

**NGSS Science and Engineering
Practices with Corresponding
ELD Standards
Kindergarten Grade**

1. Asking questions and defining problems

Students will inquire, identify, predict, describe, and define

- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Ask and/or identify questions that can be answered by an investigation.
- Define a simple problem that can be solved through the development of a new or improved object or tool

(NGSS Appendix F)

General Strategies for All Students

- Provide an engaging context that peaks student curiosity (discrepant event, interesting scenario, hands-on activity, relevant situation, authentic problem)
- Keep class chart for student questions
- Encourage student to ask questions based on the crosscutting concepts, e.g. *What patterns do I observe? What causes...? Which is faster? Hotter? Bigger? What are the parts of...? How can I make ... with ...? Why does ... have this shape? What is the same about ...? What changes do I observe?* (For more possible questions see <http://crosscutsymbols.weebly.com/>)
- Recast students' incomplete or flawed questions, *So what you're asking is...? You're question then is ...?*
- Brainstorm with students a list of questions based on a shared experience that could be investigated.
- Provide a context (real or imaginary) for students to define a problem that can be solved through engineering, e.g., playground or classroom environment, class pet habitat, cafeteria, etc.

Corresponding ELD Standards

Part 1. Interacting in Meaningful Ways: A. Collaborative: 1. Exchanging information/ideas; B. Interpretive: 5. Listening actively

Emerging

PI.A.1 Contribute to conversations and express ideas by asking *yes-no* and *wh-* questions using gestures, words, and simple phrases.

PI.B.5 Demonstrate active listening to read-alouds and oral presentations by asking *yes-no* and *wh-* questions with oral sentence frames and substantial prompting and support.

Expanding

PI.A.1 Contribute to class, group, and partner discussions by listening attentively, following turn-taking rules, and asking and answering questions.

PI.B.5 Demonstrate active listening to read-alouds and oral presentations by asking questions with oral sentence frames and occasional prompting and support.

Bridging

PI.A.1 Contribute to class, group, and partner discussions by listening attentively, following turn-taking rules, and asking and answering questions.

PI.B.5 Demonstrate active listening to read-alouds and oral presentations by asking detailed questions with minimal prompting and light support.

Emerging	Expanding and Bridging
<p>Sentence frames: <i>What is ..?</i> <i>What does ..?,</i> <i>Where is ...?</i> <i>When I ... why does...?</i> <i>When does ... ?</i> <i>How does ..?</i> <i>Why is ..?</i> <i>Why does...?</i> <i>I predict ...</i></p> <p>Questions/Prompts: <i>Which of these questions are you wondering about?</i> <i>Which of these parts do you want to change?</i> <i>Could ... be the problem you might solve?</i></p>	<p>Sentence frames: <i>I wonder...</i> <i>What would happen if...?</i> <i>What causes...?</i> <i>If I change ..., what will happen to ...?</i> <i>I predict ... because ...</i> <i>The problem we will solve is ...</i></p> <p>Questions/Prompts: <i>What questions do you have about...?</i> <i>What questions do you have about what you might change?</i> <i>What questions could you ask to find out...?</i> <i>What is the problem we are trying to solve?</i> <i>How might we solve this problem?</i> <i>What do you need to know about ...?</i></p>

2. Developing and using models

Students compare, develop, represent, describe, explain, and revise

- Distinguish between a model and the actual object, process, and/or events the model represents.
- Compare models to identify common features and differences.
- Develop and/or use a model to represent amounts, relationships, relate scales (bigger, smaller), and/or patterns in the natural and designed world(s).
- Develop a simple model based on evidence to represent a proposed object or tool.

(NGSS Appendix F)

General Strategies for All Students

- Provide examples of models of familiar objects, processes, and events for students to discuss and compare, e.g., *how plants grow, how rolling balls change direction, how to measure weather conditions*
- Model for students how to develop and use models (e.g., *diagrams, drawings, physical replica, dioramas, dramatizations, storyboards*) to represent their developing ideas.
- Regularly have students draw models in their notebooks to use as artifacts for discussion.
- Use a big class notebook for students to add on and revise as a group as they learn more information.

