Physics. Annual Pacing Guide

Natalia Felvinczi

Students. 2022-23Physics Agendas

Physics page with resources

SEMESTER 1

Unit 1: The Beginning

- Distance, displacement, speed, and velocity
- X v t, v vs t graphs

Unit Focus

Galileo started his studies of physics with the swinging motion of a pendulum, Newton started with the motion of falling objects, and Einstein considered objects moving at high speed. In each case, motion played the central role.

In this unit, students will explore one-dimensional motion. Beginning with evaluating the nuances of distance vs displacement and velocity vs speed, students will learn about scalars versus vectors and how they affect signs and acceleration. With this new understanding of vectors and scalars, students will embark on problem-solving techniques, experiments, and graphical analysis of motion. As a part of this unit, students will also spend time looking at the importance of units and unit conversions in calculations and understanding of what numbers really mean. Ultimately, students will be using these skills to help them develop their own procedures for different discovery lab activities

ESTABLISHED GOALS
<type here>

Social Justice. Daily class environment

Diversity

(6) Students will express comfort with people who
are both similar to and different from them and
engage respectfully with all people.

Action

(19) Students will make principled decisions about
when and how to take a stand against bias and
injustice in their everyday lives and will do so despite negative peer or group pressure.

Transfer

The student will independently use their learning to critically investigate the physical world.
Students will independently use their learning to clearly communicate in order to collaboratively exchange information, facts and perspectives.
A student will independently use their learning to select and evaluate technologies and sources to accomplish complex goals.

Meaning

UNDERSTANDINGS

1. The motion of objects must be defined by using a frame of reference.
2. There are two main types of one-dimensional motion: motion with constant velocity (at rest is a particular case of this) and accelerated motion (changing velocity).
3. Motion can be analyzed graphically

ESSENTIAL QUESTIONS

1. How can you predict or show the motion of an object? (How can motion be quantified and communicated scientifically?)
2. What do graphs communicate?

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	Acquisition		
	Students will know... 1. Speed and velocity are not the same quantity; velocity has direction 2. Distance and displacement are different quantities; displacement has a direction as well as a magnitude 3. Velocity is the rate of change of displacement 4. Acceleration is the rate of change of velocity 5. Graphs can be used to describe motion of objects 6. The slope of a position-time graph is the velocity of an object 7. The slope of a velocity-time graph is the acceleration of an object		*Students will be skilled at...* 1. Be able to solve problems using the basic definitions of average velocity and acceleration. 2. Be able to state the proper units for position, velocity, and acceleration. 3. <u>Graphical Analysis:</u> • Be able to look at a Position vs. Time graph and explain in words the motion of the object that is described by the graph. • Be able to look at a Velocity vs. Time graph and explain in words the motion of the object that is described by the graph. • Determine velocity from a Position vs. Time graph (i.e. find the slope). • Determine acceleration from a Velocity vs. Time graph (i.e. find the slope) 4. Create position-time, and velocity-time, graphs from a physical description of the motion of an object

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
<type here>	PERFORMANCE TASK(S): 1. Labs 2. Labs activities 3. Performance classwork activities 4. Unit Test

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Stage 3 – Learning Plan

E.Q:

3. How can you predict or show the motion of an object?
4. What do graphs communicate?

Class#1 *Introduction & group activity # 1. Walking Speed activity*	1. Day 1 presentation 2. Assign seats and hand out a syllabus 3. Presentations 4. Syllabus review & website tour 5. Personal info sheet. Google form 6. Lab grouping games/discussion 7. Walking speed activity 8. HW: a. Complete Personal info sheet. Google form b. After reading the syllabus with your parents/guardians, email Ms. Natalia. The email should say: "I have read and understood everything in my Physics syllabus"
	1. Circle Area Do Now 2. Classwork: "MEASURE TWICE CUT ONCE"
Class#2 *Lab report standards* *Lab # 1. Rolling ball lab*	1. Do now TBD. Review from last class. 3. Walking speed lab review and feedback- give S = d/t 4. Parts of a lab report 5. Lab #1 Rolling Ball Lab - Must get all data before class ends 6. PRE-LAB.Rolling lab. Brainstorming 7. Hand out Lab report standards. **Questions?** 8. First HW
Class#3 *Graphing notes* *Graphs and slopes*	1. No, Do Now. Start working on Graphing Notes 2. Graphing Notes 3. Hand out Formula Sheets 4. Work on lab reports - focus on graphs 5. HW.#1 a. Work on the lab report with Lab report standards.

