

**Alliance For Physics Excellence (APEX)
2016 Summer Institute Workshop – Cohort 2
Physics Teacher Institute (PTI) Activity Schedule
Alabama A & M University**

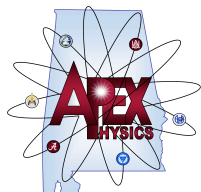


June 5 – June 17, 2016

Sunday, June 5, 2016

5:15 - 5:30 PM	<input type="checkbox"/> Welcome/Greetings <input type="checkbox"/> Introductions <input type="checkbox"/> Announcements	Dr. Barbara Cady Alabama A & M University Announcements/Housekeeping (15 min.)	AAMU Ernest L. Knight Center- VIP Room
5:30 - 5:45 PM	<input type="checkbox"/> Welcome/Greetings	Dr. Mohan Aggarwal, Chairperson, AAMU Department of Physics, Chemistry and Mathematics (15 min.)	
5:45 - 6:30 PM	<input type="checkbox"/> Eliciting Key Ideas in Waves	Jim Minstrell, Facet Innovations (45 hours)	
6:30 - 7:00 PM	Buffet Dinner		
7:00 - 8:00 PM	<input type="checkbox"/> Waves and Geometric Optics Pre Content Assessment <input type="checkbox"/> Participants should bring a calculator	Eric Banilower & Kieth Esch Horizon Research, Inc.	

1 3/4 hours



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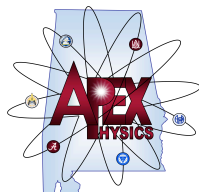


June 5 – June 17, 2016

Monday, June 6, 2016

8:00 - 8:15 AM	Welcome/Greetings/Coffee Announcements	Mohan Aggarwal AA&MU and APEX Leadership Team
8:15 - 9:00 AM	<input type="checkbox"/> Waves Activity #1: <i>Human Wave</i> (Page 19).	AAPT/PTRA (3/4 hour)
9:00 - 9:15 AM	<input type="checkbox"/> Waves Activity #2: <i>Oscillations</i> (Discuss Only, Page 23)	AAPT/PTRA (1/4 hour)
9:15 - 10:15 AM	<input type="checkbox"/> Waves Activity #4: <i>Speed of Transverse Wave Pulse (Without Reflection)</i> (Vernier Video, Page 31)	AAPT/PTRA (1 hour)
10:15 - 11:00 AM	<input type="checkbox"/> Waves Activity #5: <i>Wave at Me (Longitudinal Versus Transverse Wave)</i> (Page 37)	AAPT/PTRA (3/4 hour)
11:00 - Noon	<input type="checkbox"/> Waves Activity #6: <i>Energy Transfer & Earthquake Waves</i> (PCC Version, Page 41)	AAPT/PTRA (1 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 2:30 PM	<input type="checkbox"/> Waves Activity #8: <i>Effects of Amplitude and Media on Speed</i> (Demonstration with Shive Machine Page 47)	AAPT/PTRA (1 1/2 hour)
2:30 - 3:30 PM	<input type="checkbox"/> Waves Activity #9: <i>Wave Speed with Fixed End Reflection</i> (Vernier Video, Page 55)	AAPT/PTRA (1 hour)
3:30 - 5:00 PM	<input type="checkbox"/> Waves Activity #14: <i>Speed versus Tension & Density of Medium</i> (PASCO Page 87)	AAPT/PTRA (1 1/2 hour)
5:00 PM	<input type="checkbox"/> Waves Activity #7: Song, “ <i>Oh! How, ...?</i> ”	AAPT/PTRA
5:00 PM	Dinner (On Your Own – Determine broadcast frequency of a local Radio Station)	

7 & 3/4 hours



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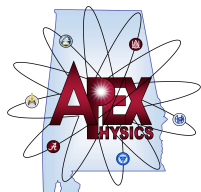