Corresponding ELD Standards

Part 1. Interacting in Meaningful Ways: A. Collaborative: 2. Interacting via written English; C. Productive 9. Presenting

Emerging	Expanding	Bridging
<p>PI.A.2 Collaborate with teacher and peers on joint composing projects of short informational texts that include minimal writing, using technology where appropriate for publishing, graphics, etc.</p>	<p>PI.A.2 Collaborate with the teacher and peers on joint composing projects of informational texts that include some writing (short sentences), using technology, where appropriate, for publishing, graphics, etc.</p>	<p>PI.A.2 Collaborate with the teacher and peers on joint composing projects of informational texts that include a greater amount of writing (a very short story), using technology, where appropriate, for publishing, graphics, etc.</p>
<p>PI.C.9 Plan and deliver very brief oral presentations (e.g., describing a picture).</p>	<p>PI.C.9 Plan and deliver brief oral presentations on a variety of topics (e.g., show and tell, recounting an experience, describing an animal).</p>	<p>PI.C.9 Plan and deliver longer oral presentations on a variety of topics in a variety of content areas (e.g., describing a science experiment).</p>

Emerging	Expanding and Bridging
<p>Sentence frames: <i>My picture shows ...</i> <i>The parts of my picture are ...</i></p>	<p>Sentence frames: <i>The model shows ...</i> <i>These models all have ...</i> <i>I changed my model because ...</i></p>
<p>Questions/Prompts:</p> <p><i>What does this picture represent?</i> <i>What do you observe in this picture?</i> <i>How might you pretend to be ...?</i> <i>What does this part mean?</i></p> <p><i>Make a drawing in your notebook to show ...</i></p>	<p>Questions/Prompts:</p> <p><i>How is this picture different than a real ...?</i> <i>What is the same about these pictures? What is different?</i> <i>How does this model help you understand ...?</i> <i>What changes could you make?</i> <i>What is another way you could show?</i></p> <p><i>Could you explain ... with a drawing?</i></p>

3. Planning and carrying out investigations

Students design, sequence, predict, evaluate, describe, organize, compare, classify, draw, label

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
- Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
- Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.
- Make observations (firsthand or from media) and/or measurements of a proposed object, tool, or solution to determine if it solves a problem or meets a goal.
- Make predictions based on prior experiences.

(NGSS Appendix F)

General Strategies for all Students

- Model the process for planning an investigation in a class notebook.
- Practice making predictions based on prior experiences, not guessing. Push students to provide a reason for their prediction.
- Introduce equipment and procedural words beforehand (*separate, pour, measure, etc.*) and post on a class word wall or chart with images.
- After coming to a class or group consensus on a procedure for an investigation, document the steps on the board with illustrations so that all students have access to them.
- Have students work in small groups. Encourage and make collaboration a focus.

Corresponding ELD Standards

Part 1. Interacting in Meaningful Ways A. Collaborative: 1. Exchanging information/ideas;
C. Productive 10. Writing

Emerging

PI.A.1 Contribute to conversations and express ideas by asking and answering yes-no and wh- questions and responding using gestures, words, and simple phrases.

Expanding

PI.A.1 Contribute to class, group, and partner discussions by listening attentively, following turn-taking rules, and asking and answering questions.

Bridging

PI.A.1 Contribute to class, group, and partner discussions by listening attentively, following turn-taking rules, and asking and answering questions.

