Westbury High School Science Department Lesson Plan

A merger of Madeline Hunter's Lesson Cycle and the 5-E Method of Instruction Teacher C Williams **Subject:** Physics Lesson: Wave Properties

LESSON OR JECTIVE, What will your students be able
Date: 02/16 - 02/20/2015

LESSON OBJECTIVE: What will your students be able to do by the end of the class?

Students will investigate and interpret a variety of waves, their characteristics, and properties such as velocity, amplitude, frequency, and wavelength. Students also calculate wave speed, frequency, and wavelength of different types of waves. Students will continue to investigate and calculate with the work-energy theorem in various situations and investigate examples of kinetic and potential energy and their transformations. After calculating momentum and energy in various situations, students demonstrate and apply the laws of conservation of energy and momentum.

Defining Success

ESSENTIAL UNDERSTANDING/GUIDING QUESTIONS:

- 1. What are waves? 2. How do transverse and longitudinal waves compare?
- 3. What is simple harmonic motion?
- 4. How are wave speed, wavelength and frequency related?
- 5. What affects a pendulums period?

STANDARDS ADDRESSED: TEKS, ELPs and CCRS's.

MISCELLANEOUS INFORMATION Marzano's Strategies, key concepts or questions

READINESS AND SUPPORTING STANDARDS	
S PHYS.7A Examine and describe oscillatory motion and wave propagation in various	Collaborative
types of media.	Grouping
R PHYS.7B Investigate and analyze characteristics of waves including velocity, frequency, amplitude, and wavelength and calculate using the relationship	Making
between wave speed, frequency, and wavelength and calculate using the relationship	Making hypothesizes
R PHYS.7D Investigate behaviors of waves including reflection, refraction, diffraction,	hypothesizes
interference, resonance, and the Doppler effect.	How do I measure
${\mathbb R}$ PHYS.6A Investigate and calculate with the work-energy theorem in various situations.	physical quantities to
R PHYS.6B Investigate examples of kinetic and potential energy and their	be able to calculate
transformations.	the distance
R PHYS.6C Calculate the mechanical energy of, power generated within, impulse applied to, and momentum of a physical system.	traveled,
	displacement, speed
PHYS.6D Demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension.	and velocity of a
	moving object?
PROCESS SKILLS	
PHYS.2E Design and implement investigative procedures including making	
observations, asking well-defined questions, formulating testable	
hypotheses, identifying variables, selecting appropriate equipment and	
technology, and evaluating numerical answers for reasonableness. PHYS.2F Demonstrate the use of course apparatus, equipment, techniques, and	
procedures.	
B PHYS.2G Use a wide variety of additional course apparatuses, equipment, techniques,	
materials, and procedures as appropriate.	
PHYS.2H Make measurements with accuracy and precision and record data using scientific notation and International System (SI) units.	
PHYS.2J Organize and evaluate data and make inferences from data including the use	
of tables, charts, and graphs.	
PHYS.2K Communicate valid conclusions supported by the data through various	
methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	
B PHYS.2L Express and manipulate relationships among physical variables quantitatively	
including the use of graphs, charts, and equations.	
ENGLISH LANGUAGE PROFICIENCY STANDARDS ELPS C.1.a Use prior knowledge and experiences to understand meanings in English.	
ELPS C.1.a Use phot knowledge and experiences to understand meanings in English. ELPS C.2.f Listen to and derive meaning from a variety of media such as audio, video,	
DVD, and CD-ROM to build and reinforce concept and language attainment.	
ELPS C.3.f Ask and give information ranging from using a very limited bank of high-	
frequency, high-need, concrete vocabulary, including key words and	
expressions needed for basic communication in academic and social contexts, to using abstract and content-based vocabulary during extended	
speaking assignments.	
ELPS C.1.d Speak using learning strategies such as requesting assistance, employing	
non-verbal cues, and using synonyms and circumlocution (conveying ideas	
by defining or describing when exact English words are not known). ELPS C.2.g Understand the general meaning, main points, and important details of	
spoken language ranging from situations in which topics, language, and	
contexts are familiar to unfamiliar.	
ELPS C.3.g Express opinions, ideas, and feelings ranging from communicating single	
words and short phrases to participating in extended discussions on a variety	
of social and grade-appropriate academic topics.	
COLLEGE AND CAREER READINESS STANDARDS	
CCRS VIII.D.1 Understand potential and kinetic energy.	
CCRS VIII.D.2 Understand conservation of energy.	
CCRS VIII.D.3 Understand the relationship of work and mechanical energy. CCRS VIII.C.3 Understand the concept of momentum	

