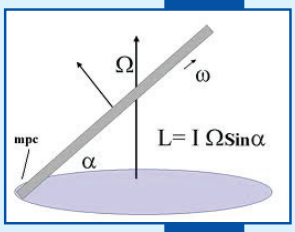
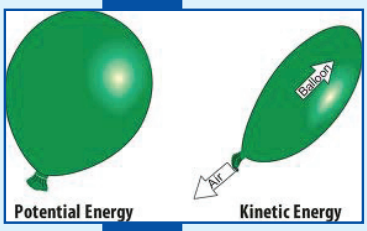
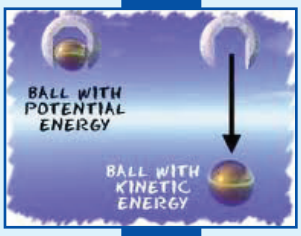
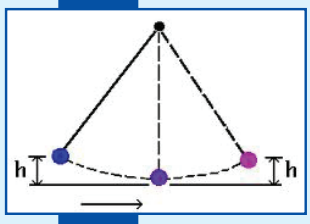
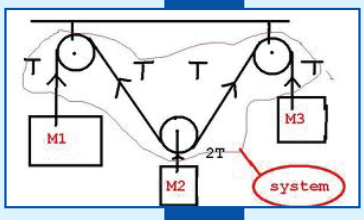
Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching

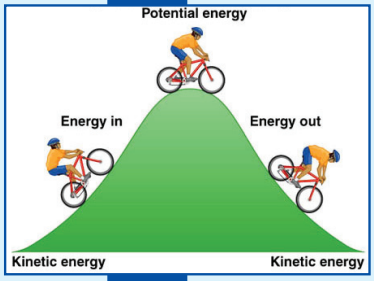












TEXAS REGIONAL COLLABORATIVES Excellence

IN THE SERVICE OF SCIENCE AND MATHEMATICS TEACHERS

PHYSICS INSTRUMENTATION

Hilton Austin Airport

February 13-14, 2012

8:30 a.m. - 4:00 p.m.

TRC Professional Development Academy

Funded by a grant from the
Texas Education Agency

Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching

Background Information and History

In 1991, tremendous science education reform activities were underway across Texas and the nation. Changes necessitated that teachers provide science instruction in fields for which they were not prepared. Dr. Kamil A. Jbeily, then at the Texas Education Agency, initiated a series of regional meetings across the state to explore ways to create support systems of professional development for Texas science teachers. The meetings included representatives from education service centers, colleges and universities, school districts, business and industry, and institutions of informal education. The goal was to create regional partnerships built on collaboration and cost-sharing that provided science teachers with relevant, sustained, high-intensity professional development. These P-16 partnerships, with federal funding from the Dwight D. Eisenhower Science Professional Development Program, developed into the statewide network that is now the Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching.

On March 2, 1996, with the reorganization of the Texas Education Agency, the statewide administrative office of the Texas Regional Collaboratives (TRC) was moved, under a TEA-UT partnership agreement to the Science Education Center, now the Center for Science and Mathematics Education at The University of Texas at Austin. The program has enjoyed support from a wide range of partners including the U.S. Department of Education Eisenhower Grants Program, the Texas Education Agency, the National Science Foundation, and a number of corporate supporters including AT&T Foundation, Shell Oil Company, the Toyota USA Foundation, The Cynthia and George Mitchell Foundation, El Paso Corporation, and others. In addition, over fifty business and community partners support activities of the Collaboratives at the regional level.

In March 2006, through a historic $1.0 Million gift from Shell, two Louisiana Regional Collaboratives prototypes modeled after the TRC, commenced their activities in the service of Louisiana science teachers. In July 2006, the TRC launched a new initiative supported by Math and Science Partnership funding through the Texas Education Agency to provide high quality professional development to mathematics teachers across Texas. After a competitive process, grants were awarded to 20 Regional Collaboratives for Excellence in Mathematics Teaching.

To date, the Texas Regional Collaboratives have served over 30,000 teachers of science and mathematics teachers, who in turn have shared their knowledge with other teachers at the district, regional, and state levels. The long-range goal of the Regional Collaboratives is to continuously (1) enhance the quality of science and mathematics teaching in Texas through Professional Development Academies and inter-regional collaboration; (2) increase the number of qualified science and mathematics educators by building the leadership capacity of teachers to mentor and serve a larger number of teachers; and (3) improve accountability of the system by evaluating the impact of the professional development on teachers' knowledge and skills, their performance in the classroom, and on student achievement.

The Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching program has received commendations from the U.S. Department of Education, policy makers, state legislators, and business partners. The Program was inducted into the Texas Science Hall of Fame on January 17, 2000, and was recognized by the Governor, the Senate, and House of Representatives on January 16, 2001 for distinguished achievements and contributions to supporting education reform.

PHYSICS INSTRUMENTATION

TRC Professional Development Academy

February 13, 2012

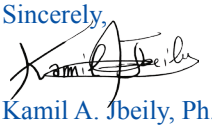
Dear TRC Teachers, Educators, and Partners,

Welcome to the Physics Instrumentation Professional Development Academy. The TRC staff in collaboration with our partners at the Texas Education Agency have prepared a high quality professional development opportunity that is designed to positively impact the teaching and learning of physics and physical sciences across Texas. The attached program includes more than 25 workshops and presentations that will be provided over the next two days. We are proud of the cadre of presenters that include highly qualified physics teachers, college physics professors, science coordinators, and physics instrumentation vendor representatives.

The variety of workshops and presentations provided are intended to help you in your role as a physics teacher mentor, a classroom physics/physical science teacher, or a physics professional development provider. If you are a physics teacher mentor, we encourage you to share the activities and lessons learned with your cadre members and other teachers in your schools and region. If you are a Regional Collaborative project director, a physics instructional team member, a partnering physics professor, or a science specialist, we encourage you to incorporate the many ideas, strategies, instructional materials, instrumentation, or activities into your upcoming Regional Collaboratives summer institutes and follow-up training.