K Grade NGSS Science and Engineering Practices with Corresponding ELD standards

Emerging	Expanding	Bridging
<p>PI.C.10 Draw, dictate, and write to compose very short informational texts (e.g., a description of the materials) using familiar vocabulary collaboratively with an adult (e.g., joint construction of texts), with peers, and sometimes independently.</p>	<p>PI.C.10 Draw, dictate, and write to compose short informational texts (e.g., a description of a tree) collaboratively with an adult (e.g., joint construction of texts), with peers, and with increasing independence.</p>	<p>PI.C.10 Draw, dictate, and write to compose longer informational texts (e.g., an informative report on trees) collaboratively with an adult (e.g., joint construction), with peers and independently using appropriate text organization.</p>
<p>Sentence frames: <i>First, we will ...</i> <i>Next, we will ...</i> <i>Then, we will ...</i> <i>We could change....</i> <i>I predict ... because ...</i> <i>I observe ...</i></p> <p>Questions/Prompts: <i>Are you trying to find out if...?</i> <i>Have you thought about...?</i> <i>What will you do first?</i> <i>Second?</i> <i>Will you need...?</i> <i>Is this the part you will change?</i></p>	<p>Sentence frames: <i>If we change ... then ...</i> <i>We need to find out ...</i> <i>If ... then ...</i> <i>We will compare ... to ...</i> <i>I think ... is a good idea because ...</i> <i>I think we should change ... because ...</i></p> <p>Questions/Prompts: <i>What are you trying to find out?</i> <i>How could you find out...?</i> <i>What part will you change?</i> <i>Is there another way?</i> <i>What materials will you need?</i> <i>How do you know ... will solve the problem?</i> <i>How well does ... solve the problem?</i></p>	

4. Analyzing and interpreting data

Students compare, represent, classify, sequence, analyze

- Record information (observations, thoughts, and ideas).
- Use and share pictures, drawings, and/or writings of observations.
- Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
- Compare predictions (based on prior experiences) to what occurred (observable events).
- Analyze data from tests of an object or tool to determine if it works as intended.

(NGSS Appendix F)

Strategies for All Students

- Model ways of recording data in a class notebook. Use a think-aloud to demonstrate how to determine what is relevant information.
- Use joint construction of text and drawings. Do a mini-lesson on technical drawing.
- Introduce and use a set of agreed upon expectations for data organization.
- Use focus questions to drive the inquiry and response.
- Record students' predictions and return to them throughout the investigations.
- Provide sentence frames for oral and written discourse.
- Chart the data that students collect and model how to use that data to analyze whether an object or tool meets the students' goals.

Corresponding ELD Standards

Part I. Interacting in Meaningful Ways B. Interpretive 6. Reading/Viewing closely;

Part II. Learning about How English Works A. Structuring Cohesive Text 1. Understanding text structure

Emerging

PI.B.6 Describe ideas, phenomena (*e.g., parts of a plant*), and text elements (*e.g., graphics*) based on understanding of a select set of grade-level texts and viewing of multimedia, with substantial support.

Expanding

PI.B.6 Describe ideas, phenomena (*e.g., how butterflies eat*), and text elements (*e.g., main idea, events*) in greater detail based on understanding of a variety of grade-level texts and viewing of multimedia with moderate support.

Bridging

PI.B.6 Describe ideas, phenomena (*e.g., insect metamorphosis*), and text elements (*e.g., major events*) using key details based on understanding of a variety of grade-level texts and viewing of multimedia with light support.

K Grade NGSS Science and Engineering Practices with Corresponding ELD standards

<p>Emerging</p> <p>P.II.A.1 Apply understanding of how text types are organized (<i>e.g. how a text is organized by a sequence of events</i>) to comprehending and composing texts in shared language activities guided by the teacher with peers, and sometimes independently.</p>	<p>Emerging</p> <p>P.II.A.1 Apply understanding of how different text types are organized to express ideas (<i>e.g. how an informative text is organized by topic and details</i>) to comprehending and composing texts in shared language activities guided by the teacher and with increasing independence.</p>	<p>Bridging</p> <p>P.II.A.1 Apply understanding of how different text types are organized predictably to express ideas (<i>e.g. narrative text versus an informative text versus an opinion text</i>), to comprehending texts and composing texts in shared language activities guided by the teacher and independently.</p>
<p>Sentence frames:</p> <p><i>I observe ...</i> <i>It looks ...</i> <i>It feels ...</i> <i>It smells ...</i> <i>It sounds like ...</i> <i>I think ...</i> <i>... reminds me of ...</i> <i>My picture shows ...</i></p> <p>Questions/Prompts:</p> <p><i>Do you observe...?</i> <i>Is this a pattern?</i> <i>Are these the same or different?</i> <i>Do you think it means...?</i> <i>Start by drawing ...</i> <i>Make a diagram to show ...</i> <i>Does this mean your design works?</i></p>	<p>Sentence frames:</p> <p><i>A pattern I observe is...</i> <i>... and... are similar because they both...</i> <i>... and... are different because ...</i> <i>I think ... because ...</i> <i>I used to think, but now I think ...</i></p> <p>Questions/Prompts:</p> <p><i>What do you observe?</i> <i>What surprised you?</i> <i>Does this change what you think about...?</i> <i>What patterns do you observe?</i> <i>Does ... answer the question...?</i> <i>How does ... show that your design works?</i></p>	

