

THE THINKING GUIDE:

A Depth & Complexity Student Workbook

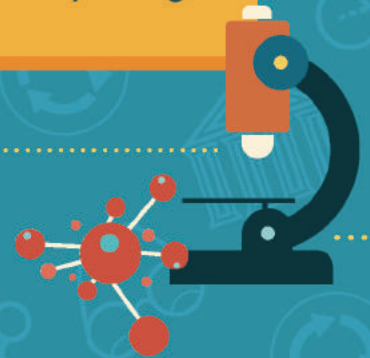


SCIENCE

Students are immersed in the 5e model with Depth & Complexity!

ENGAGE

EVALUATE



ELABORATE



EXPLAIN



EXPLORE



The Depth and Complexity Workbook consists of content that is the copyrighted intellectual property of J Taylor Education, Inc. By using this product, you agree to J Taylor Education, Inc.'s licensing and subscription agreement. The licensing agreement allows you to use the Depth and Complexity Workbook only in your classroom with your students. Sharing any of the files that comprise the Depth and Complexity Workbook including making copies and renaming any of the pages, with other teachers, schools, school districts or other individuals is strictly prohibited under U.S. Copyright laws without the written consent of J Taylor Education, Inc.

Copyright questions? Please contact us at:
info@jtayloreducation.com or 951-837-0243.



Depth & Complexity Icons, © 2006 J Taylor Education

SCIENCE

The Workbook is a useful tool to support classroom learning. Each page of the workbook incorporates elements of the Depth and Complexity framework in order to facilitate authentic engagement, critical thinking, and open-endedness for students.

The primary objective of the Depth and Complexity framework is to provide students with challenging learning opportunities by applying thinking processes to the study of the core curriculum. The icons of Depth and Complexity and Content Imperative Icons are prompts used to initiate a more advanced and extensive thinking process. Students will be engaged and appropriately challenged as they work through the activities and formulate understanding of subject matter.

The differentiated activities in this workbook are open-ended making the content accessible and appropriate for all levels of learners. All activities blend iconic prompts and critical thinking with grade level content.

This workbook contains 6 differentiated activities for each phase of the 5E instructional model as well as blank note pages and culminating CER writing activity. It is recommended that students work through each page, completing all of the activities, over the course of a unit. However, this workbook does not need to be completed in any order; the classroom teacher may select activities to support learning of content.



Table of Contents

Thinking Tools: The Icons of Depth and Complexity	3
Unit 1	
ENGAGE: Ponder	4
EXPLORE: Conversational Roundtable	5
EXPLAIN: Cause and Effect	6
ELABORATE: Prompting Pathways	7
EVALUATE: Frame	8
NOTES	9
CLAIM EVIDENCE REASONING: Writing Organizer	10
CLAIM EVIDENCE REASONING: Writing	11
Unit 2	
ENGAGE: Beaker Brain Dump	12
EXPLORE: Recognizing Patterns	13
EXPLAIN: Analyzing a Topic	14
ELABORATE: Making Connections	15
EVALUATE: Pick Your Product	16
NOTES	17
CLAIM EVIDENCE REASONING: Writing Organizer	18
CLAIM EVIDENCE REASONING: Writing	19
Unit 3	
ENGAGE: Iconic Questions	20
EXPLORE: Patterns Over Time	21
EXPLAIN: Iconic Thoughts	22
ELABORATE: Breaking It Down	23
EVALUATE: Creating a Rubric	24
NOTES	25
CLAIM EVIDENCE REASONING: Writing Organizer	26
CLAIM EVIDENCE REASONING: Writing	27
Unit 4	
ENGAGE: Converging Ideas	28
EXPLORE: Expert Perspective	29
EXPLAIN: Proving the Big Idea	30
ELABORATE: Thinking Process	31
EVALUATE: Lesson Writing	32
NOTES	33
CLAIM EVIDENCE REASONING: Writing Organizer	34
CLAIM EVIDENCE REASONING: Writing	35
Unit 5	
ENGAGE: Conversational Roundtable	36
EXPLORE: Notes Guide	37
EXPLAIN: Choose Your Own	38
ELABORATE: Connections and Questions	39
EVALUATE: 3 - 2 - 1	40
NOTES	41
CLAIM EVIDENCE REASONING: Writing Organizer	42
CLAIM EVIDENCE REASONING: Writing	43
Unit 6	
ENGAGE: Unanswered Questions	44
EXPLORE: Information Sorting	45
EXPLAIN: Discovering Details	46
ELABORATE: Related Topics	47
EVALUATE: Expert Roundtable	48
NOTES	49
CLAIM EVIDENCE REASONING: Writing Organizer	50
CLAIM EVIDENCE REASONING: Writing	51
Independent Study	52