To enhance the focus, rigor, and relevance of the professional development academy, we are grateful to the Texas Education Agency for providing us the Physics TEKS below to which we have asked our presenters to align their workshops and presentations. On behalf of the TRC staff and our TEA partners, I thank you for your active participation in this important professional development opportunity and for applying and implementing what you learn to benefit our TRC teachers and their efforts of advancing excellence in physics teaching and learning.

Sincerely,



Kamil A. Ibeily, Ph.D.
Executive Director, TRC

Vertically Aligned Middle School TEKS

Grade 6 (8) Force, motion, and energy. The student knows force and motion are related to potential and kinetic energy. The student is expected to:

(A) compare and contrast potential and kinetic energy;
(B) identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces;
(C) calculate average speed using distance and time measurements;

Grade 6 (9) Force, motion, and energy. The student knows that the Law of Conservation of Energy states that energy can neither be created nor destroyed, it just changes form. The student is expected to:

(A) investigate methods of thermal energy transfer, including conduction, convection, and radiation;

Grade 7 (7) Force, motion, and energy. The student knows that there is a relationship among force, motion, and energy. The student is expected to:

(A) contrast situations where work is done with different amounts of force to situations where no work is done such as moving a box with a ramp and without a ramp, or standing still;
(B) illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy in digestion;

Grade 8 (6) Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:

(A) demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion;

High School Physics TEKS

6. Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to:

(A) investigate and calculate quantities using the work-energy theorem in various situations;
(B) investigate examples of kinetic and potential energy and their transformations;
(C) calculate the mechanical energy of, power generated within, impulse applied to, and momentum of a physical system;
(D) demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension.

Monday, February 13

Morning Sessions 1 & 2

TIME		PRESENTATIONS / ACTIVITIES		ROOM
8:00 - 8:50 a.m.		BREAKFAST		**Atrium** *Main Floor*
9:00 - 10:00 a.m.		**Welcome to the TRC** - Kamil A. Jbeily, Ph.D., TRC Executive Director **SESSION 1 -- General Session: "Focus on Physics"** **Irene Pickhardt**, *Statewide Science Coordinator,* Texas Education Agency		**Ballroom D** *Lower Level*
10:00 - 10:15 a.m.		BREAK		
10:15 - 12:00 p.m.		**SESSION 2**	**TEKS/Level**	
	A	**I Do, iTouch, iLearn Physics** Michael Strange	Physics 6 A-D *Middle/High School*	**Longhorn** *Main Floor*
	B	**Demos, Displays & Activities with Energy, Impulse & Momentum** Evelyn Restivo	Physics 6B, 6D *Middle/High School*	**Violet Crown** *Main Floor*
	C	**Fun with Fan Cars-Calculating Energy and Momentum (Make and Take)** Robert Moore/Debbie Walker	Physics 6C *High School*	**Chennault** *Lower Level*
	D	**Rule over Physics - Work-Energy Theorem, Potential and Kinetic Energy (Vendor Presentation)** Brett Sackett/Richard Briscoe	Physics 6A, 6B *High School*	**Ballroom D** *Lower Level*

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SESSION 1

"Focus on Physics"
Irene Pickhardt
Statewide Science Coordinator
Texas Education Agency

SESSION 2

A. I Do, iTouch, iLearn Physics
Michael Strange, *Mansfield ISD*
TEKS Addressed: Physics 6 A-D
Equipment Used: iPod Touch 4G, iPad, projector, Rock it/ Boombox speaker, PASCO probes
Description: With the new budget restrictions and upcoming EOC tests, most districts are asking teachers to teach more students more content with less time. With that in mind, teachers must find a more effective way to collect/present that data. iOS devices (iPod Touch/iPhone and iPad) are used in our physics classes to find velocity, acceleration, force, sound, etc. This hands-on presentation will change the way you view how to teach physics with this new generation of students. Bring you own iOS device or use ours!

B. Demos, Displays & Activities with Energy, Impulse & Momentum
Evelyn Restivo, *Navarro College*
TEKS Addressed: Physics 6B, 6D
Equipment Used: Demonstration tracks, carts, and timers
Description: The Impulse-Momentum equation which like Newton's Second Law tells us if momentum is conserved, or if not, how much it changes. The Energy equivalent equation is the First Law of Thermodynamics. This workshop will offer examples to show the similarities of equations and laws in physics by using a series of demonstrations and activities that can be used as introduction, displays or enhancements with more detailed lab experiments when teaching Energy, Impulse and Momentum.

C. Fun with Fan Cars-Calculating Energy and Momentum (Make and Take)
Robert Moore/Debbie Walker, *Texas A&M*
TEKS Addressed: Physics 6C
Equipment Used: Meter sticks, balances, photogates, GLXs, timers, car components, knives/scissors.
Description: Come join us as we construct a fan car and use it in inquiry-based activities to investigate the relationship between force and acceleration. Activities completed with the fan car will include graphing, variables, force, acceleration and momentum. We'll use both high-tech and low-tech means for measurement and analysis. Participants will leave with their own fan car to take back to their classroom and plans for constructing a class set.

D. Rule over Physics - Work-Energy Theorem, Potential and Kinetic Energy (Vendor Presentation)
Brett Sackett/Richard Briscoe, *PASCO Scientific*
TEKS Addressed: Physics 6A, 6 B
Equipment Used: SPARK science learning system, motion and force sensors, PASTrack, dynamics carts.
Description: This session will contain hands-on activities specifically designed to meet the 6A & 6B TEKs. Gain best practices using SPARK science, PASCO's K-12 data acquisition software, and the latest PASCO physics apparatus. Also, we will be unveiling the new PASCO Capstone software, designed specifically for AP and College level physics.

