Inventing

Ticket In

Read Page B

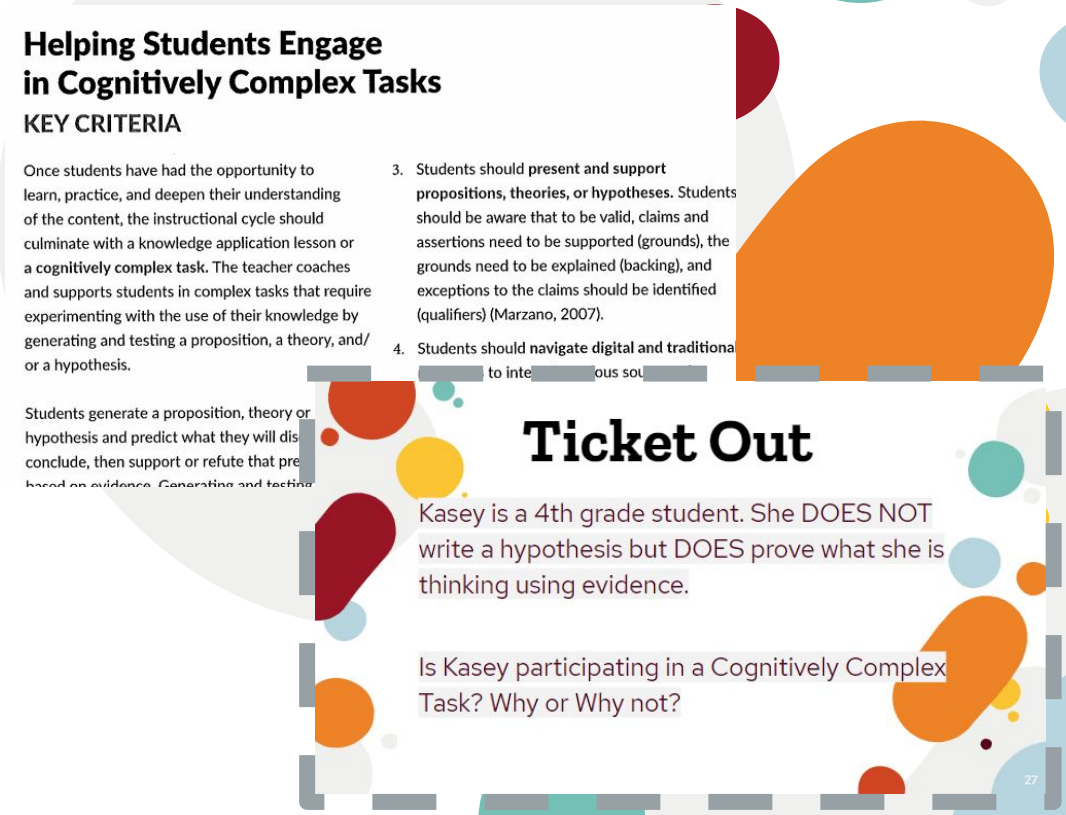
Helping Students Engage in Cognitively Complex Tasks: Key Criteria

1. Do you agree or disagree with original thinking on TOD?
2. Can you add on or revise?

FF: Examples of CCT

Please sign in for PLC

1/28 3rd-5th: Engaging in Cognitively Complex Tasks Part 2



Helping Students Engage in Cognitively Complex Tasks

KEY CRITERIA

Once students have had the opportunity to learn, practice, and deepen their understanding of the content, the instructional cycle should culminate with a knowledge application lesson or **a cognitively complex task.** The teacher coaches and supports students in complex tasks that require experimenting with the use of their knowledge by generating and testing a proposition, a theory, and/or a hypothesis.

Students generate a proposition, theory or hypothesis and predict what they will dis… conclude, then support or refute that pre… based on evidence. Generating and testing…

3. Students should **present and support propositions, theories, or hypotheses.** Students should be aware that to be valid, claims and assertions need to be supported (grounds), the grounds need to be explained (backing), and exceptions to the claims should be identified (qualifiers) (Marzano, 2007).
4. Students should **navigate digital and traditiona…** … to inte… …ous sou…

Ticket Out

Kasey is a 4th grade student. She DOES NOT write a hypothesis but DOES prove what she is thinking using evidence.

Is Kasey participating in a Cognitively Complex Task? Why or Why not?

Ticket In

Was Kasey participating in a Cognitively Complex Task?

