

Alliance for Physics Excellence (APEX)
2017 Summer Institute Workshop – Cohort 3
Physics Teacher Institute (PTI) Activity Schedule
Alabama A & M University

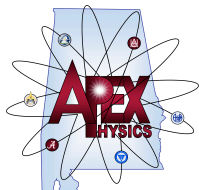


June 4 – June 16, 2017

Sunday, June 4, 2017

5:00 - 5:15 PM	<input type="checkbox"/> Welcome/Greetings <input type="checkbox"/> Introductions <input type="checkbox"/> Announcements	Dr. Barbara Cady Alabama A & M University Announcements/Housekeeping (15 minutes)	AAMU APEX Lab (room129) Chambers Building
5:15 - 5:30 PM	<input type="checkbox"/> Welcome/Greetings	Dr. Mohan Aggarwal, Chairperson, AAMU Department of Physics, Chemistry and Mathematics (15 minutes)	
5:30 - 6:30 PM	<input type="checkbox"/> Waves and Geometric Optics Pre- Content Assessment <input type="checkbox"/> Participants should bring a calculator	Eric Banilower, Sean Smith & Keith Esch Horizon Research, Inc.	
6:30 - 7:15 PM	Buffet Dinner		
7:15 - 8:00 PM	<input type="checkbox"/> Eliciting Student Thinking about Waves	Jim Minstrell, Facet Innovations (45 minutes)	

1 ¾ hours



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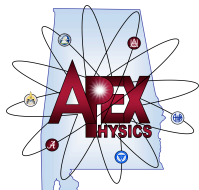


June 4 – June 16, 2017

Monday, June 5, 2017

8:00 - 8:15 AM	Welcome/Greetings/Coffee Announcements	Mohan Aggarwal AAMU and APEX Leadership Team
8:15 - 9:00 AM	<input type="checkbox"/> Waves Activity #1: <i>Human Wave</i> (Page 19). Particle versus Wave motion. Transverse versus Longitudinal. Pulse versus continuous. Waves Transfer Energy	AAPT/PTRA (3/4 hour)
9:00 - 9:15 AM	<input type="checkbox"/> Waves Activity #2: <i>Simple Oscillations</i> (Discuss Only, Page 23)	AAPT/PTRA (1/4 hour)
9:15 - 10:30 AM	<input type="checkbox"/> Waves Activity #3A: <i>Estimate the Speed of a Transverse Wave</i> (Page 31)	AAPT/PTRA (1 1/4 hour)
10:30 - Noon	<input type="checkbox"/> Waves Activity #4: <i>Speed of Transverse Wave Pulse (Without Reflection)</i> (Vernier Video, Page 35)	AAPT/PTRA (1 1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 1:45 PM	<input type="checkbox"/> Waves Activity #5: <i>Wave at Me (Longitudinal Versus Transverse Wave)</i> (Page 41) Which type wave travels faster?	AAPT/PTRA (3/4 hour)
1:45 - 2:45 PM	<input type="checkbox"/> Waves Activity #6A: <i>Energy Transfer & Earthquake Waves</i> (YouTube, Page 51)	AAPT/PTRA (1 hour)
2:45 - 4:45 PM	<input type="checkbox"/> Waves Activity #8: <i>Effects of Amplitude and Media on Speed</i> (Page 61) <input type="checkbox"/> Demonstration with Shive Machine (Page 65). Partial reflection and partial transmission of wave pulse.	AAPT/PTRA (2 hours)
4:45 - 5:00 PM	<input type="checkbox"/> Waves Activity #7: Song, “ <i>Oh! How, ...?</i> ” (Page 59)	AAPT/PTRA (1/4 hour)
5:00 PM	Dinner (On Your Own – Homework: Determine the Broadcast Frequency of a Local Radio Station)	

7 ¾ hours



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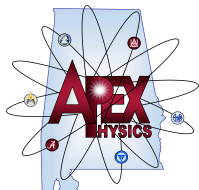