June 5 – June 17, 2016

Tuesday, June 7, 2016

8:00 - 9:30 AM	<input type="checkbox"/> Waves Activity #15: Speed of a Wave in a String (Page 103)	AAPT/PTRA (1 1/2 hour)
9:30 - 10:00 AM	<input type="checkbox"/> Waves Activity #16: Speed of a Pulse in a Slinky (Vernier Video, Page 113) Can skip or Do as preview.	AAPT/PTRA (1/2 hour)
10:00 - 11:30 AM	<input type="checkbox"/> Waves Activity #17: <i>Speed of a Pulse</i> (Three Ways, Page 119)	AAPT/PTRA (1 1/2 hour)
11:30 - Noon	<input type="checkbox"/> <i>Presentation Tools</i>	Marius Schamschula, AA&MU (1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 2:00 PM	<input type="checkbox"/> Waves Activity #19: Song, “Where is wavelet? ...” <input type="checkbox"/> Waves Activity #21: <i>Standing Waves</i>	AAPT/PTRA (1 hour)
2:00 - 3:00 PM	<input type="checkbox"/> Waves Activity #26: <i>Reflection and Interference of Pulses.</i> (Page 169)	AAPT/PTRA (1 hour)
3:00 - 3:30 PM	<input type="checkbox"/> Waves Activity #28: <i>Family Physics - Radio</i> (Page 183)	AAPT/PTRA (1/2 hour)
3:30 - 4:00 PM	<input type="checkbox"/> Waves Activity #29: <i>Waves Review</i> (Page 187) <input type="checkbox"/> Show “String Thing” (Page 205)	AAPT/PTRA (1/2 hour)
4:00 - 4:30 PM	<input type="checkbox"/> <i>Survey of APEX Activities</i>	Jim Minstrell, Facet Innovations (1/2 hour)
4:30 PM	Dinner (On Your Own)	

7 & 1/2 hours



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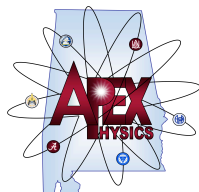


June 5 – June 17, 2016

Wednesday, June 8, 2016

8:00 - 9:00 AM	<input type="checkbox"/> Activity #1 (Waves in Ripple Tank): <i>Pulses and Waves in a Ripple Tank</i> (Page 23)	AAPT/PTRA (1 hour)
9:00 - 10:00 AM	<input type="checkbox"/> Activity #2 (Waves in Ripple Tank): <i>Speed of Waves in a Ripple Tank</i> (Page 29)	AAPT/PTRA (1 hour)
10:00 - 11:15 AM	<input type="checkbox"/> Activity #3A (Waves in Ripple Tank): <i>Refraction of Water Waves</i> (Page 35)	AAPT/PTRA (1 1/4 hour)
11:15 AM - Noon.	<input type="checkbox"/> START Activity #3C (Waves in Ripple Tank): <i>Refraction of Water Waves</i> (PCC Version, Page 39) Show Photographs of “Lenses” All tables do Ch 2 and 5, and divide Ch 3, 4, 8, and 9 among tables.	AAPT/PTRA (3/4 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 1:30 PM	<input type="checkbox"/> CONTINUE Activity #3C (Waves in Ripple Tank): <i>Refraction of Water Waves</i> (PCC Version, Page 39) Show Photographs of “Lenses” All tables do Ch 2 and 5, and divide Ch 3, 4, 8, and 9 among tables.	AAPT/PTRA (1/2 hour)
1:00 - 1:45 PM	<input type="checkbox"/> Activity #3D (Waves in Ripple Tank): <i>Why Does Snell’s Law Work?</i> (Page 47)	AAPT/PTRA (3/4 hour)
1:45 - 2:00 PM	<input type="checkbox"/> Worksheet #1 (Waves in Ripple Tank): <i>Refraction of Waves</i> (Page 105) Discuss only – complete for homework.	AAPT/PTRA (1/4 hour)
2:00 - 3:00 PM	<input type="checkbox"/> Activity #4 (Waves in Ripple Tank): <i>Diffraction and Interference or Waves in Ripple Tank</i> (Page 51)	AAPT/PTRA (1 hour)
3:00 - 4:00 PM	<input type="checkbox"/> Activity #5 (Waves in Ripple Tank): <i>Two point Interference Pattern</i> (Page 55)	AAPT/PTRA (1 hour)
4:00 - 5:00 PM	<input type="checkbox"/> Activity #6 (Waves in Ripple Tank): <i>Two point Interference in a Ripple Tank</i> (PCC Version Page 59)	AAPT/PTRA (1 hour)
5:00 – 5:20 PM	<input type="checkbox"/> <i>Debrief APEX Activities I</i>	Jim Minstrell, Facet Innovations (20 min.)
5:20 PM	Dinner (On Your Own – Finish Worksheet #1, page 105)	

