

Unit 5 Physics

Energy & Momentum

Physics

Physics Daily Agenda- 4/12 & 4/16

Schedule

1. Opening Phenomenon
2. Energy Basics
3. Practice
4. Exit Ticket
5. Lab Report Check In

Warm Up

How would you describe energy? How do we use this word in our everyday life?

Upcoming

Testing Tuesday, Wednesday and Thursday

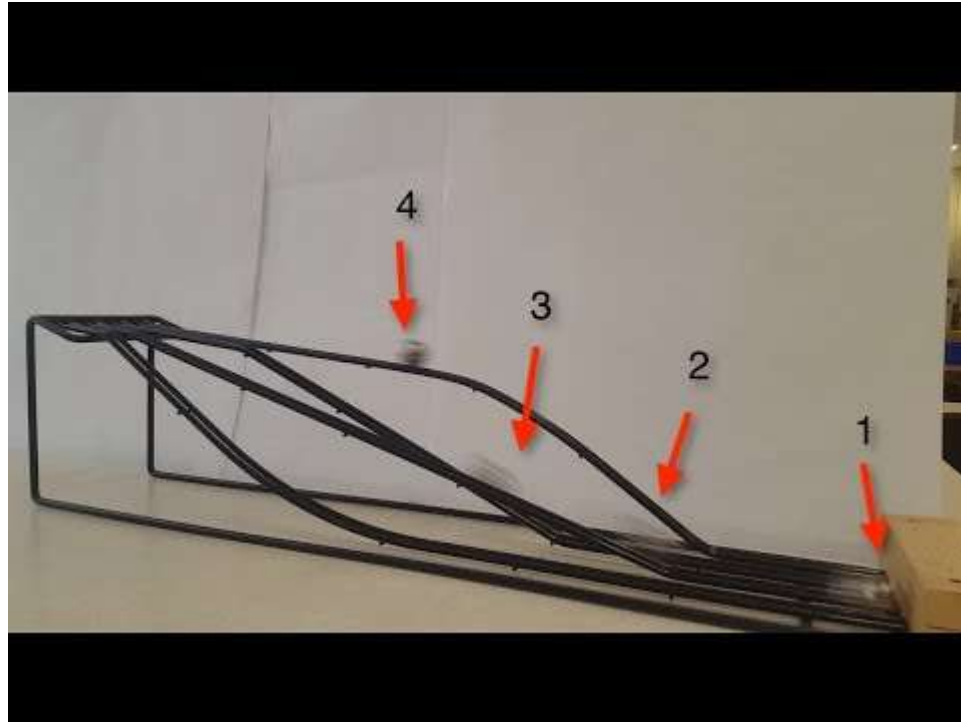
No Async Work Wednesday

Gold Day Friday

Predict

View the still from the video...

- What do you notice about the 4 ramps?
- How are they similar and different?
- Which will hit the end first?



Hour 6 Class Questions/Observations

#1 ball hit first, going really fast and furious, because of the steep decline

Since #1 was going the fastest, it hit the block the hardest

#4 was the slowest, probably because of the not so steep decline

#1 had a curve going inwards for its ramp and had a sort of sideways L shape

How do the shape and slope of the ramps relate to their speed?

Deep slope at the beginning of the ramp helped the ball go faster

The Basics of Energy

What is energy?

Where have you heard of energy before?

The Basics of Energy

What is energy? The ability to do work

Where have you heard of energy before?

