

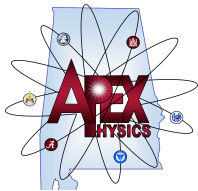
**Alliance For Physics Excellence (APEX)
 2016 Summer Institute Workshop – Week 1, Cohort 3
 Physics Teacher Institute (PTI) Activity Schedule
 Alabama A & M University
 June 19 – June 24, 2016**

APEX Schedule for Cohort 3 June 19-24, 2016

Sunday, June 19, 2016

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

Total Time = 3 hours



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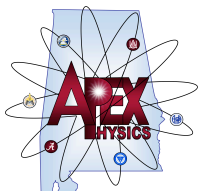
Monday June 20, 2016
(Material person prepare stirrers or straws.)

Activity	Title	Source	Time (min)	Clock Time
#1	<i>How Do Insulators Differ From Conductors?</i>	PTRA Electrostatic Supplement, Page 5	90	8:00 – 9:30 AM
#2	<i>How Do Charged Objects Behave</i>	PTRA Electrostatic Supplement, Page 17	90	9:30 – 11:00 AM
#3	Start: <i>How Do We Tell the Type of Charge?</i>	PTRA Electrostatic Supplement, Page 25	60	11:00 AM – Noon
	Lunch on your own		60	Noon – 1:00 PM
#3	Continue: <i>How Do We Tell the Type of Charge?</i>	PTRA Electrostatic Supplement, Page 25	40	1:00 – 1:40 PM
#3	<i>Static Charge Song</i>	PTRA Electrostatic Supplement, Page 39	5	1:40 – 1:45 PM
#4	<i>What is the Role of Distance?</i>	PTRA Electrostatic Supplement, Page 41	60	1:45 – 2:45 PM
#5	<i>How Does The Electrical Force Vary With Distance?</i>	PTRA Electrostatic Supplement, Page 47	100	2:45 – 4:25 PM
#5	<i>Electric Force Song</i>	PTRA Electrostatic Supplement, Page 61	5	4:25 – 4:30 PM
	<i>Survey of APEX Activities</i>	Jim Minstrell, Facet Innovations	30	4:30 – 5:00 PM

Total Time = 8 hours

If time start Tuesday Activities or Practice Problems:

- Ranking Task #122, #125, #126
- AP Problem #3, 2010

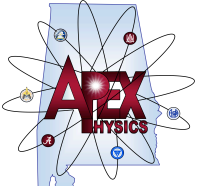


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Tuesday June 21, 2016

Activity	Title	Source	Time (min)	Clock Time
#6	<i>Line Problems (Do #3, #4, #11 & #12)</i>	PTRA Electrostatic Supplement, Page 63	45	8:00 – 8:45 AM
#7	<i>2D Problems (Do #2 & #4)</i>	PTRA Electrostatic Supplement, Page 71	45	8:45 – 9:30 AM
1.1	<i>Investigation one: What is needed to light a bulb?</i> Activity: Lighting bulbs in a loop	CASTLE Do	30	9:30 – 10:00 AM
1.2	Investigation two: Is anything happening in the wires? Activity: Using the compass to investigate a closed loop	CASTLE Do	30	10:00 – 10:30 AM
1.3	Commentary: What is a “circuit”?	CASTLE Discuss/DO	30	10:30 – 11:00 AM
1.4	Exercise – Model-Building Discussion			
1.5	Commentary: What’s moving?			
1.6	Commentary: Which direction is it moving?			
1.7	Exercise: Which is the “conventional” direction in an actual circuit? And “People & Holes” Demonstration	CASTLE & Do Demonstration	15	11:00 - 11:15 AM
1.8	<i>Investigation three: Testing Conductors and Insulators</i> Activity: Identifying conductors and insulators ¹	CASTLE Discuss ¹	10	11:15 – 11:25 AM
1.9	Activity: Bulb testing — conducting path	CASTLE Discuss – Dissect Bulbs	20	11:25 – 11:45 AM
1.10	Activity: Socket testing — conducting parts	CASTLE Do	15	11:45 AM – Noon
	Lunch on your own		60	Noon – 1:00 PM
1.10	There is a U tube about types of bulbs. (Show this.) https://www.youtube.com/watch?v=Pk60-D61h34	CASTLE Do	10	1:00 – 1:10 PM
1.11	Activity: Lighting a bulb with a single cell Show MIT YouTube Graduation (Show this.) http://www.youtube.com/watch?v=8ve23i5K334 CAN OMIT IF ALREADY DONE	Show video and Discuss Elicitation	15	1:10 – 1:25 PM
	<i>Summary Exercise (#3, #4, #7 & #8) (found on the next page in CASTLE)</i>	Whiteboard	45	1:25 – 2:10 PM
2.1	<i>Investigation one: How do resistors influence charge flow?</i> Activity: Adding a resistor (10 ohms)	CASTLE Do	30	2:10 – 2:40 PM
2.2	Activity: Replacing Resistors with Bulbs (Even Tables do 2 Bulbs & Odd Tables do 3 Bulbs)	CASTLE Do	30	2:40 – 3:10 PM