8 & 1/3 hours



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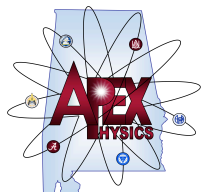


June 5 – June 17, 2016

Thursday, June 9, 2016

8:00 - 9:30 AM	<input type="checkbox"/> Activity #8 (Waves in Ripple Tank): Two Point Interference Patterns (Vernier Video Analysis Version, Page 75)	AAPT/PTRA (1 1/2 hour)
9:30 - 10:00 AM	<input type="checkbox"/> Show Wave 2-Point interference Demonstration – File (Transparencies)	AAPT/PTRA (1/2 hour)
10:00 - 11:30 AM	<input type="checkbox"/> Worksheet #2 (Waves in Ripple Tank): <i>Two point Interference</i> (Page 109)	AAPT/PTRA (1 1/2 hour)
11:30 - Noon	<input type="checkbox"/> Video in the Classroom	Marius Schamschula, AA&MU (1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 2:00 PM	<input type="checkbox"/> Activity #9 (Waves in Ripple Tank): <i>Doppler Effect</i> (Vernier Video Analysis Version (Page 81)	AAPT/PTRA (1 hour)
2:00 - 2:30 PM	<input type="checkbox"/> Activity #11 (Waves in Ripple Tank): Waves Review Worksheet	AAPT/PTRA (1/2 hour)
2:30 - 3:00 PM	<input type="checkbox"/> Activity #1 (Geometric Optics): <i>Story of Blind Man</i> - Refer to TPT Article page 29 and Intro Page 27	AAPT/PTRA (1/2 hour)
3:00 - 3:30 PM	<input type="checkbox"/> Activity #2 (Geometric Optics): <i>Sources of Light</i> (Discussion Page 31)	AAPT/PTRA (1/2 hour)
3:30 - 4:45PM	<input type="checkbox"/> Activity #3 (Geometric Optics): <i>Properties of Light - Pinhole “Image”</i> (Page 37)	AAPT/PTRA (1 1/4 hour)
4:45 - 5:30 PM	<input type="checkbox"/> <i>Using Diagnoser for Formative Assessment</i>	Jim Minstrell, Facet Innovations (45 min.)
5:30 PM	Dinner (On Your Own)	

8 & 1/2 hours



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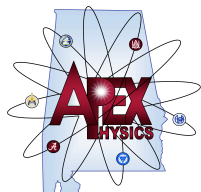


June 5 – June 17, 2016

Friday, June 10, 2016

8:00 - 9:15 AM	<input type="checkbox"/> Activity #4 (Geometric Optics): <i>Light Shadows</i> (Page 45)	AAPT/PTRA (1 1/4 hour)
9:15 - 10:45 AM	<input type="checkbox"/> Activity #5 (Geometric Optics): <i>Phases of the Moon</i> (Page 61)	AAPT/PTRA (1 1/2 hour)
10:45 AM - Noon.	<input type="checkbox"/> START Activity #9 (Geometric Optics): <i>Illuminance versus Distance</i> and discuss Activity #6 (Geometric Optics): Notes and Illuminance and Photometric Terms (Page 91 & 81)	AAPT/PTRA (1 1/4 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 1:40 PM	<input type="checkbox"/> CONTINUE Activity #9 (Geometric Optics): <i>Illuminance versus Distance</i> and discuss Activity #6 (Geometric Optics): Notes and Illuminance and Photometric Terms (Page 91 & 81)	AAPT/PTRA (40 min.)
1:40 – 2:00 PM	<input type="checkbox"/> <i>Debrief APEX Activities II</i>	Jim Minstrell, Facet Innovations (20 min.)