Ticket Out

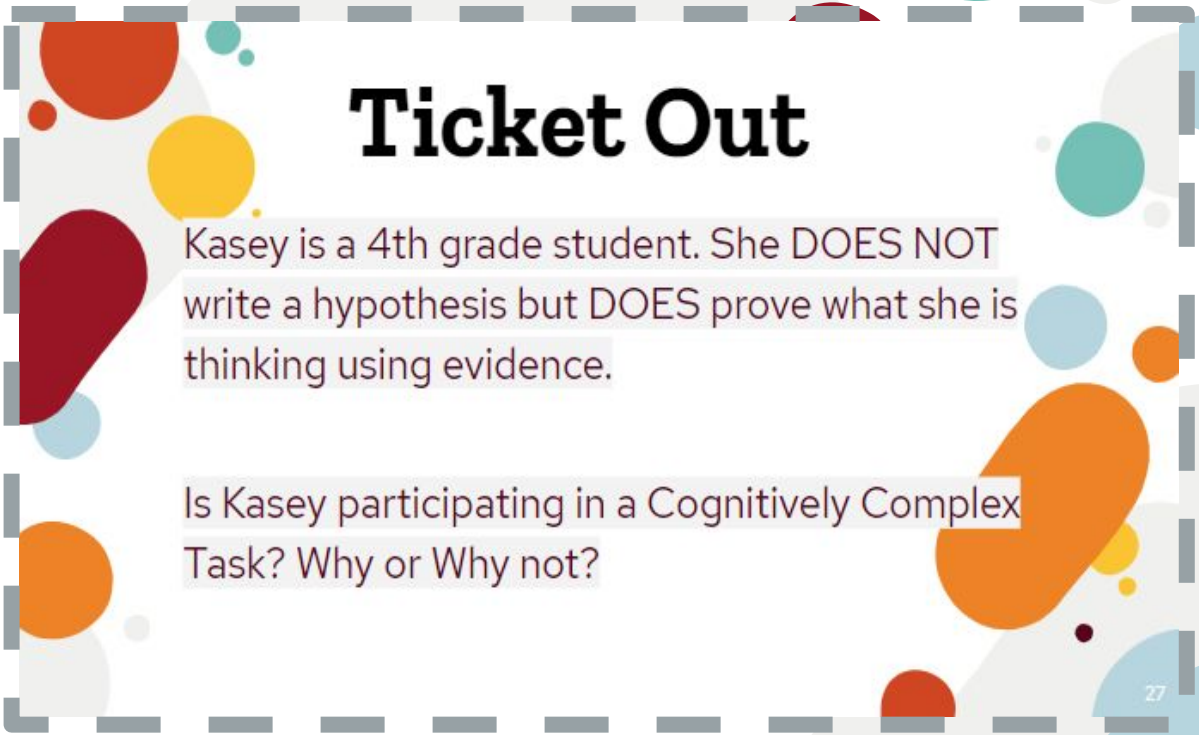
Kasey is a 4th grade student. She DOES NOT write a hypothesis but DOES prove what she is thinking using evidence.

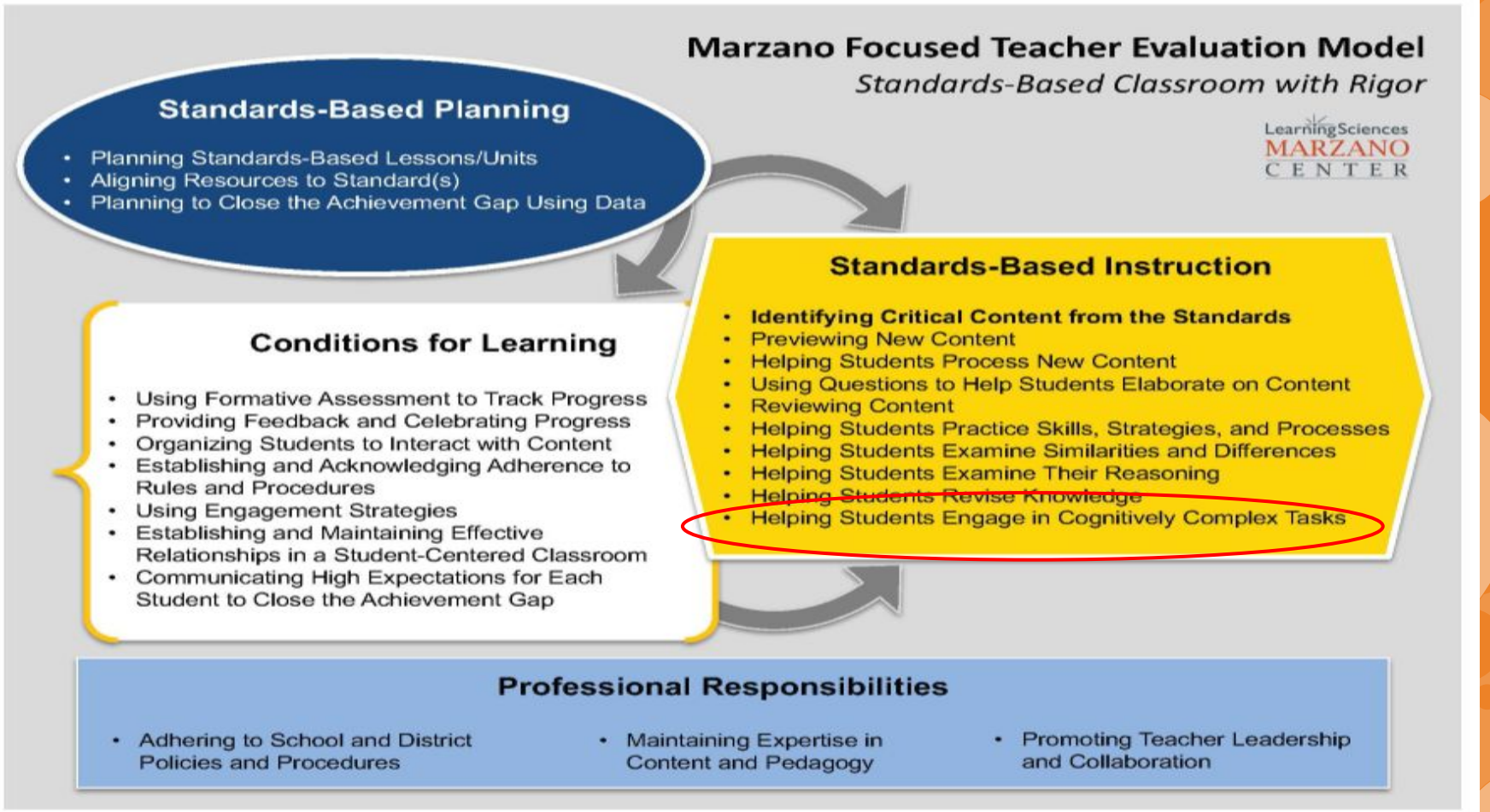
Is Kasey participating in a Cognitively Complex Task? Why or Why not?