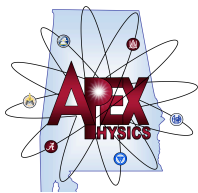
¹ Already done in Electrostatics Supplement Activity #1



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Activity	Title	Source	Time (min)	Clock Time
2.3	Activity: Additional symbols for circuit diagrams	CASTLE Discuss	10	3:10 – 3:20 PM
2.4	Commentary: Resistance and flow rate	CASTLE Discuss flow rate vs. speed	10	3:20 – 3:30 PM
2.5	Investigation two: Comparing the resistance of bulbs and wires Activity: Comparing the effect of different bulbs	CASTLE Do	30	3:30 – 4:00 PM
	Engineering Design Task: Runaway Granny!	Jim Slavicek, Facet Innovations	75	4:00 – 5:15 PM

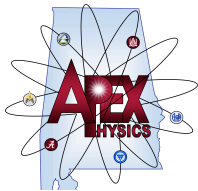
Total Time = 8 ¼ hours



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Wednesday June 22, 2016

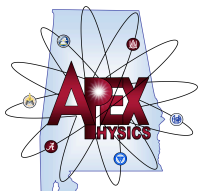
Activity	Title	Source	Time (min)	Clock Time
#1	Circuit Supplement: Activity #1, Cathy Coulomb Story	Circuit Supplement, Page 11	25	8:00 – 8:25 AM
#2 as 2.8 Ext	Circuit Supplement: Activity #2 COMPARING THE RESISTANCE OF A BULB FILAMENT WITH A WIRE, Activity 2.8 Extended. Resistance of a long bulb.	Circuit Supplement, Page 21	30	8:25 – 8:55 AM
2.9	Activity: Confirming the resistance of connecting wire	CASTLE Do	25	8:55 – 9:20 AM
2.7	Activity: Detecting the resistance of straws to airflow. Also discuss 2.10 Stirrers in series & 2:11 Stirrers in parallel	CASTLE Do Items 1, 2, & 3 only Need coffee stirrers & straws prepared by materials person	30	9:20 – 9:50 AM
2.10	Activity: Stirrers in Series			
2.11	Activity: Stirrers in Parallel			
D1	. Bulbs & Batteries Song	Circuit Supplement Appendix D1, Page 123	5	9:50 – 9:55 AM
2.12	Activity: A circuit with parallel bulbs	CASTLE Do	30	9:55 – 10:25 AM
2.13	Commentary: Overall resistance of series and parallel combinations	CASTLE Discuss	10	10:25 – 10:35 AM
#3	Circuit Supplement: Activity #3, <i>Simple Circuit Relationships</i> . Take data and do analysis. Whiteboard presentations. Mention Circuit Supplement Activity #4, <i>Simple Circuits Modified</i> , Page 37	Circuit Supplement: Activity, Page 25 CASTLE Do How to find resistance of long bulb.	85	10:35 AM – Noon
	Lunch on your own		60	Noon – 1:00 PM
3.1	Commentary: Schematic diagrams versus pictorial with battery, wires and bulbs	CASTLE Discuss	10	1:00 – 1:10 PM
3.3	Exercise: Drawing circuit diagram	Whiteboard Different Groups	30	1:10 – 1:40 PM



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Activity	Title	Source	Time (min)	Clock Time
3.12	Commentary: Energy in Electric Circuits	CASTLE Discuss page 34	10	1:40 – 1:50 PM
D2	When the Charge Song	Circuit Supplement Appendix D2, Page 125	5	1:50 – 1:55 PM
#6	Circuit Supplement #6, Color Coding Rules and Potential Diagrams page 99	Circuit Supplement, Page 55 Discuss CASTLE 4.10	40	1:55 – 2:35 PM
4.14	Activity: Color coding the circuit that does not have a capacitor (Build only circuit #4.14e and explain it.)	CASTLE Do	60	2:35 – 3:35 PM
5.5	Activity: Non-identical bulbs in series. Two non-identical bulbs in series Potential Diagrams with Open and Closed switch Combine with 5.10	Start: CASTLE activities. Each time you build a circuit and color code it, use a voltmeter to measure the voltage drops over each resistor and the voltage across the battery.	65	3:35 – 4:40 PM
5.9	Exercise: Two non-identical bulbs in series			
5.10	Activity: Parallel pair in a series circuit			
6.4	Activity: Testing the voltmeter quantitatively			
	6.4a. How do the voltage measurements compare when using two long bulbs? 6.4b. How do the voltage measurements compare when using round and long bulbs? 6.4c. How does the total voltage compare/relate to voltage for long and for round bulb? Use both circuits.			
	Debrief APEX Activities I	Jim Minstrell, Facet Innovations	20	4:40 – 5:00 PM