5. Using mathematics and computational thinking

Students enumerate, measure, graph, estimate, describe, organize

- Decide when to use qualitative vs. quantitative data.
- Use counting and numbers to identify patterns in the natural and designed world(s).
- Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.
- Use quantitative data to compare two alternative solutions to a problem.

(NGSS Appendix F)

General Strategies for all Students

- Discuss the ways students use math to describe, measure, and compare their observations, (e.g., *The ball rolls faster when I push it hard. Today the air feels warmer than yesterday. I see three snails in the garden today.*)
- Model through a think-aloud when to use quantities (counting and numbers) to describe observations and when to use comparative terms (e.g., bigger, higher, more, less, darker, softer).
- Conduct mini-lessons on measurement and graphs when appropriate.
- Provide simple tables for students to record data as they test their designs. Discuss what the data show.

Corresponding ELD Standards

Part 1. Interacting in Meaningful Ways B. Interpretive: 8. Analyzing language choice;
C. Productive 10. Writing

Emerging

PI.A.8 Distinguish how two different frequently used words (e.g., describing an action with a verb *walk* versus *run*) produce a different effect.

PI.C.10 Draw, dictate, and write to compose very short informational texts (e.g., *a description of the materials*) using familiar vocabulary collaboratively with an adult (e.g., *joint construction of texts*), with peers, and sometimes independently.

Expanding

PI.A.8 Distinguish how two different words with similar meaning (e.g., describing an action a *walk* vs. *march*) produce shades of meaning and a different effect.

PI.C.10 Draw, dictate, and write to compose short informational texts (e.g., *a description of a tree*) collaboratively with an adult (e.g., *joint construction of texts*), with peers, and with increasing independence.

Bridging

PI.A.8 Distinguish how multiple different words with similar meaning (e.g., *walk, march, strut, prance*) produce shades of meaning and a different effect.

PI.C.10 Draw, dictate, and write to compose longer informational texts (e.g., *an informative report on trees*) collaboratively with an adult (e.g., *joint construction*), with peers and independently using appropriate text organization.

Emerging	Expanding and Bridging
<p>Sentence frames:</p> <p><i>We counted...</i> <i>We measured ...</i> <i>There are more/less ...</i> <i>The ... is bigger/smaller ...</i> <i>We found out that ...</i> <i>The graph/table shows ...</i></p> <p>Questions/Prompts:</p> <p><i>How many?</i> <i>How much?</i> <i>How long?</i> <i>How could you find out how many?</i> <i>How could you find out how long?</i> <i>Which is longer/shorter?</i> <i>Which is taller?</i> <i>Which is heavier?</i> <i>Which has more/less?</i></p>	<p>Sentence frames:</p> <p><i>We counted ... in order to ...</i> <i>We measured ... in order to ...</i> <i>We compared ... and ... to find out ...</i> <i>We were surprised that ...</i> <i>We can use the graph/table to show...</i></p> <p>Questions/Prompts:</p> <p><i>How should you record your observations?</i> <i>How would you measure...?</i> <i>What could you compare...?</i> <i>How will you show how ... are different?</i> <i>Do you observe a pattern in these numbers?</i> <i>What do you think the pattern means?</i> <i>What does the graph show?</i></p>

6. Constructing explanations and designing solutions

Students infer, explain, provide evidence, design, identify, apply, solve, compare

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.
- Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.
- Generate and/or compare multiple solutions to a problem.