Ticket In

Was Kasey participating in a Cognitively Complex Task?

"Although Kasey provides evidence, the 1st step is making a claim/hypothesis. How can she prove what isn't stated to begin with?"




Marzano Focused Teacher Evaluation Model
Standards-Based Classroom with Rigor
Learning Sciences MARZANO CENTER
Standards-Based Planning
• Planning Standards-Based Lessons/Units
• Aligning Resources to Standard(s)
• Planning to Close the Achievement Gap Using Data
Standards-Based Instruction
• Identifying Critical Content from the Standards
• Previewing New Content
• Helping Students Process New Content
• Using Questions to Help Students Elaborate on Content
• Reviewing Content
• Helping Students Practice Skills, Strategies, and Processes
• Helping Students Examine Similarities and Differences
• Helping Students Examine Their Reasoning
• Helping Students Revise Knowledge
• Helping Students Engage in Cognitively Complex Tasks
Conditions for Learning
• Using Formative Assessment to Track Progress
• Providing Feedback and Celebrating Progress
• Organizing Students to Interact with Content
• Establishing and Acknowledging Adherence to Rules and Procedures
• Using Engagement Strategies
• Establishing and Maintaining Effective Relationships in a Student-Centered Classroom
• Communicating High Expectations for Each Student to Close the Achievement Gap
Professional Responsibilities
• Adhering to School and District Policies and Procedures
• Maintaining Expertise in Content and Pedagogy
• Promoting Teacher Leadership and Collaboration

Learning Target

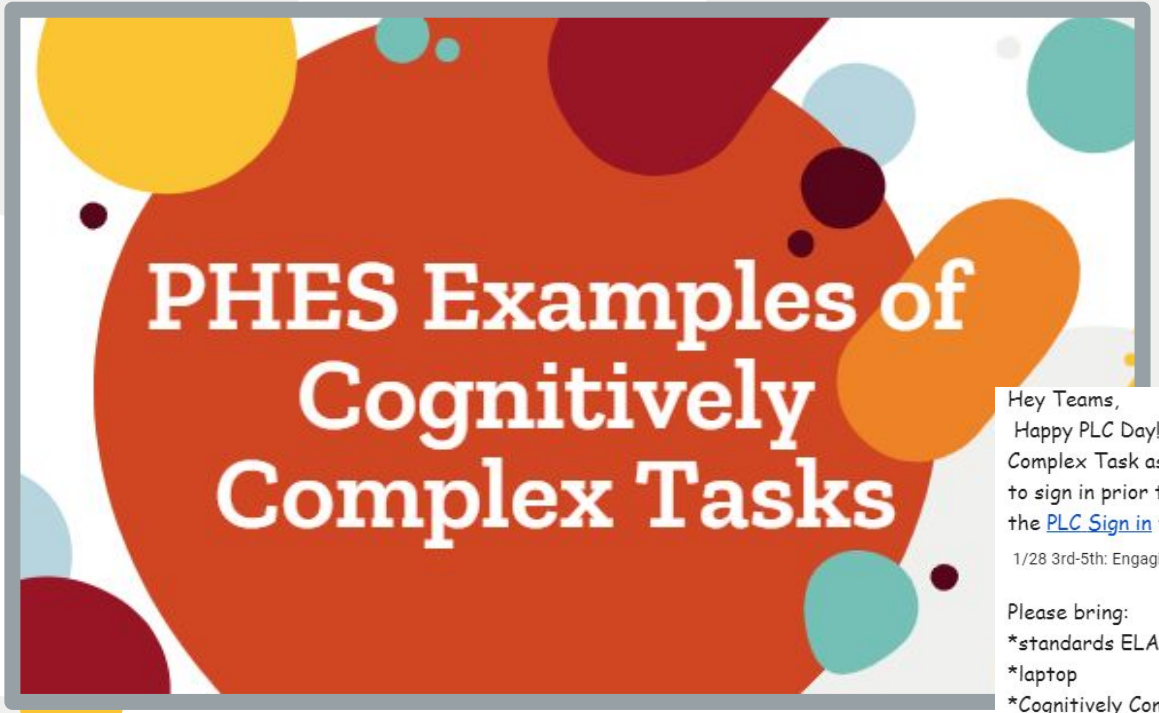
Teachers will develop understanding of Cognitively Complex Tasks (CCT) by:

-review experimental inquiry and investigating CCT using PHES teacher examples

-examine and develop "Inventing" Cognitively Complex Tasks

Helping Students Engage in Cognitively Complex Tasks
Focus Statement: Teacher coaches and supports students in complex tasks that require experimenting with the use of their knowledge by generating and testing a proposition, a theory, and/or a hypothesis.
Desired Effect: Evidence (formative data) demonstrates students prove or disprove the proposition, theory, or hypothesis.

