Power Observation Date(s) Teacher Grade School District

Science Content

| | |
|---|---|
| Science/Engineering **content** is accurate.<br>**Connections** to other content, future courses, college, career, citizenship | |
| **Cross-cutting concept**(s): (circle) | Patterns; Cause and effect; Scale, proportion, and quantity; Systems and system models; Energy and matter; Structure and function; Stability and change |
| *Science/engineering is portrayed as dynamic body of knowledge continually enriched by conjecture, investigation analysis, and/or proof/justification.<br>*The design of the lesson tasks, roles, and interactions consistent with investigative science/engineering.<br>*Failure is seen as "not yet", opportunity to learn | |
| Content concepts and data analysis are **appropriate** for the age and educational background level of students, high level, high challenge, with support. | |
| Type of learning opportunity (circle) | Skills/ procedures; Conceptual understanding 5Es, Inquiry/ Project-Based/ Problem-based/ Service Learning / Engineering Design |

Learning Opportunity Focus

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|---|---|
| **Science/Engineering Objective or Focus Question** is displayed, read to and with students, clearly defined, referred to before and during the lesson, assessed at the end. | |
| **Language Objective** is displayed, read to and with students, clearly defined, referred to before and during the lesson, assessed at the end. | (analyze the language needs of the lesson, determine language structures/vocabulary needs for students to listen with comprehension, respond orally, read, and write) |

Learning Opportunity Delivery

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|---|---|
| Science/Engineering objectives or Focus Question is/are clearly supported in the learning opportunity | |
| Language objective(s) is/are clearly supported in the learning opportunity | |
| Students are responsible for negotiating meaning, thinking deeply, knowing what they know and how they know it, deciding how to explain or represent what they know so others understand.<br>Teacher supports with skillful questions, scaffolds. | |
| Students are engaged in active learning activities approximately 90-100% of the period. | |
| Pacing of the lesson is appropriate to students' learning and language levels (e.g., teach a portion, provide time to process) | |
| Formative Assessment is used to check for understanding. The lesson is adjusted as a result of the formative assessment. (observe, interview, products) | |

Power Observation Date(s) Teacher Grade School District

**LO is purposefully constructed to Activate and/or Build Background, Engage the Learner** 4-2-0

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|---|---|
| Connect to students lives, natural phenomena, culture; or build needed background, st records | |
| Connect to prior learning, to 'big' ideas, *to other content areas*-form hypotheses, questions, record | |
| Provide reasons to learn, activate curiosity, explore, discrepant event, *personally relevant* | |
| Teach and practice vocabulary for this lesson, make a personal record, post on wall | |
| Teach and practice discourse for this lesson, make a personal record, post on wall | |

**Total: /20**

**LO is purposefully constructed to provide Comprehensible Input** 4-2-0

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|---|---|
| Teacher's language is precise, appropriate for student language levels, and supported by visuals | |
| Teacher and students work to build a conceptual framework: 'big' ideas, cross-cutting concepts | |
| *Learning opportunities are open-ended, accommodate different learning styles, choice* | |
| Clear explanation/modeling of task, investigation, or design challenge with visuals<br>Language learners have print copies of directions, students can do the work | |
| Students use appropriate *hands-on* concrete materials: science/math tools, realia, manipulatives | |
| Materials for Visual Learning: advanced organizers, diagrams, equations, models, protocols. | |
| Differentiation of tasks and/or responses appropriate to language level (show, word, sentence) | |
| Opportunities and resources for language learners to clarify in primary language | |
| Students use learning strategies: monitor understanding and ask questions, use the resources in the room, predict and check, represent their learning, reflect on their learning, analyze errors, revise | |

**Total: /36**

**LO is purposefully constructed to provide Interaction** 4-2-0

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|---|---|
| Teacher/students build a safe and positive environment, respectful listening to each other, acknowledge student efforts, reinforce accomplishments, *provide specific positive feedback* | |
| Teacher establishes and uses predicable routines and signals, students know and respond | |
| Students are directed to use academic vocabulary and discourse, teacher assesses the use | |
| *Grouping strategies* are used to facilitate student-to-student discourse | |
| *High level questions* are asked of all students, response stems are posted and referenced,<br>Time is provided for students to think and prepare a response | |
| Students represent, *explain, elaborate, justify, defend, question others*; support with data/evidence (words, math, visuals) Sentence frames/stems are posted, referenced | |
| Students *listen to each other, paraphrase, restate, elaborate, question for clarification*, argue from data/evidence. Sentence/question frames/stems are posted and referenced to support language | |

**Total: /28**

**LO is purposefully constructed to provide opportunity to Practice and Apply** 4-2-0

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|---|---|
| Students practice and apply: science/engineering skills, conceptual understanding, problem solving: through hands-on, manipulatives, visual tools, guided practice, independent practice | |
| Students practice and apply language learned: vocabulary, discourse patterns | |
| Students practice and apply reading comprehension processes in science/engineering learning | |
| Students practice and apply writing processes to reflect, clarify thinking, communicate to self/others in science/engineering notebooks, science/engineering journals, other products | |

**Total: /16**

**LO is purposefully constructed to Provide Closure, Move to Scientific Understanding** 4-2-0

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|---|---|
| Students review, summarize, connect science/engineering learning to other learning, revise initial thinking based on new evidence/data. Students make connections between multiple representations. | |
| Students review, summarize, and connect language learning to other learning | |