June 4 – June 16, 2017

Tuesday, June 6, 2017

8:00 - 9:15 AM	<input type="checkbox"/> Waves Activity #9A: <i>Effect of Amplitude and Media on Speed, PSSC (Page 81)</i>	AAPT/PTRA (1 1/4 hour)
9:15 - 10:30 AM	<input type="checkbox"/> Waves Activity #11: <i>Using a Wave Simulation to Determine a Relationship, PhET (Page 91)</i>	AAPT/PTRA (1 1/4 hour)
10:30 - Noon	<input type="checkbox"/> Waves Activity #13: <i>Relating Frequency, Wavelength and Speed using Standing Wave (Page 103)</i>	AAPT/PTRA (1 1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 1:45 PM	<input type="checkbox"/> Formative Assessment and Related Interpretation Activities	Jim Minstrell, Facet Innovations (3/4 hour)
1:45 - 3:15 PM	<input type="checkbox"/> Wave Activity #14: <i>Speed versus Tension & Density of Medium, PASCO, ASIM (Page 113)</i> <p style="text-align: center;">OR</p> <input type="checkbox"/> Wave Activity #15: <i>Speed of a Wave in a String ... Interactive Video by Peter Bohacek (Page 123)</i>	AAPT/PTRA (2 hours)
3:15 - 5:15 PM	<input type="checkbox"/> Waves Activity #18: <i>Speed of a Pulse (Three Ways) (Page 153)</i>	AAPT/PTRA (1 1/2 hours)
5:15 PM	Dinner (On Your Own)	

8 ¼ hours



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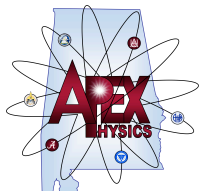


June 4 – June 16, 2017

Wednesday, June 7, 2017

8:00 – 8:30 AM	<input type="checkbox"/> Waves Activity #18: <i>Speed of a Pulse (Three Ways)</i> (Page 153). Whiteboard	AAPT/PTRA (1/2 hour)
8:30 – 9:15 AM	<input type="checkbox"/> Waves Activity #21: Song, “ <i>Where is wavelet? ...</i> ” (Page 175) <input type="checkbox"/> Show “ <i>String Thing</i> ” (Page 229) <input type="checkbox"/> Waves Activity #28: <i>Family Physics - Radio</i> (Page 207)	AAPT/PTRA (3/4 hour)
9:15 - 10:15 AM	<input type="checkbox"/> Do as a group... Waves Activity #26: <i>Reflection and Interference of Pulses.</i> (Page 191)	AAPT/PTRA (1 hour)
10:15 - 11:45 AM	<input type="checkbox"/> Activity #1 (Waves in Ripple Tank): <i>Pulses and Waves in a Ripple Tank</i> (Page 23)	AAPT/PTRA (1 1/2 hour)
11:45 - Noon	<input type="checkbox"/> Start Activity #2 (Waves in Ripple Tank): <i>Speed of Waves in a Ripple Tank</i> (Page 31). If you are using the video, use the top waves found at about 9 minutes 27 seconds.	AAPT/PTRA (1/4 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 – 2:15 PM.	<input type="checkbox"/> Finish Activity #2 (Waves in Ripple Tank): <i>Speed of Waves in a Ripple Tank</i> (Page 31). If you are using the video, use the top waves found at about 9 minutes 27 seconds.	AAPT/PTRA (1 1/4 hour)
2:15 - 3:30 PM	<input type="checkbox"/> Activity #3C (Waves in Ripple Tank): <i>Refraction of Water Waves</i> (Page 41) All tables do Diagrams 2 and 5. Divide Diagrams 3, 4, 8, and 9 among tables. <input type="checkbox"/> Show Photographs of “Lenses”	AAPT/PTRA (1 1/4 hour)
3:30 - 4:30 PM	<input type="checkbox"/> Activity #3D (Waves in Ripple Tank): <i>Why Does Snell’s Law Work?</i> (Page 49). A look at the mathematics of refraction of waves.	AAPT/PTRA (1 hour)
4:30- 5:00 PM	<input type="checkbox"/> Activity #12 (Waves in Ripple Tank): Worksheet #1 Waves in Ripple Tank (Page 113) <input type="checkbox"/> Discuss/Start only – complete for homework.	AAPT/PTRA (1/2 hour)
5:00 PM	Dinner (On Your Own). Homework: Finish Activity #12, Worksheet #1 (Page 113) and look at Waves Activity #26: <i>Reflection and Interference of Pulses.</i> (Waves, Page 191)	

