



Formative Assessment

# Teacher Guide

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COGNIA ASSESSMENTS

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# About This Guide

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This Cognia™ Formative Assessment Teacher Guide provides information on how to access Cognia Formative Assessment materials, item sets, and tools, and how to use them.

## Purpose

Formative assessment is part of an ongoing cycle of instruction and feedback in classrooms and is integral to effective teaching and learning. Teachers use our resources to measure student understanding in real time, which supports them in making instructional adjustments for the benefit of every student. We want every student to have the opportunities that knowledge brings.

## Guide Terminology


The formative item sets for each grade and content area include the following:

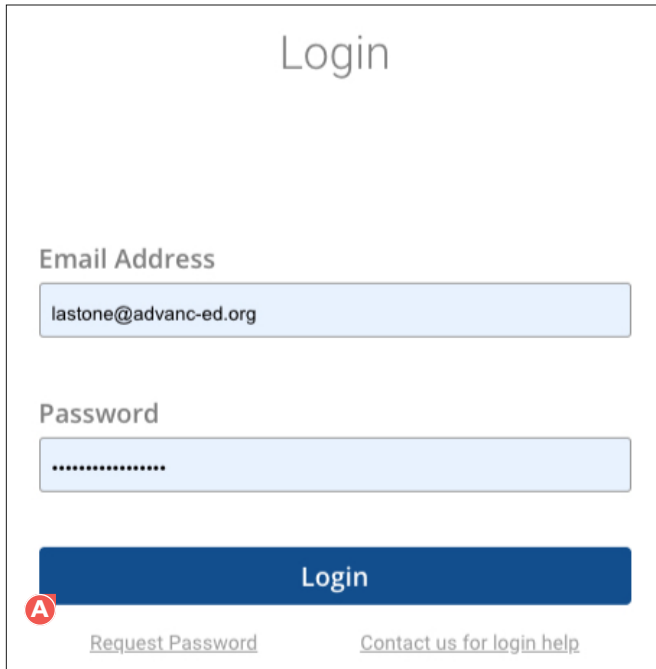
- **Blueprints.** A high-level technical overview of the items in each set that shows the standard and learning targets the items align to, item depth of knowledge (DOK), item type, item position, and number of items that exist for that standard
  - **Scoring guide.** Information about item alignment, including learning target, standard, cluster, and DOK
  - **Distractor rationales.** Information related to incorrect answer choices to selected-response items that supports the formative process by identifying misunderstanding, misinterpretations, and other sources of error
  - **Scoring rubrics.** Guidance for constructed-response items that helps ensure easier and more uniform scoring
  - **Student item sets.** Ready-to-use, formatted, printable groups of items with response spaces
- Item types in the formative sets include the following:

- **Selected-Response**
  - Multiple-choice—Students select one answer from four possible choices.
  - Multiple-select—Students select more than one answer from four to eight possible choices.
- **Constructed-Response**
  - Short-answer—Students respond to a question using a few words or numeric response.
  - Constructed-response—Students respond to a question by writing a response.

# Accessing Cognia's Formative Resources

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To access Cognia's formative assessment resources, go to [myjourney.cognia.org](https://myjourney.cognia.org), type your email address and password into the appropriate boxes, and click **Login**. 



The screenshot shows a login form titled "Login". It contains two input fields: "Email Address" with the text "lastone@advanc-ed.org" and "Password" with masked characters. Below the fields is a blue "Login" button. At the bottom left of the form is a red circle with a white "A" next to the "Request Password" link. At the bottom right is the "Contact us for login help" link.

Login


Email Address

lastone@advanc-ed.org

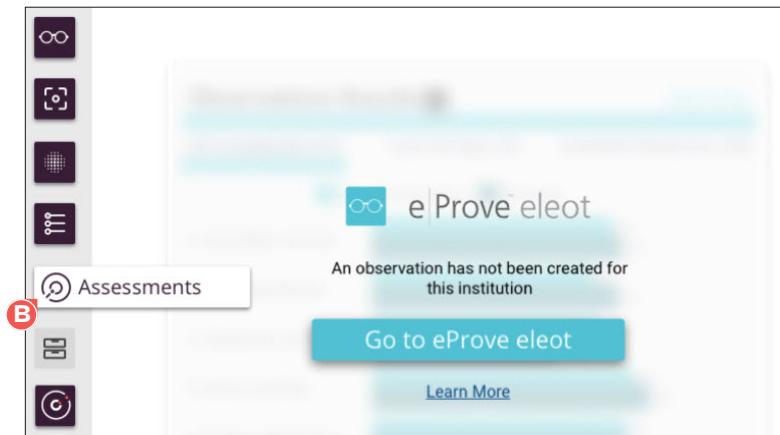
Password

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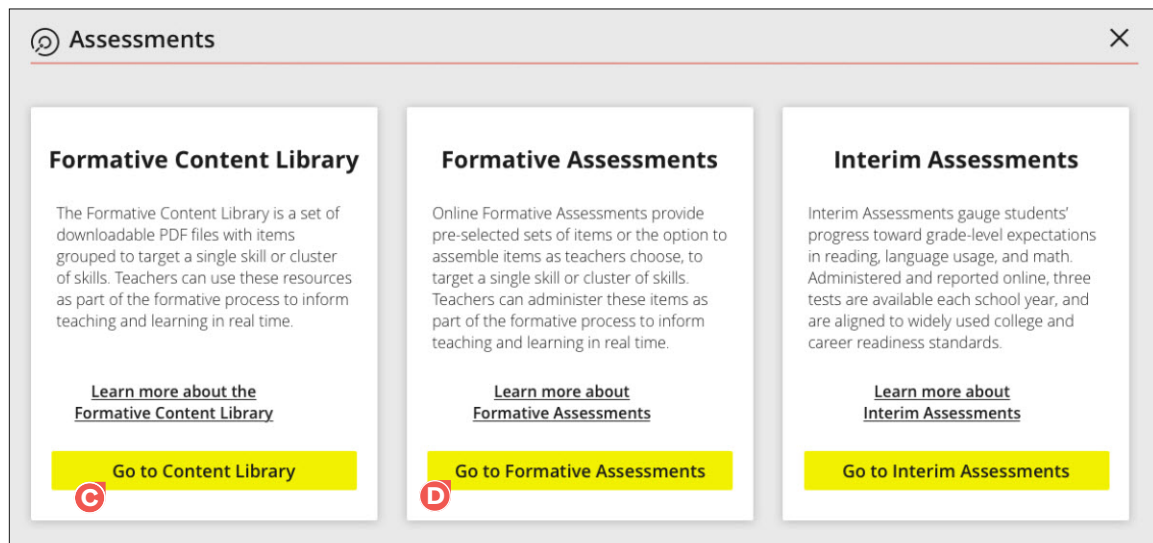
Login

 [Request Password](#) [Contact us for login help](#)

After logging in, a page appears with the navigation bar at the left side. The **Assessments** widget is located there. **B**



Click the **Assessments** widget to access a dialog box with the different assessment options.



- To access PDF versions of formative item sets and resources, click **Go to Content Library** **C**. Each PDF includes a blueprint, a scoring guide, and a student item set.
- To access formative items using Cognia's assessment platform, click **Go to Formative Assessments** **D**. The Formative Assessment items and item sets are delivered in an interactive, online delivery system where students take assessments online.

The interactive online tools for assessment administration and the Formative Assessments are accessed through myJourney.

# Introduction to Formative Assessment

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It is important to remember that formative assessment is not a test. It is a process, a practice that is part of instruction. In effective formative instruction, teachers use a variety of methods to determine whether students understand the current lesson and adjust instruction accordingly. Methods include homework assignments, check-ins, exit tickets, peer-to-peer exchanges, short quizzes, etc. Formative assessment helps to:

- Establish a teacher-student learning partnership.
- Clarify learning targets and criteria for success.
- Identify students' misconceptions.
- Provide teachers and students with actionable feedback.
- Identify next steps for instruction.

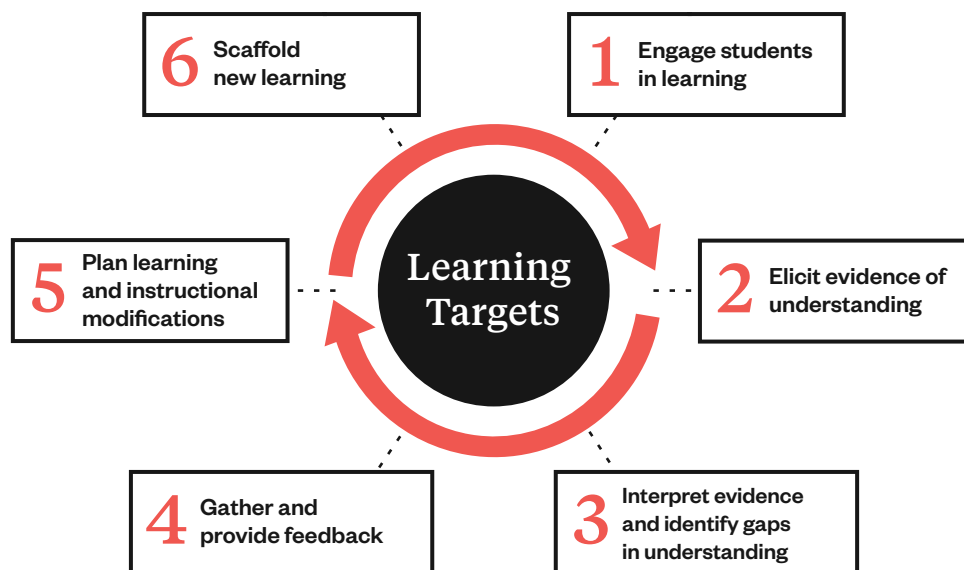
## Data

Students and teachers are the primary users of formative assessment data. These data have the greatest effect on learning and instruction because feedback for both student and teacher occurs over a very short or nearly instantaneous time period. This allows for adjustments in instruction, reteaching, and additional practice with learning targets to occur.