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	b. Graphs and Slopes c. Optional: Watch these two videos 1. Video 1 Mandatory 2. Video 2 Mandator
Class#4 *Graphs and slopes review* *Intro physics notes* *Distance, displacement, speed, velocity, and acceleration*	1. HW review before do now (Graphs and Slopes) gives ppl a chance to make corrections on the do now 2. Notebook check called "first HW" 3. Graphing Do Now 4. Time to ask questions about lab #1 5. Intro Physics Notes - Dist, disp, etc In discussion groups 6. HW: a. Work on the lab report b. Extra. Optional. Real-world problems, graphs, and slopes
Class#5 *Intro physics notes* *Distance, displacement, speed, velocity, and acceleration.* *Day # 2* *Lab # 2 Measuring unknown distance* • Lab example with Alex's notes as reference	Rolling lab due. Hand out Lab report Standards with Rolling ball lab KEY 1. Swimmer Do Now -Small review. (the last one is impossible, let students struggle with it for a few mins) 2. Extra. Do now. Review with students Lab report standards. Questions? 3. Day #2 Intro Physics Notes Some important considerations Speed vs velocity Questions? 4. Discussion about how to get a good walking speed. 5. Lab #2 Measuring an unknown distance 6. HW a. Finish Measuring an unknown distance b. Squirrel HW + Finish Measuring an unknown distance
Class#6 *Install Logger Pro* TBD *Lab # 3 Moving man*	Measuring an unknown distance due 1. Small review Do Now Small review 2. Check Squirrel HW. Questions? 3. Time in class to ask final questions for Measuring an unknown distance lab activity 4. Install Logger Pro - Didn't need any password, or to install an update 5. HW. Lab #3 Moving man Students will have time in class to work on this activity. Lab # 3 is due at the end of the next class.
Class#7 *Re-cap day*	1. Exploring previous ideas Acceleration Do now 2. Work on Lab #3 Moving man 3. Check the Do now

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	4. Share some important ideas about Lab #3 Moving man 5. Finish Lab #3 Moving man 6. EXTRA Website activities 7. HW: Finish lab and Quizlet Quizlet 1. Acceleration Vocabulary & Concepts Quizlet 2. Distance, displacement, speed, and velocity Quizlet 3. Position vs time graphs Extra: Position vs time graphs 2
Class#8 *Lab # 4. X vs T graphs matching*	Moving man Due 1. Quizlet lives in Groups with one computer. 2. Review the last problem from Squirrel HW. 3. STOP!!! Let's do a recap! A brief discussion of Finish Lab #3 Moving man. The goal is to know the rule about acceleration and velocity. Questions? 4. Lab #4. X vs time graphs matching 5. Graph description vocabulary Demo the color coding, two lines per graph, and the vocab (orally following the instructions) 6. HW: Finish lab. 9 descriptions
Class#9 *Extra* X vs T graphs exercises #1 *X vs t graphs notes*	1. No, Do Now a. Match Graphs (30ish mins). *A small example together b. Talk about descriptions and updated Graph description vocabulary. Mandatory: compare and contrast descriptions 7 through 9 c. Questions? d. Turn in Lab #4. X vs time graphs matching 2. Position vs time graph notes. Presentation here 3. HW: X vs t #1 Challenge yourself, and do your best! Use your X vs t graphs notes
Class#10 Position vs time graphs practice packet #2! *X vs T graphs exercises and review*	1. Longer Do now. Small review 2. Review X vs t HW #1 3. Hand out Lab report Standards Questions? 4. The physics classroom "describing motion with x vs t graphs" sheet, then put x vs t graphs to rest. Position vs time graphs practice packet. Answer key. 5. No HW

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Class#11 *Lab # 5 Vvs T graph matching*	1. X vs t Do now. Extra Do Now HERE 2. Lab #5 V vs time graph matching 3. Graph description vocabulary 4. HW finish the lab
Class#12 *V vs t graphs notes*	Lab #5 V vs t graphs matching due 1. V vs t Do now 2. Extra practice 3. Quick C.F.U. Time to ask questions, and last minute editions of lab # 5. Turn in lab #5 4. Velocity vs time graph notes. Option 2 5. Describing motion Graphically. Answer key 6. HW: V vs t graphs
Class#13 *Describing motion with graphs*	1. Do Now Rocket v vs t graph questions 2. Extra practice 3. Check HW Key 4. Check Do Now Rocket v vs t graph questions Answer key 5. Physics classroom. Describing motion with v vs t graphs Answer Key 6. HW:
Class#14 *Graph conversion notes*	1. Do now. Let's play some games! 1. Match position graphs to words-constant motion (2 motions) 2. Velocity graphs to words-constant motion (2 motions) 3. Notes on Graph Conversions (Both x vs t to v vs t and v vs t to x vs t) 4. HW # 8 Graph Conversions (If time allows it, start HW in class) Key
Class#15 *Graphs conversions exercises*	1. Do now Graphing summary Key 2. HW Check / Review -Graph Conversions KEY

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	3. . Check Final Graph Problems Key 4. Graph packet review and answers 5. EXTRA: Transforming graphs of motion HW Finish all classwork and study for Test #1
Class#16 *Review day*	Review day 1. C.F.U Do now KEY 2. Check Graph packet review and answers 3. Study guide Pre-Test Warm-Up #1 HERE Answers. Pre-Test #1 HERE 4. Extra: Let's play a review game!
Class#17	• Test #1. KEY

Unit 2: 1-d Kinematics

- Accelerated motion
- Free Fall
- THE 6 Equations (Kinematics equations)

Unit Focus

In this unit, we continue our study of motion. This time, however, we will consider situations in which the velocity of an object changes with time. Examples of changing velocity are all around us, from a car that slows down when the traffic light turns red to a ball that speeds up when it is dropped. As students will see, motion with changing velocity is of central importance in physics. Why??