8 hours



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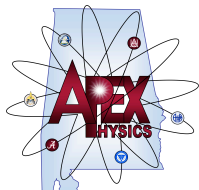


June 4 – June 16, 2017

Thursday, June 8, 2017

8:00 - 8:45 AM	<input type="checkbox"/> White Board Worksheet #1 (Waves in Ripple Tank): <i>Refraction of Waves</i> (Page 113)	AAPT/PTRA (3/4 hour)
8:45 - 10:00 AM	<input type="checkbox"/> Activity #4 (Waves in Ripple Tank): <i>Diffraction and Interference or Waves in Ripple Tank.</i> (Page 53)	AAPT/PTRA (1 1/4 hour)
10:00 - 11:15 AM	<input type="checkbox"/> Activity #5 (Waves in Ripple Tank): <i>Two-point Interference Pattern</i> (Page 57)	AAPT/PTRA (1 1/4 hour)
11:15 – 11:45 AM	<input type="checkbox"/> Show Wave 2-Point Interference Demonstration – File (Transparencies) (Page 157) <input type="checkbox"/> Show Point Arc (Page 64)	AAPT/PTRA (1/2 hour)
11:45 - Noon	<input type="checkbox"/> Start Worksheet #2 (Waves in Ripple Tank): <i>Two-point Interference</i> (Page 117)	AAPT/PTRA (1/4 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 – 2:00 PM	<input type="checkbox"/> Storyline for a Short Unit on Waves	Jim Minstrell, Facet Innovations (1 hour)
2:00 - 2:45 PM	<input type="checkbox"/> Finish Worksheet #2 (Waves in Ripple Tank): <i>Two-point Interference</i> (Page 117)	AAPT/PTRA (3/4 hour)
2:45 - 4:00 PM	<input type="checkbox"/> Activity #8 (Waves in Ripple Tank): Speed of Wave in ripple tank (<i>Vernier Video Analysis Version (Stationary Source)</i>) (Page 81)	AAPT/PTRA (1 1/4 hour)
4:00 - 5:15 PM	<input type="checkbox"/> Activity #9 (Waves in Ripple Tank): <i>Doppler Effect (Vernier Video Analysis Version (Page 87) (Moving Source)</i>	AAPT/PTRA (1 1/4 hour)
5:15 PM	Dinner (On Your Own) Homework Look at Activity #10 (Page 101): Do Activity #11 (Waves in Ripple Tank) <i>Waves Review Worksheet</i> (Page 105)	

8 ¼ hours



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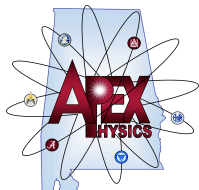