	IPATORY SET: (<i>ENGAGE</i>): A "hook" to get the students interest and on. (A question, picture, 2-3 minute long video clip, a demonstration).	MATERIAL
M/T:	Do Now (Connected to previous homework - designed to engage	HUB
	incoming students quickly with today's academic content.)	 Resource
W/Th:	Do Now (Connected to previous homework - designed to engage	Activities
	incoming students quickly with today's academic content.)	SmartBoard [™]
Fr:	Do Now (Connected to previous homework - designed to engage	
	incoming students quickly with today's academic content.)	Meter sticks
	Checks for Understanding	Stopwatches
Oral /	Written Debrief Connect Correct Collect Student Leadership	Masking tape
TEAC	HING/INSTRUCTIONAL PROCESS: (EXPLORE/EXPLAIN): Provide	
studer	ts with a common experience (Labs, hands on activities). Debrief	Graph paper
	v, teach concept.	
M/T:	Activity - Students begin to explore essential question (In pairs, triads	Camera
	and quads, students debrief/teach concept facilitated by	Tennis ball
	teacher)	
W/Th:	Activity - Students begin to explore essential question (In pairs, triads	Logger Pro™
	and quads, students debrief/teach concept facilitated by	
_	teacher)	PPT
Fr:	Activity - Students begin to explore essential question (In pairs, triads	
	and quads, students debrief/teach concept facilitated by	Whiteboards
-	teacher)	
	Checks for Understanding	Dry Erase Marke
Oral /	Written Debrief Guiding / Essential Student Leadership	
	Questions	
	D PRACTICE AND MONITORING: (EXPLAIN). Interactive discussions	
	en teacher and students. Guide/help students as they solve problems	
and/or	answer questions. Clarify misconceptions and check for understanding.	
M/T:	Mini Lesson – Interactive Teacher-Student open discussion (facilitated	
	by multimedia, worksheets, and educational technology	
	tools) that validates student knowledge and skill and	
	uncovers and clarifies misconceptions and	
	misunderstandings. (Prepares students to produce	
	products)	
W/Th:	Mini Lesson – Interactive Teacher-Student open discussion	
	(facilitated by multimedia, worksheets, and educational	
	technology tools) that validates student knowledge and	
	skill and uncovers and clarifies misconceptions and	
	misunderstandings. (Prepares students to produce	
-	products)	
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	by, multimedia. worksheets, and educational	
	technology tools) that validates student knowledge and	
	skill and uncovers and clarifies misconceptions and	
	misunderstandings. (Prepares students to produce	
	products)	
INDEF	ENDENT PRACTICE: (<i>ELABORATE</i>) Students apply the information	
	d in the Explain to answer questions or solve problems.	

W/Th:	Student Product - Students apply knowledge and skills to an authentic task. (In pairs, triads and quads, students support each others learning – products are informally/formally assessed by teacher) Student Product - Students apply knowledge and skills to an authentic task. (In pairs, triads and quads, students support each others learning – products are	
Fr:	Student Product - Students apply knowledge and skills to an authentic task. (In pairs, triads and quads, students support each others learning.	
EVAL	UATE: Assess student mastery. (Quizzes, Lab Reports, Unit tests)	
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M/T:	Assessment - Students products are assessed for mastery informally and formally by teacher (Completion of activity sheet, presentation, and/or exit ticket)	
	and formally by teacher (Completion of activity sheet,	

Westbury High School Science Department Lesson Plan

A merger of Madeline Hunter's Lesson Cycle and the 5-E Method of Instruction

Teacher: C. Williams

Date: 02/23 -27/2015

Defining Success

Subject: Physics Lesson: Sound

LESSON OBJECTIVE: What will your students be able to do by the end of the class?