# Formative Assessment Cycle

The formative assessment cycle occurs during formative assessment. The diagram illustrates the step-by-step process in relation to the learning target being taught. When using the formative items, educators should refer to the cycle diagram and consider where they are in the process and which resources will best help them at that point.

## The Formative Assessment Process



- 1. Engage students in learning:** Student engagement directly affects student learning. Students become more invested in the learning process when they are encouraged to ask questions and actively participate in discussions about their own thinking.
- 2. Elicit evidence of understanding:** Evidence can be defined as observable features of student performance and can be gathered in a variety of ways. Students' responses provide evidence about their understanding and progress toward meeting learning targets.
- 3. Interpret evidence and identify gaps in understanding:** Teachers and students interpret the collected evidence to determine where the students are in relation to the learning goals. Analysis and interpretation of evidence is ongoing and is used to monitor progress and inform instructional next steps.
- 4. Gather and provide feedback:** Actionable feedback keeps learning moving forward. When students receive timely, descriptive feedback, they understand what they need to do next and their performance improves. This kind of effective feedback also supports students' metacognition, or awareness about their own thinking.
- 5. Plan learning and instructional modifications:** Collected evidence and feedback can be used to inform and modify lesson plans while teaching and learning is still occurring. Instruction can be targeted to address specific misconceptions or learning needs.
- 6. Scaffold new learning:** Teachers can support students' transition to the rigor of the standards by translating the standards to learning targets. When teachers provide additional clarification and guidance through modeling and feedback, students gain a greater understanding of what is expected.

# Formative Support Tools

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The following optional tools are offered to help engage students in the assessment process. These tools can also assist teachers in using the evidence collected from the Cognia Formative Assessment resources to inform instructional next steps. See [Appendix A](#) for the tools.

## How to Use the Formative Support Tools

A brief description of each formative tool is listed, defining the purpose of each tool and offering a recommendation on how it can be used. The tools have been divided into two sections: planning tools, which are helpful for educators, and student tools, which are helpful for students.

### Planning Tools

- **Response Review:** A guide for reviewing student responses and recording evidence about student response patterns regarding specific distractors and skill areas that need more instructional attention. Once these have been documented, it will be easier to determine which areas need reinstruction and more opportunities for practice.
- **Constructed-Response Task Review Guide:** A guide for reviewing student work and recording evidence of student understanding. The evidence collected through analyzing student responses and the accompanying rubrics can be used as formative feedback.
- **Stars and Steps Formative Feedback:** A template to provide feedback to students on areas of strength and mastery within the learning target and on areas that require additional learning.
- **Curriculum-Embedded Performance Assessment Model:** A tool that provides a framework for planning and embedding formative items into curriculum-embedded performance assessments to engage students in instructional activities and provide evidence of understanding as instruction occurs.
- **Formative Assessment Review Plan:** An organizer for teachers to use that provides a walkthrough of the formative assessment process and a space to organize their thoughts on how to use the process during a specific instructional period. Teachers will use the tool to document the formative assessments they use during the instructional period, the evidence obtained, and the conclusions about student learning based on that evidence.
- **Evidence Review Plan:** An organizer for teachers to use that provides a walkthrough of the formative assessment process and a space to organize their thoughts on how to use the process during a specific instructional period.



## Student Tools

- **Fray Model:** A graphic organizer that helps students define a concept and sort its characteristics, examples, and nonexamples
- **3-2-1 Feedback:** A template for students to provide feedback to teachers by listing three things they learned, two things they found interesting, and one question they still have; may be useful as an exit slip
- **Self-Assessment Tools**
  - **Stoplight Self-Assessment:** A tool for students to describe their progress toward the learning target and select which circle of the traffic light best indicates their level of understanding
  - **Student Self-Assessment Gauge:** A tool for students to describe their accomplishment of the learning target and to draw on a gauge graphic indicating their own assessment of their current level of understanding
  - **Student Self-Assessment:** A tool that helps students organize their learning targets, describe their level of understanding for a specific target, and reflect about questions they still have for a specific learning target
  - **Student Self-Assessment of 3-Dimensional Learning:** A tool to help students reflect on a learning target, writing what they did, what they know, and how they think about it
- **Student Self-Reflection:** A STEM-specific tool that allows students to connect specific disciplinary core ideas (DCI) to different science and engineering practices (SEP) and crosscutting concepts (CCC) and then reflect on those connections
- **Cause and Effect Map:** A graphic organizer that helps students define specific cause-and-effect relationships
- **Claim, Evidence, and Reasoning:** A graphic organizer that helps students organize a specific claim, evidence for that claim, and reasoning to support that claim
- **Draw and Explain:** A tool that gives students a chance to discuss their answers with peers
- **Pass the Question Protocol:** A frame that allows students to write down questions and work with partners to synthesize a response to their questions
- **Three-Fact Fold Chart:** A graphic organizer that has a section for a student to write down three pieces of information, a section for a partner to write down three pieces of information, and a section where common information and ideas can be described

# Accommodations

## Defining Accommodation

The Council of Chief State School Officers (CCSSO) has provided guidance on how to approach accommodations during student assessment. They define accommodations as “changes in procedures or materials that ensure equitable access to instructional and assessment content and generate valid assessment results for students who need them. Embedded accommodations (e.g., text-to-speech) are provided digitally through instructional or assessment technology, while non-embedded designated features (e.g., scribe) are provided locally. Accommodations are generally available for students for whom there is a documented need on an IEP or 504 accommodation plan, although some states also offer accommodations for ELs.”

## Accommodations in Cogna's Assessment Platform

Standard test-taking tools are available to students within the testing interface on Cogna's assessment platform. Universal and system tools are available to all students. Item-level tools appear in items that require their use to respond. In addition, the items include accommodation tools that can be used by students as determined by the district or school. The platform supports accommodating learners through the following tools:



**Answer Masking:** A universal tool that provides the ability to “hide” an answer by clicking on the eye icon next to the answer choice. This can be used to eliminate answer choices. Answer masking will persist if a student navigates away from a question, but not if the student exits the test. Answer choices may not be selected while they are masked.



**Calculator:** An item-level tool that comes in two modes, Basic and Scientific. The Basic calculator is an item-level tool for students taking Mathematics tests in grades 3–5. The Scientific calculator is an item-level tool for students taking Mathematics tests in grades 7–8 or higher. Students can click the numbers and symbols on the calculator to use it.



**Color Contrast:** An accommodation tool that allows the student to select from a menu of 12 different color combinations of background and text. Click the color combination choice to change the color contrast. Click Default to return to the standard colors.



**Dictionary:** An item-level tool that provides the ability to look up a phrase or word. The definition for the phrase or word is then displayed in a dialog box on the page. To close the dialog box, click the X in the upper-right of the box.



**Line Reader:** A universal tool that helps the student focus on one or more lines of text when reading test content. Use the mouse or touchscreen to raise and lower the tool for each line of text on the page. Adjust the number of lines in the line reader tool window with the resizing handle.



**Highlighter:** A universal tool that allows students to select text and highlight the selection. Erase the highlighting of text by using the eraser—select the eraser and select the highlighting to erase. To clear all highlighting on the page, click Clear All.



**Masking:** An accommodation tool that provides the ability to mask certain parts of the test interface, passage, or item. The student can resize and drag custom masking planes.



**Notepad:** A system tool that allows students to retain notes on an item. Notes uniquely persist per item and are only viewed by the student while taking the test. The notes will not be visible once the test session is exited or when the test is submitted. Notes will not be submitted with the student responses. The student can resize and drag the notepad within the item. The notepad displays a timestamp for when the contents were last modified. If the notepad is used on a passage that is shared across multiple items, the notes will persist each time the passage is seen with all items.



**Protractor:** A vector-based, partially translucent item-level tool available for specific items (designated by content). The student can rotate, resize, and drag the protractor within the item.



**Reverse Contrast:** An accommodation tool that inverts all color values on the page. Reverse Contrast is available when Color Contrast is selected as an accommodation for a student.



**Ruler:** A vector-based, partially translucent item-level tool available for specific items (designated by content). Depending on the item, there will be a ruler available in inches by 1/4-inch or 1/8-inch increments or in centimeters. The student can rotate, resize, and drag the ruler within the item.



**Screen Zoom:** An accommodation tool that allows students to magnify the entire page in four increments: 100%, 150%, 200%, and 300%. Clicking the magnifying glass zooms in, the minus symbol zooms out, and the circular arrow returns to the default 100% magnification. Screen zoom is only available in the kiosk version of the student interface.



**Sketch:** A universal tool that allows students to draw anywhere on the item area or shared stimulus (passage), using a choice of black, red, or blue pens or a semi-transparent yellow highlighter.



**Text-to-Speech (TTS):** An accommodation tool that allows students to hear the text read out loud. Students who have a TTS Mathematics accommodation will have TTS controls available. TTS is only available in the kiosk version of the student interface.

