Energy is the ability to do work!
Work:
\[ W = F \cdot d \]

Gravitational Potential Energy:
\[ GPE = m \cdot g \cdot h \]

Weight:
\[ F_w = m \cdot g \]

Speed (velocity):
\[ v = \frac{d}{t} \]

Power:
\[ P = \frac{W}{t} \]

Kinetic Energy:
\[ KE = \frac{1}{2} m \cdot v^2 \]

Gravity:
\[ g = 10 \, \frac{m}{s^2} \]

Pounds to Newtons:
\[ 1 \, lb = 4.45 \, N \]
Physics, December 5

HOMEWORK CAROUSEL

1. Pull out your POWER homework from Friday and grab 1-2 whiteboards per table.

2. Each table sign up for a problem and do it on your whiteboard (each whiteboard should have one problem done on it)

3. If your table has more than 2 people, sign up for 2 problems

4. Ask Dr. Wagner to check your whiteboard

5. When all whiteboards are checked, go around and check your homework
Physics, December 5

Energy Reading

1. Read and highlight the Energy handout
2. On the back of your guided notes, summarize the energy article.
Physics, December 6

1. Get notes from Energy reading stamped
2. Guided notes on Energy
3. Energy WS: 20 minutes
4. Jigsaw Energy WS
Physics, December 7

1. Get Energy WS stamped
2. Move to a table so that there are four people per table.
3. Jigsaw Energy WS work time, wait for instructions
4. Work period: Work on your problems with your group. Become an expert on your problems. You must be able to explain what you did.
5. Return to your home group and explain the problems to the rest of your group
Energy is the ability to do work!

Mechanical Energy

Mechanical energy is due to position or to motion, or both.

There are two forms of mechanical energy:

- Potential energy
- Kinetic energy
Kinetic Energy

What is it?

• Kinetic energy is energy due to motion.
• Energy of a moving object.
• Note: Kinetic means moving

How do you get it?

• Doing work to change speed

Example

• Bowling ball that does work when it hits the pins
Kinetic Energy

What is its equation?

\[ KE = \frac{1}{2} m \cdot v^2 \]

KE = kinetic energy measured in joules
m = mass measured in kg
v = velocity measured in m/s

** Note: velocity is squared so the velocity will affect the KE more!!
A 14 kg ball rolls at a speed of 3 m/s. What is the kinetic energy?

\[ KE = \frac{1}{2} mv^2 \]

\[ = \frac{1}{2} (14 \text{ kg})(3 \text{ m/s})^2 \]

\[ = 63 \text{ J} \]
Potential Energy

What is it?
• Potential energy is energy due to an object’s position or height

How do you get it?
• Work done against another force, and that force is gravity

Example
• A forklift lifting a load up or down.
Potential Energy

What is its equation? We are looking at gravitational potential energy (GPE)

\[ GPE = m \cdot g \cdot h \]

GPE = gravitational potential energy measured in joules
m = mass measured in kg
g = gravity = 10 m/s^2
h = height measured in m

**Note: both mass and height contribute to changes in GPE equally.**
Calculate how much potential energy a 2 kg book has if a student puts it on a shelf 2 m high.

\[ m = 2 \text{ kg} \]
\[ h = 2 \text{ m} \]
\[ g = 10 \text{ m/s}^2 \]

\[ \text{GPE} = mgh \]
\[ = (2 \text{ kg})(10 \frac{\text{m}}{\text{s}^2})(2 \text{ m}) \]
\[ = 40 \text{ J} \]
Does a car hoisted for repairs in a service station have increased potential energy relative to the floor?

A. Yes
B. No
C. Sometimes
D. Not enough information
Does a car hoisted for repairs in a service station have increased potential energy relative to the floor?

A. Yes
B. No
C. Sometimes
D. Not enough information

Comment:
If the car were twice as heavy, its increase in potential energy would be twice as great.
Potential Energy

Example: Potential energy of 10-N ball is the same in all 3 cases because work done in elevating it is the same.
Energy Practice problems

• Work with your table group to solve the energy practice problems.

• Due TOMORROW at the start of class (first thing we will do is check them)
Missing 1-D Phet Lab
(pushing the locker)

- Anna
- Kyier
- Jueniyah
- Tatum
- Renato
- Trinity

- Huwa
- Xinglei
- Yangchen
- John
- Zach
- Shaughnessy

- Rhamaia
- Saeed
- Jason