Previous Learning: Experimental Inquiry & Investigating CCT



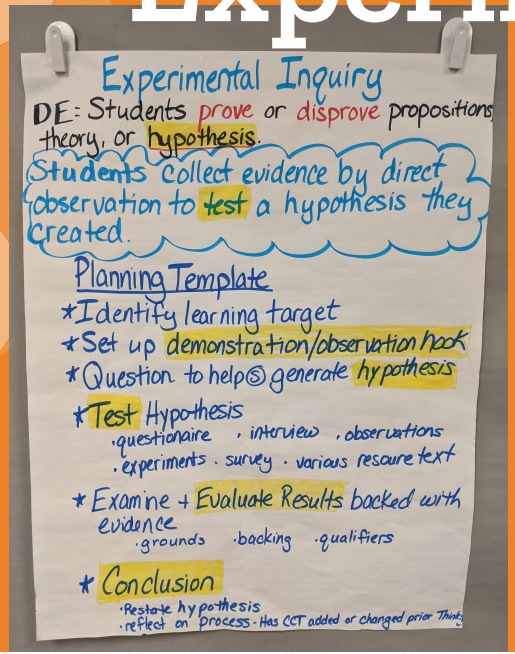
Hey Teams,

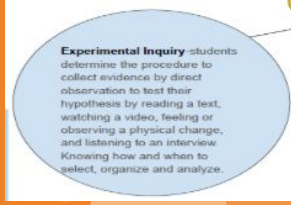
Happy PLC Day! Today, we will review previously learned Cognitively Complex Task as well as learn about invention CCT. If you would like to sign in prior to PLC then you are welcome to. Here is the PLC Sign in for today.

1/28 3rd-5th: Engaging in Cognitively Complex Tasks Part 2

Please bring:
*standards ELA/Math
*laptop
*Cognitively Complex Task Workbook.
Yours Truly,
Angela
PS Fast Finisher: Examples of PHES Cognitively Complex Tasks

Experimental Inquiry





*Identify Learning Target

*Demonstration/Observation Hook

*Question

*Hypothesis

*Test

*Examine & Evaluate Results Back with evidence

*Conclusion

Helping Students Engage in Cognitively Complex Tasks
Focus Statement: Teacher coaches and supports students in complex tasks that require experimenting with the use of their knowledge by generating and testing a proposition, a theory, and/or a hypothesis.
Desired Effect: Evidence (formative data) demonstrates students prove or disprove the proposition, theory, or hypothesis.

1st Grade Math Teacher

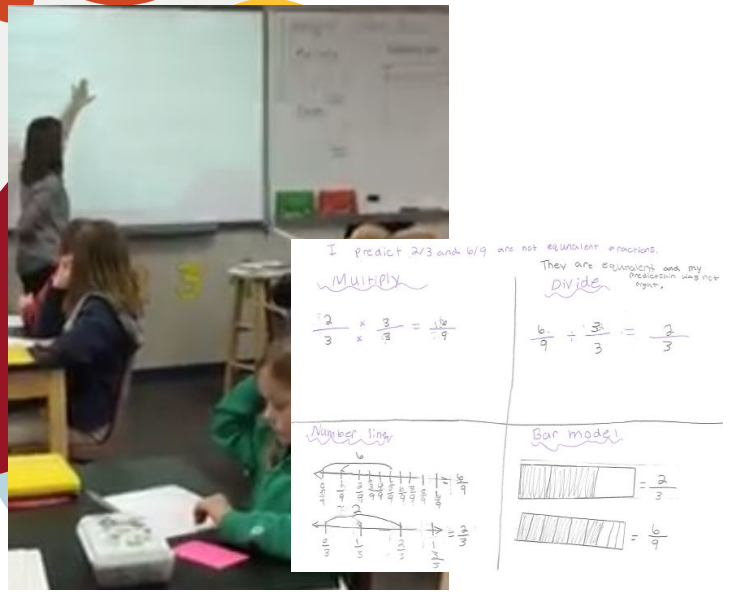
1.OA.D.8

Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ - 3, 6 + 6 = _.

4	Justify the unknown whole number in an addition or subtraction equation relating three whole numbers.
3	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.
2	Determine the unknown whole number in an addition equation. Determine the unknown whole number in a subtraction equation.
1	With the teachers help, students will have partial success at levels 2 and 3.

First grade teacher began lesson with My Favorite No motivational Hook. Then, she supported students in generating a hypothesis in math by writing sentence stem....I predict addition subtraction (will be used to create a number sentence that is true). Students wrote a hypothesis and then experimented with three numbers to create a number sentence that was true. Also, students used previously learned math strategies (count on with number line/grab and count, count back) to prove (or disprove) their hypothesis. Students wrote a conclusion to restate hypothesis and explain how proved or disproved.

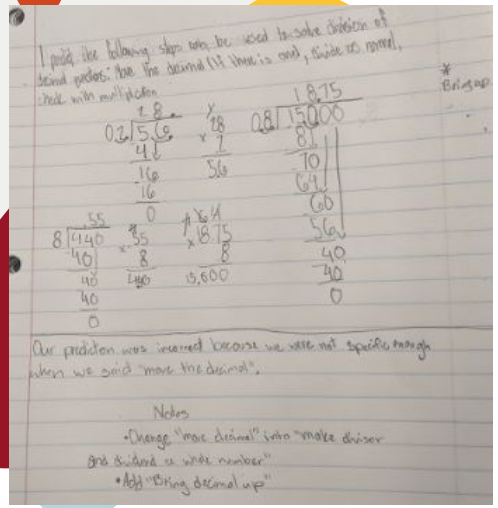
4th Grade Math Teacher



Learning Targets *(write targets from each level of the scale below)*		
2.0 Foundational Knowledge & Skills *Level of Taxonomy	**3.0 Learning Target/Objective *Level of Taxonomy**	**4.0 More Complex Knowledge *Level of Taxonomy**
I can understand and generate equivalent fractions. • represent fractions in different ways • name fractions Vocabulary: equivalent, denominator, numerator	I can explain why fraction (A) is equivalent to fraction (B), looking at how the number and size of the part are different even though the fractions are the same size.	I can form a hypothesis about two fractions and prove or disprove that they are or are not equivalent fractions.