The focus of this unit is on investigating characteristics and behaviors of longitudinal waves such as sound waves.

ESSENTIAL UNDERSTANDING / GUIDING QUESTIONS:

- 1. What properties do sound waves share with other waves?
- 2. How do the physical properties of sound waves relate to our perception of sound?
- 3. How are waves reflected and refracted at boundaries between mediums?
- 4. What is the principle of superposition?

STANDARDS ADDRESSED: TEKS, ELPs and CCRS's.

MISCELLANEOUS INFORMATION Marzano's Strategies, key concepts or questions

READINESS AND SUPPORTING STANDARDS	
SPHYS.7C Compare characteristics and behaviors of transverse waves including	Collaborative
electromagnetic waves and the electromagnetic spectrum and	Grouping
characteristics and behaviors of longitudinal waves including sound	NA 1.
waves.	Making
PHYS.7D Investigate behaviors of waves including reflection, refraction, diffraction,	hypothesizes
interference, resonance, and the Doppler effect.	How do I measure
	physical quantities to
PROCESS SKILLS	be able to calculate
PHYS.2E Design and implement investigative procedures including making	the distance
observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and	traveled,
technology, and evaluating numerical answers for reasonableness.	displacement, speed
B PHYS.2J Organize and evaluate data and make inferences from data including the use	and velocity of a
of tables, charts, and graphs.	moving object?
PHYS.2K Communicate valid conclusions supported by the data through various	0,
methods such as lab reports, labeled drawings, graphic organizers, journals,	
summaries, oral reports, and technology-based reports.	
ENGLISH LANGUAGE PROFICIENCY STANDARDS	
ELPS C.1.d Speak using learning strategies such as requesting assistance, employing	
non-verbal cues, and using synonyms and circumlocution (conveying ideas	
by defining or describing when exact English words are not known).	
ELPS C.2.g Understand the general meaning, main points, and important details of	
spoken language ranging from situations in which topics, language, and	
contexts are familiar to unfamiliar. ELPS C.3.g Express opinions, ideas, and feelings ranging from communicating single	
words and short phrases to participating in extended discussions on a variety	
of social and grade-appropriate academic topics.	
ELPS C.1.c Use strategic learning techniques such as concept mapping, drawing,	
memorizing, comparing, contrasting, and reviewing to acquire basic and	
grade-level vocabulary.	
ELPS C.4.f Use visual and contextual support and support from peers and teachers to read grade-appropriate content area text, enhance and confirm	
understanding, and develop vocabulary, grasp of language structures, and	
background knowledge needed to comprehend increasingly challenging	
language.	
ELPS C.5.f Write using a variety of grade-appropriate sentence lengths, patterns, and	
connecting words to combine phrases, clauses, and sentences in	
increasingly accurate ways as more English is acquired.	
COLLEGE AND CAREER READINESS STANDARDS	
CCRS VIII.C.3 Understand the concept of momentum.	
CCRS VIII.D.2 Understand conservation of energy.	
CCRS VIII.A.2 Understand states of matter and their characteristics.	
CCRS VIII.H.1 Understand the gain and loss of heat energy in matter. CCRS VIII.H.2 Understand the basic laws of thermodynamics.	
CORO VIII. I.Z Onderstand the basic laws of thermodynamics.	