Thinking Tools: The Icons of Depth and Complexity and the Content Imperatives

Name	Icon	Definition	“Verb” It is the process of...
Big Idea		The generalization, principles, and theories that distinguish themselves from the facts and concepts of the area or discipline under study.	Gathering all the information and details to generalize the main idea.
Details		Specific characteristics that describe a concept, theory, or even a fact.	Identifying the important items in an area of study.
Unanswered Questions		The ambiguities and gaps of information recognized within an area or discipline under study.	Determining what is still unknown or ambiguous while providing room to make a prediction in an area of study.
Patterns		Recurring events represented by details; sequences of order of events.	Examining commonalities that repeat or are easily predictable.
Trends		Refers to factors that influence events; political, social, economic, or religious factors that influence / create a pattern.	Analyzing commonalities of human influence that repeat or are easily predictable in an area of study.
Ethics		The controversial issues that plague an area of study; moral values involved; biases that exist.	Judging the degree of right or wrong, good or bad; all depend on the perspective.
Rules		The natural or person-made structure or order of things that explains the subject in study.	Looking for structure and / or order in an area of study.
Language of the Discipline		The specific specialized and technological terms associated with a specific area of study.	Analyzing, identifying, and interpreting the content-specific vocabulary.
Over Time		The understanding of time as an agent of change and recognition that the passage of time changes our knowledge of things.	Examining how time affects or changes a concept or area of study.
Across Disciplines		Connections made within, between, and among various areas of study or disciplines.	Examining one curricular area and then finding similarities and connections to other curricular areas.
Multiple Perspectives		The concept that different points of view alter the way ideas and objects are viewed and valued.	Examining or analyzing the different points of view (including thoughts, emotions, values, motives, etc.) in an area of study.
Origin		The beginnings, roots, foundations, or causes.	Understanding, determining, and exploring the emergence of a topic.
Contribution		The lasting effects; the results or product; the influence of a topic, event, or person.	Determining the effects or results of a particular event, action, and / or aspect.
Convergence		Events, items that merged or happened concurrently in order for a particular result to occur.	Examining all of the aspects, details, and factors that come together in order for something to occur or exist.
Parallel		The similarities, events, people, problems, principles, that compare or correspond; compare or correspond events, people, problems, and principles.	Analyzing the commonalities and differences between two or more aspects.
Paradox		Contradictions regarding opinion, statement, events, situation, or area of study; opposites.	Examining the simultaneous duality between two concepts or two aspects.

ENGAGE

During the first phase of the 5E instructional model, teachers are activating students' prior knowledge. The “*ENGAGE*” activities provide multiple opportunities for students to ask questions, share information, and collaborate with others.

Example Activity:

The “*ENGAGE: Ponder*” activity provides students space to do a “brain dump” to detail all of their prior knowledge. You may choose the icon for focus. Students write and/or illustrate what they already know about the topic.

Workbook

ENGAGE: Ponder Date: _____

Directions: What do you already know about this topic? What connections come to mind? What do you wonder? Draw an icon in the box. Use the icon to guide and record your thinking.

