

## Energy Review

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1. Work is required to lift a barbell. How many times more work is required to lift the barbell three times as high?
2. Which requires more work – lifting a 10-kg sack a height of 2 meters, or lifting a 5-kg sack a height of 4 meters?
3. How many Joules of work are done on an object when a force of 10 N pushes it a distance of 10 m?
4.
  - a. How much power is required to do 100 J of work in a time of 2 seconds?
  - b. How much power is required to do 100 J of work in a time of 4 seconds?
  - c. How much power is required to do 100 J of work in a time of 0.5 seconds?
5. If you do 100 J of work to lift a bucket of water, how much potential energy do you give the bucket?
6. A rock is held above the ground and has 250 J of potential energy. It is then dropped.
  - a. What is its kinetic energy while it is still being held?
  - b. What is the total energy of the rock?
  - c. What is its potential energy just as it hits the ground?
  - d. What is its kinetic energy just as it hits the ground?
  - e. While it is falling, if it has only 100 J of potential energy at some point, how much kinetic energy does it have?
  - f. While it is falling, if it has only 50 J of kinetic energy at some point, what is its potential energy?
7. Suppose a car has a kinetic energy of 2000 J.
  - a. If it moves with twice the speed, what will be its kinetic energy?
  - b. If it moves with three times the speed, what will be its kinetic energy?

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8. A certain engine can make a car go from 0 to 100 km/h in 10 seconds. All other things being equal, if the engine has twice the power, how many seconds would it take to go from 0 to 100 km/h?
  
9. A car traveling at 60 km/h skids 20 m when its brakes are locked. How far will it skid if it is traveling at 120 km/h?
  
10. A hammer falls off a roof and hits the ground with 75 J of kinetic energy. If it fell from a roof twice as high, how much kinetic energy would it have when it hit the ground?
  
11. Does a car use more gas when the air conditioner is on? How about the headlights or radio?
  
12. A car has 2500 J of kinetic energy and it skids to a stop, losing all its kinetic energy. Where did this energy go?
  
13. It is a really nice day and you decide to go out for a run. If energy cannot be created or destroyed, where did you get the energy to do this? Trace back as many energy conversions as you can.

*Answers:* 1) 3x 2) same! 3) 100 J 4. a) 50 W b) 25 W c) 200 W  
 5) 100 J 6. a) 0 J b) 250 J c) 0 J d) 250 J e) 150 J f) 200 J  
 7. a) 8000 J b) 18,000 J 8) 5 s 9) 80 m 10) 150 J 11) Yes, yes, yes  
 12) brakes are hotter (KE became thermal energy)