Flipped Classroom Experience

One Lesson at a Time

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Objectives

- Define appropriate learning outcomes for in class vs out of class activities.
- Discuss the ways in class flipped learning activities have been implemented.
- List technologies available for flipped learning for interactivity, engagement, and content creation and delivery.

9 Design Principles

1. Provide an opportunity for students to gain first exposure prior to class
2. Provide clear connections between in-class and out-of-class activities
3. Provide clearly defined and well-structured guidance
4. Provide an incentive for students to prepare for class
5. Provide a mechanism to assess student understanding
6. Provide prompt/adaptive feedback on individual or group works
7. Provide facilitation for building a learning community
8. Provide technologies familiar and easy to access
9. Provide enough time for students to carry out the assignments

Learning Objectives

What will students learn?

A. Compare and contrast potential lemonade stand locations.
B. Rank a set of possible locations in terms of their potential as locations for a profitable lemonade stand.
C. List at least three critical factors in determining a profitable location for a lemonade stand.
D. Identify the necessary licensing and regulatory requirements for each location.
E. For a given location, determine the relative weight of various factors in predicting the profitability of the location.
F. Describe potential trade-offs that may be required for a particular lemonade stand location.
G. Assemble a market analysis report for each of the potential locations.

Organize the Learning Objectives

Arrange the LOs in order from most difficult to least difficult

TIME’S UP!

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Identify the break point

At what point is your support required for students to be successful?

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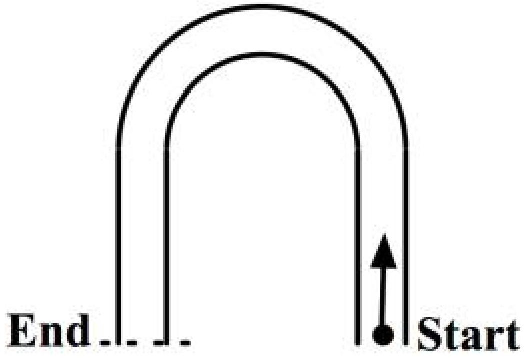
Activities inside the classroom

CT1: A runner is training on a U-shaped track. She starts at rest at the end of near straightaway and speeds up until she reaches the curve. She runs around the curve in the track at a constant speed, then slows down in the far straightaway until she comes to a stop at the far end. During which sections of the track does the runner accelerate?

