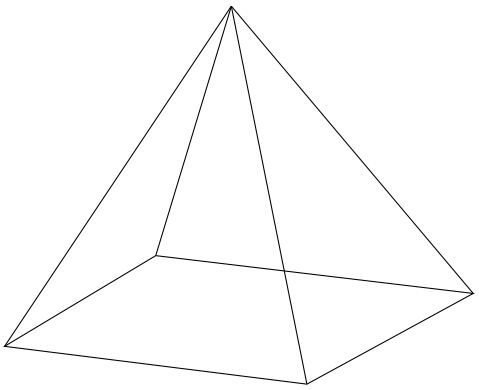
# Unit 3: Sections 8.5 - 9.5

In Section 8.5, we are going to calculate the work done by moving a mass a particular distance in the presence of a known force. It has long been know that that the work done by the force is the product of the force and the distance moved in the direction parallel to the force. In the seventeenth century, Isaac Newton demonstrated his new Mathematics by applying calculus to problems where the force (or the mass) was no longer constant.




Work in pairs to find the work done to build the Great Pyramid of Egypt. The pyramid is 410 feet high and has a square base of 755 feet by 755 feet. The stone making up the pyramid has a density of 200 pounds per cubic foot. (Hint: Think slices!)



It is reported that the Great Pyramid of Egypt was built in 20 years. Make some reasonable assumptions on the amount of work that laborer can accomplish in a day to estimate the number of laborers needed to build the pyramid.

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# Physics

Section 8.5
March 3, 2016

Name:
Math 129 - 01

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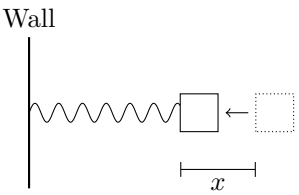
|---|---|
| Understand | Know that the formula for work generalizes to $W = \int_a^b F(x)\,dx$. |
| Understand | Use SI units of force (newton, nt), distance (meter, m) and work (joule, j). |
| Understand | Use Imperial units of force (pound, lb), distance (foot, ft) and work (foot-pound, ft-lb). |
| Understand | Use the correct conversions to switch from SI units to Imperial units. |
| Apply | 1a. Preserve constant displacement by slicing perpendicular to the direction of motion. |
| Apply | 1b. Find the work done by a force when moving a single slice the required distance. |
| Apply | 2a. Preserve constant force by slicing perpendicular to the force. |
| Apply | 2b. Find the work done when a variable force moves a single slice and integrate over all slices. |

1. Calculate the work done on an object when a force of 2 newtons moves it 12 meters.

2. Calculate the work an object does to move 4 feet when it's motion is opposed by an external force of 3 lb.

3. Hooke's law states that the force $F$ requred to compress a spring by some distance $x$ is given by $F = kx$, for some constant $k$.




Assume that a spring with spring constant $k = 8nt/m$ has already been compressed 0.1m. Estimate the work done in compressing the spring by a further $\Delta x$ m.

4. Find the work done when the spring is compressed from $x = .1$m to $x = .3$m.

Quiz (Leave this space blank)