Motivational Hook (Differentiated color cards) Students were given colored note cards and predict a pair of equivalent fractions (example pink cards would look at pink fractions, green cards would look at green fractions) Teacher utilized colored note cards to differentiate equivalent fractions (pink: 3/4, 6/8 and 8/12 green: 2/3. 6/9, orange: 3/4 and 5/8, yellow: 2/4 and 1/2). Students recorded predictions on white sheet of paper (I predict _____are/ are not equivalent fractions). Students then proved their prediction using several previously learned strategies (multiply/divide by whole number, number line, bar model) for equivalent fractions. After experimenting with several math strategies to prove/disprove hypothesis, students met with their color card partners and discussed their predictions and justifications. The conclusion re-stated hypothesis with justification.

5th Grade Math Teacher

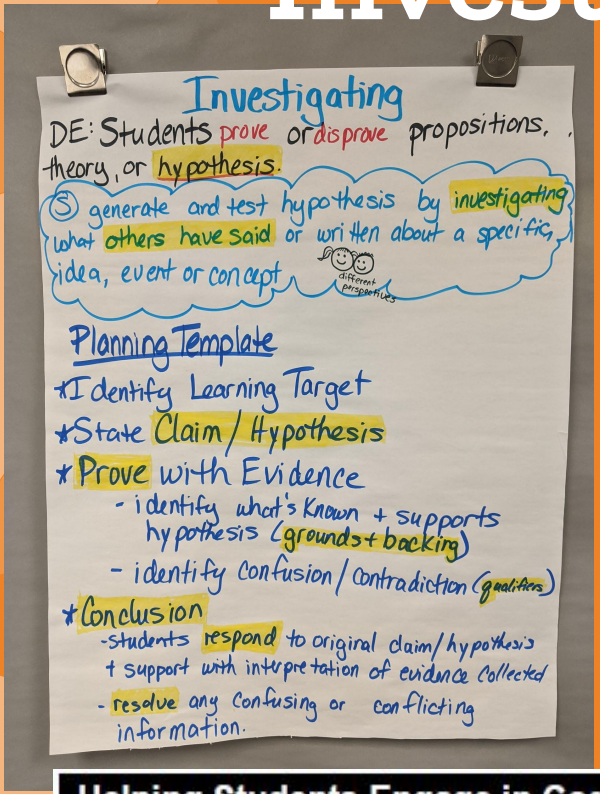


Learning Targets *(write targets from each level of the scale below)*

2.0 Foundational Knowledge & Skills *Level of Taxonomy	3.0 Learning Target/Objective *Level of Taxonomy	4.0 More Complex Knowledge *Level of Taxonomy
I can recognize and recall specific vocabulary, including: • product • partial products • factors I can: • multiply multi-digit whole numbers.	• I can multiply decimals to hundredths, connecting objects or drawings to strategies based on place value, properties of operations, and/or the relationship between operations. • relate the strategy to a written form.	• I can identify errors in multiplication calculations that may or may not include visual models.

Teacher coaches and supports students in complex tasks that require experimenting with the use of S knowledge by generating and testing a hypothesis of dividing fractions (decimal by whole number, a whole number by decimal, and decimal by decimal). Student work within ISN and Google Form demonstrates students prove or disprove their created hypothesis. In the beginning of the lesson, teacher connected science prior knowledge with mathematical experiment/hypothesis "What do you think of with mathematical experiments? We tend to think of science with experimenting. Can we experiment in math?" "What would be our next phase after we ask our question?" S: Hypothesis "What is a hypothesis?" S: educated guess. In table groups, students hypothesized the steps to solve division problems (NOT FORMALLY TAUGHT) Each student wrote their hypothesis in ISN (I predict the following steps can be used to solve division of decimal questions). After hypothesis was formed, each table group tested out the hypothesis using three different type of decimal division problems (5.6 divided by 0.2, 15 divided by 0.8, 4.4 divided by 8). Some students referred to ISN notebook resources to help with vocabulary.One group realized they were not specific when describing how to move the decimals. During testing phase, students were asked to articulate errors in hypothesis "If you notice you made a mistake then make a note of it" At the end, students wrote a conclusion within ISN and Google form.

Investigating CCT



*Identify Learning Target

*State Claim/Hypothesis

*Prove with evidence

-identify what is known & supports claim (Grounds & Backing)

-identify what is confusing or conflicting information

*Conclusion

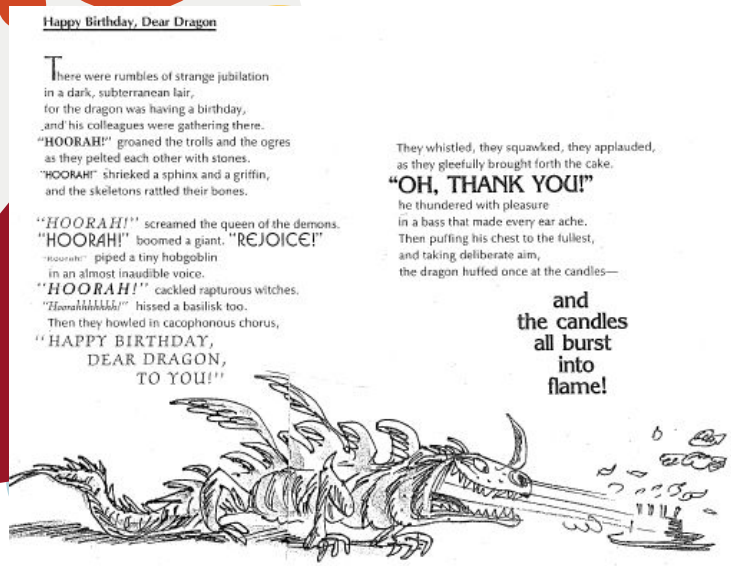
-responds to original prompt (supported by interpretation of evidence collected or resolves any confusing conflicting information)

