# Review Chapter 7 & 8 Test

Thursday and Friday the $6^{th}$ and $7^{th}$

# This test

- This test is 31 questions and if you know your chapter 7 and 8 worksheet reviews and this PowerPoint you will get an A!
- Remember, if you get over an 85%, you can drop your lowest grade so far!
- Chapter 7 is about ENERGY
- Chapter 8 is about WORK and POWER

# Potential Energy

- The equation for potential energy (and the other equations) will be provided for you.
  - It is Ep=mgh
  - where “m” is mass, “g” is gravity, and “h” is height
  - Remember gravity is always $9.8 m/s^2$
  - Therefore, potential energy depends on <u>mass</u> and <u>height</u>!
  - Indeed, potential energy is energy stored in the <u>position</u> of something

# Potential Energy

- For example, if I hold a book by my waist vs. over my head, which position of the book has more potential energy?
- Because Ep=mgh, the higher the book, the more potential energy it will have!
- Why?

# Conservation of Energy

- Because….according to the law of conservation of energy, “energy cannot be created or destroyed…just transformed into another type of energy.”
- So, if you drop a book from your waist vs. from above your head, which one will drop the furthest?
- The book above your head will have more kinetic energy (or the energy of MOTION) because it travels further to the ground
- Because “energy in” = “energy out,” the potential energy stored in a book above your head is high because this book also has high kinetic energy when it falls. High potential = high kinetic.

# Kinetic Energy

- $Ek = ½ \; m \; v^2$
  - M = mass
  - V = velocity
- So, therefore, kinetic energy depends on <u>mass</u> and <u>velocity</u>

# See if you can answer these questions?

What is energy measured in?

Answer: Joules! You need to keep your units straight. We will find out later that both energy and work are measured in joules because you can't do work without energy so they are closely tied. Don't get this mixed up with Newtons…that was the measure of FORCE from Newton's 3 Laws of Motion (last test)

- An extended spring stores what kind of energy?

- Answer: The spring is not moving, it is just storing energy due to it’s position of being stretched, therefore, it holds potential energy.

- What happens to the energy stored in oil when you use it to heat your house?

- Answer: energy is never created or destroyed, just turned into a different type of energy. Therefore, the energy is converted to heat energy.

- What provides most of Earth’s energy for living things and technology?

- Answer: The sun! Remember, nuclear reactions in the sun provide most of the initial energy that get’s transformed many times into other forms of energy. Do you know the other forms of energy?

# Types of energy

- For this test, you should know some different forms of energy. Chemical energy is stored in food. Thermal energy is heat energy. A stretched spring is elastic energy.
- Wait, I thought a stretched spring was potential? ALL forms of energy have some level of potential or kinetic energy. So, a stretched string has potential energy….and to get more specific, that type of potential energy is elastic energy.

- Energy can be thought of as stored what?

- Answer: work! Let’s learn a little bit about work

# Work vs. Power

- Work = distance (d) * force
- Remember in class when I was pushing on a chair but not making it move? I was not doing work, why? BECAUSE it was not moving and so the distance would be 0 making work equal to 0.
- In order to do work you have to move something a distance by using force

# Power

- Unlike work, power depends on TIME.
- Remember in class when me and another student pushed a chair the same distance but they did it much faster than me?
- Technically, we did the same amount of work, but we did it with different power.
- Power = work/time

# Work & Power

- Work is measured in Joules, because it is closely related to energy.
- Power is either measured in horsepower OR watts.
- Technically, the work INPUT and the work OUTPUT should be equal in a perfect world but NO machine is perfect (friction).
- Therefore the output is never more than the input. Let's think about our chapter 8 lab

- For the chapter 8 lab, we used 1,2,3,4,5, and 6 pulleys and measured the string length and force needed to lift the block a specified height (.2 meters)
- The string length increased but the force decreased with the more pulleys we used. This is because W = fd. The work stayed about the same (output was 2, input was around 1.8-2), but the force and distance decreased and increased, respectively, to compensate for each other.

# Efficiency

- Because no machine is perfect (<u>friction</u>), we can measure the efficiency to see the ratio of work output to input.
- This is like taking a test. If it’s worth 100 points and you received an 85, than you were 85% efficient [(85/100)*100].
- Therefore, efficiency is usually expressed in <u>percent</u>

# Make sure for your test you know how to use the equations to solve problems

1. What is the kinetic energy of a go-cart with a mass of 150kg and a speed of 20m/s?
2. Jake weighs 680 newtons, climbs a 6 meter ladder in 8 seconds. What is Jake's power?
3. What is the most work that can be done with 10J of energy?
4. What is the work needed to push a block with 4 newtons of force a distance of 10 meters?

# Answers

- 1. $E_k$=.5mv$^2$
  =.5(150)(20)$^2$
  = 30000J

  2. P= W/t and W = F * d
  in this case, his weight is the force so…
  P = (F*d)/t
  P = [(680*6)]/8
  = 510W

  3. This is conceptual. You can not do more work than you have energy. The answer is 10J

  4. W = Fd
  = (4)(10)
  = 40J

- If you understand EVERYTHING in this powerpoint and the information on your reviews, you will be sure to get an A ☺

- Just remember, some of the questions are higher-order questions and so you must apply what you know to answer something you might not have exactly learned. For example, if you go twice as fast, you kinetic energy becomes
  - 2 times smaller?
  - 4 times smaller?
  - 2 times bigger?
  - 4 times bigger?

Plug in numbers to $Ek = .5\ mv^2$ to figure this out (use 1 as your mass and 2 and 4 as your velocity and see the difference between the two final values.

GOOD LUCK ☺