5 hours



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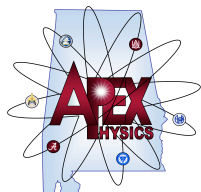


June 5 – June 17, 2016

Monday June 13, 2016

8:00 - 8:45 AM	<input type="checkbox"/> Activity #8 (Geometric Optics): <i>Practice Problems on Shadows and Illuminance</i> (Page 87)	AAPT/PTRA (3/4 hour)
8:45 - 9:45 AM	<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 hour)
9:45 AM – 10:15	<input type="checkbox"/> Activity #12 (Geometric Optics): <i>How To Measure An Angle With A Protractor</i> (Page 119)	AAPT/PTRA (1/2 hour)
10:15 AM - Noon.	<input type="checkbox"/> Activity #13 (Geometric Optics): <i>Objects, Flat Mirrors, and Properties of Images</i> (Page 123)	AAPT/PTRA (1 3/4 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 2:30 PM	<input type="checkbox"/> Activity #14 (Geometric Optics): <i>Reflection of Light from a Flat Mirror</i> (Page 146)	AAPT/PTRA (1 1/2 hour)
2:30 - 4:00 PM	<input type="checkbox"/> Activity #15 (Geometric Optics): <i>Reflection of Light from Multiple Flat Mirrors</i> (Page 155)	AAPT/PTRA (1 1/2 hour)
4:00 - 4:30 PM	<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, etc.) (Page 169) <input type="checkbox"/> Activity #16 & #17 (Geometric Optics): <i>Sample Tests on Reflection and Flat Mirrors</i> (Discuss Pages 151 & 165) <input type="checkbox"/> Activity #21 (Geometric Optics): <i>Family Physics Concave Mirror</i> (Discuss Page 191)	AAPT/PTRA (1/2 hour)
4:30 PM	Dinner (On Your Own)	

7 & 1/2 hours



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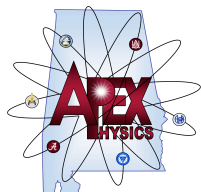


June 5 – June 17, 2016

Tuesday June 14, 2016

8:00 - 10:00 AM	<input type="checkbox"/> Activity #20 (Geometric Optics): <i>Properties of Images Formed by a Concave/Convex Mirrors</i> (Page 179) Skip Questions on Pages 181-182	AAPT/PTRA (2 hours)
10:00 - Noon	<input type="checkbox"/> Activity #22: & #23 (Geometric Optics): <i>Ray Diagrams and Worksheet 1 Mirrors</i> (Pages 195 & 205) Return to Activity #20, pages 181-182 to complete ray diagrams	AAPT/PTRA (2 hours)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 1:30 PM	<input type="checkbox"/> START Activity #25 (Geometric Optics): <i>Refraction of Light - Liquids</i> (Page 215)	AAPT/PTRA (1/2 hours)
1:30 – 2:30 PM	<input type="checkbox"/> <i>Teacher Reflection on Using APEX model Activities in Classrooms 2015-16: What Was Learned</i>	Dennis Sunal (1 hour)
2:30 – 3:30 PM	<input type="checkbox"/> <i>APEX Program Results 2015-16: What Was Learned</i>	Dennis Sunal (1 hour)
3:30 – 4:30 PM	<input type="checkbox"/> <i>Developing Expertise in Assessing Inquiry III</i>	Dennis Sunal (1 hour)
4:30 PM	Dinner (On Your Own)	

7 & 1/2 hours



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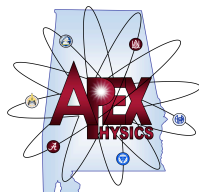