## Accommodation and Assessment

CCSSO also states that “in the context of new technology-based instruction and assessments, various accessibility supports are available for students to meet their individualized needs and preferences. These new individualized approaches to accessibility place greater responsibility on educator teams and individuals who make decisions about which students need and should receive specific supports among a variety of accessibility choices. Even those features that are universally available for all students may need to be turned off for some students if they have proven to be distracting in instruction and on assessments. Educators should also ensure that students have ample opportunity to practice using accessibility supports or accessing assessment content without certain supports if they are only available in instruction.”

## Making Accessibility Decisions

CCSSO developed a five-step process to help with making accessibility decisions in the classroom.

**Step 1:** Expect students to achieve grade-level standards. Educators should expect all students, including accommodated learners, in their classroom to be able to meet the learning standards that are the basis for instruction.

**Step 2:** Learn about accessibility supports for instruction and assessment. Educators can learn about accessibility supports from the special education department at their school.

**Step 3:** Identify accessibility supports for instruction and assessment. Educators should work as a team to determine which supports best help each student obtain and process the information learned during the instructional period.

**Step 4:** Apply accessibility supports during instruction and assessment. Educators should follow the recommendations of the school’s special education department as to which accessibility supports are appropriate to apply during instruction and assessment.

**Step 5:** Evaluate use of accessibility supports in instruction and assessment. Educators should review the student evidence of learning from instruction and assessment and consider if the accessibility supports were sufficient for the learner.

# Modification of Instruction and Assessment

There are many different types of learning exceptionalities and those exceptionalities have specific accommodations that will help the student. Supporting learning exceptionalities using accommodations does not lower learning expectations; they help ensure the student's needs are met and help teachers better measure the student's learning.

CCSSO defines *modifications* as “practices or materials that change, lower, or reduce state-required learning expectations. Modifications may change the underlying construct of an assessment.” Some examples of modifications in instruction and assessment include the following:

- reducing the student learning load through fewer learning targets, fewer problems, less reading, and shorter units of instruction
- reducing the number of assignments, the volume of work within the assignment, and the number of assessments; focusing on obtaining the appropriate evidence of learning for the student
- using the appropriate accommodations and support tools that best help the learner
- reducing the difficulty of tasks and assessments through scaffolding, providing additional content, extra labeling, or reducing the number of options a student has to work through.

## Evaluation of Accessibility at the Student Level

CCSSO put together the following list of questions that can be used to help evaluate accessibility supports for students:

1. What accessibility supports are used by the student during instruction and assessments?
2. What are the results of classroom assignments and assessments when accessibility supports are used versus when they are not used? If a student did not meet the expected level of performance, is it due to not having access to the necessary instruction, not receiving the accessibility supports, or using accessibility supports that were ineffective?
3. What is the student's perception of how well the accessibility support worked?
4. What combinations of accessibility supports seem to be effective?
5. What are the difficulties encountered in the use of accessibility supports?
6. What are the perceptions of teachers and others about how the accessibility supports appear to be working?
7. How have the characteristics of the student changed over time to warrant a plan or accessibility support change?

Questions that pertain to school or the school district should be used during the continuous improvement cycle, and questions that pertain to the student should be used by their teachers, co-teachers, and counselors.

Whether students receive accommodations for learning and assessments or not, the formative assessment cycle should occur and students should be provided feedback on their progress toward understanding a specific learning target.

# Mathematics-Specific Information

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Educators work to ensure that their lessons are comprehensive and provide students with opportunities to practice and apply the mathematics skills they have learned. Cognia's formative mathematics item sets support classroom instruction by engaging students to demonstrate what they know on meaningful tasks. These items are evidence of student understanding and can be used by educators as actionable data during the formative assessment cycle.

There are currently 30 sets of formative mathematics items for grades 3–8. Each grade includes an item set from each individual cluster. Additional items will be added during the 2020–2021 school year.

Each mathematics item set aligns to a mathematics college and career readiness domain and is focused on one specific cluster within that domain. Clusters are standards that are grouped together to represent key concepts and skills emphasized within a domain. Mathematics item sets are designed to help educators integrate formative assessment into instruction while learning is still occurring.

Each mathematics item set assesses a range of cognitive complexities and encourages students to apply their understanding of key skills and concepts.

Each item set consists of two parts: Part A and Part B. Part A consists of four to eight multiple-choice, multiple-select, and short-answer items, and Part B consists of one extended constructed-response item.

Calculator functionality is limited to specific items and sets of items when they are used in Cognia's assessment platform. Not all items allow use of the calculator tool. Keep this in mind when administering the items using PDFs from the Formative Content Library; calculator usage is then at the teacher's discretion.

Cognia does not recommend using any of the formative assessment item sets as a topic "test." Our mathematics formative items are designed to work within a larger assessment program that includes formative, interim, and summative assessment components. The item sets are designed to complement instruction.

## Mathematics Formative Item Types

**Multiple-choice (MC) 1-point items:** MC items include an item stem (question) and answer options. The incorrect answer options, or distractors, are often based on typical misunderstandings or common errors. The Scoring Guide for each MC item includes distractor rationales that identify the correct answer and help explain why each other option is incorrect. An analysis of students' answer choices provides evidence of the students' current level of understanding of key concepts and skills.

**Multiple-select (MS) 1-point items:** MS items include an item stem (question) and answer options. The item has more than one correct answer. The incorrect answer options, or distractors, are often based on typical misunderstandings or common errors. The Scoring Guide for each MS item includes distractor rationales that identify the correct answer and help explain why each other option is incorrect. An analysis of students' answer choices provides evidence of the students' current level of understanding of key concepts and skills.

**Short-answer (SA) 1-point items:** SA items include a student entering in a numeric response. These items are looking for students to generate a specific number. The responses to this type of item provide evidence of students' understanding and application of specific mathematics skills.

**Constructed-response (CR) 2- or 4-point items:** A CR item presents an open-ended prompt that gives students the opportunity to write answers that demonstrate application of their knowledge and skills. These items also allow students to practice higher-order thinking skills such as analyzing, explaining, synthesizing, elaborating, and questioning their own thinking.

# Mathematics Standards

The college and career readiness standards such as the Common Core State Standards or similar U.S. state standards in mathematics were created in response to over a decade of research about mathematics education in the United States with the goal of having standards that provide clear, specific language about what students should be learning.

“These new standards build on the best of high-quality mathematics standards from states across the country. They also draw on the most important international models for mathematical practice, as well as research and input from numerous sources, including state departments of education, scholars, assessment developers, professional organizations, educators, parents and students, and members of the public.

“They endeavor to follow the design envisioned by William Schmidt and Richard Houang (2002), by not only stressing conceptual understanding of key ideas, but also by continually returning to organizing principles such as place value and the laws of arithmetic to structure those ideas.

“In addition, the ‘sequence of topics and performances’ that is outlined in a body of mathematics standards must respect what is already known about how students learn. As Confrey (2007) points out, developing ‘sequenced obstacles and challenges for students...absent the insights about meaning that derive from careful study of learning, would be unfortunate and unwise.’ Therefore, the development of the standards began with research-based learning progressions detailing what is known today about how students’ mathematical knowledge, skill, and understanding develop over time. The knowledge and skills students need to be prepared for mathematics in college, career, and life are woven throughout the mathematics standards. They do not include separate Anchor Standards like those used in the ELA/literacy standards.

“The Common Core concentrates on a clear set of mathematics skills and concepts. Students will learn concepts in a more organized way both during the school year and across grades. The standards encourage students to solve real-world problems.”

“Mathematics Standards.” *Mathematics Standards | Common Core State Standards Initiative*, [www.corestandards.org/Math/](http://www.corestandards.org/Math/).

## How to Best Use the Mathematics Item Sets

The content in this section explains each component of the item sets and how they can best be incorporated into the classroom. The PDF item sets are designed to be used in conjunction with online formative assessment. The PDF item set documentation should be used as the reference, while the delivery of the assessment would be either on paper using the PDFs or online through Cognia’s assessment platform.



## Mathematics Blueprint

The mathematics blueprint should be used to help select the formative item(s) that will provide the best evidence of student learning. Each cluster of items is organized by a common performance expectation. The learning targets differentiate between the type of evidence each item will provide. The depth of knowledge (DOK) informs the cognitive rigor that the item requires. The item type informs the type of interaction that the student will have to perform to respond to the item.

The following blueprint is aligned to these Common Core State Standards:

- **04.OA.01.01:** Interpret a multiplication equation as a comparison, e.g., interpret  $35 = 5 \times 7$  as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- **04.OA.01.02:** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
- **04.OA.01.03:** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

To obtain evidence of understanding for each standard, teachers should:

- use items individually as the learning targets are covered in class,
- use the items in small groups to address a series of learning targets that focus on one standard, or
- use the entire six-item cluster to measure students' understanding of learning targets before, during, or after instruction.

**Domain:** Operations and Algebraic Thinking

**Cluster:** Use the four operations with whole numbers to solve problems

**Item Types:** Multiple-choice, short-answer, and constructed-response items

### Blueprint

Standard(s)	Learning Target	DOK	Item Type	Item Position
Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (04.OA.01.01)	I can identify the equation needed to solve a word problem involving multiplicative comparisons.	2	MC	A-1
	I can identify the situation represented by a multiplication expression.	2	MC	A-2
Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. (04.OA.01.02)	I can use multiplication to solve a word problem involving multiplicative comparisons.	2	MC	A-3
	I can use division to solve a word problem involving multiplicative comparisons.	2	SA	A-4
Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (04.OA.01.03)	I can identify the equation needed to solve a multistep word problem.	2	MC	A-5
	I can use the four operations to solve a multistep word problem.	2	MC	A-6
		2	CR	B-1

# Mathematics Scoring Guide

The scoring guide has two tools that are useful to educators because they help provide accurate formative feedback when addressing misconceptions about the standard.