(NGSS Appendix F)

General Strategies for all Students

- Mini-lesson on language structures and norms for engaging in academic discussions
- Writing frames for explanatory writing
- Start with simple diagrams to formulate ideas
- Think-Pair-Share to encourage building on the ideas of others
- Introduce engineering design process
- Whole class or small groups make concept maps using pictures and words

Corresponding ELD Standards

Part 1. Interacting in Meaningful Ways A. Collaborative: 1. Exchanging Information/Ideas; C. Productive: 12. Selecting language resources; C. Productive 10. Writing

Emerging

PI.A.1 Contribute to conversations and express ideas by asking and answering *yes-no* and *wh-* questions and responding using gestures, words, and simple phrases.

PI.C.12 Recount experiences using a select set of key words. b.) Use a select number of general academic and domain-specific words to add detail (e.g., using the word *larva* when explaining insect metamorphosis) while speaking and composing.

Expanding

PI.A.1 Contribute to class, group, and partner discussions by listening attentively, following turn-taking rules, and asking and answering questions.

PI.C.12 Recount experiences using complete sentences and key words. b.) Use a growing number of general academic and domain-specific words to add detail or to create shades of meaning (e.g., using the word *scurry* versus *run*) while speaking and composing.

Bridging

PI.A.1 Contribute to class, group, and partner discussions by listening attentively, following turn-taking rules, and asking and answering questions.

PI.C.12 Recount experiences using increasingly detailed complete sentences and key words. b.) Use a wide variety of general academic and domain-specific words, synonyms, antonyms, and non-literal language to create an effect, (e.g., using the word suddenly to signal a change) or to create shades of meaning (e.g., the cat's fur was *as white as snow.*) while speaking and composing.

K Grade NGSS Science and Engineering Practices with Corresponding ELD standards

Emerging PI.C.10 Draw, dictate, and write to compose very short informational texts (e.g., a description of the materials) using familiar vocabulary collaboratively with an adult (e.g., joint construction of texts), with peers, and sometimes independently.	Expanding PI.C.10 Draw, dictate, and write to compose short informational texts (e.g., a description of a tree) collaboratively with an adult (e.g., joint construction of texts), with peers, and with increasing independence.	Bridging PI.C.10 Draw, dictate, and write to compose longer informational texts (e.g., an informative report on trees) collaboratively with an adult (e.g., joint construction), with peers and independently using appropriate text organization.
<p>Sentence frames:</p> <p><i>I observed ...</i> <i>I think ... because...</i> <i>We could solve the problem by ...</i> <i>The best way to solve the problem is ...</i></p> <p>Questions/Prompts: <i>Are you saying ...?</i> <i>Does ... mean that ...?</i> <i>Would ... be an example of ...?</i> <i>Do you think ... caused ...?</i> <i>Which ... caused ...?</i> <i>Does ... change ...?</i> <i>Is ... the same or different from ...?</i></p>	<p>Sentence frames:</p> <p><i>The evidence is ...</i> <i>I think the pattern shows ...</i> <i>I think ... causes ...</i> <i>When ... then ...</i> <i>The more..., the ...</i> <i>We think ... is the best solution because ...</i></p> <p>Questions/Prompts: <i>Explain why you think ...</i> <i>Which ideas show that ...?</i> <i>What does ... mean?</i> <i>Give an example.</i> <i>What happens when ...?</i> <i>What do you think would happen if...?</i> <i>How did you use ... to ...?</i> <i>Why do you think ... is important?</i></p>	

7. Engaging in argument from evidence

Students discuss, compare, persuade, synthesize, negotiate, suggest, critique, evaluate, reflect

- Identify arguments that are supported by evidence.
- Analyze why some evidence is relevant to a scientific questions and some is not.
- Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.
- Construct an argument with evidence to support a claim.
- Make a claim about the effectiveness of an object, tool, or solution that is supported by relevant evidence. (NGSS Appendix F)

General Strategies for all Students

- Provide norms and structures for students to discuss in pairs, small group, and whole class.
- Provide examples of arguments supported by evidence.
- Jointly sort examples of explanations supported by evidence and those that are not.
- Model and discuss expectations for academic discourse.
- Encourage divergent ideas for discussion topics.