ESTABLISHED GOALS
NGSS

Transfer

The student will independently use their learning to critically investigate the physical world.
Students will independently use their learning to clearly communicate in order to collaboratively exchange information, facts, and perspectives.
A student will independently use their learning to select and evaluate technologies and sources to accomplish complex goals.

Meaning

UNDERSTANDINGS

1. The pattern of an object's motion in various situations can be observed and measured from which predictions can be made.
2. The motion of objects must be defined by using a frame of reference.
3. The motion of an object can be determined and/or predicted by using its position, velocity, and acceleration

ESSENTIAL QUESTIONS

1. How often do we need to describe the motion of an object?

2. How can we use math to predict and describe the motion of an object?

3. How is the motion of an object affected by the acceleration of gravity?

Acquisition

Students will know...

Students will be skilled at...

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	1. An object in linear motion may travel with a constant velocity or with acceleration. 2. An object in free fall accelerates due to the force of gravity. Friction and other forces cause the actual motion of a falling object to deviate from its theoretical motion 3. Objects near the earth fall at an acceleration rate of 9.8 m/s/s	1. Use kinematics equations for constant acceleration, to solve word problems 2. Effectively measure, evaluate and analyze motion variables in a laboratory setting 3. Be able to state the proper units for position, velocity, and acceleration. 4. Solve Free Fall problems using THE six equations

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
<type here>	PERFORMANCE TASK(S): 1. Labs 2. Labs activities 3. Performance classwork activities 4. Unit Test

Stage 3 – Learning Plan

E.Qs

1. How often do we need to describe the motion of an object?
2. How can we use math to predict and describe the motion of an object?
3. How is the motion of an object affected by the acceleration of gravity?

Book resources

Pearson Physics. James S. Walker Acceleration and Accelerated Motion

Class#18 *Lab report Standard review* *Lab #6 Video analysis rolling ball lab*	1. Lab Report Standards Do Now 2. Quick Lab Report Standards Review 3. Give video analysis guide / quick video analysis demo 4. PART 1 Lab # 6. Video analysis rolling ball lab (30 min) 5. Data collection for rolling ball video analysis lab - the goal is to have graphs done before the end of class.
Class#19 *Lab report Standard review* *Lab #6 Video analysis rolling ball lab* *Logger Pro app!*	1. Lab Report Standards Do Now 2. Quick Lab Report Standards Review 3. Video Logger Pro App HERE Website! 4. Quick video analysis demo. 5. PART 1 Lab # 6. Video analysis rolling ball lab (30 min) 6. Data collection for rolling ball video analysis lab - the goal is to have graphs done before the end of class.
Class#20 *Kinematics equations notes* Extra: The runner Do now exercise	Lab # 6 Due 1. IN CLASS PART 2 Lab # 6. Video analysis rolling ball lab 2. HW Study THE 6 equations notes/some examples. Challenge yourself and complete as much as you can of the practice problems!
Class#21 *Kinematics equations notes*	1. Watermelon Do Now. Due in 3 weeks. The only available grades are 0 or 10 2. THE 6 equations notes/some examples in class. 3. HW: THE 6 equations 4. HW: HW: THE 6 equations

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Class#22 *Lab # 7 Free Fall video analysis lab*	1. 6 equations do now 2. Check HW: THE 6 equations 3. Document: Summary of the lab report standards. 4. Kinematic equations. bonus exercises. Time to ask questions in class
Class#23 *Free fall lab*	1. Example of expectations for an excellent conclusion 2. Lab # 7 Freefall video analysis lab 3. What's the point? Data analysis 4. HW finish the lab
Class#24 *Free fall lab + Free fall notes day 1* *Galileo Galilei classwork*	Lab # 7 Due next class! 1. Freefall Do now #1. Key Extra Freefall Do now 2. Last minute questions about lab 3. Freefall notes Day 1 4. What's the point? Equations 5. HW THE 6 equations / Free Fall Practice (HW #1)
Class#25 *Free Fall notes. Day # 2. Upward Free Fall* *Upward Free Fall review*	Free Fall Lab Due 1. Freefall Do now #2 2. Hammer vs feather. Physics in the moon 1. Check Freefall HW #1.Key. Ex 6 Key 2. MINI-Lab # 8 Reaction time Lab activity/Free fall Scenario? Key 3. HW Finish the mini-lab What's the point? Equations
Class#26 *Lab # 9 Popper Lab*	Lab #8 due 1. Upward Free Fall Notes. Free Fall notes Day 2 2. It is your turn.Upward free fall. KEY 1. HW - Freefall HW #2
Class#27 *Review day*	1. Ugg Do Now Key (Upward freefall do now #3) Key 2. HW review -#2 especially the last problem KEY 3. Lab # 8Velocity of a Popper lab 4. HW: Finish lab and work on the Pre-Test Warm-Up #2
Class#28	Lab #9 due Time to ask questions for lab. Turn in your lab REVIEW DAY

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	1. Study guide. Here 2. Review for test # 2. Pre-test #2 warm-up and answers here. Key step by step HERE
Class#29	TEST #2 KEY

Mini Unit 3: 2-d Kinematics Do it!

