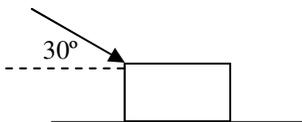
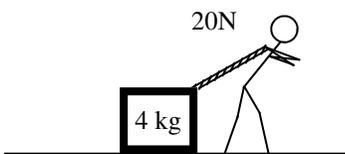


1. A 3 kg object is 2 m up a ramp tilted at 25°.
  - A. What kind of energy does it have at the top?
  - B. What kind of energy is it gaining as it slides down?
  - C. Calculate its energy at the top.



2. A 25 N force pushes a box 3.2 meters at an angle of 30° to the surface.
  - A. Which portion of the force moves the object: x or y?
  - B. As it moves because of work, the object gains what kind of energy?
  - C. Find the work done by this force.



3. Slim Jim pulls on a box with 20N for 15m. His force pulls at an angle of 40°.
  - A. Calculate the work done on the box.
  - B. So, how much kinetic energy does the box have afterwards?
  - C. Calculate the final velocity of the box.

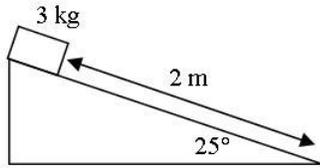
4. A 3 kg ball is thrown upward into the air. The ball reaches a height of 20 m.
  - A. What kind of energy does it have just after it is thrown?
  - B. What kind of energy does it have after (up in the air)?
  - C. Calculate the energy at the top.
  - D. If there was no air friction, how much energy did it have when it was thrown?

*Power is how fast energy is transferred. If two forces transfer energy and one transfers it faster, the faster one uses more power.*

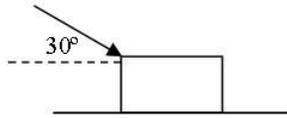
P	watts	Power	Rate (how fast) work is done
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$$P = \frac{W}{t}$$

5. Motor A has a rating of 300 W. Motor B has a rating of 200 W.
  - A. Which motor is more powerful?
  - B. How long would it take Motor A to do 6000 J of work?
  - C. How long would it take Motor B to do 6000 J of work?
  - D. Which motor did the work quicker?
  - E. Which motor did more work?
6. True or false (and why?): "A more powerful object does more work."

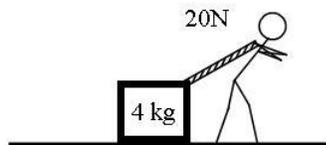


1. A 3 kg object is 2 m up a ramp tilted at 25°.
- PE A. What kind of energy does it have at the top? PE  
 B. What kind of energy is it gaining as it slides down? KE  
 C. Calculate its energy at the top.  
 $h$  must be vertical, so  $h = 2 \sin 25^\circ = .85 \text{ m}$   
 $PE = mgh = 3(10)(.85) = 25.5 \text{ Joules}$



2. A 25 N force pushes a box 3.2 meters at an angle of 30° to the surface.
- A. Which portion of the force moves the object, x or y?  
 B. As it moves because of work, the object gains what kind of energy? KE  
 C. Find the work done by this force.

$$W = F \cos \theta = 25(3.2) \cos 30^\circ = 69.3 \text{ J}$$



3. Slim Jim pulls on a box with 20N for 15m. His force pulls at an angle of 40°.

- A. Calculate the work done on the box.  
 $W = 20(15)(\cos 40^\circ)$   
 $W = 230 \text{ J}$
- B. So, how much kinetic energy does the box have afterwards?

230 J (= amount of work done)

- C. Calculate the final velocity of the box.

$$230 = \frac{1}{2}(4)v^2$$

$$230 = 2v^2$$

$$v = 10.7 \text{ m/s}$$

4. A 3 kg ball is thrown upward into the air. The ball reaches a height of 20 m.
- A. What kind of energy does it have just after it is thrown? KE  
 B. What kind of energy does it have after (up in the air)? PE  
 C. Calculate the energy at the top.

$$mgh = 3(10)(20) = 30(20) = 600 \text{ J}$$

- D. If there was no air friction, how much energy did it have when it was thrown?  
 600 J

Power is how fast energy is transferred. If two forces transfer energy and one transfers it faster, the faster one uses more power.

P	watts	Power	Rate (how fast) work is done
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$$P = \frac{W}{t}$$

5. Motor A has a rating of 300 W. Motor B has a rating of 200 W.

- A. Which motor is more powerful? A  
 B. How long would it take Motor A to do 6000 J of work?  
 $P = \frac{W}{t}$      $t = \frac{W}{P}$      $\frac{6000}{300} = 20 \text{ sec}$

- C. How long would it take Motor B to do 6000 J of work?  
 $\frac{6000}{200} = 30 \text{ sec}$

- D. Which motor did the work quicker? A  
 E. Which motor did more work? same

6. True or false (and why)?: "A more powerful object does more work."  
 False: a more powerful object can do the same amount of work, just in less time.