1. The near straightaway
2. The curve in the track
3. The far straightaway

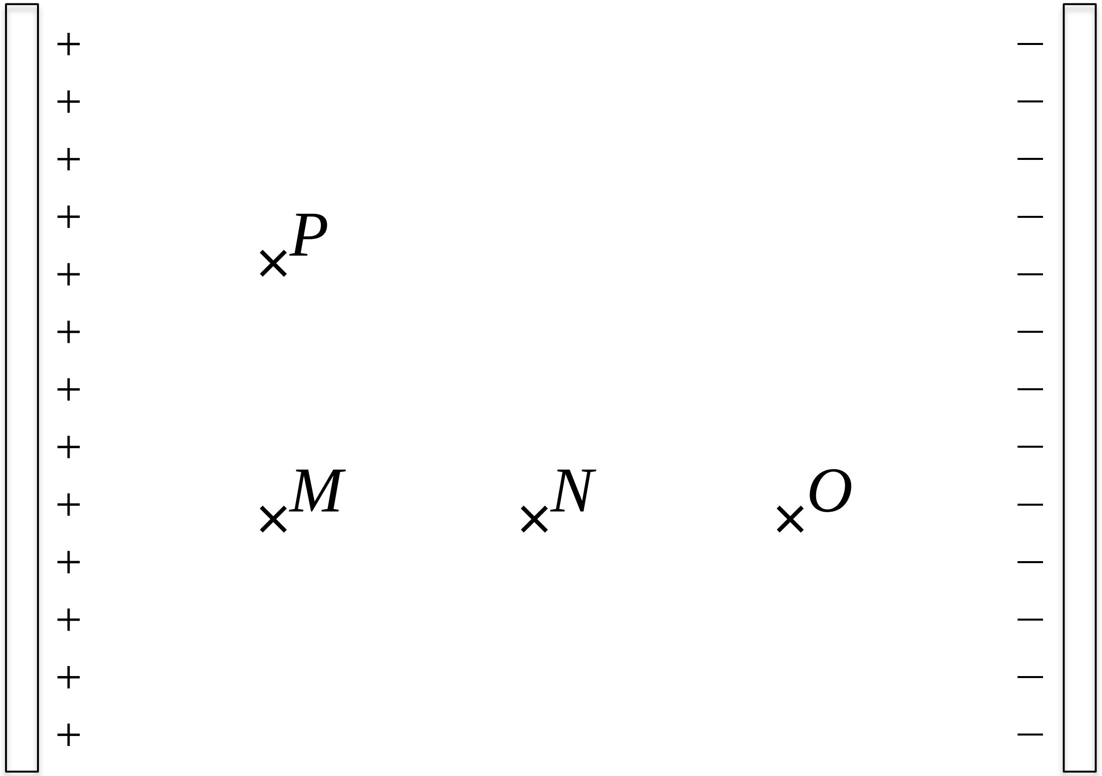


GW1: Two charged parallel plates create a uniform electric field of 10 N/C between the plates. You can move a charged particle between any pair of the four points shown in the figure below. The charged particle can be either a proton (charge +*e*), an electron (charge –*e*), or an alpha particle (charge +2*e*). The table on the right shows nine different options for moving a charge within the electric field.

(a) In which cases is the change in the electric potential energy of the charged particle positive, negative, or zero?

(b) Rank the cases where the electric potential energy increases, from greatest to least.

(c) Rank the cases where the electric potential energy decreases, from greatest to least.



	Particle	From	To
A	e^-	*M*	*N*
B	p^+	*O*	*P*
C	α	*O*	*P*
D	p^+	*M*	*O*
E	e^-	*N*	*O*
F	α	*O*	*N*
G	e^-	*O*	*M*
H	p^+	*N*	*M*
I	α	*M*	*P*

GW1: Which of the following statements are correct? (There may be more than one.)

1. Heat is a form of energy, like kinetic energy or potential energy.

2. Temperature is a measure of the heat of an object.

3. Temperature will change during melting or boiling.

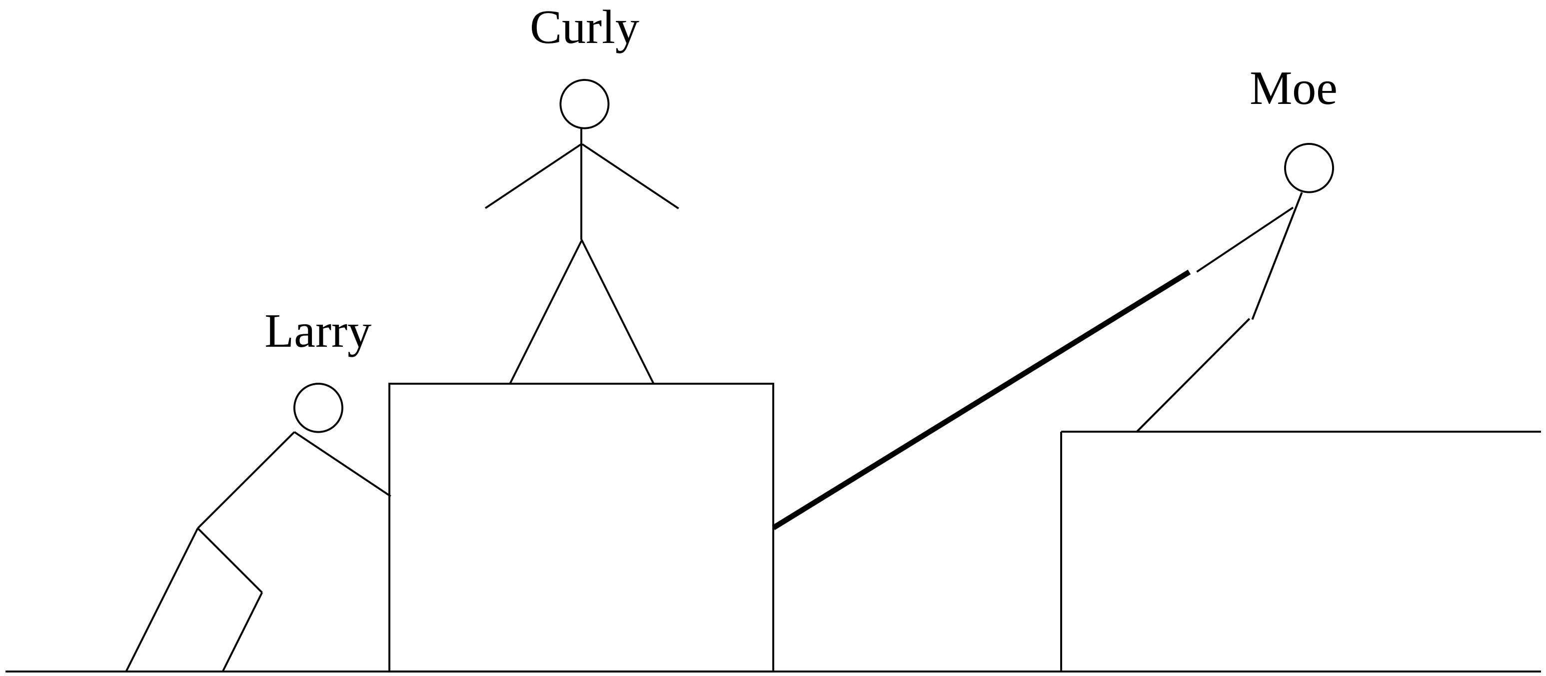
4. If two bodies are at the same temperature, they have the same amount of heat.