TIME		PRESENTATIONS / ACTIVITIES		ROOM
1:00 - 2:00 p.m.	**SESSION 3**		**TEKS/Level**	
	A	**When Balls Collide: Engaging Ways to Teach Momentum and Energy Conservation** Tom Hsu/Manos Chaniotakis	Physics 6C, 6D *High School*	**Longhorn** *Main Floor*
	B	**Strategies for Success with CPO STAR (Vendor Presentation)** Sally Dudley/Kat Woodring	6th grade (8A, 8B) Physics 6A *Middle School*	**Violet Crown** *Main Floor*
	C	**Conservation of Energy-Roller Coaster Fun** Kathy Steward	Physics 6B *Middle/High School*	**Chennault** *Lower Level*
	D	**Using the 5E Lesson Cycle to Teach Conservation of Energy** Greg Garcia/Emilio Barrientos	Physics 6D *High School*	**Ballroom D** *Lower Level*
2:00 - 2:15 p.m.	BREAK			
2:15 - 4:00 p.m.	**SESSION 4**		**TEKS/Level**	
	A	**Nspired Physics: Energy and Momentum** Shawn Schlueter	Physics 6A, 6C, 6D *High School*	**Longhorn** *Main Floor*
	B	**Work and Energy Explorations with Technology (Vendor Presentation)** David Walling	6th grade (8A, 8E) 7th Grade (7A) *Middle School*	**Violet Crown** *Main Floor*
	C	**Explore Force and Acceleration with Tracks and Cars (Make and Take)** Robert Moore/Debbie Walker	Physics 6D *High School*	**Chennault** *Lower Level*
	D	**Can You Control Your "Impulse"?** Karen Jo Matsler	Physics 6C *Middle/High School*	**Ballroom D** *Lower Level*

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Presentation Descriptions -- Sessions 3 & 4

SESSION 3

A. When Balls Collide: Engaging Ways to Teach Momentum and Energy Conservation
Tom Hsu/Manos Chaniotakis, *Author/Physicist*
TEKS Addressed: Physics 6C, 6D
Equipment Used: Rubber, clay, plastic, steel balls, interactive web simulations, videos, CDs for all participants with curriculum and interactive elements
Description: A wide variety of colliding balls, cell phone cameras, interactive simulations, and video make for an engaging workshop on the conservation of energy and momentum. Dr. Tom Hsu will demonstrate several curriculum lessons and techniques that will stimulate conceptual thinking about energy and momentum, and also teach powerful problem solving skills.

B. Strategies for Success with CPO STAAR (Vendor Presentation)
Sally Dudley/Kat Woodring, *CPO Science*
TEKS Addressed: 6th grade (8A, 8B); Physics 6A
Equipment Used: CPO stands, cars, ramps, spring scales
Description: Middle school teachers in grades 6-8 will experience a unique supplemental solution for student success on the STAAR test: 49 Interactive digital lessons, teacher resources, five sets of classroom-friendly equipment, assessments, plus new student content correlated especially to the new TEKS. Free CD and door prizes!

C. Conservation of Energy-Roller Coaster Fun
Kathy Steward, *Region 8/North Lamar High School*
TEKS Addressed: Physics 6B
Equipment Used: Foam pipe insulation, marbles, tape, meter sticks, cloth to catch marbles
Description: Conservation of Energy means energy can change forms. This presentation will address the potential energy to kinetic energy transfer with hands-on participation. A brief overview of potential energy and kinetic energy will be given. Participants will then design and build "roller coasters" to meet certain criteria. Online simulation links will also be provided.

D. Using the 5E Lesson Cycle to Teach Conservation of Energy
Greg Garcia/Emilio Barrientos, *Brownsville ISD*
TEKS Addressed: Physics 6D
Equipment Used: CPO stand, inclined ramps, photogates, timer, car, triple beam balance, and test cars
Description: Workshop participants will gain an understanding of potential and kinetic energy and how they tie in to the Law of Conservation of Energy. The hands-on activities presented build students' experiences and foundation so that they can apply conservation of energy to a CPO adapted activity. Participants will also see how a teacher created activity has been adapted to demonstrate Webb's Depth of Knowledge.

SESSION 4

A. Nspired Physics: Energy and Momentum
Shawn Schlueter, ESC Region 14
TEKS Addressed: Physics 6A, 6C, 6D
Equipment Used: TI Nspire calculators, Vernier probe ware
Description: Come work with the Texas Instruments Nspire calculator to explore energy and momentum using interactive documents, as well as learn to use common probes with the handheld to conduct data gathering activities. Participants receive ready to use documents, including teacher and student handouts, as well as the skills to effectively use the handheld with probe ware. Links to additional activities to cover other physics TEKS provided.

B. Work and Energy Explorations with Technology (Vendor Presentation)
David Walling, *SmartSchool*
TEKS Addressed: 6th grade (8A, 8E); 7th Grade (7A)
Equipment Used: Ramps, carts, data loggers, computers, timing sensors, and force sensors
Description: Investigating examples of potential and kinetic energy in different forms and utilizing simple machines to explore the energy required to move an object. The Vision and SOLUS data loggers will be used with timing and force sensors with a timing ramp among other devices. The Vision has a color graphic touch screen and it can connect directly to a projector. The SOLUS has five built-in sensors to make data logging easy and cost effective.

C. Explore Force and Acceleration with Tracks and Cars (Make and Take)
Robert Moore/Debbie Walker, *Texas A&M*
TEKS Addressed: Physics 6D
Equipment Used: Meter sticks, balances, weights, photogates, GLXs, timers, car components, scissors
Description: We will construct a track and car to use to explore Newton's Second Law of Motion by looking at the transfer of energy between a falling weight and a moving car. Numerous measurements can be taken and used for a graphing activity. Participants will also make measurements and compare potential and kinetic energy to look at conservation of energy. Participants will be able to take the car and track with them to incorporate in their curriculum.

D. Can You Control Your "Impulse"?
Karen Jo Matsler, *UT Arlington*
TEKS Addressed: Physics 6C
Equipment Used: Dynamics tracks, carts, force sensors, motion detectors
Description: The emphasis of this workshop is the primacy of impulse in any situation involving momentum. If the net impulse is zero, momentum is conserved; if not, then the momentum change equals the net impulse. This idea is developed and reinforced in numerous activities including use of probes, sensors, and iPad apps. An important focus of the discussion is automobile collisions, with emphasis on the use of seat belts, as well as air bags and crumple zones.