## Distractor Rationales

The distractor rationales are helpful because each rationale explains why a specific misunderstanding or common error is incorrect. Providing students with feedback is a key component of the formative assessment cycle. Reviewing the distractor rationales with students is beneficial for learning and could be done through the following:

- Have students explain why a specific response is correct/incorrect and evaluate their explanation through the use of the distractor rationale text.
- Use the distractor rationales to help target points of necessary reinstruction.
- Discuss the misunderstanding or common error addressed in each rationale with the class/student and consider other examples of the same misunderstanding or error type.

**STANDARD:** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (04.OA.01.03)

**LEARNING TARGET:** I can identify the equation needed to solve a multistep word problem.

**DOK:** 2

- 5.** Brendan bought 2 notebooks for \$5 each and a pen that cost \$3.

Which equation can Brendan use to find the total cost,  $c$ , of the notebooks and pen?

- ☐ A  $3 \times 2 + 5 = c$   
☐ B  $2 \times 5 \times 3 = c$   
☒ C  $2 \times 5 + 3 = c$   
☐ D  $5 \times 2 - 3 = c$

### Distractor Rationales

- A. Student multiplied the cost of the pen instead of the cost of the notebook.  
B. Student multiplied by the cost of the pen instead of adding it.  
C. Key  
D. Student subtracted the cost of the pen instead of adding.



## Mathematics Rubrics

The rubrics and scoring notes help delineate scoring of student responses so that common errors are more easily identified, which helps ensure that scoring is more uniform and fairer to all learners. Providing students with feedback is a key component of the formative assessment cycle. Reviewing the rubric and scoring notes with students is beneficial for learning and could be done through the following:

- Have students evaluate the rubric so that they are aware of how constructed-response tasks are assessed.
- Have students identify/generate responses that meet the full rubric score point but are not listed in the scoring notes.
- Have students score themselves or their peers using the rubrics and scoring notes.

**STANDARD:** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (04.OA.01.03)

**LEARNING TARGET:** I can use the four operations to solve multistep word problems.

**DOK:** 2

**1.** A garden store sells two types of flowers. The store sells 40 daisies. The store sells 8 times as many tulips as daisies.

**a.** How many tulips does the store sell? Show your work or explain how you know.

The garden store sells each daisy for \$4 and each tulip for \$6.

**b.** How much more money does the store make from the sale of tulips than from the sale of daisies? Show your work or explain how you know.

Constructed-Response Rubric	
Score	Description
4	4 points
3	3 points
2	2 points
1	1 point
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No Response.

### Scoring Notes

Part a: 2 points for correct answer, **320** (tulips), with sufficient work or explanation to indicate correct strategy

OR

1 point for correct answer with insufficient or no explanation or work shown

or

for correct strategy with incorrect or no answer

Part b: 2 points for correct answer, **\$1760**, with sufficient work or explanation to indicate correct strategy

OR

1 point for correct answer with insufficient or no explanation or work shown

or

for correct strategy with incorrect or no answer

### Sample Response

Part a.  $40 \times 8 = 320$

Part b.  $320 \times 6 = 1920$

$40 \times 4 = 160$

$1920 - 160 = 1760$

## Next Steps for Formative Mathematics Item Data

After obtaining data that serve as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback. For these items to be formative, students must receive feedback. The feedback provided to students should be descriptive instead of evaluative. Descriptive feedback communicates what is working and indicates the next steps the students need to take in their learning process. Students with no gaps in learning also should receive descriptive feedback that provides their next steps for how to apply and extend what they learned or for how to begin learning the next concept.

After feedback is provided to students, educators should consider documenting the instructional modifications and supplementations provided to the students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how best to scaffold that learning. Teachers can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the student.

# Reading-Specific Information

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English language arts (ELA) teachers are responsible for ensuring students are able to use language effectively through reading and writing. Cognia's formative reading item sets support classroom instruction by engaging students to demonstrate what they know on meaningful tasks. These items are evidence of student understanding and can be used by educators as actionable data during the formative assessment cycle.

There are 36 sets of formative reading items in grades 3–8. More item sets will be added during the 2020-2021 school year.

Each reading item set aligns to a reading domain and is focused on a cluster within that domain. Standards that are grouped together to represent key concepts and skills emphasized within a domain are called clusters. The reading item sets are designed to help educators integrate formative assessment into instruction while learning is still occurring.

Each reading item set features single or paired passages and assesses target college and career readiness standards related to the different domains. Each domain focuses on one of the following clusters:

- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas

Reading item sets provide grade-appropriate passages that include informational or literary selections.

Reading item sets assess a range of cognitive complexities and encourage students to apply their understanding of key skills and concepts. The item sets are designed not only to assess students' ability to comprehend what they read, but also to prompt them to analyze and synthesize text and cite evidence to support their thinking.

Each item set consists of two parts to provide flexibility for instructional planning. Part A consists of four to eight multiple-choice items, and Part B consists of one extended constructed-response item.

Cognia does not recommend using any of the formative assessment item sets as a topic "test." Our reading formative items are designed to work within a larger assessment program that includes formative, interim, and summative assessment components. The item sets are designed to complement instruction.

## Reading Formative Item Types

**Multiple-choice (MC) 1-point items:** MC items include an item stem (question) and answer options. The incorrect answer options, or distractors, are often based on typical misunderstandings and misinterpretations. The Scoring Guide for each MC item includes distractor rationales that identify the correct answer and help explain why each other option is incorrect. An analysis of students' answer choices provides evidence of the students' current level of understanding of key concepts and skills.

**Multiple-select (MS) 1-point items:** MS items include an item stem (question) and answer options. The item has more than one correct answer. The incorrect answer options, or distractors, are often based on typical misunderstandings and misinterpretations. The Scoring Guide for each MS item includes distractor rationales that identify the correct answers and help explain why each other option is incorrect. An analysis of students' answer choices provides evidence of the students' current level of understanding of key concepts and skills.

**Constructed-response (CR) 2-, 3-, or 4-point items:** A CR item presents an open-ended prompt that gives students the opportunity to write answers that demonstrate application of core reading skills. These items also allow students to practice higher-order thinking skills such as analyzing, explaining, synthesizing, elaborating, and questioning their own thinking.

# English Language Arts Standards

The college and career readiness standards such as the Common Core State Standards or similar U.S. state standards in English language arts were developed to help ensure that all students are prepared for success in life, a career, or college by graduation.

“The standards establish guidelines for English language arts (ELA) as well as for literacy in history/social studies, science, and technical subjects. Because students must learn to read, write, speak, listen, and use language effectively in a variety of content areas, the standards promote the literacy skills and concepts required for college and career readiness in multiple disciplines.

“The College and Career Readiness Anchor Standards form the backbone of the ELA/literacy standards by articulating core knowledge and skills, while grade-specific standards provide additional specificity. Beginning in grade 6, the literacy standards allow teachers of ELA, history/social studies, science, and technical subjects to use their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and using language in their respective fields.

“It is important to note that the grade 6–12 literacy standards in history/social studies, science, and technical subjects are meant to supplement content standards in those areas, not replace them. States determine how to incorporate these standards into their existing standards for those subjects or adopt them as content area literacy standards.

“The skills and knowledge captured in the ELA/literacy standards are designed to prepare students for life outside the classroom. They include critical-thinking skills and the ability to closely and attentively read texts in a way that will help them understand and enjoy complex works of literature. Students will learn to use cogent reasoning and evidence collection skills that are essential for success in college, career, and life. The standards also lay out a vision of what it means to be a literate person who is prepared for success in the 21st century.”

“English Language Arts Standards.” *English Language Arts Standards | Common Core State Standards Initiative*, [www.corestandards.org/ELA-Literacy/](http://www.corestandards.org/ELA-Literacy/)

## How to Best Use the Reading Item Sets

The content in this section explains each component of the item sets and how they can best be incorporated into the classroom. The PDF item sets are designed to be used in conjunction with online formative assessment. The PDF item set documentation should be used as the reference, while the delivery of the assessment would be either on paper using the PDFs or online through Cognia’s assessment platform.

### Reading Blueprint

The reading blueprint should be used to help select the formative item(s) that will provide the best evidence of student learning. Each cluster of items is organized by a reading domain. The learning targets differentiate between the type of evidence each item will provide. The depth of knowledge (DOK) informs the cognitive rigor that the item requires. The item type informs the type of interaction that the student will have to perform to respond to the item.

The following blueprint is aligned to these Common Core State Standards:

- **RL.03.01:** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RL.03.02:** Recount stories, including fables, folktales, and myths from diverse cultures: to determine the central message, lesson, or moral and explain how it is conveyed through key details.
- **RL.03.03:** Describe characters in a story (e.g. their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.

To obtain evidence of understanding for each standard, teachers should:

- use items individually as the learning targets are covered in class;
- use the items in small groups to address a series of learning targets that focus on one standard (each testlet focuses on one cluster, and a cluster may have multiple standards addressed); or
- use the entire item cluster to measure students' understanding of learning targets before, during, or after instruction.

