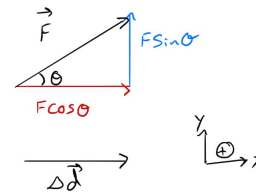
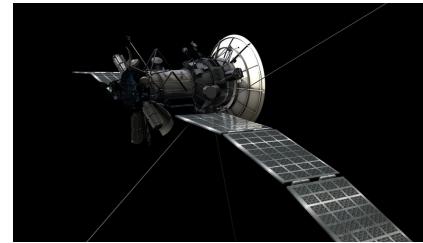


Work and Force

- Work
- Units and direction
- Positive vs. Negative work
- When zero work is done



Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

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Work

- Work (W) is the energy transferred to an object when a force acting on the object moves it through a distance

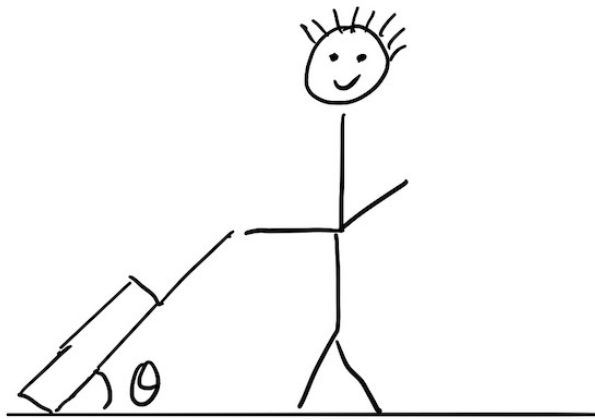
- $W = F \times d$

○ _____

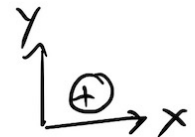
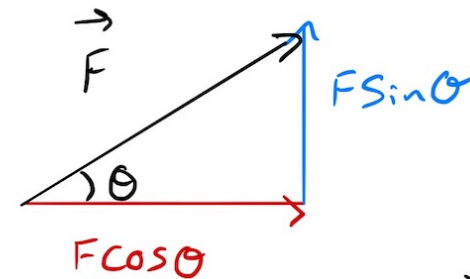
○ _____

Work

- Consider a situation where you are pulling a bag on wheels at an angle Θ to the displacement
- The force parallel to the displacement = $F \cos \Theta$



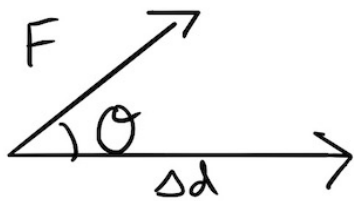
→
Direction of displacement



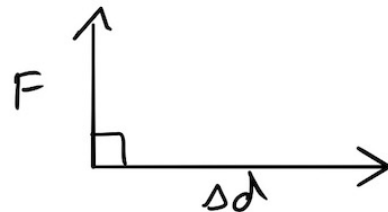
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Positive or Negative Work

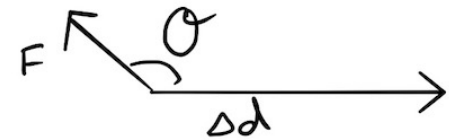
- _____
- If F and d are in opposite directions, work is “-”
- Work is positive, negative, or zero, depending on the angle between the force and the displacement



$\theta < 90^\circ$, W positive



$\theta = 90^\circ$, $W = 0$



$\theta > 90^\circ$, W negative

- Try an example on your own calculator for each

If velocity is constant, isn't $a = 0$ and therefore, $F = 0$ and $W = 0$?

- _____
- i.e., if the object is moving at a constant v

$$W_{\text{friction}} = F_f \times d$$

$$W_{\text{app}} = F_{\text{app}} \times d$$

$$W_{\text{net}} = F_{\text{net}} \times d$$

Check Your Understanding

A hospital worker applies a force to push a patient horizontally for 2.44 m on a gurney with nearly frictionless wheels.

- a) Determine the work done in pushing the gurney if the force applied is horizontal and of magnitude of 15.5 N.
- b) Determine the work done if the force of magnitude 15.5 N is applied at an angle of 25.3° below the horizontal.

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Check Your Understanding

A store employee raises an 8.72-kg case of cola at a constant velocity from the floor to a shelf 1.72 m above the floor. Later, a customer lowers the case 1.05 m from the shelf to a cart at a constant velocity. (We can neglect the short periods of acceleration at the beginning and end of the raising and lowering of the case.) Determine the work done on the case.

- a) by the employee as the case rises
- b) by gravity as the case rises
- c) by the customer as the case descends

Zero Work Done - Summary

When $W = 0$

- _____
- _____
- _____
- _____