TIME		PRESENTATIONS / ACTIVITIES		ROOM
8:00 - 8:50 a.m.	BREAKFAST			**Atrium** *Main Floor*
9:00 - 10:45 a.m.	**SESSION 5**		**TEKS/Level**	
	A	**Exploring Energy: What is it? When is it? Where is it?** Beverly Cannon	Physics 6B *High School*	**Longhorn** *Main Floor*
	B	**Race into Physics with the Energy Car (Vendor Presentation)** Sally Dudley/Kat Woodring	Physics 6D *Middle/High School*	**Violet Crown** *Main Floor*
	C	**Work and Energy Explorations with Technology (Vendor Presentation)** David Walling	6th grade (8A, 8E) 7th Grade (7A) *Middle School*	**Chennault** *Lower Level*
	D	**Can You Control Your "Impulse"?** Karen Jo Matsler	Physics 6C *Middle/High School*	**Ballroom D** *Lower Level*
10:45 - 11:00 a.m.	BREAK			
11:00 - 12:00 p.m.	**SESSION 6**		**TEKS/Level**	
	A	**Springs and Masses: Understanding and Solving Energy Conservation Problems** Tom Hsu/Manos Chaniotakis	Physics 6A, 6B *High School*	**Longhorn** *Main Floor*
	B	**SEPUP Energy (Vendor Presentation)** Oralia Gill	Physics 6B, 6D *Middle/High School*	**Violet Crown** *Main Floor*
	C	**Explore Newton's Laws with Tracks and Cars (Make and Take)** Robert Moore/Debbie Walker	6th grade (8B, 8C, 8D) 7th grade (7A) 8th grade (6A, 6B, 6C) *Middle School*	**Chennault** *Lower Level*
	D	**Unbalanced Orcs** C. J. Thompson	8th Grade (6A) *Middle School*	**Ballroom D** *Lower Level*
12:00 - 12:50 p.m.	LUNCH			**Atrium** *Main Floor*

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SESSION 5

A. Exploring Energy: What is it? When is it? Where is it?

Beverly Cannon, *Highland ISD*
TEKS Addressed: Physics 6B
Equipment Used: Hot Wheels tracks and cars, triple beam balance, a 1-meter ramp, the Penguin Race, a motion detector, a bouncing ball, Data Studio software.
Description: The mystery of kinetic and potential energy along with work can be described in many ways. Rather than having the students overwhelmed with the black box of physics equipment and computers, we will investigate these energies with Hot Wheels and the Penguin Race. We will then follow up with a bouncing ball and motion detectors.

B. Race into Physics with the Energy Car (Vendor Presentation)

Sally Dudley/Kat Woodring, *CPO Science*
TEKS Addressed: Physics 6D
Equipment Used: Energy cars and data collectors
Description: Middle or high school teachers will explore the concepts of momentum and see how energy is conserved using technology and a virtually frictionless car. Through data collection and graphing, students will see how the laws of physics apply to real life situations. Free CDs and door prizes!

C. Work and Energy Explorations with Technology (Vendor Presentation)

David Walling, *SmartSchool*
TEKS Addressed: 6th grade (8A, 8E); 7th Grade (7A)
Equipment Used: Ramps, carts, data loggers, computers, timing sensors, and force sensors
Description: Investigating examples of potential and kinetic energy in different forms and utilizing simple machines to explore the energy required to move an object. The Vision and SOLUS data loggers will be used with timing and force sensors with a timing ramp among other devices. The Vision has a color graphic touch screen and it can connect directly to a projector. The SOLUS has five built-in sensors to make data logging easy and cost effective.

D. Can You Control Your "Impulse"?

Karen Jo Matsler, *UT Arlington*
TEKS Addressed: Physics 6C
Equipment Used: Dynamics tracks, carts, force sensors, motion detectors
Description: The emphasis of this workshop is the primacy of impulse in any situation involving momentum. If the net impulse is zero, momentum is conserved; if not, then the momentum change equals the net impulse. This idea is developed and reinforced in numerous activities including use of probes, sensors, and iPad apps. An important focus of the discussion is automobile collisions, with emphasis on the use of seat belts, as well as air bags and crumple zones.

SESSION 6

A. Springs and Masses: Understanding and Solving Energy Conservation Problems

Tom Hsu/Manos Chaniotakis, *Author/Physicist*
TEKS Addressed: Physics 6A, 6B
Equipment Used: Interactive web simulations, videos, CDs for all participants with curriculum and interactive elements
Description: In this workshop, Dr. Tom Hsu will use an engaging combination of video, interactive simulations and activities that will enable your students to deeply understand how to use the law of energy conservation to solve real problems. All participants will receive curriculum elements and interactive tools that teach students how to solve problems with elastic and gravitational potential energy and kinetic energy.

B. SEPUP Energy (Vendor Presentation)

Oralia Gill, *Lab-Aids*
TEKS Addressed: Physics 6B, 6D
Equipment Used: 9-volt battery harnesses with alligator clips, LAB-AIDS hot bulb trays, #50 flashlight bulbs (7.5 volts, 0.22 amperes), sockets, foam caps, thermometers, 20 cm long clear plastic tubes, 10 cm long clear plastic tubes, 10 cm long steel rods, 10 cm long aluminum rods, 5 cm long steel rods, 5 cm aluminum rods, nails, foam blocks
Description: People use energy! In this part of *Issues and Physical Science*, students explore energy transfer and conservation in the context of household energy usage. The activities explore key energy concepts, including the variety of types of energy, energy transfers within and between systems, the energy chains involved when energy is transformed from one type of a more desired type, and the methods used to quantify energy and determine the efficiency of energy transfers.