aucini		cture, 2-3 minute long vide	the students interest ar o clip, a demonstration)	
M/T:	Do Now (Connec	ted to previous homework	- designed to engage	HUB
		g students quickly with toda		Resource
W/Th:		cted to previous homework		Activities
		ng students quickly with tod)
Fr:		cted to previous homework		Meter sticks
		ng students quickly with tod)
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		Checks for Understandi	na	
Oral	/ Written Debrief	Connect Correct Collec	<u> </u>	Masking tape
		ONAL PROCESS: (EXPL		de Graphi paper
		experience (Labs, hands o	on activities). Debrief	Camera
	y, teach concept.			
M/T:		ts begin to explore essentia		lds Logger Pro™
		ads, students debrief/teach	concept facilitated by	
	teacher	/		Multimedia
W/Th:	-	its begin to explore essenti		
		ads, students debrief/teach	concept facilitated by	Whiteboards
_	teacher	,		
Fr:		ts begin to explore essentia		ads Dry Erase Marke
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M/T:	Student Product - Students apply knowledge and skills to an authentic task. (In pairs, triads and quads, students support each others learning – products are informally/formally assessed by teacher)	
W/Th:	Student Product - Students apply knowledge and skills to an authentic task. (In pairs, triads and quads, students support each others learning – products are informally/formally assessed by teacher)	
Fr:	Student Product - Students apply knowledge and skills to an authentic task. (In pairs, triads and quads, students support each others learning.	
EVAL	UATE: Assess student mastery. (Quizzes, Lab Reports, Unit tests)	
M/T :	Assessment - Students products are assessed for mastery informally and formally by teacher (Completion of activity sheet, presentation, and/or exit ticket)	
W/Th:	Assessment - Students products are assessed for mastery informally and formally by teacher (Completion of activity sheet, presentation, and/or exit ticket)	
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Westbury High School Science Department Lesson Plan

A merger of Madeline Hunter's Lesson Cycle and the 5-E Method of Instruction

Subject: Physics

Teacher: C. Williams **Date:** 03/02 -06/2015

Defining Success

Lesson: Electromagnetic Waves

LESSON OBJECTIVE: What will your students be able to do by the end of the class?

Students <u>investigate</u> characteristics and behaviors of transverse waves such as electromagnetic waves and <u>investigate</u> and <u>describe</u> the role of wave characteristics in a variety of medical and industrial applications such as mirrors, lenses, and fiber optics.

ESSENTIAL UNDERSTANDING / GUIDING QUESTIONS:

- The amount of heat energy added to a system is equal to the increase in the internal energy of the system plus the work done by the system.
 - 1. How is the first law of thermodynamics expressed mathematically?
 - 2. Why is the first law of thermodynamics related to the law of conservation of energy?
- Natural processes go in a direction that maintains or increases the total entropy of the universe.
 - 1. How does the second law of thermodynamics predict that heat flows spontaneously from an object of higher temperature to an object of lower temperature?
 - 2. Why must some energy always be transferred as heat to a system's surroundings?

• Heat energy transfers by conduction, convection, and radiation resulting in an increasing amount of disorder.

- 5. How are the processes of conduction, convection, and radiation similar and how are the different?
 - 6. Why does transfer of heat energy result in an increasing amount of disorder?

STANDARDS ADDRESSED: TEKS, ELPs and CCRS's.