Types of Energy



Mechanical
Energy



Thermal
Energy



Nuclear
Energy



Chemical
Energy



Electromagnetic
Energy



Sonic
Energy



Gravitational
Energy



Kinetic
Energy



Potential
Energy



Ionization
Energy

Kinetic Energy

Energy from movement

Anything with a velocity has kinetic energy

$$K = \frac{1}{2}mv^2$$

Gravitational Potential Energy

Energy from anything that has height off the ground (vertical)

$$PE = mgh$$

Example Problems

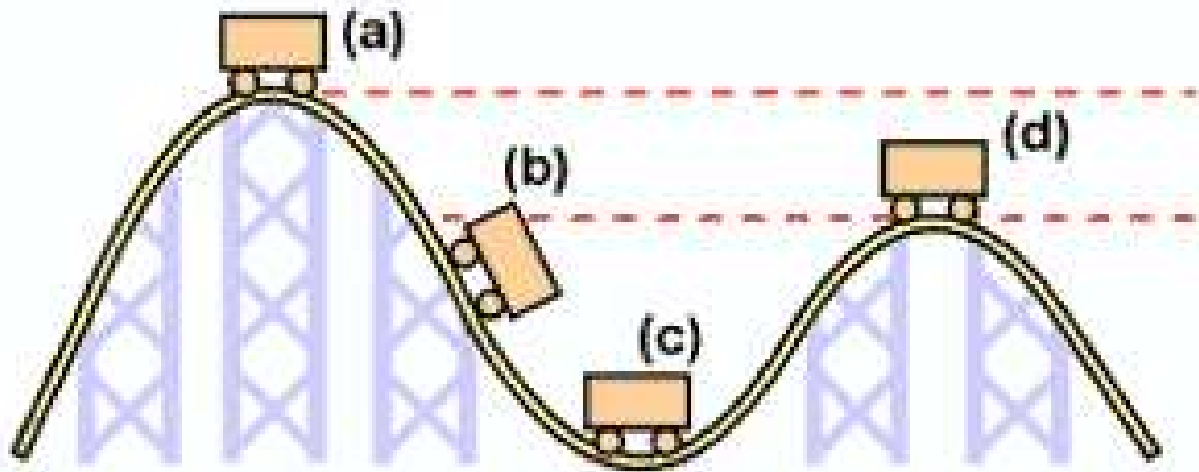
A 1.3 kg ball is thrown up in the air reaches a height of 1.2 m. What is the is potential energy of the ball?

The same ball is thrown at an initial velocity of 6 m/s. What is the kinetic energy of the ball?

Conservation of Energy

Energy cannot be created or destroyed.

Energy Before = Energy After



Max PE?

Max KE?

Both PE and KE?

A 0.001 kg penny falls from the top of a building that is 50 m tall.

What is the initial PE?

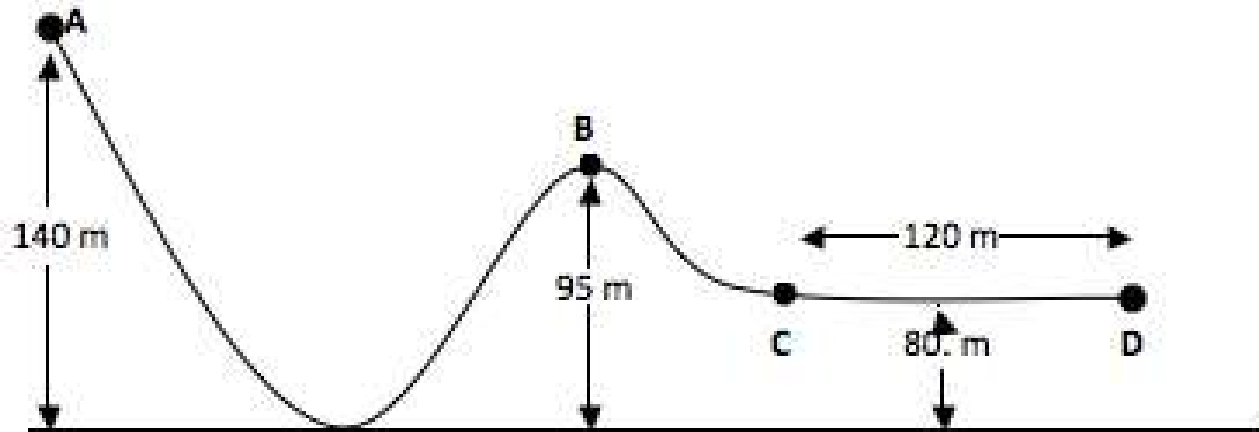
What is the total energy?

