



i-STEM Strand Instruction Agenda

Presentation

Strand Presenters Name: Jan Smith (CWI) & Matt Wigglesworth (CSI)

Strand Assistants: Ciera Partyka-Worley & Nuha Aktar

Organization: Boise State University, IDoTeach and Central Idaho Dark Sky STEM Network

Strand Title: Earth's Place in the Universe

Day 1 – <u>Morning Session</u> (2.5 hours)			
Introduction to Earth's Place in the Universe & State Science Standards			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
Introductions/Ice Breaker	We will do a fun ice breaker for participants to get to know each other a little. Bingo Game. Identify grade bands for mini PLCS and strand differentiation and participant support.		15-30 mins
Strand pre assessment	Access pre assessment form	Presentation	15-30 mins
Pedagogical Practice: 5E Lesson Design	Review/introduce participants to the 5E lesson design using Earth's Water Lesson in the context of the strand theme: Earth's place in the Universe - a Pale Blue Dot with a video	Presentation Demo lesson: • 100 ml graduated cylinder (filled to 100 ml) 1 per group • clear plastic cup • small cups of varying sizes (5-6 per group) • blue food coloring • paper towels	30 mins

		• pipettes	
NGSS/Idaho Science Content Standards Scavenger Hunt	Review the structure and organization of the NGSS and Idaho Content Standards for Science through a digital scavenger hunt	Laptops of participants for digital access.	30 mins
Earth's Place in the Universe Unit Overview	We will narrow the focus of the standards to the 3-D unit specifics and share the learning progressions through the standards through K-8.	Presentation	15 minutes
Develop Content Background	Introduce NASA resources : • The Universe of Learning (for teachers)	Laptops of participants for digital access. Introducing Project website resources, and STEM kits.	Ongoing throughout Unit
Day 1 – Afternoon Session (3.5 hours) Theme: Earth Motions and Inquiry Lesson Planning Essential Question: Why do we have day and night?			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
Day and Night K-2: Day and Night Activity Upper Elementary and MS: How Fast Does The Earth Spin?	K-2: Students will track the movement of the Sun throughout the day 3-5 and MS: Students will model how the Earth spins and how the position of the Sun appears to change.	K-2: • Inflatable Globe • Flashlight • Crayons • Construction paper • stickers • What makes Day and Night 3-MS: • Light Source • Copies of Earth Cutouts • Tape • Scissors	45 mins
Pedagogical Practice: Using Phenomena in Science Instruction	Resources: The Wonder of Science Idaho Specific Phenomena		30 min

	NGSS Phenomena Our Phenomenal Library : Let's add to this as we go through our unit.		
Shadows K-2 Bear's Shadow 3-5 Me and My Shadow MS: Noontime Around the World	K-2: Students experiment with moving a light source and how it affects shadows. 3-5: Students make observations of their own shadows and track how they change throughout the day. They will also make Pocket Sun Clocks. MS: Students compare sundials around the room to gain an understanding of time differences around the globe.	K-2: • Plastic Bears • Plastic Trees (optional) • Green Construction Paper • Blue Construction Paper • Flashlights 3-5: • Plunger • Chalk • Pocket Sun Clock Patterns • Card Stock • String • Tape MS: • modeling clay or putty • toothpicks • Shadow recording templates • Globe • Light source	45 mins
Analyzing Sunrise and Sunset Data Activity	Participants will use the sunrise and sunset data to create a 5E lesson with their grade band group.	Sunrise and Sunset Data	45 mins
Wrap Up Day 1			15 Mins
Day 2 – Morning Session (3 hours) Theme: The Reasons for the Seasons Essential Question: Why do we have seasons?			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
Engagement: What do we think we know?	Introducing the seasons begins with questions around particular phenomena. Structured talk is used to share thinking.	Presentation, index cards, Structured talk handout	20 mins

How can this be true?	Participants look at emails about experiencing differences in climates/seasons at different locations and discuss using talk moves.	Presentation, Talk moves handout	20 mins
Science Symposium : The Reason For Seasons.	Grade-level groups split to plan and carry out an investigation on the following factors for seasons: • Distance of Earth-Sun • Height of Sun (angle of insolation) • Tilt of earth	Classroom supply: globes Kit materials: • Earth Model: 2" styro ball, 2" styrocube, safety pin, timing disk, $\frac{3}{8}$" dowel • Folder, graph paper, and angle indicator sheet • Large black paper for model 56" x 56"	60 mins
Length of day around the world	The dog days of summer are here! Exploring changes in length of day using sundials. Teacher-led model.	Globes, light, gnomon sundial (template , toothpicks, clay balls)	10 mins
The seasons at grade level:	Grade level 5E lesson plans: • Kindergarten: look for clues in season cards to put the seasons in order. What Will the Weather Be Like on My Birthday? • 3rd Grade: investigating different weather conditions in different parts of the US: Sweltering Summer • 5th grade: Seasonal Stars • MS: See Science Symposium Investigations	Presentation	45 mins
Day 2 – Afternoon Session (4 hours) Theme: The Moon, Misconceptions in Science, and Pedagogy			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
Engagement: Predicting what the Moon will look like: Moon cards	Participants make predictions about the phases of the Moon as seen from Earth.	Moon cards of 6 phases.	15 mins