**Domain:** Reading: Literary

**Cluster:** Key Ideas and Details

**Passage Name(s):** Skylark; Caleb's Story

**Item Types:** Multiple-choice and constructed-response items

### Blueprint

Standard(s)	Learning Target	DOK	Item Type	Item Position
Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (RL.03.01)	I can answer questions referring explicitly to the text as the basis for the answers.	2	MC	A-1
Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events. (RL.03.03)	I can describe characters' traits, motivations, or feelings and explain how their actions contribute to the sequence of events.	2	MC	A-2
Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text. (RL.03.02)	I can recount stories and determine the central message.	2	MC	A-3
Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (RL.03.01)	I can answer questions referring explicitly to the text as the basis for the answers.	1	MC	A-4
		1	MC	A-5
Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events. (RL.03.03)	I can describe characters' traits, motivations, or feelings and explain how their actions contribute to the sequence of events.	2	MC	A-6
Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text. (RL.03.01)	I can recount stories and determine the central message.	2	MC	A-7
Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events. (RL.03.03)	I can describe characters' traits, motivations, or feelings and explain how their actions contribute to the sequence of events.	2	CR	B-1

MC = multiple-choice

CR = constructed-response

# Reading Scoring Guide

The scoring guide has two tools that are helpful to educators because they help provide accurate formative feedback when addressing students' misunderstandings and misinterpretations related to the standard being assessed.

## Distractor Rationales

The distractor rationales are helpful because each rationale explains why a specific common misunderstanding or misinterpretation is incorrect. Providing students with feedback is a key component of the formative assessment cycle. Reviewing the distractor rationales with students is beneficial for learning and could be done through the following:

- Have students explain why a specific response is correct/incorrect and evaluate their explanation through the use of the distractor rationale text.
- Use the distractor rationales to help target points of necessary reinstruction.
- Discuss the common misunderstanding addressed in each rationale with the class/student and consider other examples of the same common misunderstanding.

STANDARD: Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (RL.03.01)

LEARNING TARGET: I can answer questions referring explicitly to the text as the basis for the answers.

DOK: 2

1. At the beginning of "Skylark," what is Anna **most likely** doing?
- Ⓐ planning for Sarah's wedding
  - dreaming of something to come
  - Ⓒ hoping to go to Sarah's wedding
  - Ⓓ thinking of something in the past

### Distractor Rationales

A. Student chooses response due to lack of comprehension. The narrator is holding up Sarah's wedding dress. However, the narrator is dreaming of someday wearing a similar dress. She is not planning for Sarah's wedding, as it has already taken place.

#### B. Key

C. Student chooses response due to lack of comprehension. The narrator is holding up Sarah's wedding dress. However, the narrator is dreaming of someday wearing a similar dress. She is not hoping to attend Sarah's wedding, as it has already taken place.

D. Student chooses response due to lack of comprehension. The excerpt refers to Sarah's wedding in the past; however, it begins with the narrator, Anna, dreaming about her own wedding someday.

## Reading Rubrics

The rubrics and scoring notes help delineate scoring of student responses so that misunderstandings and misinterpretations are more easily identified, which helps ensure that scoring is more uniform and fairer to all learners. Providing students with feedback is a key component of the formative assessment cycle. Reviewing the rubric and scoring notes with students is beneficial for learning and could be done through the following:

- Have students evaluate the rubric so that they are aware of how constructed-response tasks are assessed.
- Have students identify/generate responses that meet the full rubric score point but are not listed in the scoring notes.
- Have students score themselves or their peers using the rubrics and scoring notes.

STANDARD: Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events. (RL.03.03)  
LEARNING TARGET: I can describe characters' traits, motivations, or feelings and explain how their actions contribute to the sequence of events.  
DOK: 2

1. How does Sarah becoming part of the family help the family? Use details from **both** passages to explain your answer.

Constructed-Response Rubric	
Score	Description
4	Response provides a thorough explanation of how Sarah becoming part of the family helps the family. Response includes relevant details from the selections.
3	Response provides an explanation of how Sarah becoming part of the family helps the family. Response lacks some relevant details from the selections or is not fully developed.
2	Response provides a partial explanation of how Sarah becoming part of the family helps the family. Response uses limited details from one or both selections.
1	Response is vague or minimal. <b>OR</b> Response only provides a personal opinion with no text support.
0	Response is totally incorrect or irrelevant.
Blank	No Response.

### Sample Response

The response may include but is not limited to the following:

#### "Skylark"

- Sarah spends time/talks with the children. At the end of the passage, Anna states that "Sarah, who didn't know that she had changed us all."
- In Anna's journal entry, she writes, "Everyone was happy." They were all happy because Papa married Sarah, making her a permanent part of the family.
- Sarah makes Anna and Caleb feel loved.
- Sarah helps Papa show how he feels.
- Sarah makes Papa, Anna, and Caleb feel happy.

#### "Caleb's Story"

- Sarah offers guidance in difficult situations, as when the stranger shows up in the barn. Caleb's first thought is to get help from Sarah.
- Sarah is very caring—she wants the stranger to come into the house so he can warm up. She wants Caleb to offer the stranger hot tea; that is helping Caleb to learn to be kind to others.
- Sarah encourages Caleb to write in his journal.

## Next Steps for Formative Reading Item Data

After obtaining data that serve as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback. For these items to be formative, students must receive feedback. The feedback provided to students should be descriptive instead of evaluative. Descriptive feedback communicates what is working and indicates the next steps the students need to take in their learning process. Students with no gaps in learning also should receive descriptive feedback that provides their next steps for how to apply and extend what they learned or for how to begin learning the next concept.

After feedback is provided to the students, educators should consider documenting the instructional modifications and supplementations provided to the students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how to best scaffold that learning. Teachers can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the student.



# STEM-Specific Information

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## Overview

STEM educators that teach to the Next Generation Science Standards (NGSS) are responsible for ensuring students learn the science content that is the basis for the standard, the science and engineering practice (SEP) that clarifies how the student should use the content, and the underlying crosscutting concept (CCC) that links the standard to other NGSS standards. Cognia's STEM formative item sets help educators obtain useful evidence of student understanding of the standard and the three dimensions on which the standard is based.

There are 97 formative STEM item sets for grades 3–8. Each set of items focuses on one performance expectation (PE), and the number of items per set varies from 3 to 13, with most having 6 or 7 items.

Cognia does not recommend using any of the formative assessment item sets as an NGSS topic “test.” Our STEM formative items are designed to work within a larger NGSS assessment program that includes both formative, interim, and summative assessment components. The STEM formative items are one part of a broad NGSS curriculum, instruction, and formative assessment program. The item sets are designed to complement instruction.

## STEM Formative Item Types

**Multiple-choice (MC) 1-point items:** MC items include an item stem (question) and answer options. The incorrect answer options, or distractors, are often based on typical misunderstandings and misinterpretations of the learned material. The Scoring Guide for each MC item includes distractor rationales that identify the correct answer and help explain why each other option is incorrect. An analysis of students' answer choices provides evidence of the students' current level of understanding of key concepts and skills.

**Constructed-response (CR) 2-point items:** A CR item presents an open-ended prompt that gives students the opportunity to write answers that demonstrate application of scientific practices—including scientific explanations. These items also allow students to practice higher order thinking skills such as analyzing and synthesizing. Different CR items call for varying response lengths—from brief sentences to explanations with drawings.

**Extended-response (ER) 3-point items:** ER items present open-ended prompts that require more writing than CR items. ER items actively engage students in constructing and organizing their knowledge by asking students to explain, elaborate, and question their own thinking.

# Next Generation Science Standards

The Next Generation Science Standards (NGSS) represent an innovative approach to science education that supports a child's learning from kindergarten through high school. Built on a solid foundation, the NGSS are innovative because they integrate the following:

- three-dimensional (3-D) learning
- explanations of phenomena and design solutions
- engineering design and the nature of science
- coherent learning progressions from kindergarten through high school
- connections to English language arts and mathematics

The standards are performance expectations that identify what students are expected to master by the end of instruction. The standards blend three equally important learning dimensions:

- Disciplinary core ideas (DCI), which represent what scientists and engineers know, or the academic core content
- Science and engineering practices (SEP), which represent what scientists and engineers do, or the behaviors scientists and engineers use to investigate the natural world and to design solutions to problems
- Crosscutting concepts (CCC), which represent how scientists and engineers think as they look for common framing concepts that span all domains of science

Engaging in the SEPs is essential for students to understand the relevancy of the content and skills they are learning. One way to start transitioning to the NGSS is to consider ways to integrate or blend the SEPs with the CCCs and DCIs. Rather than presenting content and concepts in isolation, this approach integrates scientific knowledge with practice, mirroring the way real scientists and engineers work.

# How to Best Use the STEM Item Sets

The content in this section explains each component of the item sets and how they can best be incorporated into the classroom. The PDF item sets are designed to be used in conjunction with online formative assessment. The PDF item set documentation should be used as the reference, while the delivery of the assessment would be either on paper using the PDFs or online through Cognia's assessment platform.

## STEM Blueprint

The science blueprint should be used to help select the formative item(s) that will provide the best evidence of student learning. Each cluster of items is organized by a common performance expectation. The learning targets differentiate between the type of evidence each item will provide. The depth of knowledge (DOK) informs the cognitive rigor that the item requires. The item type informs the type of interaction that the student will have to perform to respond to the item.

The following blueprint is aligned to this NGSS performance expectation:

- **PE 5-PS1-2:** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

In order to obtain evidence of understanding for this performance expectation, teachers should:

- use items individually as the learning targets are covered in class,
- use the items in pairs or trios to address a series of learning targets, or
- use the entire cluster to measure students understanding of learning targets before, during, or after instruction.