- Vectors

Summary

- Vector notes
- Lab. As the Crow Flies

EQs:

1. What is a vector and how do we combine them?
2. Why vectors? How and why is direction important in the prediction of motion?
3. How can vector and scalar quantities compare and contrast with each other?

Class#30	• Triangle Do Now Key • Vector Notes key • Vector HW key
Class#31 *Vector Notes*	1. Review the last problem of the notes from the previous class. **Questions?** 2. Review Vector HW Key 3. Chek Vector Addition Do Now Key 4. Vector. Classwork Key 5. Student feedback 6. HW Watch the video for Lab # 9As the Crow Flies
Class#32 *Vector addition and Lab # 10 As the crows flies*	1. No, do now 2. Lab # 9As the Crow Flies. Time to work in class. 3. Extra TBD 4. HW Finish Lab # 9
Class#33 *Classwork. Lab # 9 As the crow flies. Review day # 1*	lab # 9 Due 1. Do now. Vectors mini review Key 2. Questions about the lab? 3. Participation form 4. Review day#1 Study guide HERE

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Class#34	Review day Study guide HERE
Class#35	FINAL KEY

SEMESTER 2

Unit 4: Dynamics. Newton's Laws of Motion

- Newton's 3 laws of motion
- Forces
- Applications of Newton's Laws

Unit Focus:

We will explore forces as being a push or a pull. We will begin by evaluating if a system of forces is balanced or unbalanced. We will be introduced to the creation of free-body diagrams as a modality to analyze and survey motion in order to determine if the motion is, or is not, accelerated. We will explore Newton's three laws of motion and apply their understanding to real-life situations. With this new understanding, we will explore the principle of force of friction as an application of Newton's Third Laws of Motion. Add an example!

ESTABLISHED GOALS
<type here>

Transfer

1. *The student will independently use their learning to critically investigate the physical world.*
2. *Students will independently use their learning to clearly communicate in order to collaboratively exchange information, facts, and perspectives.*
3. *A student will independently use their learning to select and evaluate technologies and sources to accomplish complex goals.*

Meaning

UNDERSTANDINGS

1. Pushes and pulls have different strengths and directions.
2. The pattern of an object's motion in various situations can be observed and measured from which predictions can be made.
3. Objects in motion remain in straight-line motion at a constant speed, and objects at rest remain at rest unless acted upon by unbalanced forces. (Newton's 1st law).
4. The acceleration of an object depends upon its mass and the net force acting on it. (Newton's 2nd Law)
5. Forces between objects come in pairs that are equal in magnitude but opposite in direction (Newton's 3rd law)

ESSENTIAL QUESTIONS

1. How are force and motion related?
2. How does the second law apply to everyday life?
3. Why do forces always come in pairs?
4. How does an object's mass affect its motion?
5. How is it possible for an object to stay in constant motion or constant rest forever?
6. What is the difference between mass and weight in simple words?
7. How can I combine Newton's Second Law and the six equations to perfectly describe an object's motion?
8. What factors affect air resistance?How does air resistance affect falling objects?

	Acquisition	
	Students will know...	*Students will be skilled at...*
	1. F = ma 2. A body in motion (rest) stays in motion (at rest) unless acted upon by a net force 3. Forces come in pairs; a force on an object causes an equal and opposite reaction force on another object 4. Forces can be contact (2 objects touching each other) or non-contact forces (caused by fields) 5. Force is measured in Newton's 6. Force is a vector; its direction is relevant as is its magnitude	1. Be able to recognize when an object is in equilibrium and to use the condition of equilibrium to solve for unknown forces and/or masses, including situations where torque is relevant 2. Be able to add horizontal and vertical vectors together to find the Net force 3. Be able to draw force diagrams (also known as free body diagrams) for a described object 4. Be able to identify and label all forces (gravitational, normal, tension, push/pull, and friction) and show their directions on a force diagram. 5. Be able to apply Newton's 2nd Law of Motion in order to solve for unknown forces and/or accelerations. 6. Be able to assess real-life situations and determine which of Newton's Laws applies in each situation. 7. Be able to use kinematics in conjunction with force problems in order to determine acceleration

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Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
<type here>	PERFORMANCE TASK(S): 1. Labs 2. Labs activities 3. Performance classwork activities 4. Unit Test

Stage 3 – Learning Plan

E.Qs

1. How are force and motion related?
2. How does the second law apply to everyday life?
3. Why do forces always come in pairs?
4. How does an object's mass affect its motion?
5. How is it possible for an object to stay in constant motion or constant rest forever?
6. What is the difference between mass and weight in simple words?
7. How can I combine Newton's Second Law and the six equations to perfectly describe an object's motion?
8. What factors affect air resistance?How does air resistance affect falling objects?