June 4 – June 16, 2017

Friday, June 9, 2017

8:00 – 8:45 AM	<input type="checkbox"/> Discuss... Whiteboard Homework: Activity #11 (Waves in Ripple Tank): <i>Waves Review Worksheet</i> (Page 105)	AAPT/PTRA (3/4 hour)
8:45 – 9:30 AM	<input type="checkbox"/> Activity #1 (Geometric Optics): <i>Story of Blind Man.</i> (Page 25) <input type="checkbox"/> Refer to TPT <i>Story of Blind Man</i> Article (Page 27) <input type="checkbox"/> Also refer to Intro D, Maria & Jessica (Page 6) <input type="checkbox"/> Definition versus Properties	AAPT/PTRA (3/4 hour)
9:30 – 10:00 AM	<input type="checkbox"/> Activity #2 (Geometric Optics): <i>Sources of Light</i> - Discussion (Page 29)	AAPT/PTRA (1/2 hour)
10:00 – 11:00 AM	<input type="checkbox"/> Activity #3 (Geometric Optics): <i>Properties of Light - Pinhole "Image"</i> (Page 37) ...Whiteboard on Monday AM	AAPT/PTRA (1 hour)
11:00 - Noon	<input type="checkbox"/> <i>Building Expertise through Reflection: What Change Can You Expect?</i>	Dennis Sunal (1 hour)
Noon - 1:00 PM	Lunch (On Your Own)	Noon - 1:00 PM
1:00 – 1:30 PM	<input type="checkbox"/> <i>Comparing APEX Classrooms with other Physics Classrooms in Alabama: What Can We Learn?</i>	Tara Ray
1:30 - 2:00 PM	<input type="checkbox"/> <i>Comparing APEX AP Classrooms with other AP Physics Classrooms in Alabama: What Can We Learn?</i>	Justina Ogodo

5 hours



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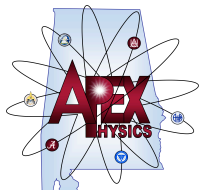


June 4 – June 16, 2017

Monday June 12, 2017

8:00 – 8:30 AM	<input type="checkbox"/> Discuss/Whiteboard Activity #3 (Geometric Optics): <i>Properties of Light - Pinhole “Image”</i> (Page 37)	AAPT/PTRA (1/2 hour)
8:30 – 9:45 AM	<input type="checkbox"/> Activity #4 (Geometric Optics): <i>Light Shadows</i> (Page 45)	AAPT/PTRA (1 1/4 hour)
9:45 AM – 11:15	<input type="checkbox"/> Activity #5 (Geometric Optics): <i>Phases of the Moon</i> (Page 61)	AAPT/PTRA (1 1/2 hour)
11:15 AM – Noon	<input type="checkbox"/> Activity #8 (Geometric Optics): <i>Practice Problems on Shadows and Illuminance</i> (Page 87)	AAPT/PTRA (3/4 hour)
Noon - 1:00 PM	Lunch (On Your Own)	Noon - 1:00 PM
1:00 - 2:30 PM	<input type="checkbox"/> Activity #9 (Geometric Optics): <i>Illuminance versus Distance</i> (Page 91) Hybrid of this and the following: <input type="checkbox"/> ASIM <i>Light Intensity</i> Activity (In back pocket of Geometric Optics Binder) <input type="checkbox"/> Discuss Activity #6 (Geometric Optics): <i>Notes on Inverse Square, Illuminance and Photometric Terms</i> (Page 79)	AAPT/PTRA (1 1/2 hour)
2:30 – 3:45 PM	<input type="checkbox"/> Activity #10 (Geometric Optics): <i>Making a Paraffin Wax Photometer and Measuring the Luminous Intensity of the Sun</i> (Page 105)	AAPT/PTRA (1 1/4 hour)
3:45 – 4:15 PM	<input type="checkbox"/> Activity #12 (Geometric Optics): <i>How to Measure an Angle with A Protractor</i> (Page 119)	AAPT/PTRA (1/2 hour)
4:15 -5:00 PM	<input type="checkbox"/> Start Activity #13 (Geometric Optics): <i>Objects, Flat Mirrors, and Properties of Images</i> (Start on Page 123) Do only the first 5 Pages!	AAPT/PTRA (3/4 hour)
5:00 PM	Dinner (On Your Own)	

8 hours



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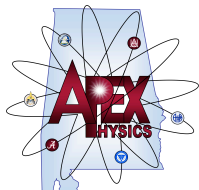