Corresponding ELD Standards

Part I. Interacting in Meaningful Ways: A. Collaborative: 3. Offering Opinions;

B. Interpretive: 7. Evaluating Language Choices; C. Productive: 11. Supporting Opinions

Emerging

PI.A.3 Offer opinions and ideas in conversations using a small set of learned phrases (e.g., *I think...*), as well as open responses.

PI.B.7 Describe the language an author uses to present an idea (e.g., the words or phrases used to make an argument) with prompting and substantial support.

Expanding

PI.A.3. Offer opinions in conversations using an expanded set of learned phrases (e.g., *I think/don't think ...; I agree with X.*), as well as open responses, in order to gain and/or hold the floor.

PI.B.7 Describe the language an author uses to present an idea (e.g., the vocabulary or phrasing used to make an argument based on evidence), with prompting and moderate support.

Bridging

PI.A.3. Offer opinions in conversations using an expanded set of learned phrases (e.g., *I think/don't think ...; I agree with X, but...*), as well as open responses in order to gain and/or hold the floor or to add information to an idea, etc.

PI.B.7 Describe the language an author uses to present or support an idea (e.g., the vocabulary used to present evidence is precise enough) with prompting and light support.

K Grade NGSS Science and Engineering Practices with Corresponding ELD standards

<p>Emerging</p> <p>PI.C.11 Offer opinions and provide good reasons (e.g., <i>I think ... because ...</i>) referring to the text or relevant background knowledge.</p>	<p>Expanding</p> <p>PI.C.11 Offer opinions and provide good reasons and some textual evidence or relevant background (e.g., <i>paraphrased examples from text or knowledge of content</i>).</p>	<p>Bridging</p> <p>PI.C.11 Offer opinions and provide good reasons with detailed textual evidence or relevant background (e.g., <i>specific examples from text or knowledge of content</i>).</p>
<p>Sentence frames:</p> <p><i>I think ... because...</i> <i>My picture shows...</i> <i>I wonder why...</i></p> <p>Questions/Prompts:</p> <p><i>Do you agree or disagree?</i> <i>Which idea do you agree with?</i> <i>Which explanation makes more sense to you?</i> <i>Is this an opinion or evidence?</i></p>	<p>Sentence frames:</p> <p><i>I claim ...</i> <i>My evidence is ...</i> <i>What about...?</i> <i>I changed my mind about ...</i> <i>I agree/disagree with ... because...</i> <i>I would like to add ...</i></p> <p>Questions/Prompts:</p> <p><i>Why do you think that is so ...?</i> <i>Do you think ... supports the idea that...?</i> <i>What is your evidence?</i> <i>Explain why you disagree that...</i> <i>Does this information help us answer the question...?</i> <i>Can you say more about ...?</i> <i>Tell me how you know ... solves the problem.</i></p>	

8. Obtaining, evaluating, and communicating information

Students read, summarize, describe, compare, combine, explain, communicate

- Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).
- Describe how specific images (e.g., a diagram showing how a machine works) supports a scientific or engineering idea.
- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) and other media that will be useful in answering a scientific question and/supporting a scientific claim.
- Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.

General Strategies for all Students

- Use reading comprehension strategies, read aloud, unpack complex text, and guided reading.
- Introduce visual literacy strategies for interpreting illustrations and creating diagrams.
- Discuss text features in informational text and multimedia.
- Reinforce vocabulary using pictorials (review key concepts by illustrating and labeling on chart paper in front of students).
- Provide ample opportunities for students to talk, write, and read about their science experiences.

Corresponding ELD Standards

Part 1. Interacting in Meaningful Ways: All

Part 2. Learning How English Works: All