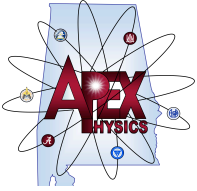
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Thursday June 23, 2016

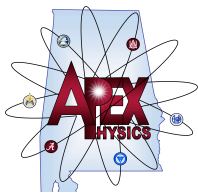
Activity	Title	Source	Time (min)	Clock Time
5.5	Activity: Non-identical bulbs in series. Two non-identical bulbs in series Potential Diagrams with Open and Closed switch Combine with 5.10	Continue: CASTLE activities. Each time you build a circuit and color code it, use a voltmeter to measure the voltage drops over each resistor and the voltage across the battery.	50	8:00 – 8:50 AM
5.9	Exercise: Two non-identical bulbs in series			
5.10	Activity: Parallel pair in a series circuit			
6.4	Activity: Testing the voltmeter quantitatively 6.4a. How do the voltage measurements compare when using two long bulbs? 6.4b. How do the voltage measurements compare when using round and long bulbs? 6.4c. How does the total voltage compare/relate to voltage for long and for round bulb? Use both circuits.			
6.7	Activity: Testing the ammeter in series circuits	CASTLE Do	30	8:50 – 9:20 AM
#7	Circuit Supplement Activity #7 Parallel Resistors Take and analyze data.	Circuit Supplement #7, Page 69	115	9:20 – 11:15 AM
#8	Circuit Supplement Activity #8 Parallel Circuits and More Worksheet	Circuit Supplement #8, Page 77	45	11:15 AM - Noon
	Lunch on your own		60	Noon – 1:00 PM
6.1	Commentary	Investigation one: What does a voltmeter do? CASTLE Discuss	10	1:00 – 1:10 PM
6.3	Commentary	CASTLE Discuss	10	1:10 – 1:20 PM
6.5	Activity: Investigating voltmeter resistance	CASTLE Do	25	1:20 – 1:45 PM
6.8, Appendix C	Commentary on Current and (Equation Sheet)	CASTLE Discuss and Appendix C, Circuit Supplement, Page 121 Discuss $I = q/t$ & $V = E/q$	20	1:45 – 2:05 PM



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Appendix B	Circuit Rules (Record on board or chart)	Circuit Supplement (Appendix B) , Page 118	25	2:05 – 2:30 PM
6.9	Activity: Testing the ammeter in parallel circuits	CASTLE Do	30	2:30 – 3:00 PM
6.10	Activity: Investigating ammeter resistance	CASTLE Discuss low Shunt Resistance	15	3:00 – 3:15 PM
6.11	Commentary R and ohm	Investigation four: How do we measure resistance? CASTLE Discuss	10	3:15 – 3:25 PM
6.14	Commentary: The “equivalent resistance” idea	CASTLE Discuss	10	3:25 – 3:35 PM
6.15	Activity: Equivalent resistance for parallel and series resistors	CASTLE Do #5, Set up and explain without colors	25	3:35 – 4:00 PM
6.17	Commentary: What is “power”? What is a “watt”?	CASTLE Discuss with 6.19	10	4:00 – 4:10 PM
6.19	Activity: Power Input vs. Power Output	Start: CASTLE Do	35	4:10 – 4:45 PM
	Using Diagnoser for Formative Assessment	Jim Minstrell, Facet Innovations	45	4:45 – 5:30 PM

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Activity	Title	Source	Time (min)	Clock Time
6.19	Activity: Power Input vs. Power Output	Continue: CASTLE Do	25	8:00 – 8:25 AM
10	Circuit Supplement, European Light Bulb Problem	Circuit Supplement, Page 85	50	8:25 – 9:15 AM
D3	Electricity Song	Circuit Supplement #D3, Page 127	5	9:15 – 9:20 AM
11	Power of the Hot Dog	Circuit Supplement, Page 89	60	9:20 – 10:20 AM
12	Practice Circuit Problems	Circuit Supplement, Page 97	110	10:20 AM - Noon
Lunch Break	Lunch Provided. (Participants can start Post Content Assessment on Electricity as soon as everyone is done with lunch.)		Noon – 1:00 PM	
	Debrief APEX Activities II	Jim Minstrell, Facet Innovations	20	1:00 – 1:20 PM
Institute Post Electricity Assessment	Post Institute Content Assessment on Electricity	Eric Banilower & Kieth Esch Horizon Research, Inc.	60	1:20 – 2:20 PM
	Complete APEX Evaluation Form.	Eric Banilower & Kieth Esch Horizon Research, Inc.	10	
Institute Pre Magnetism Assessment	Option to go home at 2:20 PM and return for Magnetism Pre Content Assessment on Sunday evening at 7:00 PM or stay and take the Magnetism Pre Content Assessment today after finishing the post Institute Content Assessment on Electricity.	Eric Banilower & Kieth Esch Horizon Research, Inc.	60	2:20 – 3:20 PM

Total Time = 5 hours