**Total: /8**

Power Observation Date(s) Teacher Grade School District

**Summative Assessment** 4-2-0

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|---|---|
| Science/engineering learning is assessed to plan for next learning | |
| Language learning is assessed to plan for next learning | |

**Total: / 8**

**Total: / 116**

**NOTES:**

**Science, Engineering, and Mathematical Practices**

Students work on **questions or problems with high cognitive demand**, **multiple solution paths**

| Science | Engineering | | Mathematics | Score |
|---|---|---|---|---|
| **1. Asking questions** (based on careful observations, that can be investigated, questions about data or claims, impact of changing a variable, the relationship between independent and dependent variables, relationships in models, the answers lie in explanations supported by empirical evidence) | **1. Defining problems** (define a simple design problem that can be solved through the development of a new or improved object or tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.) | | **1. Make sense of problems** (analyze givens, constraints, relationships, goals; make conjectures, seek entry points, plan a solution pathway) **and persevere in solving them** (consider analogous problems, try simpler forms of the problem, monitor and evaluate progress and change course if necessary, use multiple representations, ask: "Does this make sense?", and check answers using different methods) | |
| **2. Developing and using models** (Models include: diagrams, physical replicas, mathematical representations, analogies, computer simulations. All models include approximations and assumptions, so students need to recognize and state limitations. Models represent a system or part of a system and aid in the development of questions, generate data to make predictions, and communicate to others. Models need to be evaluated and refined through an iterative cycle.) | | | **4. Model with mathematics** (apply math to solve problems, identify important quantities in a situation, map their relationships using tools such as diagrams, tables, graphs, formulas, analyze those relationships mathematically, draw conclusions, interpret results in the context of the situation) (select, apply, translate among math representations to solve problems) | |
| **3. Planning and carrying out investigations** (state the goal, predict, identify variables, state assumptions, control variables, collect data, use tools) | | | **6. Attend to precision** (communicate precisely to others, state the meaning of the symbols they use, use "=" appropriately, specify units of measure, label axes, calculate accurately and efficiently, give numerical answers to an appropriate degree of | |
| (Scientific investigations may be carried out to explain a phenomena or test a theory or model) | (Engineering Investigations: Find out how to fix or improve a system, or compare different solutions) | | | |

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<td colspan="2">4. <u>Analyzing and interpreting data</u><br>(present <u>data</u> in a form that can reveal patterns or relationships, and that communicates to others, use a range of tools for tabulation, graphical representation [bar graphs, pictographs, pie charts, linear, non-linear], visualization, statistical analysis, use mathematics to represent relationships between variables, 7-8th grade apply statistics and probability concepts, consider limitations, increase precision)</td>
<td></td>
<td>precision for the context of the problem, state when this applies)<br>5. Use appropriate tools strategically (choose from a variety of tools to explore and deepen their understanding of the mathematics (paper/pencil, geometry software, calculator, computer, manipulatives, multi-lingual glossary)<br>7. Look for and make use of structure or pattern (step back for an overview and shift perspective, see an expression as a single object or composed of several objects, utilize properties, decompose and recombine numbers and expressions)<br>8. Look for and express regularity in repeated reasoning<br>(look for general methods or shortcuts, abstract an equation, generalize to a formula, maintain oversight of the process while attending to details, continually evaluate the reasonableness of their intermediate results)</td>
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<td colspan="2">5. Using mathematics and computational thinking<br>(use mathematics to represent physical variables and their relationships, make quantitative predictions, patterns, describe/measure/compare quantitative <u>data</u>, represent in graphs, compare two solutions to a problem, use digital tools to analyze large <u>data</u> sets, create algorithms, apply math concepts and/or processes to questions and problems: ratio, rate, percent, basic operations, simple algebra)</td>
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<td>2. Reason abstractly and quantitatively<br>(create a coherent representation of the problem, consider the units involved, attend to the meaning of quantities and relationships, contextualizes, decontextualizes, knows and flexibly uses different properties of operations and objects)</td>
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<td>6. Constructing explanations<br>(includes a claim that relates to how a variable or variables relate to another variable or variables. A claim is often in response to a question, with investigations and <u>data</u>.)</td>
<td>6. Designing solutions<br>(This is iterative and systematic, specifying constraints and desired qualities of the solution, developing a design plan, producing and testing models or prototypes, and selecting between alternative designs to optimize the solution.) [based on <u>data</u>]</td>
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<td>3. Construct viable arguments<br>(understand and use stated assumptions, definitions, and prior results; make conjectures, build a logical progression of statements to support, use concrete referents, recognize and use counterexamples, justify their conclusions, communicate conclusions to others, use math induction as a technique for proof) and critique the reasoning of others (listen to or read the</td>
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<td colspan="2">7. Engaging in argument from evidence</td>
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| (Students are expected to use argumentation to listen to, compare, and evaluate competing ideas and methods based on their merits.) [propose, support, critique, refine ideas based on data/evidence, identify weaknesses in lines of reasoning] | | arguments of others, decide whether they make sense, ask useful questions to clarify or improve the argument, identify correspondences between different approaches (multiple solution paths, multiple solutions) | |
| **8. Obtaining, evaluating, and communicating information** (able to read, interpret, and produce scientific and technical text, critical consumer, communicate clearly and persuasively, differentiate between opinion and fact, identify sources of errors and flaws, use multiple sources to compare, combine, summarize with variety of media) [based on data/evidence] | | | |

Notes on Science/Engineering Practices: (evident/not evident today)