Helping Students Engage in Cognitively Complex Tasks
Focus Statement: Teacher coaches and supports students in complex tasks that require experimenting with the use of their knowledge by generating and testing a proposition, a theory, and/or a hypothesis.
Desired Effect: Evidence (formative data) demonstrates students prove or disprove the proposition, theory, or hypothesis.

CCT: Inventing

When you hear the word “inventing” what comes to your mind?

4th Grade ELA



Happy Birthday, Dear Dragon

There were rumbles of strange jubilation
in a dark, subterranean lair,
for the dragon was having a birthday,
and his colleagues were gathering there.
"HOORAH!" groaned the trolls and the ogres
as they pelted each other with stones.
"HOORAH!" shrieked a sphinx and a griffin,
and the skeletons rattled their bones.

"HOORAH!" screamed the queen of the demons.
"HOORAH!" boomed a giant. "REJOICE!"
"HOORAH!" piped a tiny hobgoblin
in an almost inaudible voice.
"HOORAH!" cackled rapturous witches.
"HOORAH!" hissed a basilisk too.
Then they howled in cacophonous chorus,
"HAPPY BIRTHDAY,
DEAR DRAGON,
TO YOU!"

They whistled, they squawked, they applauded,
as they gleefully brought forth the cake.
"OH, THANK YOU!"
he thundered with pleasure
in a bass that made every ear ache.
Then puffing his chest to the fullest,
and taking deliberate aim,
the dragon huffed once at the candles—

and
the candles
all burst
into
flame!

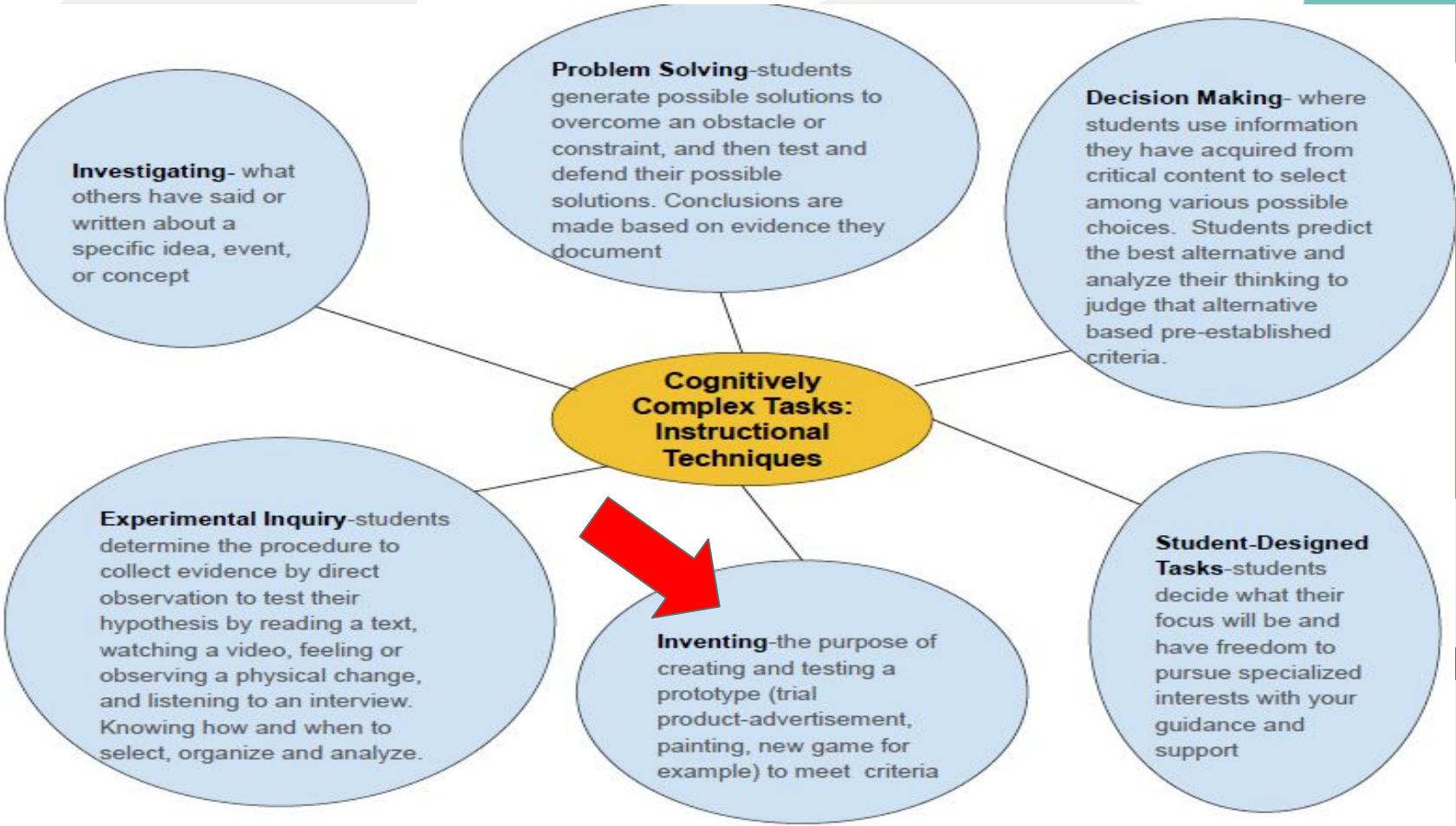
Learning Targets *(write targets from each level of the scale below)*		
2.0 Foundational Knowledge & Skills ***Level of Taxonomy**	**3.0 Learning Target/Objective** ***Level of Taxonomy**	**4.0 More Complex Knowledge** ***Level of Taxonomy**
I know and can define poems, dramas, or prose and the structural elements of each. *Retrieval	Explain the overall structure and major differences between poetry, drama and prose. *Analysis	I can construct an argument to defend a claim about a poem, drama, or prose. *Knowledge Utilization