**Domain:** Physical Science

**Topic:** Structure and Properties of Matter

**Item Types:** Multiple-choice, constructed-response, and extended-response items

### Blueprint

Performance Expectation	Learning Target	DOK	Item Type	Item Position
Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. (5-PS1-2)	I can predict the weight of an object that has undergone a change in state of matter.	2	MC	1
	I can predict the weight of some substances to support the claim that the total weight of matter is conserved no matter what type of change occurs when substances are mixed together.	2	CR	2
	I can predict the amount of a substance after the substance has undergone a change.	2	CR	3
	I can predict and graph the weight of a mixture and graph the weights of its components to support the claim that the total weight of matter is conserved when materials are mixed together.	2	ER	4
	I can predict and graph weights of some substances to support the claim that the total weight of matter is conserved no matter what type of change occurs during heating, cooling, or mixing materials.	2	ER	5
	I can predict and graph weights of some substances to support the claim that the total weight of matter is conserved no matter what type of change occurs during heating and cooling.	2	ER	6

## STEM Scoring Guide

The scoring guide has two tools that are useful to educators because they help provide accurate formative feedback when addressing misunderstandings about the standard.

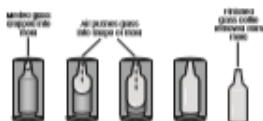
### Distractor Rationales

The distractor rationales are helpful because each rationale explains why a specific common error is incorrect. Providing students with feedback is a key component of the formative assessment cycle. Reviewing the distractor rationales with students is beneficial for learning and could be done through the following:

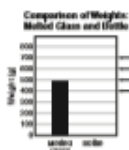
- Have students explain why a specific response is correct/incorrect and evaluate their explanation through the use of the distractor rationale text.
- Use the distractor rationales to help target points of necessary reinstruction.
- Discuss the common error addressed in each rationale with the class/student and consider other examples of the same error type.

PERFORMANCE EXPECTATION: 5-PS1-2: Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.  
LEARNING TARGET: I can predict the weight of an object that has undergone a change in state of matter.  
SEP: SEP.3-5.5.c Using Mathematics and Computational Thinking DCI: 5.PS1.A.2 Structure and Properties of Matter  
CCC: CCC.3-5.3.2 Scale, Proportion, and Quantity  
DOK: 2

1. A glass bottle is made by dropping melted glass into a mold and then blowing air into the mold, as shown.



When it cools, the melted glass becomes a solid, and the bottle is removed from the mold. An engineer makes a bar graph to compare the weight of the melted glass dropped into the mold to the weight of the bottle, as shown. The graph does not show the weight of the bottle.



Which arrow points to the expected weight of the bottle?

- Ⓐ arrow W
- Ⓑ arrow X
- arrow Y
- Ⓓ arrow Z

#### Distractor Rationales

- A. Arrow W indicates that the bottle is heavier than the melted glass dropped into the mold, which does not support conservation of matter. The student may think the bottle is heavier because it looks larger than the drop of melted glass.
- B. Arrow X indicates that the bottle is slightly heavier than the melted glass dropped into the mold, which does not support conservation of matter. The student may think the bottle is heavier because it looks larger than the drop of melted glass.
- C. Key. Arrow Y indicates that the bottle has the same weight as the melted glass dropped into the mold. Conservation of matter supports the weight of the bottle being the same as the weight of the melted glass dropped into the mold.
- D. Arrow Z indicates that the bottle has less weight than the melted glass dropped into the mold, which does not support conservation of matter. The student may think the bottle weighs less because it is cooler than the drop of melted glass.

#### Connections to Common Core State Standards

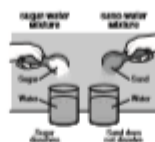
- MP.2: Reason abstractly and quantitatively.
- MP.4: Model with mathematics.

## STEM Rubrics

The rubrics and scoring notes help delineate scoring of student responses so that common errors are more easily identified, which helps ensure that scoring is more uniform and fairer to all learners. Providing students with feedback is a key component of the formative assessment cycle. Reviewing the rubric and scoring notes with students is beneficial for learning and could be done through the following:

- Have students evaluate the rubric so that they are aware of how constructed-response tasks are assessed.
- Have students identify/generate responses that meet the full rubric score point but are not listed in the scoring notes.
- Have students score themselves or their peers using the rubrics and scoring notes.

2. Maria has two beakers of water prepared for an investigation. The weight of each beaker of water is 100 grams. Maria adds 20 grams of sugar to one beaker and 20 grams of sand to the other beaker, as shown.



The sugar dissolves in the water. The sand does not dissolve in the water.

Predict the total weight of each beaker and mixture. Explain your reasoning.

Constructed-Response Rubric		
Score	Level of Understanding	Evidence of Understanding
2	Demonstrating Expected Understanding	Student response provides <b>clear</b> evidence of using the dimensions* to make sense of scientific phenomena and/or to design solutions to problems. Student is able to: <ul style="list-style-type: none"> <li>• predict the total weight of each beaker and mixture and explain the reasoning.</li> </ul>
1	Progressing toward Understanding	Student response provides <b>partial</b> evidence of using the dimensions* to make sense of scientific phenomena and/or to design solutions to problems. The response lacks some critical information and details or contains some errors. Student is able to: <ul style="list-style-type: none"> <li>• predict the total weight of each beaker and mixture <b>BUT</b> the explanation of reasoning contains errors or is not provided.</li> </ul>
0	Not Showing Understanding	Student does not respond or student response is inaccurate, irrelevant, or contains insufficient evidence of using the dimensions* to make sense of scientific phenomena and/or to design solutions to problems.

\*As outlined in the Performance Expectations (PE) of the NGSS, the three dimensions are the disciplinary core ideas (DCI), science and engineering practices (SEP), and crosscutting concepts (CCC). Note that due to the complexity of the PEs, individual assessment items may not address all three dimensions.

### Scoring Notes

Possible answers include:

The weight of the beaker containing the sugar-water mixture will be 120 grams and the weight of the beaker containing the sand-water mixture will be 120 grams. The weights are the same because both beakers of water weigh the same [100 grams], and the added sugar [20 grams] weighs the same as the added sand [20 grams]. The weight of matter always stays the same even when it is mixed.

### Connections to Common Core State Standards

MP.2: Reason abstractly and quantitatively.

MP.3: Construct viable arguments and critique the reasoning of others.

## Next Steps for Formative STEM Item Data

After obtaining data that serve as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback. For these items to be formative, students must receive feedback. The feedback provided to students should be descriptive instead of evaluative. Descriptive feedback communicates what is working and indicates the next steps the students need to take in their learning process. Students with no gaps in learning also should receive descriptive feedback that provides their next steps for how to apply and extend what they have learned or for how to begin learning the next concept.

After feedback is provided to the students, educators should consider documenting the instructional modifications and supplementations provided to students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how to best scaffold that learning. Teachers can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the students.

# Appendix A



# Response Review

STUDENT NAME:	TEACHER NAME:	DATE:
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## Multiple-Choice and Short-Answer Item Review

1. Use the scoring guide to analyze student responses and record correct and incorrect responses in the table below. As you review student responses, review the distractor rationales and note the target standards/concepts/skills being assessed with each item.

Item Analysis		
Item #	Correct ✓	Incorrect ✓
1	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>
Totals		

Distractor Rationale Review Notes	
Item #	
1	
2	
3	
4	
5	
6	

2. **Analysis:** Based on this evidence of student understanding, which specific areas seem to need more instructional attention?



# Constructed-Response Task Review Guide

## Constructed-Response Task

1. **Review student work:** Use the rubric and scoring notes to look for evidence of the student meeting expectations.

*What do you notice about the student's work? How has the student demonstrated understanding?  
What misconceptions are evident?*

2. **List evidence of student understanding and/or misconceptions:**

3. **Using the rubric, determine the number of score points earned at this time (optional):**

= # of score points earned for the constructed-response task.

4. **Use results to inform teaching and learning:**

- **Evidence review:** *How can this student evidence be used to inform instructional next steps?*

- **Feedback for student:** *How can the student move forward with his or her learning?*

Provide some descriptive feedback to help the student set learning goals and improve his or her understanding and performance.

## **Directions for Stars and Steps Formative Feedback:**

1. Review the performance expectation, the associated student learning target(s), and student work sample.
2. Using the Stars and Steps Formative Feedback form, provide the student with some “star” feedback based on the quality of their work in meeting the student learning target(s). Feedback should be descriptive and nonevaluative.
3. Next, identify which dimension of the performance expectation has not been demonstrated in the student work. Provide feedback on the next “steps” the student should take to meet the student learning target(s) and improve his or her mastery of the performance expectation.
4. As a formative assessment practice, Stars and Steps formative feedback is returned to students. Then, they can have an opportunity to see their accomplishments and apply the feedback in order to move along their personal continuum of learning toward mastery of the performance expectation.

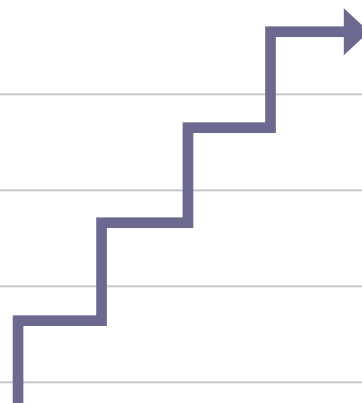
Name: \_\_\_\_\_

# Stars and Steps Formative Feedback

Things I do well:



Things I need more learning or help to do:



Other comments:

# Curriculum-Embedded Performance Assessment Model

## Targeted Performance Expectations/Standards

List the standards that this specific task will target.