June 4 – June 16, 2017

Tuesday June 13, 2017

8:00 – 8:30 AM	<input type="checkbox"/> Whiteboard Activity #13 (Geometric Optics): <i>Objects, Flat Mirrors, and Properties of Images</i> (Page 123)	AAPT/PTRA (1/2 hours)
8:30 - 10:00 AM	<input type="checkbox"/> Activity #14 (Geometric Optics): <i>Reflection of Light from a Flat Mirror</i> (Page 139)	AAPT/PTRA (1 1/2 hour)
10:00 - 11:00 AM	<input type="checkbox"/> Use a laser to demonstrate a retro reflector instead of Activity #15. <input type="checkbox"/> Activity #15 (Geometric Optics): <i>Reflection of Light from Multiple Flat Mirrors</i> (Page 155). Have Mirrors out and discuss what it shows in the laboratory activity.	AAPT/PTRA (1 hour)
11:00 AM - Noon	<input type="checkbox"/> Activity #16 & #17 (Geometric Optics): <i>Sample Tests on Reflection and Flat Mirrors</i> (Discuss Pages 165 & 169) <input type="checkbox"/> Activity #21 (Geometric Optics): <i>Family Physics Concave Mirror</i> (Discuss Page 203)	AAPT/PTRA (1 hour)
Noon - 1:00 PM	Lunch (On Your Own)	Noon - 1:00 PM
1:00 - 2:00 PM	<input type="checkbox"/> Choosing Activities to Address Learner Needs	Jim Minstrell, Facet Innovations (1 hour)
2:00 – 4:00 PM	<input type="checkbox"/> Do a demonstration with large mirrors. Measure and focal length. Page 187 <input type="checkbox"/> Activity #20 (Geometric Optics): <i>Properties of Images Formed by a Concave/Convex Mirrors</i> (Page 187) <input type="checkbox"/> For now, skip ray diagram questions 2, 3 & 5 on Pages 189-190.	AAPT/PTRA (2 hours)
4:00 – 5:00 PM	<input type="checkbox"/> Begin Activity #22 (Geometric Optics): <i>Ray Diagrams for Curved Mirrors</i> (Page 207) Participants use templates on Pages 211 & 214 to do their diagrams. <input type="checkbox"/> Activity #23 (Geometric Optics): <i>Worksheet on Reflection and Mirrors</i> (Page 217) <input type="checkbox"/> Return to Activity #20 <i>Properties of Images Formed by a Concave/Convex Mirrors</i> Do questions 2, 3 & 5. Pages 189-190 to complete ray diagrams	AAPT/PTRA (1 hours)
-	<input type="checkbox"/> Activity #18 (Geometric Optics): Set up a couple of demonstrations and/or displays (e.g., OBJECT, IMAGE, and TEST signs, Pepper's "ghost", Draw your Face, Optical Lever, Periscope, Anamorphic Art, etc.) (Pages 175-176) <input type="checkbox"/> Have Confocal Mirrors out for the teachers to consider and think about. (Page 199)	Have demonstrations out for teachers to observe.
5:00 PM	Dinner (On Your Own)	

8 hours



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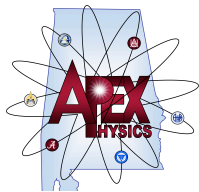