C. Explore Newton's Laws with Tracks and Cars (Make and Take)

Robert Moore/Debbie Walker, *Texas A&M*
TEKS Addressed: 6th grade (8B, 8C, 8D); 7th grade (7A); 8th grade (6A, 6B, 6C)
Equipment Used: Meter sticks, balances, weights, photogates, GLXs, timers, car components, scissors
Description: We will be able to use the concept of acceleration as a change in velocity over a period of time to study the motion of the cart as it is accelerated by a net force, which in this case will be a falling weight. Participants will be able to take the car and track with them to incorporate in their curriculum.

D. Unbalanced Orcs

C. J. Thompson, *Rice University*
TEKS Addressed: 8th Grade (6A)
Equipment Used: Laptop, chart paper, markers, index cards and documents
Description: This lesson is designed to utilize "orcs", the powerful beasts from the Lord of the Ring movies, as units of force that students can use to conceptualize unbalanced forces and the resultant motion of objects.

TIME		PRESENTATIONS / ACTIVITIES		ROOM
1:00 - 2:00 p.m.	**SESSION 7**		**TEKS/Level**	
	A	**Energy, Gravity, and Speed: Understanding and Solving Energy Conservation Problems** Tom Hsu/Manos Chaniotakis	Physics 6A, 6B *High School*	**Longhorn** *Main Floor*
	B	**All Work and NO Play? Energize your new MS TEKS with CPO Science (Vendor Presentation)** Sally Dudley/Kat Woodring	Physics 6A *Middle/High School*	**Violet Crown** *Main Floor*
	C	**Conversions of and Conservation of Mechanical Energy with Poppers** Milijana Suskavcevic	Physics 6C, 6D High School	**Chennault** *Lower Level*
	D	**Do you have UPS & DOWNS in your classroom? Change to Potential and Kinetic Energy using CPO equipment** Wanda Pagonis	Physics 6B *Middle/High School*	**Ballroom D** *Lower level*
2:00 - 2:15 p.m.	BREAK			
2:15 - 4:00 p.m.	**SESSION 8**		**TEKS/Level**	
	A	**Rule over Physics - Mechanical Energy, Conservation of Energy and Momentum (Vendor Presentation)** Brett Sackett/Richard Briscoe	Physics 6C, 6D *High School*	**Longhorn** *Main Floor*
	B	**Transformations Using the Coupled Pendulum** Patricia Stevenson	Physics 6B *High School*	**Violet Crown** *Main Floor*
	C	**Using Fan Cars to Explore Force, Motion, and Energy TEKS (Make and Take)** Robert Moore/Debbie Walker	6th grade (8B, 8C, 8D) 7th grade (7A) 8th grade (6A, 6B, 6C) *Middle School*	**Chennault** *Lower Level*
	D	**Transformations From Kinetic Energy to Potential Energy** Antonia Chimonidou/Mark Baumann/ Alex Barr	Physics 6B, 6D *High School*	**Ballroom D** *Lower level*

NOTES

SESSION 7

A. Energy, Gravity, and Speed: Understanding and Solving Energy Conservation Problems
Tom Hsu/Manos Chaniotakis, *Author/Physicist*
TEKS Addressed: Physics 6A, 6B
Equipment Used: Interactive web simulations, videos, CDs for all participants with curriculum and interactive elements.
Description: Things that roll down hill go faster as they descend. This simple and intuitive scenario is a compelling starting point for applying the conservation of energy. In this workshop, Dr. Tom Hsu will show you some very effective simulations and activities that will enable your students to deeply understand how to use the law of energy conservation to solve real problems. Participants will each receive curriculum elements, worksheets, and interactive tools that teach students how to solve problems with gravitational potential energy and kinetic energy.

B. All Work and NO Play? Energize your new MS TEKS with CPO Science (Vendor Presentation)
Sally Dudley/Kat Woodring, *CPO Science*
TEKS Addressed: Physics 6A
Equipment Used: CPO stands, ropes, pulleys and spring scales
Description: Middle and high school teachers will do a guided inquiry, hands-on activity that integrates the math and science principles needed for calculating work. Use real life experiences to help your students relate and remember concepts including: work, force, distance, energy, mechanical advantage and simple machines. Free CDs and door prizes!

C. Conversions of and Conservation of Mechanical Energy with Poppers
Milijana Suskavcevic, *Rice University*
TEKS Addressed: Physics 6C, 6D
Equipment Used: Poppers and rulers
Description: The workshop will engage participants in the TEKS-aligned activities on the forms of mechanical energy, energy conversions, and conservation of mechanical energy. Roller coasters are traditionally used to illustrate these phenomena, however this workshop will use a simple device (popper) to describe and calculate different forms of energy and several other kinematics and dynamics physical quantitates involved.

D. Do you have UPs & DOWNs in your classroom? Change to Potential and Kinetic Energy using CPO equipment
Wanda Pagonis, *Our Lady of the Lake University*
TEKS Addressed: Physics 6B
Equipment Used: CPO equipment and pipe insulation
Description: Experience potential and kinetic energy using CPO roller coasters.

SESSION 8

A. Rule over Physics - Mechanical Energy, Conservation of Energy and Momentum (Vendor Presentation)
Brett Sackett/Richard Briscoe, *PASCO Scientific*
TEKS Addressed: Physics 6C, 6D
Equipment Used: SPARK science learning system, motion and force sensors, PASTrack, dynamics carts.
Description: Gain best practices using SPARK science, PASCO's K-12 data acquisition software, and the latest PASCO physics apparatus. Also, we will be unveiling the new PASCO Capstone software, designed specifically for AP and College level physics.

B. Transformations Using the Coupled Pendulum
Patricia Stevenson, *Simms ISD*
TEKS Addressed: Physics 6B
Equipment Used: Tape, string, various pendulum bobs, scissors, balances and stopwatches
Description: Participants will construct a coupled pendulum system using simple materials and explore the concepts of potential and kinetic energy transformations. Using the system, participants will observe and investigate the motion of the pendulums, develop a reasonable explanation for the motion, describe potential and kinetic energy, and discover how changes in mass and length affect the motion of the coupled pendulum.