Why do we see Phases of the Moon?	Participants will model Moon phases using two different strategies: NASA JPL guide and NASA oreo activity to construct an explanation for the moon's phases. Misconceptions will be explored.	Kit materials: 3" styrofoam ball and dowel, clamp lamp, oreos with activity handout .	45 mins
Exploring NGSS practices and Ambitious Science Teaching	What NGSS practices did we use in the Moon phases activity? Reference the 5E Moon Phases Lesson Plan Connect AST with the 5E	Presentation	15 mins
Misconceptions in science. The reasons for the seasons.	Watch A Private Universe video to share common misconceptions about seasons. 10 minute discussion.	Presentation	30 mins
Developing a Lesson Plan from NASA resources	Inquiry-based lessons will be developed (using the 5E template) at specific content levels, based on NASA resources. K-4: Moon Phases Matching (see activity section) 4-8: When do Lunar Eclipses Happen?	Presentation Kit materials: • Moon cards/banner, tray w/black paper, salt • 2" styrofoam ball and paper plate, scissors, compass	75 mins
Closure: Pedagogical Activity	Uncover the 5 Practices and learn how teachers (Anticipate, Monitor, Select, Sequence and Connect) big ideas in science, based on standards and the use of phenomena.	Presentation	15 mins
Day 3 – Morning Session (3 hours) Theme: Central Idaho Dark Sky Reserve STEM Network Essential Question: How does light affect night?			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
Engagement: The Dark Sky Reserve STEM Network.	A presentation of the Dark Sky Reserve will be shared (in person, live via zoom, or recorded) by NASA cooperative project PI, Brian Jackson.	Presentation	60 mins
Measuring Light Activity	Use a light meter to measure light from various sources to notice and wonder about light, stars, and the distance between objects in the night sky.	Presentation Light meter and notebook.	30 mins

Citizen Science - connecting with your school community through the dark skies.	Explore and identify local resources for hosting events at your school. Start a STEM night, host a party with the stars, and plan for field trips. AstroTAC shares outreach resources and presents on the Mars mission and other resources (Q/A doc) using the mobile planetarium.	Presentation	45 mins
Closure: How might the Moon affect dark skies?	Predict when would be ideal for stargazing in the CIDSr?	Moon calendar	15 mins
Day 3 – Afternoon Session (4 hours) Theme: Light and Distance			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
CSI: Public Solar Observing & Astronaut Show	Visit the observatory for safe public viewing of the sun.	Field Trip to Herrett Observatory and Planetarium	3 hours
CWI: 2-5: Light and Distance Investigation CWI MS: Inverse Square Law Lab	Plan and conduct an investigation to explore how distance and brightness are related. This content helps contextualize the impacts of light on dark skies and provides a foundation for understanding the light coming from stars and other phenomena, like gravity.	Light and Distance Investigation: • Chalk • Black Paper • Flashlights • Rulers • Tape Measures/Meter Sticks Inverse Square Law Lab: • See lesson resources section	75 mins
Dark sky film	Watch a video made by the Dark Sky Association about ways in which we can mitigate light pollution.	Mobile planetarium	15 mins
Survey of lighting and community action to darken night skies.	We will take a walk in the general vicinity and look for evidence of light pollution mitigation.	Campus locations	30 mins

CWI: Light Pollution Engineering Challenge		Light Pollution Engineering Challenge: • String and carabiner • Flashlights • light meters • post-its • Random materials: Fabric, cardboard, foil, masking tape, coffee filters, etc.	75 mins
Day 4 – Morning Session (3 hours) Theme: How do we keep our skies dark?			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
CSI: See above (Day 3 afternoon session) CWI: Field Trip Planetarium	Either visit a local planetarium or use the portable one from Boise State	Field site/planetarium	All Morning
Day 4 – Afternoon Session (3 hours) Theme: A Journey through the Cosmos Essential Question: What is out there?			
Activity/Lesson	Description	Materials/Equipment, Handouts	Time
TED Talk: A Journey through the Cosmos	Video and practices: Asking Questions.	Projector/computer	15 mins
Star Finder lesson plan	This star finder allows students to investigate which stars are visible during different months of the year.	Star finder printouts: Instructions Template File Folders Glue Sticks Scissors	45 mins
Apps and tools for star viewing	AstroTAC guides participants in how to use various telescopes for observations along with the Stellarium and skyview app to explore the cosmos.	Telescopes, devices for apps, mobile planetarium	60 mins
Summative Assessment:	Strand post assessment iSTEM post survey and closure	Survey Links	60 mins

--	--	--	--