TOPIC: _____

PONDER

ICON



Student Sample Work

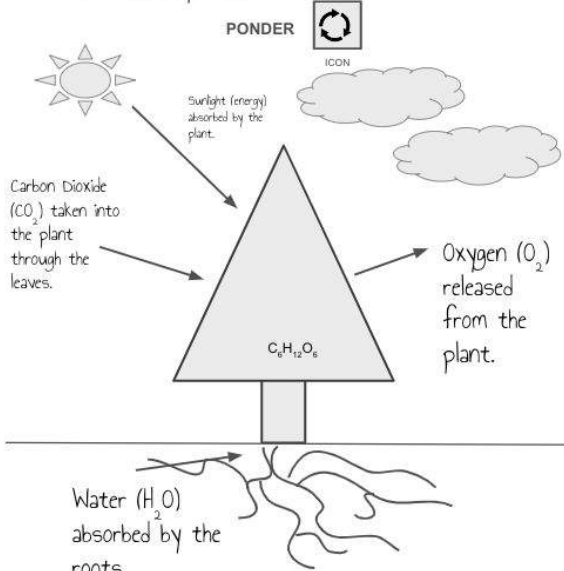
ENGAGE: Ponder Date: _____

Directions: What do you already know about this topic? What connections come to mind? What do you wonder? Draw an icon in the box. Use the icon to guide and record your thinking.

TOPIC: Photosynthesis

PONDER

ICON



EXPLORE

During the second phase of the 5E instructional model, teachers are facilitating exploration, investigation, and problem-solving of the concept. The “*EXPLORE*” activities provide multiple opportunities for students to investigate, collaborate, and test predictions.







Example Activity:

The “*EXPLORE: Notes Guide*” activity provides students space to take notes as they learn information. Students use the icon prompts in the cue column to formulate specific questions. Students then summarize all information.

Workbook

EXPLORE: Notes Guide Date: _____

Directions: Use the icons to prompt and guide your thinking.







Title/Topic:	
<p>Cues:</p>    	<p> Notes:</p>
<p> Summary:</p>	

Depth & Complexity Icons, © 2006 J Taylor Education 37

Student Sample Work

EXPLORE: Notes Guide Date: _____

Directions: Use the icons to prompt and guide your thinking.

Title/Topic: Rocks and the Rock Cycle	
<p>Cues:</p>    	<p> Notes:</p> <ul style="list-style-type: none"> • Rocks are made of a lot of minerals. • Classified by how they were made or formed. • Igneous rock: formed by volcanoes/magma that erupts and hardens and cools down. Examples - basalt and granite. • Metamorphic rock: formed by heat and pressure inside the Earth's crust, usually made from other types of rocks. Examples - slate and marble. • Sedimentary rock: formed by years of sediments being compacted together to become hard. Examples - shale and limestone. • It takes millions of years for rocks to change. • Rock cycle: a volcano erupts magma and it cools into igneous rock, the rock is weathered and broken down into sediment, sediment builds up and is compacted into sedimentary rock, these rocks are covered up and the pressure produces metamorphic rock. • Sometimes the rock cycle doesn't actually follow that order. • Layers of sedimentary rocks are called strata. • Humans use rocks for a lot of things: building, jewelry, roads, makeup. • Petrologists study rocks and how they were formed.
<p>Important words:</p> <ul style="list-style-type: none"> • Sediment and sedimentary • Rock cycle • Igneous • Metamorphic • Weathering and erosion • magma <p>Rocks fall into three categories</p> <p>Rocks are formed by either heat, pressure, or weathering.</p> <p>Rocks are used for a variety of things</p> <p>Why don't all rocks always follow the rock cycle?</p> <p>What causes a change in the rock cycle?</p>	
<p> Summary: Rocks come in many shapes and sizes and are classified into three categories: igneous, metamorphic, and sedimentary. They are composed of a variety of minerals and can be changed by heat, pressure, and weathering. Rocks are a useful part of our everyday lives.</p>	

Depth & Complexity Icons, © 2006 J Taylor Education 1

EXPLAIN

During the third phase of the 5E instructional model, teachers are leading students to build their understanding of the concept. The “EXPLAIN” activities provide multiple opportunities for students to record understanding, explain using evidence, and sharing solutions.

Example Activity:

The “EXPLAIN: Cause and Effect” activity requires that students determine the key details that contribute to the overarching big idea.