June 5 – June 17, 2016

Wednesday, June 15, 2016

8:00 - 9:30 AM	<input type="checkbox"/> CONTINUE Activity #25 (Geometric Optics): <i>Refraction of Light - Liquids</i> (Page 215)	AAPT/PTRA (1 1/2 hour)
9:30 - 10:00 AM	<input type="checkbox"/> Activity #26 (Geometric Optics): <i>Disappearing Solution</i> (Page 229)	AAPT/PTRA (1/2 hour)
10:00 - 10:30 AM	<input type="checkbox"/> Activity #27 (Geometric Optics): <i>Fish Tank Demonstration</i> (Page 230)	AAPT/PTRA (1/2 hour)
10:30 - Noon	<input type="checkbox"/> START Activity #28 (Geometric Optics): <i>Refraction of Light - Solids</i> (Page 231)	AAPT/PTRA (1 1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 1:30 PM	<input type="checkbox"/> CONTINUE Activity #28 (Geometric Optics): <i>Refraction of Light - Solids</i> (Page 231)	AAPT/PTRA (1/2 hour)
1:30 - 3:30 PM	<input type="checkbox"/> Activity #29 (Geometric Optics): <i>Index of Refraction and Prisms</i> (Page 241)	AAPT/PTRA (2 hours)
3:30 - 4:30 PM	<input type="checkbox"/> START Activity #30 (Geometric Optics): <i>Critical Angle</i> (Page 253)	AAPT/PTRA (1 hour)
4:30 PM	Dinner (On Your Own)	

7 & 1/2 hours



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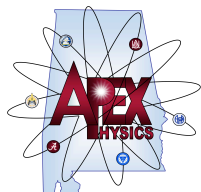


June 5 – June 17, 2016

Thursday, June 16, 2016

8:00 – 8:30 AM	<input type="checkbox"/> CONTINUE Activity #30 (Geometric Optics): <i>Critical Angle</i> (Page 253)	AAPT/PTRA (1/2 hour)
8:30 -10:30 AM	<input type="checkbox"/> Activity #35 (Geometric Optics): <i>Properties of Images Formed by a Concave/Convex Lenses</i> (Page 291)	AAPT/PTRA (2 hours)
10:30 – 11:30 AM	<input type="checkbox"/> Activity #37 (Geometric Optics): <i>Diverging Lens</i> (Page 315)	AAPT/PTRA (1 hour)
11:30 -Noon	<input type="checkbox"/> START Activity #36 (Geometric Optics): <i>Mammalian Eye</i> (Page 305)	AAPT/PTRA (1/2 hour)
Noon - 1:00 PM	Lunch (On Your Own)	
1:00 - 2:00 PM	<input type="checkbox"/> CONTINUE Activity #36 (Geometric Optics): <i>Mammalian Eye</i> (Page 305)	AAPT/PTRA (1 hour)
2:00 - 4:00 PM	<input type="checkbox"/> Activity #39 & #40 (Geometric Optics): <i>Ray Diagrams and Worksheet 2 Lenses</i> (Pages 325 & 333)	AAPT/PTRA (2 hour)
4:00 - 5:30 PM	<input type="checkbox"/> Engineering Design Task: Look Out Below!	Jim Slavicek, Facet Innovations (1 1/2 hours)
5:30 PM	Dinner (On Your Own)	

8 & 1/2 hours



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June 5 – June 17, 2016

Friday, June 17, 2016

8:00 – 9:00 AM	<input type="checkbox"/> Activity #41 (Geometric Optics): <i>Demonstrations Using A Dissectible Lens</i> (Page 341)	AAPT/PTRA (1 hour)
9:00 - 10:00 AM	<input type="checkbox"/> Activity #44 (Geometric Optics): <i>Beer-Lambert's Law of Absorption</i> (Page 353)	AAPT/PTRA (1 hour)
10:00 - 11:00 AM	<input type="checkbox"/> Activity #45 (Geometric Optics): <i>Efficiency of Various Light Bulbs</i> (Page 359)	AAPT/PTRA (1 hour)
11:00 AM - Noon.	<input type="checkbox"/> Activity #46 (Geometric Optics): <i>Microwave and Speed of Light</i> (Page 367)	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 & Kieth Esch Horizon Research, Inc.

5 hours