C. Using Fan Cars to Explore Force, Motion, and Energy TEKS (Make and Take)
Robert Moore/Debbie Walker, *Texas A&M*
TEKS Addressed: 6th grade (8B, 8C, 8D); 7th grade (7A); 8th grade (6A, 6B, 6C)
Equipment Used: Meter sticks, balances, photogates, GLXs, timers, car components, knives/scissors
Description: Come join us as we construct a fan car and use it in inquiry-based activities investigating the difference between speed, velocity, and acceleration. Activities done with the fan car will include graphing, variables, calculating speed, and investigating Newton's laws. We'll use both high-tech and low-tech means for measurement and analysis. Participants will make their own fan car to take back to their classroom and plans for constructing a class set.

D. Transformations From Kinetic Energy to Potential Energy
Antonia Chimonidou/Mark Baumann/Alex Barr, *The University of Texas at Austin*
TEKS Addressed: Physics 6B, 6D
Equipment Used: Frictionless carts and tracks, motion sensors, GLX, elastic band attachments, copies of activities
Description: This hands-on activity addresses the energy changes involved in the interaction between rigid and elastic bodies. Elastic potential energy is introduced and the role of energy transfers and energy conservation is explored during elastic body interactions. Chemical potential energy is also discussed. The activity is presented in an inquiry-style format in which the students collect motion data, analyze speed-time graphs, draw conclusions about energy transfer and conservation, and discuss their results.

COLLABORATIVES AND PROJECTS (2011-2012)

Regional Mathematics and Science Collaboratives

R	M	S	REGIONAL COLLABORATIVES
1	♦	♦	Region 1 Collaborative/*Edinburg*
		♦	UT Pan American Regional Collaborative/*Edinburg*
	♦	♦	UT Brownsville Regional Collaborative/*Brownsville*
		♦	TAMU International Regional Collaborative/*Laredo*
2	♦		Region 2 Collaborative/*Corpus Christi*
		♦	Texas State Aquarium-ESC 2 Regional Collaborative/*Corpus Christi*
3	♦	♦	Region 3 Collaborative/*Victoria*
4	♦	♦	Region 4 Collaborative/*Houston*
		♦	Rice University Regional Collaborative/*Houston*
		♦	Galveston County Regional Collaborative/*Galveston*
	♦	♦	Lake Houston Regional Collaborative/*Humble*
		♦	UHCL Regional Collaborative/*Houston*
		♦	UH-Downtown Regional Collaborative/*Houston*
		♦	Aldine ISD Regional Collaborative/*Houston*
5	♦	♦	Region 5 Collaborative/*Beaumont*
6	♦		Region 6 Collaborative/*Huntsville*
		♦	TAMU-College Station Regional Collaborative/*College Station*
7	♦	♦	Region 7 Collaborative/*Kilgore*
	♦	♦	UT Tyler Regional Collaborative/*Tyler*
8	♦	♦	Region 8 Collaborative/*Mount Pleasant*
		♦	TAMU-Texarkana Regional Collaborative/*Texarkana*
9	♦	♦	Region 9 Collaborative/*Wichita Falls*
10	♦	♦	Region 10 Collaborative/*Richardson*
		♦	Southern Methodist University Regional Collaborative/Dallas
		♦	UT Dallas Regional Collaborative/*Dallas*
11	♦	♦	Region 11 Collaborative/*Fort Worth*
	♦	♦	North Central Texas College Regional Collaborative/*Gainesville*
		♦	University of North Texas Regional Collaborative/*Denton*
12	♦	♦	Region 12 Collaborative/*Waco*
13	♦	♦	Region 13 Collaborative/*Austin*
		♦	Capital City Regional Collaborative/*Austin*
		♦	UT MD Anderson Regional Collaborative/*Smithville*
		♦	UT Austin-College of Nat. Sci. Regional Collaborative/Austin
14	♦	♦	Region 14 Collaborative/*Abilene*
15	♦	♦	Region 15 Collaborative/*San Angelo*
16	♦	♦	Region 16 Collaborative/*Amarillo*
17	♦	♦	Region 17 Collaborative/*Lubbock*
18	♦	♦	Region 18 Collaborative/*Midland*
19	♦	♦	Region 19 Collaborative/*El Paso*
20	♦	♦	Region 20 Collaborative/*San Antonio*
	♦	♦	OLLU Regional Collaborative/*San Antonio*
	25	39	

R: Region **M**: Mathematics **S**: Science

The Louisiana Outreach Project

Two Louisiana Regional Collaboratives are supported by the Shell-TRC Partnership:

Louisiana State University/Southern University Regional Collaborative

Louisiana Tech University/Grambling State University Regional Collaborative

BTIM (Beginning Teacher Induction and Mentoring)

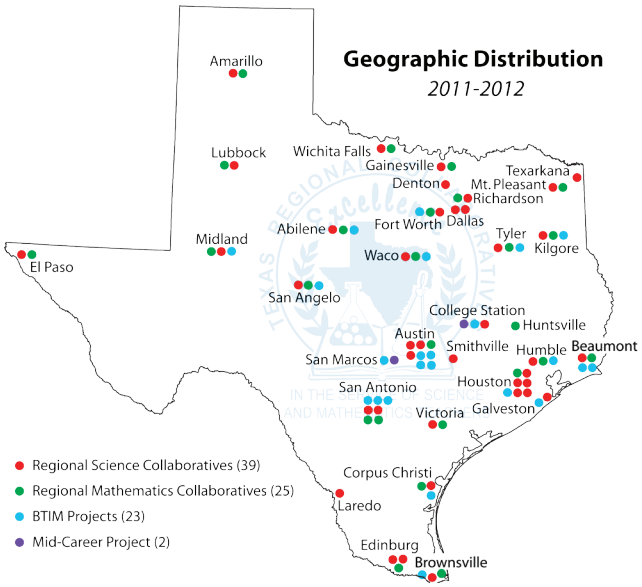
R	M	C	S	INSTITUTIONS
1		♦		UT Brownsville/*Brownsville*
2		♦		Texas State Aquarium-ESC 2/*Corpus Christi*
4			♦	Galveston County/*Galveston*
			♦	Humble ISD/*Humble*
			♦	University of Houston-Downtown/*Houston*
5	♦		♦	Region 5 ESC/*Beaumont*
6		♦		Texas A&M University System/*College Station*
7		♦		Region 7 ESC/*Kilgore*
		♦		UT Tyler/*Tyler*
11		♦		Region 11 ESC/*Fort Worth*
12		♦		Region 12 ESC/*Waco*
13		♦		Austin Community College/*Austin*
		♦		Region 13 ESC/*Austin*
			♦	Texas State University/*San Marcos*
		♦		UT Austin - UTeach/*Austin*
		♦		UT Austin - UTeach Institute Expansion/*Texas*
14		♦		Region 14 ESC/*Abilene*
15			♦	Region 15 ESC/*San Angelo*
18			♦	Region 18 ESC/*Midland*
20		♦		Region 20 ESC/*San Antonio*
	♦		♦	OLLU/*San Antonio*
	23			