## Design your performance assessment

Use the checklist below to help you design the activities, prompts, and assessments to be used in each part of the performance assessment for the targeted standards.

☐ Clear alignment to the standards  
☐ Clear integration of practices  
☐ Use of higher-order thinking skills  
☐ Engaging, real-world context for scenarios, prompts, and problems  
☐ Deep exploration of a topic  
☐ Formative assessment and feedback opportunities for students  
☐ Activities and prompts that elicit responses to show evidence of student learning of the targeted standards  
☐ Accompanying rubrics (qualitative or quantitative) are clear

Fill in the boxes below and on the next pages to draft your complete performance assessment, using the parts that would match the content, your classroom needs, and your intended use of the task.

### Engagement

(Describe the context/scenario of the performance assessment. What is the “hook”?)

# Curriculum-Embedded Performance Assessment Model

## Instructional notes

(Describe the student activities, questions/prompts, and student work products.)

## Investigation

(Describe the student activities, questions/prompts, and student work products that you will use to investigate student learning.)

# Curriculum-Embedded Performance Assessment Model

## Formative feedback activities

(List some techniques that would be appropriate and when you might use them.)

## Individual assessment activities

(Describe the student activities, questions/prompts, and student work products.)

**Engage students in learning**

Identify a learning activity that you will use to engage students in learning.

List the standards that this specific lesson will target. List the learning target(s).

**Elicit evidence of understanding**

Identify specific ways that you will elicit evidence of student understanding using the Cognia formative items, formative tools, and instructional strategies.

**Interpret the evidence and identify gaps in understanding**

Review and analyze the evidence you have collected. Identify specific gaps or misconceptions in student work.

**Gather and provide feedback**

Identify timely, actionable, and descriptive feedback that will keep your students' learning moving forward. (Remember that this kind of effective feedback supports students' metacognition, or awareness, about their own thinking.)

**Plan learning and instructional modifications**

Identify ways to plan learning and to modify instruction based on the evidence you gathered from timely formative assessments.

**Scaffold new learning**

Once you have evidence that students understand the learning target, identify specific ways to use this lesson to scaffold new learning. What instructional sequence will build on the foundation of learning from this lesson?



**Date:**

**Topic:**

**Area of Focus:**

Students who have met the expectations:

Strengths:

Students who need more instruction:

Misconceptions:

Instructional Next Steps:

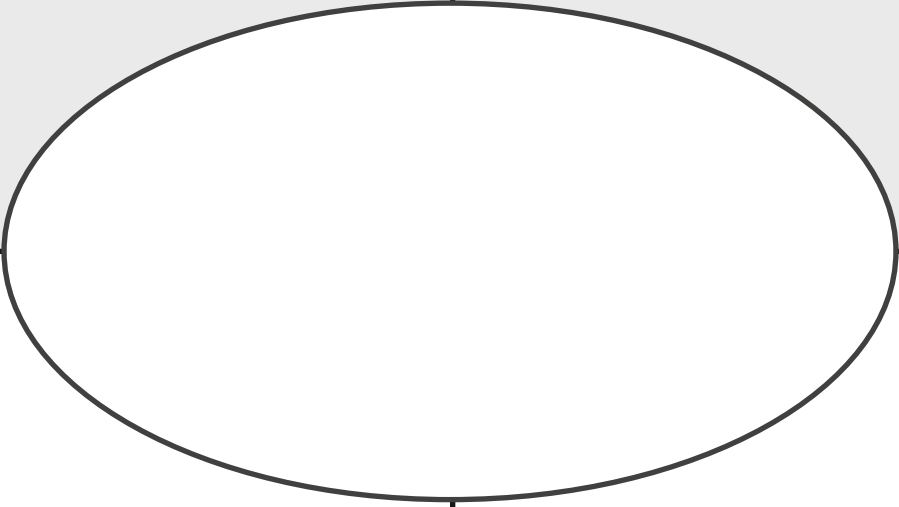
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# Frayer Model

## Directions:

1. In the oval in the middle, write the topic you will be learning about.
2. Write what you already know about the topic in the white part of each box.
3. At the end of the lesson, review your responses, and revise them based on what you've learned.  
Write your new responses in the shaded areas.

<b>Definition</b>	<b>Essential Characteristics</b>
<b>Examples</b>	<b>Non-examples</b>

A large white oval is centered in the middle of the four quadrants of the Frayer Model table. The top-left and bottom-right quadrants are shaded light gray, while the top-right and bottom-left quadrants are white. The oval spans across the white quadrants.

Name: \_\_\_\_\_

# 3-2-1 Feedback

Complete each sentence with the correct number of things.

---

**3** things I learned today:

- 

- 

- 

---

**2** things I found interesting or that surprised me:

- 

- 

---

**1** question I still have:

- 

---

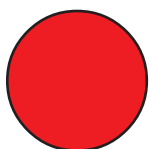
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# Stoplight Self-Assessment

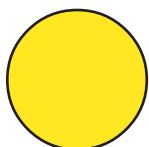
**Student Learning Target:**

*I can*

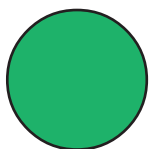
**Can you do all of what the student learning target says? Where do you think you are in your learning? Check the circle that best shows where you are.**



**Stop! I am just beginning this.**



**Wait! I am still working on this.**



**Go! I can do this! I am ready to go on.**

---

**What else are you wondering?**

*I'm still wondering...*

Name: \_\_\_\_\_

# Student Self-Assessment Gauge

**Student Learning Target:**

*I can*

**Can you do everything in the student learning target?**

Draw an arrow on the graph that points to where you think you are in learning this target.

Where I think I am in learning this target



Sample








**What else are you wondering?**

*I'm still wondering...*

Name: \_\_\_\_\_

# Student Self-Assessment

<b>Learning Targets</b> Write in the <b>Learning Targets</b> you focused on in this topic.	<b>Gauge Your Understanding</b> Can you do what is described in the <b>Learning Target</b> ? Draw a pointer on the gauge to show where you think you are.	<b>Reflect</b> I'm still wondering about...
		
		
		
		
		

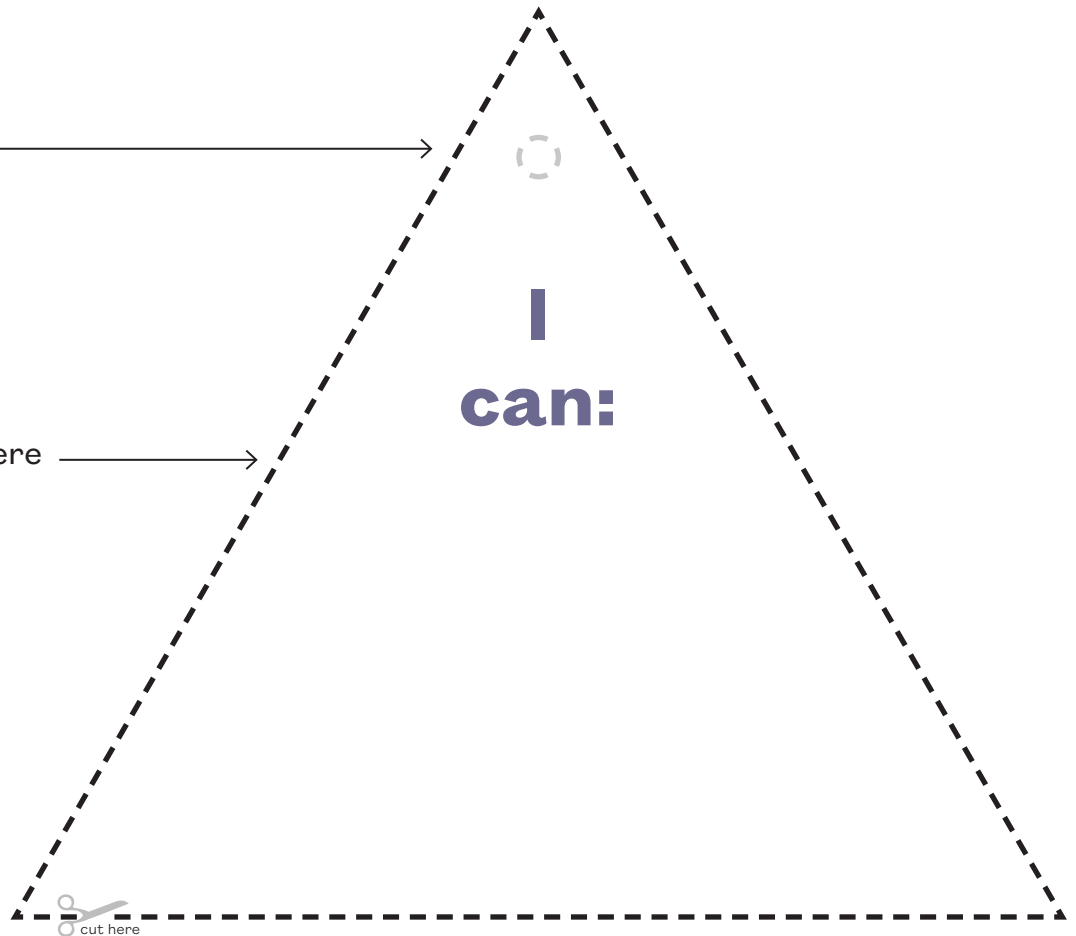
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# Student Self-Assessment of 3-Dimensional Learning (3-D Mobile)

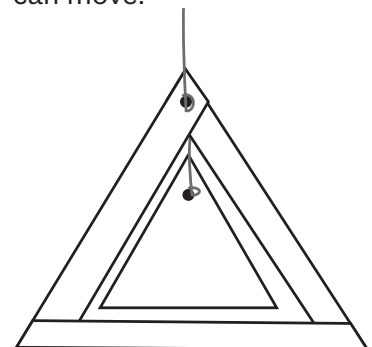
Think about the student learning target. When you can meet this target, what is it that you can **do**, what is it you **know**, and how do you **think** about it?