5. If two bodies are at the same temperature, they have the same amount of energy.

6. Heat is a measure of the energy of an object.

GW4: After all your exertions, you hire the Three Stooges Moving Company to move the box for you. You watch as the three movers slide the box across the floor as Moe pulls on a rope that is angled above the horizontal, Larry pushes horizontally on the box, and Curly stands on top.

Draw the free-body diagram for the box.

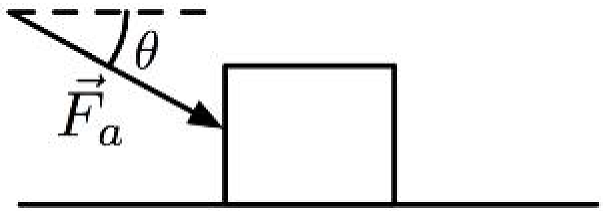


CT6: A box of mass m, initially traveling with a speed v_0, slides up a rough plane inclined at an angle θ above the horizontal. What is the direction of the acceleration of the box?

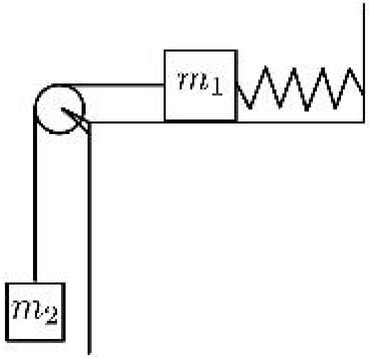
1. Up the plane
2. Down the plane
3. There is no acceleration
4. It cannot be determined

EX2: A box of mass m, initially traveling with a speed v_0, slides up a rough plane inclined at an angle θ above the horizontal. If the coefficient of kinetic friction between the plane and the box is μ_k, what is the acceleration of the box?

GW5: A constant force $\vec{F}_a$ pushes a 22.5-kg box across a rough horizontal surface. The magnitude of $\vec{F}_a$ is 185 N and the force is inclined at an angle of θ = 30.0° below the horizontal. If you know that the box slides across the surface at a constant speed, what must be the value of the coefficient of kinetic friction between the box and the surface?



Two blocks with masses m_1 = 7.00 kg and m_2 = 5.00 kg are connected by a massless string across a massless, frictionless pulley as shown in the figure below. Block 1 sits on a frictionless horizontal surface and is connected to one end of a spring with a spring constant k = 500 N/m. Initially, both blocks are stationary and the spring is at its equilibrium position. What is the maximum distance the blocks will stretch the spring after they have been released?

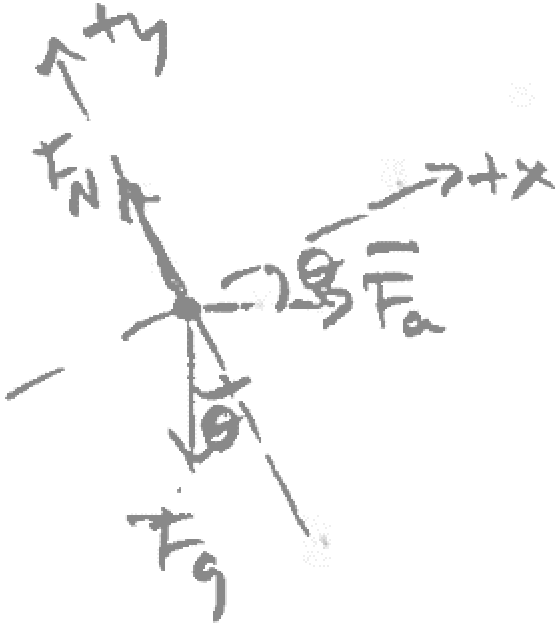


What type of problem is this?

1. Conservation of energy
2. Energy with W_{nc}
3. Impulse
4. Conservation of momentum
5. Rotational kinematics & linear acceleration

A box of mass $m = 18.0$ kg is initially at rest at the bottom of a frictionless plane that is inclined at an angle of $\theta = 20.0°$ above the horizontal. You push horizontally on the box with a constant force $\vec{F}_a$ that has a magnitude of 115 N. As you push, the box accelerates up the incline. What is the magnitude of the box's acceleration?