R: Region **M**: Mathematics **S**: Science
C: Combined Science/Math

Mid-Career

R	INSTITUTIONS
6	Texas A&M University System/*College Station*
13	Texas State University/*San Marcos*

R: Region



TEXAS REGIONAL COLLABORATIVES

Who We Are

The Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching (TRC) is an award-winning statewide network of 64 P-16 partnerships (Regional Collaboratives) that provide sustained and high intensity professional development to P-12 teachers of science and mathematics across the state. This infrastructure of over 58 institutions of higher education collaborating with the Texas Education Agency, Education Service Centers, school districts, and business partners, has a 20-year track record of designing and implementing exemplary professional development using research-based instructional models, materials, and best practices. In addition, the TRC network includes 25 projects (BTIM and Mid-Career) that focus on teacher mentoring, recruitment, and preparation.

Our Mission

To provide Texas science and mathematics teachers with support systems of scientifically researched, sustained, and high intensity professional development and mentoring to assist them in the successful implementation of the Texas Essential Knowledge and Skills (TEKS). TRC programs equip teachers with the knowledge and skills to engage students in meaningful science and mathematics learning experiences. Activities are designed to improve students' scientific, mathematical and technological literacy, and inspire them to pursue science and engineering related careers.

Achievements

Over two million students across Texas have benefited from the improved instruction and performance of participating teachers. The program has developed the knowledge, skills, and leadership capacity of approximately 30,000 science and mathematics teachers through sustained and high intensity professional development. Many of these teachers serve as Science Teacher Mentors (STMs) and Mathematics Teacher Mentors (MTMs), and share their experiences with other teachers through mentoring, peer coaching, technical assistance, and workshops at the campus, district, and regional levels. Science and mathematics teachers in almost all of the state's 254 counties have been the beneficiaries of this extensive statewide network.

Values

- We **serve** our teachers and students.
- We **treasure** our people.
- We **operate** with integrity.
- We **reward** our partners.
- We **contribute** to systemic reform and to the community.

TEXAS REGIONAL COLLABORATIVES PARTNERS

STATEWIDE CORPORATE AND FOUNDATION PARTNERS

elpaso

at&t

The Cynthia and George Mitchell Foundation

STATE AND FEDERAL PARTNERS

TEA Texas Education Agency

NSF

The University of Texas at Austin

What Starts Here Changes the World

ED.gov

PROJECT CONTRIBUTORS

IBM

FLUOR

Texas Regional Collaboratives for Excellence

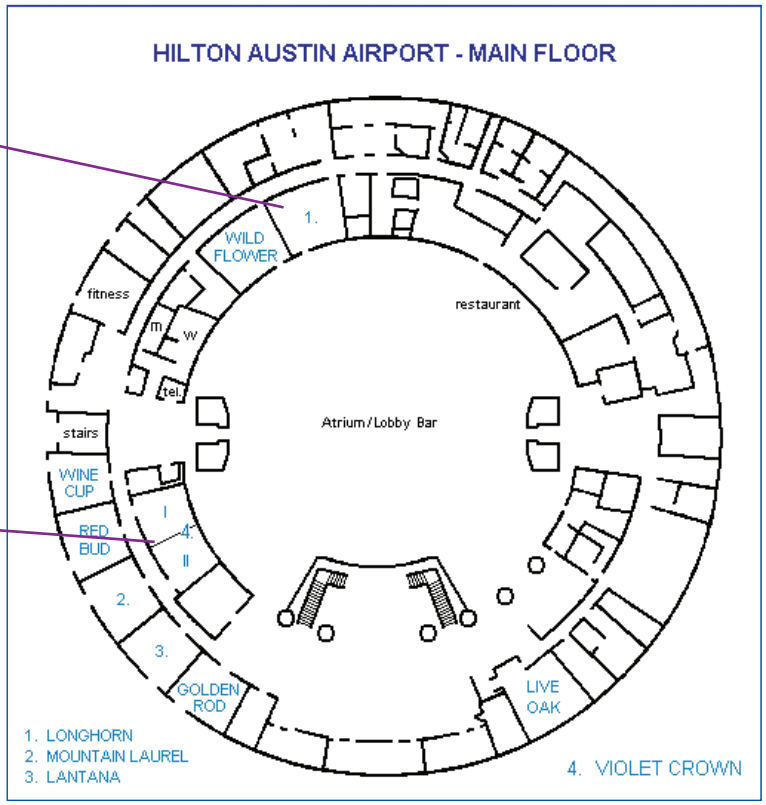
In the Service of Science and Mathematics Teachers