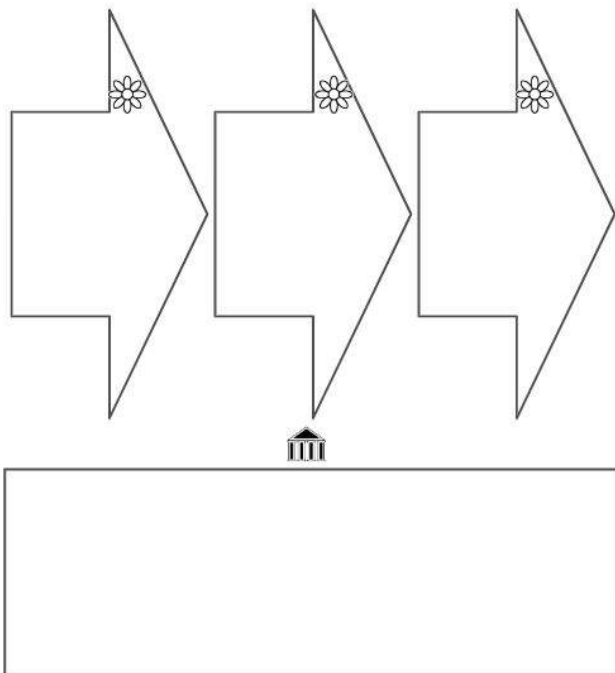
Workbook

EXPLAIN: Cause and Effect

Date: _____

Directions: As you actively explore and investigate this topic, determine the key Details that contribute to the Big Idea. The Details are the cause and the Big Idea is the effect.

TOPIC: _____



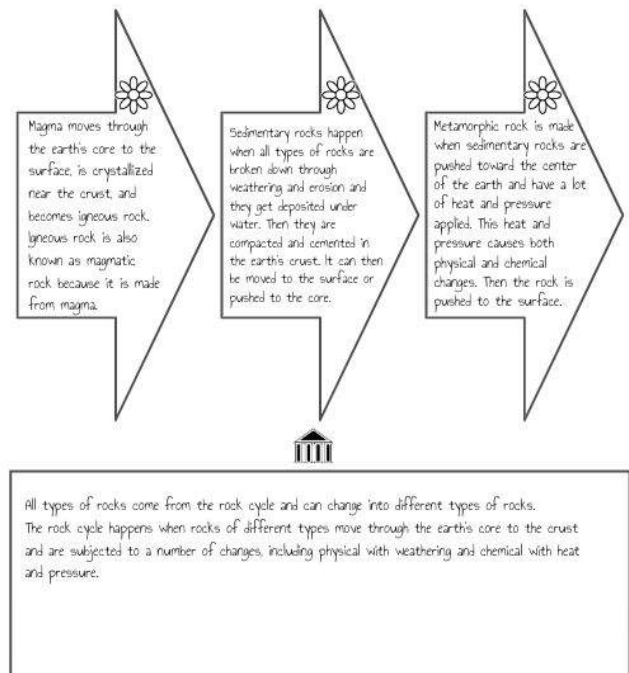
Student Sample Work

EXPLAIN: Cause and Effect

Date: _____

Directions: As you actively explore and investigate this topic, determine the key Details that contribute to the Big Idea. The Details are the cause and the Big Idea is the effect.

TOPIC: The Rock Cycle



ELABORATE

During the fourth phase of the 5E instructional model, teachers are supporting students in applying learning in new situations. The “**ELABORATE**” activities provide multiple opportunities for students to make connections, ask new questions, and apply to new circumstances.

Example Activity:

The “**ELABORATE: Connections and Questions**” activity allows students to analyze the topic with icons of choice (teacher or student). Students may be given the Big Idea and then find evidence to support it OR they can complete the petals first and then create a Big Idea statement. All of the information contributes or leads to more Unanswered Questions.

Workbook

ELABORATE: Connections and Questions Date: _____

Directions: Choose 5 icons and use them to make connections to your topic. Then, using those connections, creating a summary statement about the topic. Finally, record any unanswered questions that you have after exploring the topic...