Book resources

Pearson Physics. James S. Walker Newton's Laws of Motion.

Class# 1 Force definition Type of forces Recognizing forces Free body diagram Net Force	1. Do now. Newton's Laws Preconceptions. Force and motion 2. Classwork Force and Net force 3. Force and motion notes. **Day 1: Force, FBD and. Net Force.** 4. Force Diagrams and supplemental notes HERE 5. HW finish Force Diagrams HERE
Class# 2 Recognizing forces Free body diagram Net Force Force and motion Newton's First Law of Motion	1. Net Force do now 2. Check Force Diagrams and supplemental Notes HERE 3. Check Net Force do now 4. Force and motion notes. **Day #2 Review force types, Takeaways Force and motion, and First Newton's Law. Inertia.** **5. TBD** Classwork Recognizing Forces Key 6. HW Newton's First Law Examples
Class#3 1. Review day: 1. CFU What did we learn the first week of the semester? 2. Forces 3. Recognizing forces 4. Newton's First Law of Motion	1. Do now. 2. Check HW. Newton's First Law Examples Questions? 3. Classwork Quick review .Balanced and unbalanced Forces 4. Due in 3 weeks. The only available grades are 0% or 100%. Classwork: Newton's First Law Thinking Practice 5. HW: Forces and Newton's First Law
Class#4 1. Newton´s First Law Thinking 2. Mass and Weight Lab # 1	1. **Do now: Mini quick review.** **Quizlet live!** Force, Type of forces,Net force and Newton´s first law of motion 1. Quick check HW: Forces and Newton's First Law Questions?

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	★ Who wants to explain some problems on the board? 2. Lab: # 1 Mass and Weight. Day 1 3. HW: Work on the lab
Class#5 Mass vs weight	Lab Mass & Weight due 1. Do now 2. Lab: Mass and Weight. Day 2. Questions? 3. Turn in lab #1 4. Mass and Weight notes. (Mass vs weight vs the force of gravity notes) 5. ClassworkMass, Weight, and Local Gravitational Field Constant. 6. HW: finish Mass, Weight, and Local Gravitational Field Constant.
Class#6 Intro Newton's Second Law Newton's Second Law lab simulation	1. Review/check HW from the last class. Mass, Weight, and Local Gravitational Field Constant. 2. Feedback from Lab #1 Questions? 3. Lab # 2: Newton's Second Law Simulation 4. HW: Work in Lab # 2: Newton's Second Law Simulation
Class#7 Newton's Second Law notes and examples Extras 1. Newton's Second Law 2. Drawing Free Body Diagrams 3. Watch the video. Newton's Second Law. Here	Lab #2. DUE 1. No do now! 2. Lab # 2: Newton's Second Law Simulation . Day 2 3. Turn in lab #2 4. Classwork. Group discussion. Force and acceleration scenario 5. HW: Study Newton's Second Law notes and challenge yourself to complete the examples **Extra:** Watch the video. Newton's Second Law. Here
Class#8 Newton's First and Second Law practice #2.	1. Do now. 2. Lab # 2 Feedback 3. Finish Classwork Newton's First and Second Law practice #1 **KEY** 4. HW: Newton's First and Second Law practice #2
Class#9 Review Newton's First and Second Law Extra Newton's Second Law and Problem-Solving	1. Do now 2. Check HW 3. ClassworkNewton's First and Second Law practice #2 4. HW: Complete classwork and read Lab #3. Fiction Lab

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Extra Classwork. STOP! Check-in class. review	
Class#10 1. Acceleration due to gravity in freefall motion 2. Friction Lab	1. Do now **3.** Lab #3. Fiction Lab **4.** HW: Work in the lab
Class#11 1. Friction Review 2. Friction notes	1. Do now 2. Talk about test #3 3. Lab #3. Fiction Lab Day 2 4. Turn in lab 5. Mini review about the lab. Hear from groups about friction lab results. 6. Intro Friction notes and complete the examples. 7. HW: Friction notes examples
Class#12 1. Friction review 2. Friction problems 3. Into Mu of the shoe lab	1. No do now. Friction notes 2. Classwork Friction problems 3. Intro: Lab#4. Mu of a Shoe - Kinetic Friction 4. HW: READ Mu of a Shoe - Kinetic Friction :
Class#13	1. Classwork Friction problems. Questions? 2. Lab#4. Mu of a Shoe - Kinetic Friction 3. HW: Finish the lab
Class#14 Review day for Test #3 Extra problem for the test! ! A 1100 kg car accelerates from rest to 16.7 m/s over a distance of 45 m. Find the Net Force acting on the car. Show your work.	Lab Mu of the shoe DUE 1. Do now 2. Review: **physical meaning of the slope.** Questions? Share and compare different Mu and discuss post-lab questions 3. **Review day #1**. Study guide
Class#15 Review day for Test #3	**Review day #2** Study guide Extra 1. Looking for some challenge? 2. Newton's Second Law and Problem Solving
Class# 16	TEST # 3
Class#17	Movie day!
Class#18 Air resistance notes	1. No, Do Now. Time to ask questions about test #3 2. Air resistance notes