Tape string here

Write learning target here



1. Write the student learning target inside the triangle. You may use your own words.
2. Answer each question inside strips 1, 2, and 3.
3. Cut out the triangle and the three strips.
4. Color the back of the strips:  
Strip 1—blue, strip 2—orange, strip 3—green
5. Fold each strip back along the line.
6. Keeping the printed side up, place the folded part of strip 1 over the end of strip 2 that is not folded. Tape, glue, or staple the two pieces together. The two pieces will be perpendicular to each other.
7. Repeat step 6 with strips 2 and 3, and with strips 3 and 1.
8. Cut a piece of string about 8 inches long.
9. Tape one end of the string to the gray dot in the triangle.
10. Tape the string to the gray dot on strip 1 so that the triangle hangs inside the three attached strips.
11. Hang up your mobile where it can move!



# Student Self-Assessment of 3-Dimensional Learning

(3-D Mobile)

Tape string here

Fold each strip  
back along this line.

What do you do to learn about this learning target?

## 1. What I do:



cut here

Color the back of the strip blue.

What do you know about this learning target?

## 2. What I know:



cut here

Color the back of the strip orange.

How do you think about this learning target?

## 3. How I think:



cut here

Color the back of the strip green.



Name: \_\_\_\_\_

# Student Self-Reflection

## Directions:

1. In each space in the center column, write in one of the Disciplinary Core Ideas (DCIs) that you focused on in this topic.
2. Reflect on the ways that the Science and Engineering Practices and the Crosscutting Concepts connect to each of the DCIs in the middle column.
3. Draw lines to show the connections you made across the three dimensions.

## Connecting the 3 Dimensions

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking questions (for science) and defining problems (for engineering)		Patterns
Developing and using models		Cause and effect
Planning and carrying out investigations		Scale, proportion, and quantity
Analyzing and interpreting data		Systems and system models
Using mathematics and computational thinking		Energy and matter
Constructing explanations (for science) and designing solutions (for engineering)		Structure and function
Engaging in argument from evidence		Stability and change
Obtaining, evaluating, and communicating information		

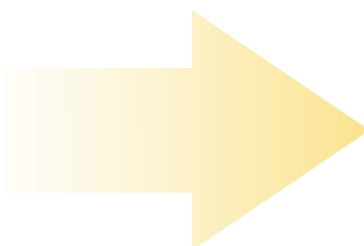
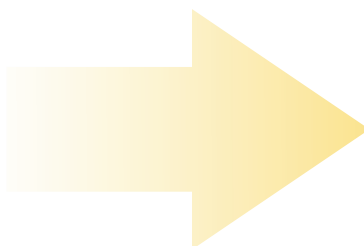
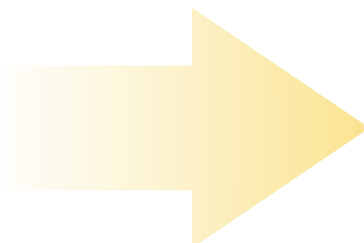
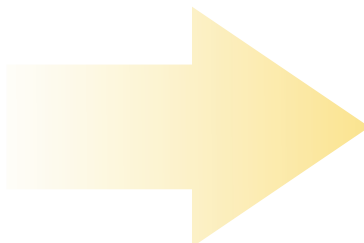
Name: \_\_\_\_\_

# Cause and Effect Map

Write what changes under "Cause." Write what happens next under "Effect."

**Cause**  
(What changes?)

**Effect**  
(What happens when it changes?)



Name: \_\_\_\_\_

# Claim, Evidence, and Reasoning

**Claim:**

**Evidence:**

**Evidence:**

**Evidence:**

**Evidence:**

**Reasoning:**

Name: \_\_\_\_\_

# Claim, Evidence, and Reasoning

**Claim**

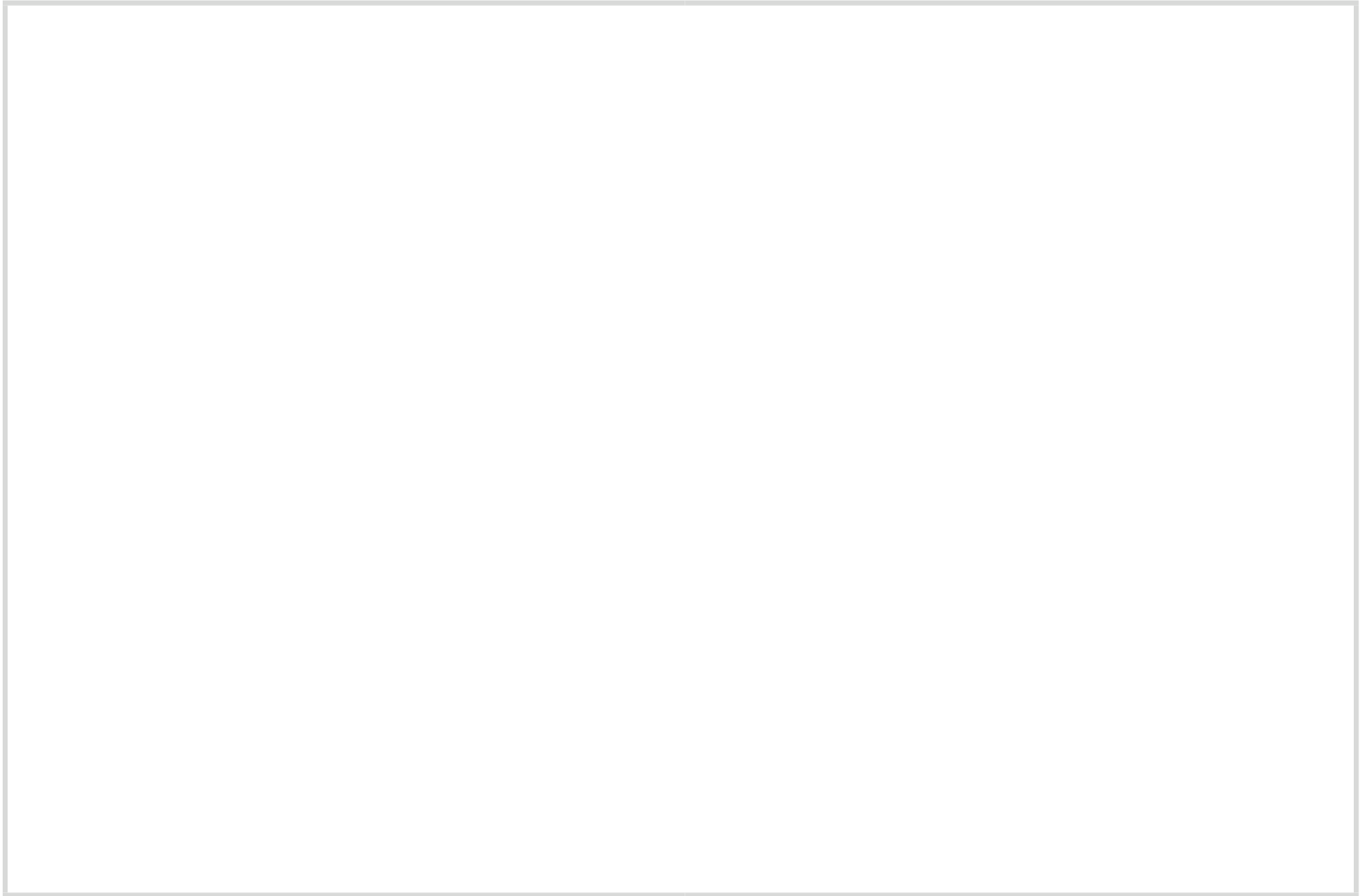
**Evidence**

**Reasoning**

Name:

---

# Draw and Explain



---

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---

---

---

Name:

---

# Pass the Question Protocol

**Purpose:** To share ideas about answering questions

**Time Allotted:** Approximately 30 minutes

**Directions:**

1. In the box below, write your own response to the question you have been given.

2. Share your response with a partner and then combine your responses into one response.
3. As partners, trade your response with another partner group.
4. Read and discuss your responses with each partner. What is similar to and different from your response?
5. Rejoin your first partner and share your findings.

Name: \_\_\_\_\_

# Three-Fact Fold Chart

In the top section, list three ideas or facts that you remember from today's lesson. Then fold your paper to cover your responses. Exchange your list with a partner. Without looking at each other's ideas, record your own three facts in the "Partner Share" section of your partner's chart. Trade back your charts, and together discuss the ideas or facts you had in common. Record the commonalities in the space at the bottom of your own chart.

Student Name:
1.
2.
3.

-----  
*Fold at this line.*  
-----

Partner Share:
1.
2.
3.

Common Facts or Ideas:
1.
2.
3.



---

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