TOPIC: _____

Depth & Complexity Icons, © 2006 J Taylor Education 39

Student Sample Work

ELABORATE: Connections and Questions Date: _____

Directions: Choose 5 icons and use them to make connections to your topic. Then, using those connections, creating a summary statement about the topic. Finally, record any unanswered questions that you have after exploring the topic...

TOPIC: Pandemic

Depth & Complexity Icons, © 2006 J Taylor Education 39



EVALUATE

During the fifth phase of the 5E instructional model, teachers assess student learning through formative and summative methods. The “*EVALUATE*” activities provide multiple opportunities for students to measure their own understanding, give and receive feedback, and present information.

Example Activity:

The “*EVALUATE: 3 - 2 - 1*” activity provides students with an opportunity to measure their own understanding of the topic. This also may be used as a summative or formative assessment for the teacher. Icons may be self-selected or teacher selected.

Workbook

EVALUATE: 3 - 2 - 1

Date: _____

Directions: For each section, circle an icon to use to evaluate your topic. Use the icons to guide and prompt your thinking. In the top box write 3 pieces of evidence related to that icon. In the second box, write 2. In the last box, write 1.

TOPIC: _____

3	
2	
1	

Student Sample Work

EVALUATE: 3 - 2 - 1

Date: _____

Directions: For each section, circle an icon to use to evaluate your topic. Use the icons to guide and prompt your thinking. In the top box write 3 pieces of evidence related to that icon. In the second box, write 2. In the last box, write 1.

TOPIC: Invasive Species

3	<ol style="list-style-type: none"> 1. Invasive species take over the places that they are introduced 2. There are not natural predators to invasive species so they are able to spread unchecked 3. Over time entire ecosystems can collapse because of the disruptions from invasive species
2	<ol style="list-style-type: none"> 1. The killing of an invasive species is an ethical dilemma for those who do not wish to harm animals 2. There is an ethical dilemma in how to stop an invasive species. Researchers question if they are able to bring in a non-native predator to help.
1	<ol style="list-style-type: none"> 1. From my perspective, invasive species are causing too much damage to an ecosystem that they enter and humane solutions need to be found in order to reduce their impact on the environment.



CER

Claim, Evidence, Reasoning (CER) is the goal in science. Students explain their thinking, justify with evidence, and use scientific reasoning. Each set of the 5E activities contains this culminating activity. The “CER” pages include two pages: prewrite and final draft.

Prewrite/Organizer Sample 1

CLAIM EVIDENCE REASONING: Writing Organizer Date: _____

What is the Question or Prompt: _____

What is your Claim? Answer: _____

Cite Evidence Use an icon of your choice to analyze and gather evidence of the topic.	Explain Explain how the evidence supports and connects your big idea.
•	•
•	•
•	•
•	•
•	•

Depth & Complexity Icons, © 2006 J Taylor Education 10

Final Draft Sample 1

CLAIM EVIDENCE REASONING: Writing Date: _____

Directions: Use the information from page 10 to plan and write your response.

What is the Question or Prompt: _____

Claim: _____

Evidence: _____

Explain: _____

Depth & Complexity Icons, © 2006 J Taylor Education 11

Prewrite/Organizer Sample 2

CLAIM EVIDENCE REASONING: Writing Organizer Date: _____

1. What is the essential question of this investigation?

2. What language or vocabulary is needed to understand this topic or investigation?

3. What are the relevant data, observations, and information from the investigation?

4. What trends and/or patterns exist in the resources?

5. Why are the details, trends, and patterns important to this topic?

6. What is the main point or answer to the essential question?

Depth & Complexity Icons, © 2006 J Taylor Education 10

Final Draft Sample 2

CLAIM EVIDENCE REASONING: Writing Date: _____

Directions: Use the information from page 10 to plan and write your response.

Claim: What is your answer to the essential question of this investigation?

Evidence: What details , trends , and/or patterns found within the resources support your claim?

Reasoning: Explain why and how your evidence supports your claims?

Depth & Complexity Icons, © 2006 J Taylor Education 11