1. Draw the picture of the crate as it slides up the incline.
2. Draw the vector diagram for the problem.



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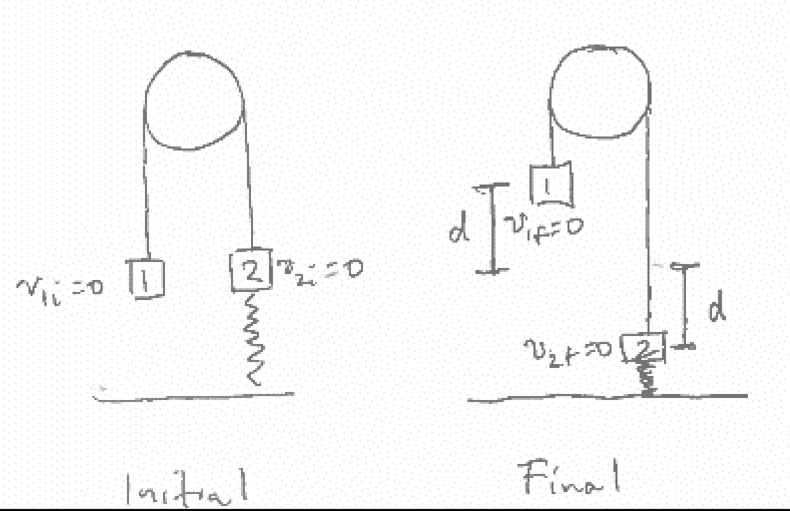
Two masses are connected by a massless string which runs across a massless, frictionless pulley. The heavier mass (m_2 = 12.0 kg) is also connected to a spring, which is attached to the ground and has a spring constant of k = 2000 N/m. Both masses are initially placed at the same height. When the masses are released, m_2 begins to fall and compresses the spring. When the masses momentarily come to a stop, the spring has been compressed by a distance d = 2.50 cm. What is the mass of m_1?

Set up the conservation of energy equation for this problem. Make sure you include all the necessary terms.



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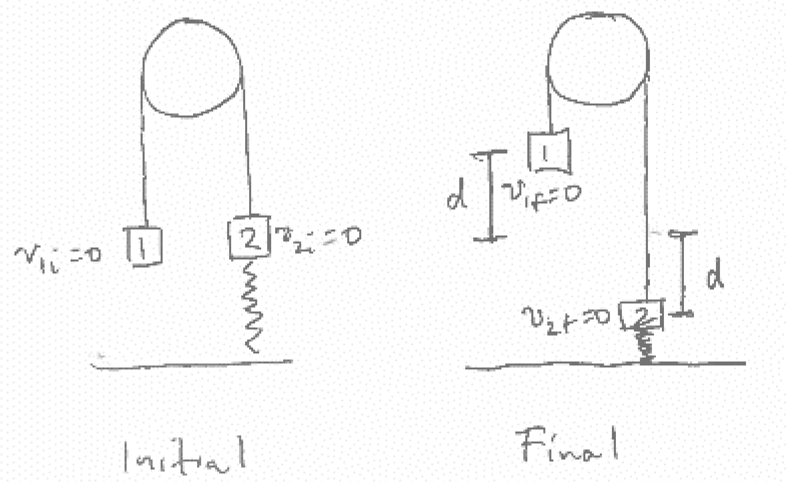

$$K_{1i}+K_{2i}+U_{g1i}+U_{g2i}+U_{si}+W_{nc}=K_{1f}+K_{2f}+U_{g1f}+U_{g2f}+U_{sf}$$

Technology for Flipping

Inside the Classroom

Interactivity and Engagement

Fancy tech
is unnecessary

Low Tech Solutions

- Entry/Exit Tickets
- Think, Pair, Share
- Markerboards/Chalkboards (handheld or wall-mounted)
- Index cards or Post-It notes
- Discussions

More Direct Tech Use

- Clickers
- Office 365
- Kahoot
- Nearpod
- Socrative
- MindMeister
- Adobe Spark

Technology for Flipping

Outside the Classroom

Low Tech Solutions

- Reading guides or guided notes
- Discussions questions
- Muddiest Point
- 3, 2, 1 Reflection

More Direct Tech Use

- Blackboard
  - Panopto
  - VoiceThread
  - Discussion threads, blogs, or wikis
  - SoftChalk
- Office 365
- Adobe Spark
- Sli.Do
- Perusall

Interaction not just watching

Create vs Curate

Create Your Own Content

- Blackboard
  - Panopto
  - SoftChalk
- Camtasia (available in the TILL)
- Digital Media Suite recording studio
  - Creating Videos for Flipped Teaching
    - Tuesday, 2/13 12:00-1:00pm
    - Digital Media Suite

Using Existing Content

- TED Ed
- Open Education Resources (OER)
  - LibGuide by the University Libraries and the Delphi Center
  - What are Open Educational Resources and Why Should I Want to Use Them?
    - This room – up next
    - Aimee Greene – Delphi Center
    - Amber Willenborg – University Libraries

More Information

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