What is the KE when it hits the ground?

What is the velocity when it hits the ground?

Energy at Each Point (Cart = 1000kg)

Figure 1:



Next Class: Energy Bar Graphs, Choice Based Project

Project Choices

- Energy of a Pendulum (PhET) (Pre-AP)
- Roller Coaster Project
- Energy Lost

Exit Ticket

- 1) A 100 kg roller coaster starts at the top of the hill at 60 m. What is the initial PE?
- 2) What is the total energy of the system?
- 3) The coaster reaches the lowest point. What is the KE now? Velocity?
- 4) The coaster goes back up to 10 m. What is the PE now? KE?

Physics Daily Agenda- 4/19 & 4/20

Schedule

1. Energy Review
2. Review of Schedule
3. Choice Project

Warm Up

1. Take your your notes on energy from Monday.
2. Open up Google Classroom.
3. Write in the chat to me:
 - a. How are you doing?
 - b. Rate yourself 1-4 in your understanding of energy.

Upcoming

Async Wednesday:
Energy Review

Energy Choice
Project Due May

2nd: **Last
Assessment for
Seniors!**

Energy Review

A 75 kg person is at the top of a 40 m high roller coaster.

1. What is their potential energy?
2. What is the total energy of the system?
3. What is the kinetic energy at the bottom?
4. What is the velocity at the bottom?

Monday's Goals

Roller Coaster

- Step 1 and Step 2 Questions
- Basic Research on Roller Coaster Designs

Energy Lost

- Equipment, Procedure, Variables, Data Table

Pendulum

- Procedure, Variables, Data Table, maybe start taking data

Physics Daily Agenda- 4/22 & 4/23

Schedule

1. Groups to Review Projects
2. Work Time
3. Share Out with what you completed today

Warm Up

1. Which project are your working on?
2. What have you accomplished so far?
3. Did you do the problems from yesterday?
4. Rate yourself on conservation of energy 1-4 and why.

Upcoming

Project should be have done by the next block (teacher will give details)

Project due May 2-2 more class blocks to work!!!!

SENIORS

- Last assignment is the energy choice project
- Last Day to turn in missing assignments and get your grade before your final: Thursday, May 6
- 70%+ you do not have to take the final, but if you do it cannot hurt your grade
- Finals are the week of May 10-13 (not sure of schedule)
- Finals are a reassessment of ALL STANDARDS- you choose!

Roller Coaster

- Review Answers to Wednesday Asynchronous
- Review Examples

Goal by end of class

- Complete rough draft including calculations

(See drive for examples)

Energy Lost

- Review Answers to Wednesday Asynchronous
- Review Lab Report Requirements

End of Class Goal

- Data Collection
- First half of lab

Pendulum

- Review Answers to Wednesday Asynchronous
- Review how to take data and get your results

Goal by the end of class:

- Complete data and graphs and the first half of the lab
- Ask any questions!

Physics Daily Agenda- 4/26 & 4/27

Schedule

1. Groups to Review Projects
2. Work Time

Warm Up

1. What you have completed so far on your project? Be specific
2. What questions do you have? Are you confused about anything?

Upcoming

FINISH PROJECT
IN CLASS TIME

Project due
Sunday, May 2

Physics Daily Agenda- 4/29 & 4/30

Schedule

1. Project Check in
2. Work Time

Warm Up

1. What do you need to finish on your project?
Be specific
2. What questions do you have? Are you confused about anything?