Fourth grade ELA team found a poem, Happy Birthday, Dear Dragon, that has BOTH elements of a poem and a prose. Teachers will pose a scenario, where students will have to defend a claim with evidence. The scenario: Ben thinks Happy Birthday, Dear Dragon is a poem. While Nate thinks Happy Birthday, Dear Dragon is a prose. Who do you think is right? Write you claim and defend with evidence.

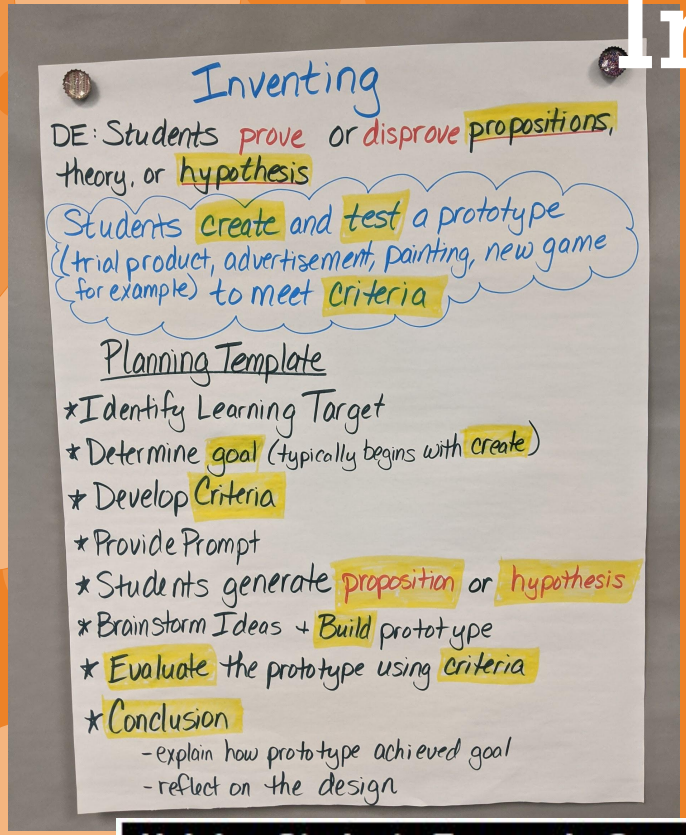
Student will write their hypothesis and defend with evidence (Grounds and Backing). Students will also write ways to discredit the other person's point of view (qualifiers).

The final conclusion allows students to revisit their initial claim and state whether they are able to support their claims, using information from their text evidence to explain why.

Types of Cognitively Complex Tasks



Inventing



*Identify Learning Target

*Determine goal (typically begins create)

*Develop Criteria

*Provide Prompt

*Students generate proprosition or hypothesis

*Brainstorm Ideas & build prototype

*Evaluate the prototype using criteria

*Conclusion

Helping Students Engage in Cognitively Complex Tasks
Focus Statement: Teacher coaches and supports students in complex tasks that require experimenting with the use of their knowledge by generating and testing a proposition, a theory, and/or a hypothesis.
Desired Effect: Evidence (formative data) demonstrates students prove or disprove the proposition, theory, or hypothesis.

CCT: Inventing

ELA
*Identify Learning Target (Text Features)
*Goal: Create sketch
*Criteria: What does the teacher expect so students are successful?
*Prompt/Hypothesis

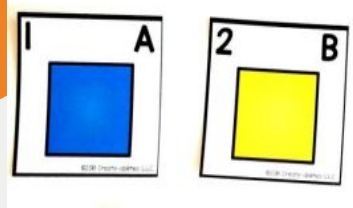
Math
*Identify Learning Target (Area Word Problems)
*Goal: Create game
*Criteria: What does the teacher expect so students are successful?
*Prompt/Proposition

CCT: Inventing

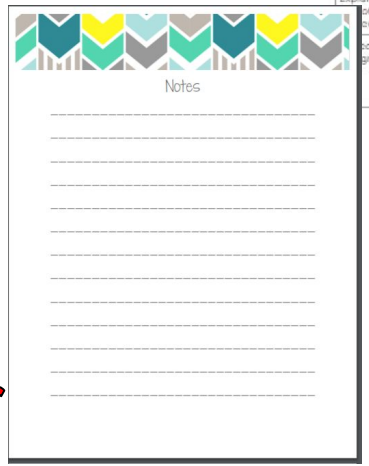
Read Inventing CCT
*Identify Learning Target (Text Features)
*Goal: Create sketch/game
*Criteria: What does teacher expect so students are successful?