MISCELLANEOUS INFORMATION Marzano's Strategies, key concepts or questions

READINESS AND SUPPORTING STANDARDS	
© PHYS.7C Compare characteristics and behaviors of transverse waves including	Collaborative
electromagnetic waves and the electromagnetic spectrum and	Grouping
characteristics and behaviors of longitudinal waves including sound waves.	
® PHYS.7D Investigate behaviors of waves including reflection, refraction, diffraction,	Making
interference, resonance, and the Doppler effect.	hypothesizes
S PHYS.7E Describe and predict image formation as a consequence of reflection from a	How do I measure
plane mirror and refraction through a thin convex lens.	physical quantities to
S PHYS.7F Describe the role of wave characteristics and behaviors in medical and	be able to calculate
industrial applications.	the distance
	traveled,
PROCESS SKILLS	displacement, speed
PHYS.2E Design and implement investigative procedures including making	and velocity of a
observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and	moving object?
technology, and evaluating numerical answers for reasonableness.	
B PHYS.2J Organize and evaluate data and make inferences from data including the use	
of tables, charts, and graphs.	
PHYS.2K Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals,	
summaries, oral reports, and technology-based reports.	
B PHYS.3E Research and describe the connections between physics and future careers.	
ENGLISH LANGUAGE PROFICIENCY STANDARDS ELPS C.1.d Speak using learning strategies such as requesting assistance, employing	
non-verbal cues, and using synonyms and circumlocution (conveying ideas	
by defining or describing when exact English words are not known).	
ELPS C.2.g Understand the general meaning, main points, and important details of	
spoken language ranging from situations in which topics, language, and contexts are familiar to unfamiliar.	
ELPS C.3.g Express opinions, ideas, and feelings ranging from communicating single	
words and short phrases to participating in extended discussions on a variety	
of social and grade-appropriate academic topics.	
ELPS C.1.c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and	
grade-level vocabulary.	
ELPS C.4.f Use visual and contextual support and support from peers and teachers to	
read grade-appropriate content area text, enhance and confirm	
understanding, and develop vocabulary, grasp of language structures, and background knowledge needed to comprehend increasingly challenging	
language.	
ELPS C.5.f Write using a variety of grade-appropriate sentence lengths, patterns, and	
connecting words to combine phrases, clauses, and sentences in increasingly accurate ways as more English is acquired.	
increasingly accurate ways as more English is acquired.	
COLLEGE AND CAREER READINESS STANDARDS	
CCRS VIII.A.2 Understand states of matter and their characteristics.	
CCRS VIII.H.1 Understand the gain and loss of heat energy in matter. CCRS VIII.H.2 Understand the basic laws of thermodynamics.	
CCRS VIII.G.1 Understand basic oscillatory motion and simple harmonic motion.	
CCRS VIII.G.2 Understand the difference between transverse and longitudinal waves.	
CCRS VIII.G.3 Understand wave terminology: wavelength, period, frequency, and	
amplitude	

allentic	IPATORY SET: (<i>ENGAGE</i>): A "hook" to get the students interest and on. (A question, picture, 2-3 minute long video clip, a demonstration).	MATERIAL
M/T :	Do Now (Connected to previous homework - designed to engage incoming	SmartBoard™
	students quickly with today's academic content.)	Constant veloc
w/in:	Do Now (Connected to previous homework - designed to engage incoming	cars (Tumble
-	students quickly with today's academic content.)	Buggies)
Fr:	Do Now (Connected to previous homework - designed to engage incoming	
	students quickly with today's academic content.)	Meter sticks
	Checks for Understanding	Stopwatches
Oral /	Written Debrief Connect Correct Collect Student Leadership	-
TEAC	HING/INSTRUCTIONAL PROCESS: (EXPLORE/EXPLAIN): Provide	Masking tape
	ts with a common experience (Labs, hands on activities). Debrief activity,	
	concept.	Graph paper
	Activity - Students begin to explore essential question (In pairs, triads and	Comoro
	quads, students debrief/teach concept facilitated by teacher)	Camera
W/Th·	Activity - Students begin to explore essential question (In pairs, triads and	Tennis ball
•••	quads, students debrief/teach concept facilitated by teacher)	
Fr:	Activity - Students begin to explore essential question (In pairs, triads and	Logger Pro™
	quads, students debrief/teach concept facilitated by teacher)	
		PPT
	Checks for Understanding	
Orol /	Written Debrief Guiding / Essential Questions Student Leadership	Whiteboards
	ED PRACTICE AND MONITORING: (EXPLAIN). Interactive discussions	Dry Erase
	en teacher and students. Guide/help students as they solve problems and/or	Marker
	r questions. Clarify misconceptions and check for understanding.	
M/T:	Mini Lesson – Interactive Teacher-Student open discussion (facilitated by	
		Launcher
	multimedia, worksheets, and educational technology tools)	Launcher Water Balloo
	multimedia, worksheets, and educational technology tools)	Water Balloo
	multimedia, worksheets, and educational technology tools) that validates student knowledge and skill and uncovers and	Water Balloo
	multimedia, worksheets, and educational technology tools) that validates student knowledge and skill and uncovers and clarifies misconceptions and misunderstandings. (Prepares	Launcher Water Balloo Tape Measure
W/Th:	multimedia, worksheets, and educational technology tools) that validates student knowledge and skill and uncovers and clarifies misconceptions and misunderstandings. (Prepares students to produce products)	Water Balloo
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M/T:	11 7 5	
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	others learning – products are informally/formally	
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