June 4 – June 16, 2017

Wednesday, June 14, 2017

8:00 - 9:00 AM	<input type="checkbox"/> Finish Activity #22 Activity #22 (Geometric Optics): <i>Ray Diagrams for Curved Mirrors</i> (Page 207). Participants use templates on Pages 211 & 214 to do their diagrams. <input type="checkbox"/> Activity #23 (Geometric Optics): <i>Worksheet on Reflection and Mirrors</i> (Page 217) <input type="checkbox"/> Return to Activity #20 <i>Properties of Images Formed by a Concave/Convex Mirrors</i> Do questions 2, 3 & 5, Pages 189-190 to complete ray diagrams	AAPT/PTRA (1 hour)
9:00 – 11:00 AM	<input type="checkbox"/> Activity #25 (Geometric Optics): <i>Refraction of Light - Liquids</i> (Page 227)	AAPT/PTRA (2 hour)
11:00 – 11:30 AM	<input type="checkbox"/> Activity #26 (Geometric Optics): <i>Disappearing Solution</i> (Page 241)	AAPT/PTRA (1/2 hour)
11:30 - Noon	<input type="checkbox"/> Activity #27 (Geometric Optics): <i>Fish Tank Demonstration</i> (Page 242)	AAPT/PTRA (1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 – 3:00 PM	<input type="checkbox"/> Activity #28 (Geometric Optics): <i>Refraction of Light - Solids</i> (Page 243)	AAPT/PTRA (2 hour)
3:00 – 5:00 PM	<input type="checkbox"/> Activity #29 (Geometric Optics): <i>Index of Refraction and Prisms (Simulation)</i> (Page 255)	AAPT/PTRA (2 hours)
5:00 PM	Dinner (On Your Own)	

8 hours



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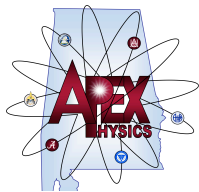


June 4 – June 16, 2017

Thursday, June 15, 2017

8:00 – 9:30 AM	<input type="checkbox"/> Activity #30 (Geometric Optics): <i>Critical Angle</i> (Page 253) (<i>Simulation</i>)	AAPT/PTRA (1 1/2 hour)
9:30 - 11:30 AM	<input type="checkbox"/> Activity #35 (Geometric Optics): <i>Properties of Images Formed by a Converging Lens II</i> (Page 295) The teachers look at collection of converging/diverging lenses and pick out the convex/converging lens to use. <input type="checkbox"/> If time, discuss confocal mirrors.	AAPT/PTRA (2 hours)
11:30 - Noon	<input type="checkbox"/> Activity #41 (Geometric Optics): <i>Demonstrations Using a Dissectible Lens</i> (Page 343)	AAPT/PTRA (1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 2:00 PM	<input type="checkbox"/> Collecting, Interpreting, and Acting with Responsive Teaching.	Jim Minstrell, Facet Innovations (1 hour)
2:00 - 4:00 PM	<input type="checkbox"/> Activity #39 & #40 (Geometric Optics): <i>Ray Diagrams and Worksheet 2 Lenses on Refraction and Lenses</i> (Pages 327 & 335)	AAPT/PTRA (2 hour)
4:00 - 5:15 PM	<input type="checkbox"/> Activity #36 (Geometric Optics): <i>Mammalian Eye</i> (Page 300)	AAPT/PTRA (1 1/4 hour)
5:15 PM	Dinner (On Your Own)	

8 & 1/4 hours



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Friday, June 16, 2017

8:00 – 9:30 AM	<input type="checkbox"/> Activity #37 (Geometric Optics): <i>Diverging Lens</i> (Page 319)	AAPT/PTRA (1 1/2 hour)
9:30 - 10:30 AM	<input type="checkbox"/> If time do Activity #45 (Geometric Optics): <i>Efficiency of Various Light Bulbs</i> (Page 359)	AAPT/PTRA (1 hour)
10:30 - 11:00 AM	<input type="checkbox"/> Let's do "Video in the Classroom"	Dr. Schamschula Alabama A&M (1/2 hour)
11:00 AM - Noon	<input type="checkbox"/> Activity #46 (Geometric Optics): <i>Microwave and Speed of Light</i> (Page 369)	AAPT/PTRA (1 hour)
Noon - 1:00 PM	In house Lunch	
1:00 – 2:00 PM	<input type="checkbox"/> Waves and Geometric Optics, Post Content Assessment <input type="checkbox"/> Post Institute Survey	Eric Banilower, Sean Smith & Keith Esch Horizon Research, Inc.

5 hours