HILTON AUSTIN AIRPORT HOTEL

MAIN FLOOR
SESSION ROOMS

Longhorn

Violet Crown I and II

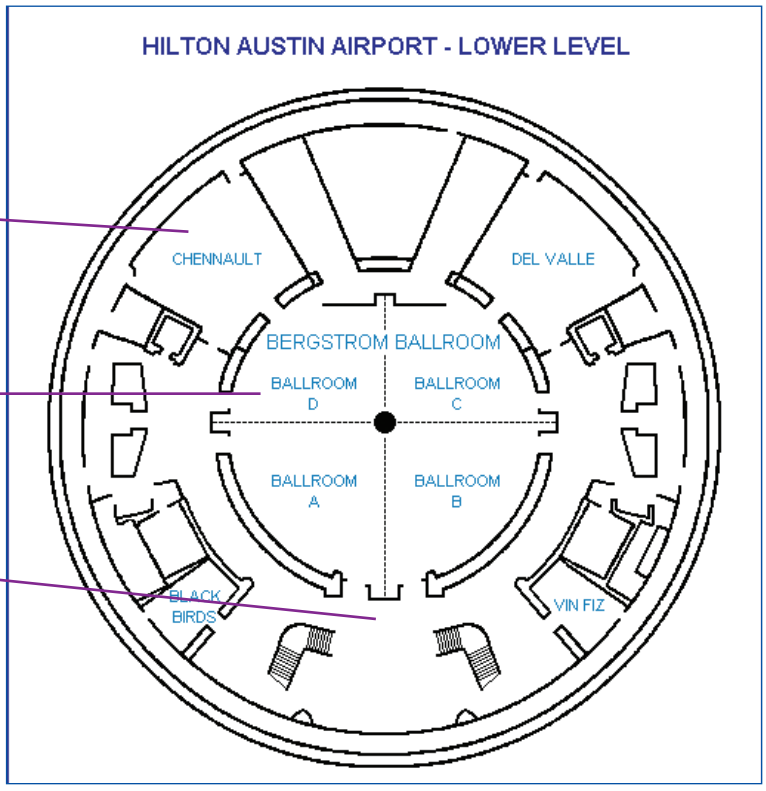


LOWER LEVEL
SESSION ROOMS

Chennault

Bergstrom Ballroom D

Bergstrom Ballroom Lobby



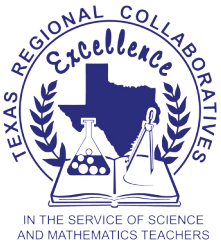
PHYSICS INSTRUMENTATION PDA -- SCHEDULE AT-A-GLANCE

MONDAY *February 13*	A	B	C	D
	Longhorn *Main Floor*	**Violet Crown** *Main Floor*	**Chennault** *Lower Level*	**Ballroom D** *Lower Level*
8:00 - 8:50 a.m.	**Breakfast** -- Atrium - *Main Floor*			
9:00 - 10:00 a.m. **SESSION 1**	**Welcome to the TRC --** Kamil A. Jbeily, Ph.D., TRC Executive Director **General Session** -- Ballroom D, *Lower Level* **"Focus on Physics" -- Irene Pickhardt**, *Statewide Science Coordinator,* Texas Education Agency			
10:00 - 10:15 a.m.	*Break*			
10:15 - 12:00 p.m. **SESSION 2**	**I Do, iTouch, iLearn Physics**	**Demos, Displays & Activities with Energy, Impulse & Momentum**	**Fun with Fan Cars- Calculating Energy and Momentum** (Make and Take)	**Rule over Physics - Work-Energy Theorem, Potential and Kinetic Energy** *(Vendor Presentation)*
12:00 - 12:50 p.m.	**Lunch** -- Atrium - *Main Floor*			
1:00 - 2:00 p.m. **SESSION 3**	**When Balls Collide: Engaging Ways to Teach Momentum and Energy Conservation**	**Strategies for Success with CPO STAR** *(Vendor Presentation)*	**Conservation of Energy- Roller Coaster Fun**	**Using the 5E Lesson Cycle to Teach Conservation of Energy**
2:00 - 2:15 p.m.	*Break*			
2:15 - 4:00 p.m. **SESSION 4**	**Nspired Physics: Energy and Momentum**	**Work and Energy Explorations with Technology*** *(Vendor Presentation)*	**Explore Force and Acceleration with Tracks and Cars** (Make and Take)	**Can you Control your "Impulse"?***

TUESDAY *February 14*	A	B	C	D
	Longhorn *Main Floor*	**Violet Crown** *Main Floor*	**Chennault** *Lower Level*	**Ballroom D** *Lower Level*
8:00 - 8:50 a.m.	**Breakfast** -- Atrium - *Main Floor*			
9:00 - 10:45 a.m. **SESSION 5**	**Exploring Energy: What is it? When is it? Where is it?**	**Race into Physics with the Energy Car** *(Vendor Presentation)*	**Work and Energy Explorations with Technology*** *(Vendor Presentation)*	**Can you Control your "Impulse"?***
10:45 - 11:00 a.m.	*Break*			
11:00 - 12:00 p.m. **SESSION 6**	**Springs and Masses: Understanding and Solving Energy Conservation Problems**	**SEPUP Energy** *(Vendor Presentation)*	**Explore Newton's Laws with Tracks and Cars** (Make and Take)	**Unbalanced Orcs**
12:00 - 12:50 p.m.	**Lunch** -- Atrium - *Main Floor*			
1:00 - 2:00 p.m. **SESSION 7**	**Energy, Gravity, and Speed: Understanding and Solving Energy Conservation Problems**	**All Work and NO Play? Energize your new MS TEKS with CPO Science** *(Vendor Presentation)*	**Conversions of and Conservation of Mechanical Energy with Poppers**	**Do you have UPs & DOWNs in your classroom? Change to Potential and Kinetic Energy using CPO equipment**
2:00 - 2:15 p.m.	*Break*			
2:15 - 4:00 p.m. **SESSION 8**	**Rule over Physics - Mechanical Energy, Conservation of Energy and Momentum** *(Vendor Presentation)*	**Transformations Using the Coupled Pendulum**	**Using Fan Cars to Explore Force, Motion, and Energy TEKS** (Make and Take)	**Transformations From Kinetic Energy to Potential Energy**

LEGEND Middle School | Middle/High School | High School

* Presented twice



Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching

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