

Work

- What is Work?
- $W = Fd$
- Work Done
- Units and Direction
- When Work = Zero



Preview File

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- 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 Done

- Work is done when you lift an object

- _____



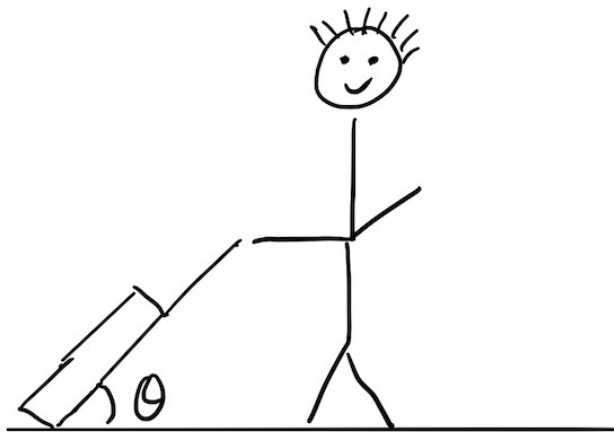
- Work is done to make a car accelerate



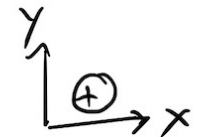
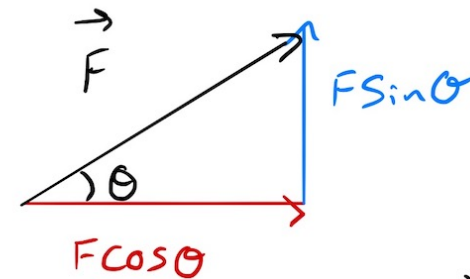
Work

- Consider a situation where you are pulling a bag on wheels at an angle Θ to the displacement

- _____



→
Direction of displacement



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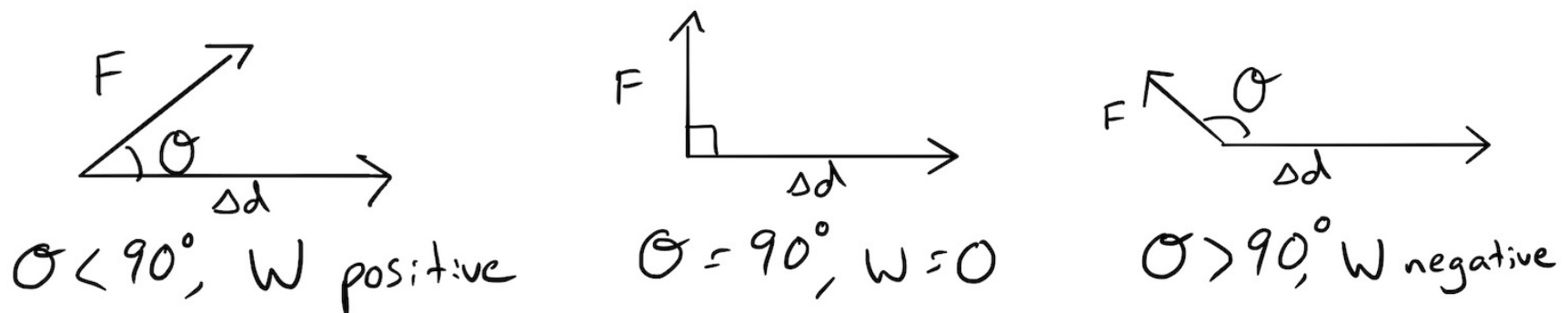
Units and Direction

- Work is scalar and has no direction
- _____
- _____
- Make sure you use the correct units when solving problems



Positive or Negative Work

- If the force and
- Work is positive, negative, or zero, depending on the angle between the force and the displacement



- Try an example on your own for each

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

- Whenever you talk about the work done, you must be very careful to specify which force does the work.
- 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 grocery store employee is pushing a line of carts at a constant velocity with a horizontal force of magnitude 95 N. How much work is done in pushing the carts 16 m in the direction of the applied force? Express the answer in kilojoules.

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Check Your Understanding

A customer moved a 4.4-kg box without acceleration along a shelf by

Check Your Understanding

A sled carrying two children (total mass = 85 kg) reaches its maximum speed at the bottom of a hill then glides to a stop in 21 m along a horizontal surface. The coefficient of kinetic friction between the toboggan and the snowy surface is 0.11.

- a) Draw an FBD of the toboggan when it is moving on the horizontal surface.
- b) Determine the magnitude of kinetic friction acting on the toboggan.

Check Your Understanding

A sled carrying two children (total mass = 85 kg) reaches its maximum speed at the bottom of a hill then glides to a stop in 21 m along a horizontal surface. The coefficient of kinetic friction between the toboggan and the snowy surface is 0.11.

c) Calculate the work done by the kinetic friction.

$F_k = 92 \text{ N}$ [backwards]

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Check Your Understanding

A student pushes against a large tree with a force of magnitude 250 N. How much work does the student do on the tree?

Check Your Understanding

A 500-kg

Check Your Understanding

You are walking east at 30 m/s while holding a box of mass 10 kg still on your shoulder. You walk 20 m , how much work is being done on the box?

Zero Work Done - Summary

When $W = 0$

- _____
- _____
- _____
- _____