Upcoming

FINISH PROJECT
IN CLASS TIME

Project due
Sunday, May 2

SENIOR FINAL SCHEDULE

Thursday, May 6th (Purple): Attend 1st, 2nd, 3rd, **start 7th hour Final for seniors**

- All late work/assessments turned in- must tell me if you are not taking the final (through asynchronous question on Wednesday)

Friday, May 7th: No School for All Students

Monday, May 10th (Purple): Attend 1st and 2nd. **Finals-3rd Hour and 7th Hour for seniors**

Tuesday, May 11th (Gold): **4th, 5th and 6th Senior Finals**, No 7th hour for seniors

Wednesday, May 12th: Asynchronous (Seniors can take a 4/5/6 final if needed, no async for seniors)

Thursday, May 13th (Purple): **1st and 2nd Senior Finals, Seniors are DONE after that :)**

Friday May, 14th (Gold): No Seniors

Physics Daily Agenda- 5/3 & 5/4

Schedule

1. Collisions
Phenomenon
2. Collisions
Flipped
Lesson
3. Senior
Meeting
4. Finish Energy
Project

Warm Up

**What is a collision?
Describe it in your own
words/draw it out.**

Upcoming

Make sure you've
turned in your
project!

Last day for late
work (seniors)-
May 6

SENIOR FINAL SCHEDULE

Thursday, May 6th (Purple): Attend 1st, 2nd, 3rd, **start 7th hour Final for seniors**

- All late work/assessments turned in- must tell me if you are not taking the final (through asynchronous question on Wednesday)

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Wednesday, May 12th: Asynchronous (Seniors can take a 4/5/6 final if needed, no async for seniors)

Thursday, May 13th (Purple): 1st and 2nd Senior Finals, Seniors are DONE after that :)

Friday May, 14th (Gold): No Seniors (if you are failing a class at this point, you will still need to work)

Do I need to take the final?

If you have a 70%+ as of **Friday** (when I have fully updated late work), you do not have to take the final.

I will have an asynchronous question on Wednesday, where you will indicate whether you are taking the final. It can be changed up to Friday!

The final is a reassessment of standards that you choose.

Juniors and sophomores will have a different question about end of year interests.

Unit 6 Phenomenon

1. What dangers can collisions cause to our bodies and brain?
2. Should certain types of collisions and contact be banned in the NFL and other sports?
3. How can we make collisions safer if they are inevitable?

Banned Hits? What was wrong with this hit?



Video

Play whole video

Focus on- 1:05-1:47

DO NOT PLAY WITH
SOUND



<https://www.youtube.com/watch?v=xGOC9iSf4D4>



Brain Video



To Do

- Seniors: Meet with me if needed
- Momentum Phenomenon (should be finished)
- Finish your Energy Choice Project
- Collisions Flipped Lesson

You must stay on if you Energy Choice Project is not turned in!

Collisions Flipped Lesson

Questions:

1. Describe the three different types of collisions in your own words.
2. In an elastic collision, is the final velocity the same or different for the two objects?
3. In an inelastic collision, is the final velocity the same or different for the two objects?
4. Is an explosion more similar to an elastic or inelastic collision? Why?

<https://www.youtube.com/watch?v=TXJTjtvL7PA&t=420s>

Physics Daily Agenda- 5/6

Schedule

1. Review Flipped Lesson
2. Momentum Simulation with a Partner
3. Class Conclusions

Warm Up

Take out your flipped lesson notes.

- What are the three types of collisions?
- In our phenomenon, what type of collision did you see?

Upcoming

Last day for late work (Seniors)!

Teacher Appreciation Week

One of the best ways to thank a teacher is to write an email of appreciation to them! Choose a teacher you've had any time in your life and send them an email of appreciation.

You can even send multiple emails :) Trust me- it will brighten up a teacher's day!

Let me know in the chat you who are sending this email to!