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	a. Air resistance. Student notes b. Air resistance teacher presentation c. Air resistance notes last page 3. HW: Air resistance HW # 1
Class#19 Air resistance notes + Analysis of a fall with a parachute	1. Watch this video **HERE** 2. Bronco. Do now 3. Check Air resistance HW 4. Classwork Terminal Velocity Questions 5. Extra: Quizlet: Air resistance 4. Air resistance HW#2
Class#20 Terminal velocity + Newton's Third Law Quizlet: Air resistance	1. Activity. What do you think? 2. Check HW # 3 3. Check Classwork: questions about terminal velocity. 4. Students.Newton's 3rd Law interactive notes. Day #1 Teacher. Newton's 3rd Law interactives notes 5. HW:: Newton's 3rd Law Questions
Class#21 Newton's third law	1. Do now and do now 2 (second part of the Hw 😕) 2. Check and discuss HW Newton's 3rd Law Questions. Questions? 3. Students.Newton's 3rd Law interactive notes. Day #2 Tension. Finish notes 4. Exit ticket 5. HW Start preparing test #4!
Class#22 Newton´s Laws Review	1. Do now + Small review about tension 🙂 2. Classwork. Newton's 3 Laws with a Bicycle 3. **OPTIONAL** Classwork.Newton's Laws Practice and Review. Force diagrams 4. Review day day #1 5. HW: Study for the test!
Class#23 1. Newton's 3rd Law practice	**Review day**
Class#24	TEST # 4 OPEN BINDER

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Unit 5: Energy

- Work and Power
- Law of Conservation of Energy
- Work-Energy Theorem

Unit Focus:

We will explore three different types of mechanical energy: kinetic energy, potential gravitational energy, and potential elastic/spring energy as well as conservation of energy, the work-energy theorem, and power. We will begin with analyzing the three common types of mechanical energy (kinetic, potential gravitational, and potential elastic). We will analyze transformation between these types of energy to uncover the conservation of energy theorem. We will continue with analyzing the transformation of work in energy and energy into work in order to uncover the work-energy theorem. We will uncover that the rate the energy transfers is called power. As a part of this unit, we will also spend time looking at the importance of units and unit conversions in calculations and understanding of what units and numbers really mean.

ESTABLISHED GOALS
<type here>

Transfer

1. *The student will independently use their learning to investigate the physical world critically.*
2. *Students will independently use their learning to clearly communicate in order to collaboratively exchange information, facts, and perspectives.*
3. *A student will independently use their learning to select and evaluate technologies and sources to accomplish complex goals.*

Meaning

UNDERSTANDINGS

1. Each form of energy can be converted into other forms of energy or into work (e.g. kinetic to potential, mechanical to electrical).
2. While energy within a system is continually changing forms, and being transferred, the total energy of the system is conserved.

ESSENTIAL QUESTIONS

1. Where does the energy of a system come from?
2. How does energy change?
3. Where does the energy go?
4. How can conservation of energy be used to predict an object's motion?
5. What does "energy cannot be created or destroyed" mean?

Acquisition

Students will know...

1. in order to change the energy of an object, work must be done on the object
2. kinetic and potential together are the mechanical energy of an object
3. potential energy is stored energy and can be chemical, nuclear, elastic, or gravitational non-conservative forces can remove mechanical energy from an object and convert it to heat

Students will be skilled at...

1. calculate gravitational potential energy, elastic potential energy and kinetic energy of an object
2. use the conservation of energy to solve problems
3. use the work energy theory to analyze objects that have friction acting on them

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	4. work can be positive or negative: it can add or remove mechanical energy of an object 5. the total energy of an object is conserved if only conservative forces act on the object	4. apply kinematics and force principles to predict the motion of objects involving transfer of energy

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
<type here>	PERFORMANCE TASK(S): 1. Labs 2. Labs activities 3. Performance classwork activities 4. Unit Test

Stage 3 – Learning Plan

EQs:

1. Where does the energy of a system come from?
2. How does energy change?
3. Where does the energy go?
4. How can conservation of energy be used to predict an object's motion?
5. What does "energy cannot be created or destroyed" mean?

