Thou Shalt Not Plug & Chug

or

Reading Equations as Functions

$KE = \frac{1}{2} m v^2$

1. One car is traveling with a speed of v, and has a KE of 100,000J. An identical second car is traveling in the opposite direction also with a speed of v. What is the KE of the second car?
2. One car is traveling with a speed of v, and has a KE of 100,000J. An identical second car is traveling in the opposite direction with a speed of 2v. What is the KE of the second car?
3. One car is traveling with a speed of v, and has a KE of 100,000J. An identical second car is traveling in the opposite direction with a speed of ½v. What is the KE of the second car?
4. One car is traveling with a speed of v, and has a KE of 100,000J. An identical second car is traveling in the opposite direction with a speed of 5v. What is the KE of the second car?
5. One car with mass m is traveling with a speed of v, and has a KE of 100,000J. A second car with mass 3m is traveling in the opposite direction also with a speed of v. What is the KE of the second car?
6. One car with mass m is traveling with a speed of v, and has a KE of 100,000J. A second car with a mass of 3m is traveling in the opposite direction with a speed of 2v. What is the KE of the second car?

GPE = mgh

7. If it takes 50,000 J of energy to raise one box, how much energy would it take to raise eight boxes by the same amount.
8. If it takes 50,000 J of energy to raise one box by a height H, how much energy would it take to raise twelve boxes by a height ½H.

Work = Force * distance

9. Two identical cars are moving through town, but one is driving twice as fast as the other. In order to stop their kinetic energies have to be converted to heat by the brakes, and take means doing work. The slower car takes 25 m to stop. Assuming the same braking force, how far will the faster car drive before stopping?

Newton's Universal Law of Gravity

10. When standing on the Earth your weight is 600 N. If your distance from the centre of the Earth is increased by a factor of 6 (that is you are now 24,000 miles from the Earth's centre) what is your new weight?
11. On the Earth's surface (4000 miles from the centre) you weigh 150 lbs. What would be your weight if I move you
    a. to a point 8000 miles from the centre?
    b. to a point 12,000 miles from the centre?
    c. to a point 40,000 miles from the centre?
12. The planet Zonk (I made that up) is the same size as the Earth but is 50% more massive. If I moved you to the planet Zonk, what would you weigh?

$Q = m c \Delta T$

13. Blocks A, B, and C all have the same mass, but are made from different materials. If the same amount of heat is applied to both which one has the larger temperature rise
    a. the one with the largest specific heat
    b. the one with the smallest specific heat
    c. the all have the same temperature rise.
    d. don't know