To Do

- Complete Momentum Collisions Simulation Inquiry
- Complete Wednesday Asynchronous Question (Seniors have until Friday to complete/change)
- Complete Energy Choice Project
- Complete Momentum Flipped Lesson

Physics Daily Agenda- 5/10

Schedule

1. Class
Conclusions
from
Momentum
Simulation
2. Collisions
Equations
3. Exit Ticket
4. Independent
Practice Time

Warm Up

- Open up your Momentum Simulation from Thursday.
- What are some things you noticed the elastic collisions had in common?

Upcoming

Hour 1 & 2-
Senior Final
Thursday

Class Conclusions

Momentum Equation

Inelastic Collisions

Definition:

Equation:

A 5 kg ball rolling at 1 m/s collides with a 10 kg ball that is at rest. The two balls stick together and move as one. What is the final velocity of the balls?

A 5 kg ball rolling at 1 m/s collides with a 10 kg ball moving towards it at 1 m/s. The two balls stick together and move as one. What is the final velocity of the balls?

Elastic Collisions

Definition?

Equation

A 200 kg bumper car collides with a 150 kg bumper car. The 200 kg car is moving at 5 m/s and the 150 kg bumper car is at rest. After the collision the 200 kg car is at rest. What is the final velocity of the 150 kg bumper car?

A 200 kg bumper car collides with a 150 kg bumper car. The 200 kg car is moving at 5 m/s and the 150 kg bumper car is moving towards it at 3 m/s. After the collision the 200 kg car bounces back at 1 m/s. What is the final velocity of the 150 kg bumper car?

Exit Ticket: Upload on Google Classroom

1. A 1 kg ball moving at 1 m/s collides with a 2 kg ball at rest. They move together when they collide. What type of collision is this? What is the final velocity of the balls?
2. A 1 kg ball moving at 1 m/s collides with a 2 kg ball at rest. The 1 kg ball is now at rest after the collision and the 2 kg moves alone. What type of collision is this? What is the new velocity of the 2kg ball?

Practice Packet

Part 1 and 2

Asynchronous Wednesday Problems

Draw it out and show all work! Check out the notes from Monday if you need help.

1. A bumper car with a mass of 300 kg is moving at 6 m/s and crashes into a 250 kg bumper car at is at rest. The two cars move together. What is the final velocity of the two cars after they collide?
2. A bumper car with a mass of 300 kg is moving at 6 m/s and crashes into a 250 kg bumper car which is moving towards the 300 kg car at 6 m/s. The two cars collide and move together. What are the final velocities of the two cars after they collide?
3. A bumper car with a mass of 300 kg is moving at 6 m/s and crashes into a 250 kg bumper car which is moving towards the car at 4 m/s. The two cars bounce off each other. The 250 kg car bounces backward from its original direction with a velocity of 2 m/s. What is the final velocity of the 300 kg car?

Physics Daily Agenda- 5/13

Schedule

1. Senior Finals
2. Review Async
Wednesday
3. Explosions
4. Impulse
5. Performance
Task Review
6. Independent
Practice

Warm Up

- Describe an explosion in real life and as a type of collision.
- Take out your Wednesday Async Assignment

Upcoming

Next Block:
Performance
Task for
Momentum

Asynchronous Wednesday Problems

Draw it out and show all work! Check out the notes from Monday if you need help.

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Asynchronous Wednesday Problems

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Explosions

Definition:

Equation:

Momentum of the Astronaut?

BEFORE...