Planning Template for a Seventh-Grade Math Lesson

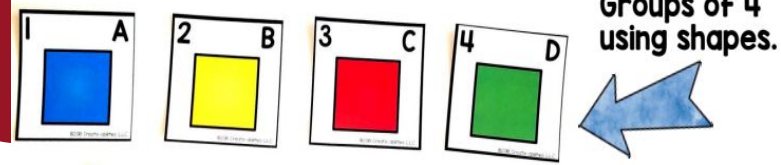
Steps	Teacher Notes
Identify the learning target	The learning for this example is solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms (CCSS-Math 7 G.6)
Determine a goal	Create a math game in which participants solve word problems and equations for area, surface area, and volume
Develop Criteria	The following criteria are provided for students: The game features word problems and equations for students to solve for • area • surface area • volume
Provide a prompt	Create a math game in which participants solve real word problems and equations for area, surface area, and volume.
Proposition	Students generate sentences about proposed invention based on prompt: • I think my design will achieve the goal because.... • The prototype I designed will achieve the goal because....
Brainstorm ideas	Students brainstorm word problems and equations for a game.
Design a prototype	Students create word problems and equations they can include in their game and get feedback from their peers as to whether the problems meet the criteria.
Build the prototype	Students use the feedback to make their game.
Evaluate the prototype using criteria	The teacher asks students to state how the word problems and equations in the game meet the criteria.
Review the prototype	If students find the word problems and equations in their game do not meet the criteria, they revise their game.
Explain how the [illegible]totype [illegible]ieved the goal	Students explain how the game asks participants to solve problems and equations involving area, surface area, and volume.
[illegible]ect on the [illegible]gn	Students answer questions: *Did you have to redesign any part of your game? How did the redesign better achieve the criteria? How could you change the game to more effectively help players solve word problems and equations involving area, surface area, and volume?*



Same Shape Partner



CCT: Inventing



FF: Can you envision using this CCT in your classroom? How?

1. What is the goal of the invention/prototype?
2. How are students providing a hypothesis/proposition?
3. What criteria will help students achieve goal?
4. Why do you think S are asked to revise their text features/math word problems?

CCT: Inventing

Math/ELA CCT

*What did students create (goal)?

*Criteria: What does teacher expect so students are successful?

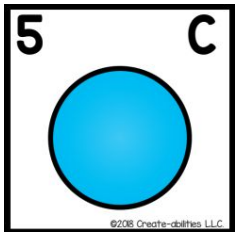
*How did students revise?

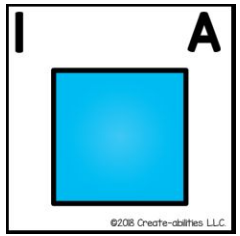
Planning Template for a Seventh-Grade Math Lesson

Steps	Teacher Notes
Identify the learning target	The learning for this example is solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms (CCSS-Math 7.G.6)
Determine a goal	Create a math game in which participants solve word problems and equations for area, surface area, and volume
Develop Criteria	The following criteria are provided for students: The game features word problems and equations for students to solve for • area • surface area • volume
Provide a prompt	Create a math game in which participants solve real word problems and equations for area, surface area, and volume.
Proposition	Students generate sentences about proposed invention based on prompt: • I think my design will achieve the goal because.... • The prototype I designed will achieve the goal because....
Brainstorm ideas	Students brainstorm word problems and equations for a game.
Design a prototype	Students create word problems and equations they can include in their game and get feedback from their peers as to whether the problems meet the criteria.
Build the prototype	Students use the feedback to make their game.
Evaluate the prototype using criteria	The teacher asks students to state how the word problems and equations in the game meet the criteria.
Review the prototype	If students find the word problems and equations in their game do not meet the criteria, they revise their game.
Explain how the prototype achieved the goal	Students explain how the game asks participants to solve problems and equations involving area, surface area, and volume.
Reflect on the design	Students answer questions: *Did you have to redesign any part of your game? How did the redesign better achieve the criteria? How could you change the game to more effectively help players solve word problems and equations involving area, surface area, and volume?*

Planning Template for a Third-Grade Reading Lesson

Steps	Teacher Notes
Identify the learning target	The learning target for this example is use text features and search tools (e.g. key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently (CCSS-ELA-RI3.5) Note: The learning target for this example goes beyond the above standard because students actually create their own text features, which is an extension of this standard.
Determine a goal	Create a text feature to be used with a selection of text.
Develop criteria	Provide criteria for students. The text feature • Is chosen based on the type of information in it • Includes information from the text • Clarifies the text
Provide a prompt	The text features from your passage have been removed. Predict one text feature the author might have used to enhance understanding of your passage. Sketch these features.
Hypothesis	Students generate a hypothesis based on the prompt • I predict_____ • One text feature the author might have used to enhance understanding of the passage is _____
Brainstorm ideas	Students read the passage, look through the list of possible text features, and decide which one they think will work best for their passage.
Design a prototype	Students sketch and create their text features and then share the sketches and passage with another group to gain feedback.
Build the prototype	Students use the feedback to make final revisions to their drawings.
Evaluate the prototype using criteria	Students are asked to • Explain how that text feature is the most appropriate one for the passage • Highlight the information in the passage that is in the text feature • Explain what the text feature is saying
Revise the prototype	If students find their prototypes do not match the criteria, they revise their prototypes.
Explain how the prototype achieved the goal	Students explain how the text features correspond with and clarify the passage.





Color partners

Develop and Apply ~ Ticket Out

ELA and Math Groups:

What grade level standards align to Inventing Cognitively Complex Tasks?

Brainstorm ideas & write your ELA/Math thoughts