Read textbook pages 700-701 – The Meaning of Work and answer

1. The everyday meaning of the word "work" is different than its meaning in science. Keeping that in mind, what is Work?
2. If you pull an object horizontally, what part of your force does work?
3. Figure 2: Force, Motion, and Work – Why doesn’t the girl do work when she carries her suitcase rather than pulling it?
4. Is work done on a stack of newspapers if you lift them from the floor to a table?
5. Is work done on a stack of newspapers if you hold them in front of you and carry them across the room at a constant velocity?
6. In order for work to be done on an object, what must happen to the object?
7. In which of the following situations is work being done: rolling a bowling ball, pushing on a tree for ten minutes, kicking a football?

Read textbook pages 702-703 – Calculating Work and answer

1. What is the formula to calculate work?
2. Figure 3: Amount of Work – work. You do more work when you lift a heavier plant the same distance. Why does it take more work to lift the heavier plant?
3. What is a joule?
4. How can you determine the amount of work done on an object?
5. Is more work done when a force of 2 N moves an object 3 m or when a force of 3 N moves an object 2 m? Explain.
6. Which involves more work—lifting a full backpack 1 meter from the ground, or lifting an empty backpack 1 meter from the ground?
7. Which involves more work—lifting the full backpack 1 centimeter from the ground or lifting the same backpack 1 meter from the ground?
8. What are the two factors that determine how much work is involved in moving an object?

Work Problems:
1. How much work is done on a 75 N bowling ball when you carry it horizontally across a 10m wide room?
2. How much work is done when a force of 1N moves a book 2m?
3. You must exert a force of 4.5 N on a book to slide it across a table. If you do 2.7J of work in the process, how far have you moved the book?
4. A child pulls a sled up a snow-covered hill. In the process, the child does 405 J of work on the sled. If she walks a distance of 15 m up the hill, how large a force does she exert on the sled?
5. 55,000 J of work is done to move a rock 25m. How much force was applied?
6. You and 3 friends apply a combined force of 489.5N to push a piano. The amount of work done is 1762.2J. What distance did the piano move?
7. If it took a bulldozer 567.6 joules of work to push a mound of dirt 30.5 meters, how much force did the bulldozer have to apply?
8. A frontend loader needed to apply 137 Newtons of force to lift a rock. A total of 223 joules of work was done. How far was the rock lifted?
9. A young boy applied a force of 2,550 Newtons on his St. Bernard dog who is sitting on the boy's tennis shoes. He was unable to move the dog. How much work did he do trying to push the dog?

Math Sample problem: Write each steps of the sample problem, and then using the same steps, answer:

- A motor exerts a force of 12,000 N to lift an elevator 8.0 m in 6.0 seconds. What is the power of the motor?
- A crane lifts an 8,000-N beam 75 m to the top of a building in 30 seconds. What is the crane's power?

Calculating Power:

1. Your family is moving to a new apartment. While lifting a box 1.5 m straight up to put it on a truck, you exert an upward force of 200 N for 1.0 s. How much power is required to do this?
2. You lift a book from the floor to a bookshelf 1.0 m above the ground. How much power is used if the upward force is 15.0 N and you do the work in 2.0 s?
3. You apply a horizontal force of 10.0 N to pull a wheeled suitcase at a constant speed of 0.5 m/s across flat ground. How much power is required to do this?
4. Your family is moving to a new apartment. While lifting a box 1.5 m straight up to put it on a truck, you exert an upward force of 200 N for 1.0 s. How much power is required to do this?
5. A motor exerts a force of 12,000 N to lift an elevator 8.0 m in 6.0 seconds. What is the power of the motor?
6. A crane lifts an 8,000-N beam 75 m to the top of a building in 30 seconds. What is the crane's power?

What characteristic do all of these things share?

What are some things you would describe as powerful?

What is Power? How are power and work related?

- How does the time it takes to lift a stack of books affect the amount of work involved?
- How does the time it takes to lift a stack of books affect the power involved?

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