0 kgm/s



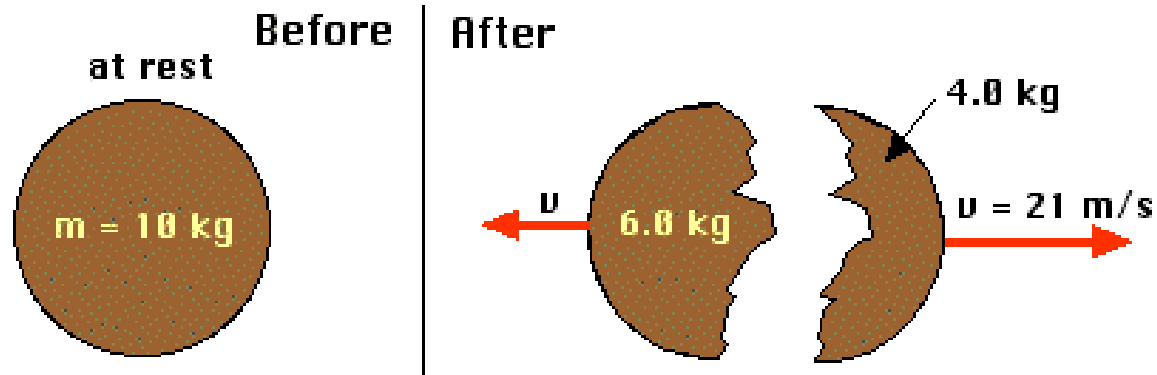
AFTER...

-5 kgm/s



? kgm/s

Final velocity of the 6 kg piece?



The other momentum... impulse

When there is a change in momentum there must be a force and time interval.

$$F \Delta t = m \Delta v = \Delta p$$

A 0.15 kg baseball is thrown at 60 m/s towards a bat and changes speed to 50 m/s. The force on the baseball is 1000 N. How much time will it take to switch directions?

A stunt woman jumps out of 10 m building onto a net. The woman has a mass of 65 kg. She lands on a net which stops her in 0.22 seconds. What is the velocity when she hits the net (use kinematics)? What is the force exerted by the net?

What we learned in this unit

- Momentum Equation
- Elastic Collisions
- Inelastic Collisions
- Explosions
- Impulse and Momentum

Unit 5 Performance Task

- Part 1

- Problem for each type of collision (elastic, inelastic and explosions)
- Can use notes and resources

- Part 2

- Phenomenon to use impulse, momentum and collisions to predict and explain the outcome of a collision

Exit Ticket

1. A person stands on a canoe and jumps off. The person has a mass of 50kg and the canoe has a mass of 200 kg. The canoe moves backwards with a velocity of 0.5 m/s. What is the velocity of the person?
2. A 0.43 kg soccer ball is rolling towards the person at -3 m/s. A person is in contact with the ball for 0.1 seconds and the new velocity is 25 m/s. How much force did it take to hit the ball in the opposite direction?

Parts 1-4

Practice Packet

I will post the answers!

Physics Daily Agenda- 5/17 & 5/18

Schedule

1. Review from Practice Packet
2. Momentum Performance Task

Warm Up

- Describe the difference between our three types of collisions.
- What is our equation for impulse?

Upcoming

Async
Assignment
Wednesday

Monday 5/24- No
Zoom Class Hour
1

In the chat rate
yourself 1-4...

- Inelastic Collisions
- Elastic/Explosions

Wentzloff Hour 1: End of Year

Thursday, May 20: Normal Class

Monday, May 24: No Zoom Class

Thursday, May 27: Normal Class

Monday, May 31: No School Memorial Day

Thursday, June 3: Normal Class

Friday, June 4: All late work due, Final decision due

Monday, June 7: Optional Final

Lee Hour : End of Year

Thursday, May 20: Normal Class

Monday, May 24: Normal Class

Thursday, May 27: Normal Class

Monday, May 31: No School Memorial Day

Thursday, June 3: Normal Class

Friday, June 4: All late work due, Final decision due

Monday, June 7: Optional Final

Physics Daily Agenda- 5/20 & 5/21

Schedule

1. Review from Practice Packet
2. Momentum Performance Task

Warm Up

- Questions on the practice packet?

Upcoming

Lee Hour 2, 4, 6: End of Year

Monday/Tuesday, May 25/26: Normal Class

Thursday/Friday, May 27/28: Normal Class

Monday, May 31: No School Memorial Day

Tuesday, June 1: Normal Class

Thursday/Friday, June 3/4: Normal Class

Friday, June 4: All late work due, Final decision due

June 7-11: Optional Final