Book resources
Pearson Physics. James S. Walker Work and Energy

Class# 25 Work and power	1. Do now 2. Lab #5 Advanced Stairmaster Lab 3. HW: Work in Lab #5 Advanced Stairmaster Lab
Class# 26 Finish Work and Power intro and Lab #5 Advanced Stairmaster Lab	Advanced Stairmaster Lab due 1. Lab #5 Advanced Stairmaster Lab Day #2. Questions? Debrief 2. Work and Power - Interactive notes and problems 3. HW: Finish the packet!
Class# 27 Finish Lab #5 Advanced Stairmaster Lab. Day #1 Lab # 6 2022 Drew Energy Skatepark	1. Do now 2. Classwork Small work and Power review **KEY** 3. HW: Complete Classwork
Class# 28 Day #2 Lab # 6 2022 Drew Energy Skatepark	1. Do now 2. Check HW. **Questions? KEY.** (talk about problem 4, part e) 3. Lab # 6 Energy Skatepark Questions? 4. HW: Lab # 6 Energy Skatepark
Class# 29 Energy consrvation notes and examples	Energy Skatepark Lab due 1. No, Do now! 2. Finish/Debrief Lab # 6 Energy Skatepark Day #2 3. Energy and Conservation of Energy notes Day #1 4. HW: finish notes. Review and study all the new concepts that we learned in this class.

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Class# 30 Energy conservation notes and examples	1. Do now. With your notes!! 2. Chack-Review Energy and Conservation of Energy notes. **Questions?** 3. Classwork and HW Feynman Conservation of Energy Questions
Class# 31 Feynman and Law of Conservation of Energy	Feynman due 1. Feynman Conservation of Energy Questions 15-20 minutes 2. Energy transformation Do now 3. Classwork Diver Energy Problem 4. HW: Work and Energy HW
Class# 32 Roller coaster Give them the study guide for the oral final assessment!	1. Check Work and Energy HW **Review: Conservation of Mechanical Energy Questions.?** 2. Do now 3. Physics Coaster video 4. Classwork/HW Roller Coaster. KEY 5. HW: Roller Coaster HW
Class# 33 Roller coaster team classwork	1. Check Roller Coaster HW 2. Teamwork in class.Group discussion 3. ClassworkTeam classwork. Final answers 4. HW: Check the Explanation **and come to class with specific questions!**
Class# 34	Lab # 7. Spring Force Lab day #1
Class# 35	Lab # 7. Spring Force Lab Day #2
Class# 36 TBD (Depending on the time we have) Do now Springs / Spring Potential Energy Notes and Practice Energy Loss Notes Reflection and survey	**Lab #7 Due** 1. 30 minutes for last minutes editions if needed. 2. Classwork/HW Springs / Spring Potential Energy Notes and Practice
Class# 37 EXTRAS: 1. : Positive and negative work (“gaining energy or losing energy”) practice. 2. Looking for an extra challenge? Click here 3. Hard-ish Energy problem Add it to the problems for the oral final 4. Thinking energy do now Add it to the problems for the oral final	1. Check HW. Review notes. Questions? 2. Energy Loss Notes
Class# 38	Lab #8 Spring toy lab or Top Gear Bungee Jump

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Class# 39	1. Do now Women in Physics +Start preparing the Final as homework
Class# 40	1. End of semester reflection 2. Second-semester feedback! 3. Woman in Physics
Class# 41	Review day #1
Class# 42	Review day #2
Class# 43	FINAL # 2. **Rubric. Oral test**

Unit 6: Women in Science. HERE

Extras:

1. Lab b Resistance Video Analysis Lab
2. Newton's 3rd Law Practice #2. KEY Some problems and examples
3. Energy and Conservation of Energy Practice
4. Hard-ish Energy problem
5. Thinking energy do now
6. Energy claswork

Calendar SEMESTER 2

Week	Monday	Tuesday	Wednesday	Thursday	Friday
January Week 1		1/3 PD	1/4 #1 P2 #1 P3	1/5 #1 P6	1/6 #2 P2 #3 P3
January Week 2	1/9 #2 P6	1/10 #3 P2 #3 P3	1/11 #3 P6	1/12 #4 P2 #4P3	1/13 #4 P6
January Week 3	1/16 No School	1/17 #5 P2 #5 P3	1/18 #5 P6	1/19 #6 P2 #6 P3	1/20 #6 P6
January Week 4	1/23 #7 P2 #7 P3	1/24 #7 P6	1/25 #8 P2 #8 P3	1/26 #8 P6	1/27 #9 P2 #9 P3
January/February Week 5	1/30 #9 P6 # 10 P2	1/31 #10 P3	2/1 # 10 P6 # 11 P2	2/2 # 11 P3	2/3 #11 P6 # 12 P2
February Week 6	2/6 #12 P3 #12 P6	2/7 #13 P2	2/8 #13 P3 #13 P6	2/9 #14 P2	2/10 #14 P3 #14 P6
February Week 7	2/13 #15 P2 #15 P3	2/14 #15 P6	2/15 #16 P2 #16 P3	2/16 #17 P6	2/17 #17 P2 #17 P3

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February Week 8	2/20 BREAK	2/21 NO	2/22 SCHOOL	2/23	2/24
February Week 9	2/27 #17 P6	2/28 #18 P2 #18 P3	3/1 #18 P6	3/2 #19 P2 #19 P3	3/3 #19 P6
March Week 10	3/6 PD	3/7 #20 P2 #20 P3	3/8 #20 P6	3/9 #21 P2 #21 P3	3/10 #21 P6
March Week 11	3/13 #22 P2 #22 P3	3/14 #22 P6	3/15 #23 P2 #23 P3	*3/16* #23 P6	*3/17* #24 P2 #24 P3
March Week 12	3/20 #24 P6	3/21 #25 P2 #25 P3	3/22 #25 P6	3/23 #26 P2 #26 P3	3/24 #26 P6
March Week 13	3/27 DEALL WEEK	3/28	3/29	3/30	3/31
April Week 14	4/3 BREAK	4/4	4/5	4/6	4/7
April Week 15	4/10 #27 P2 #27 P3	4/11 #27 P6	4/12 #28 P2 #28 P3	4/13 #28 P6	4/14 #29 P2 #29 P3

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Physics. Annual Pacing Guide

Natalia Felvinczi

April Week 16	4/17 #29 P6 #30 P2	4/18 #30 P3	4/19 #30 P6 #31 P2	4/20 DEALL FEST	4/21 #31 P3 #31 P6
April Week 17	4/24 PD	4/25 #32 P2	4/26 #32 P3 #32 P6	4/27 #33 P2	4/28 #33 P3 #33 P6
May	5/1 #34 P2 #34 P3	5/2 #34 P6	5/3 #35 P2 #35 P3	5/4 #35 P6	5/5 #36 P2 #36 P3
May	5/8 #36 P6	5/9 #37 P2 #37 P3	5/10 #37 P6	5/11 #38 P2 #38 P3	5/12 #38 P6
May	5/15 #39 P2 #39 P3	5/16 #39 P6	5/17 #40 P2 #40P3	5/18 #40 P6	5/19 #41 P2 #41 P3
May	5/22 #41P6	5/23 REVIEW DAY #42 P2 #42 P3	5/24 REVIEW DAY #42 P6	5/25 FINAL P2 AND P3	5/26
May	5/29	5/30 FINAL P6	5/31		

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Calendar SEMESTER 1

Week	Monday	Tuesday	Wednesday	Thursday	Friday
August Week 1				8/25 #1 P2 #1 P3	8/26 #1 P6
Agust/ September Week 2	8/29 #2 P2 #2 P3	8/30 #2 P6	8/31 #3 P2 #3 P3	9/01 #3 P6	9/02 #4 P2 #4 P3
September Week 3	9/05 Labor Day No classes	9/06 #4 P6	9/07 #5 P2 #5 P3	9/08 #5 P6	9/09 #6 P2 #6 P3
September Week 4	9/12 #6 P6	9/13 #7 P2 #7 P3	9/14 #7 P6	9/15 #8 P2 #8 P3	9/16 #8 P6
September Week 5	9/19 #9 P2 #9 P3	9/20 #9 P6	9/21 #10 P2 #10 P3	9/22 #10 P6	9/23 #11 P2 #11 P3
September Week 6	9/26 #11 P6 #12 P2	9/27 #12 P3	9/28 #12 P6 #13 P2	9/29 #13 P3	9/30 #13 P6 #14 P2
October Week 7	10/03 #14 P3 #14 P6	10/04 #15 P2	10/05 School Holiday No classes	10/06 Student Led Teacher conferences	10/07 Student Led Teacher conferences

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October Week 8	10/10 PD ?	10/11 Student Led Advisor conferences	10/12 PSAT day-No classes	10/13 #15 P3	10/14 #15 P6 #16 P2
October Week 9	10/17 #16 P3	10/18 #16 P6 #17 P2 TEST #1	10/19 #17 P3 #17 P6 TEST #1	10/20 #18 P2 #18 P3	10/21 #18 P6
October Week 10	10/24 #19 P2 #19 P3	10/25 #19 P6	10/26 #20 P2 #20 P3	10/27 #20 P6	10/28 #21 P2 #21 P3
October/November Week 11	10/31 #21 P6	11/01 #22 P2 #22 P3	11/02 #22 P6	11/03 #23 P2 #23 P3	11/04 #23 P6
November Week 12	11/07 PD	11/08 #24 P2 #24 P3	11/09 #24 P6	11/10 #25 P2 #25 P3	11/11 #25 P6
November Week 13	11/14 #26 P2 #26 P3	11/15 #26 P6	11/16 #27 P2 #27 P3	11/17 #27 P6	11/18 #28 P2 #28 P3
November Week 14	11/21 Thanksgiving	11/22 Break	11/23	11/24	11/25
November/ December Week 15	11/28 #28 P6	11/29 #29 P2 #29 P3	11/30 #29 P6	12/01 #30 P2 #30 P3	12/02 #30 P6

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December Week 16	12/05 #31 P2 #31 P3	12/06 #31 P6	12/07 #32 P2 #32 P3	12/08 #32 P6	12/09 REVIEW DAY #33 P2 #33 P3
December Week 17	12/12 REVIEW DAY #33 P6 #34 P2	12/13 FINAL P3	12/14 FINAL P6	12/15	12/16 FINAL P2 MAKEUPS

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