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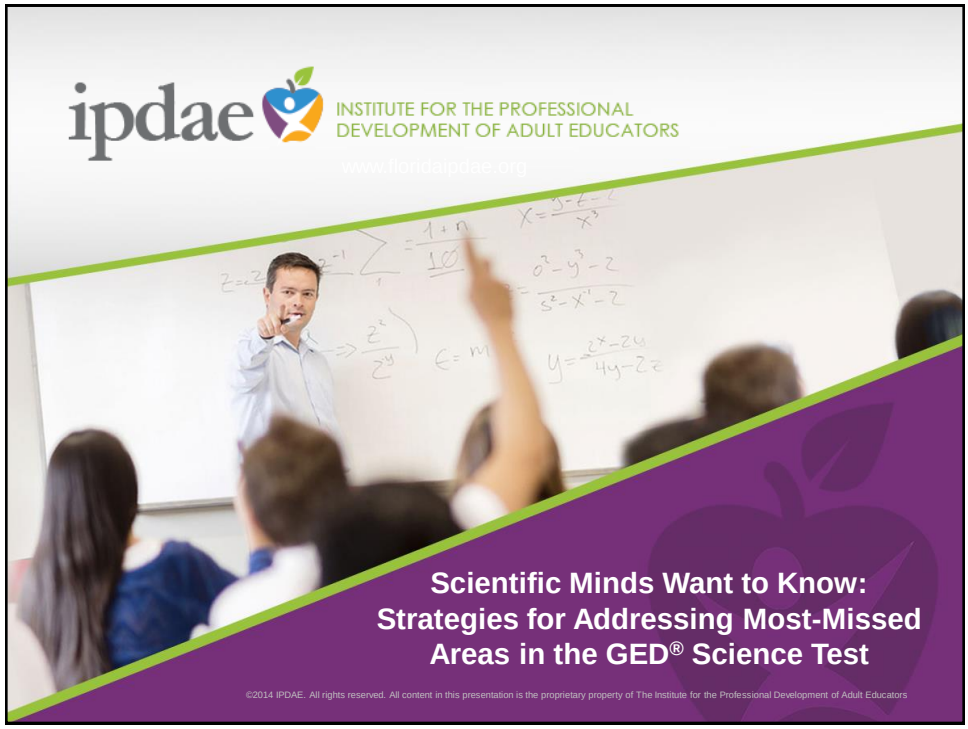


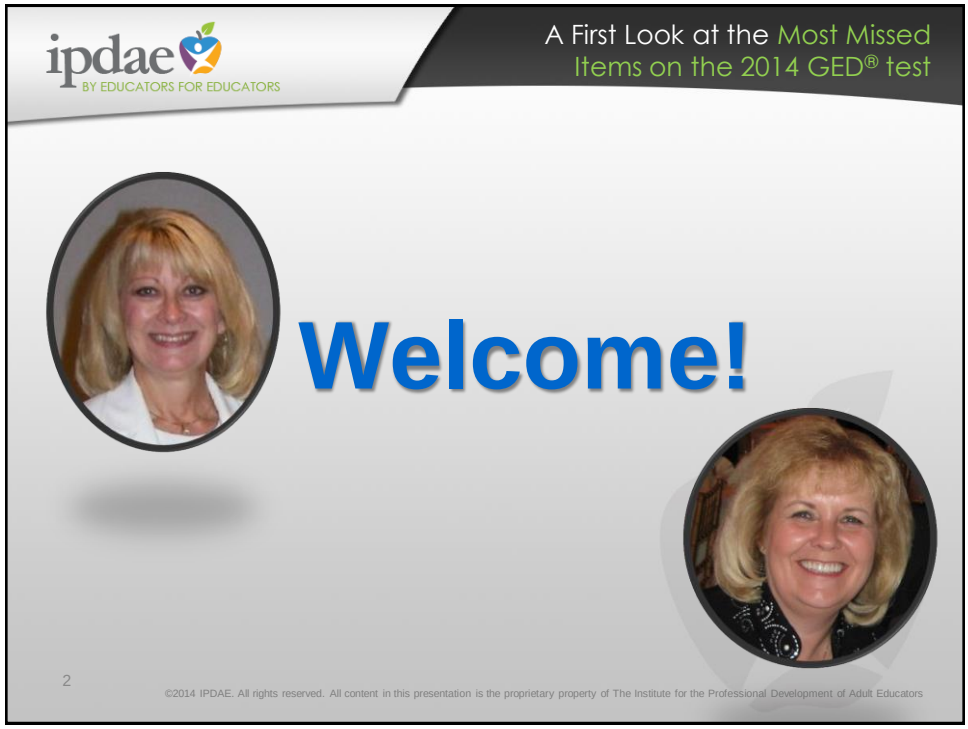

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## Objectives of Webinar

In this session, we will:

- Review science most-missed items
- Identify strategies and activities to help students overcome challenges in science
- Share online resources for local programs and adult educators

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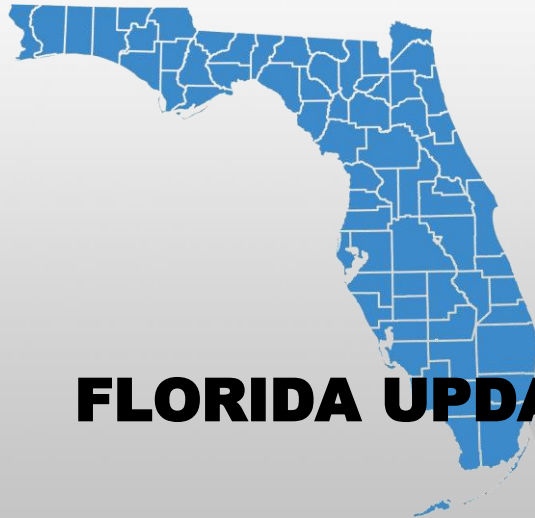

# FLORIDA UPDATE

4

## Florida Stats

| Module | Passing Percentage | Average Passing Score | Average non-Passing Score |
|---|---|---|---|
| RLA | 76% | 159 | 144 |
| Social Studies | 67% | 158 | 143 |
| Science | **72%** | **158** | **144** |
| Math | 54% | 156 | 143 |

10/2014

5



## 2014 Performance Levels

- **Performance Level 1**: scores below the Passing Standard (100-149)
- **Performance Level 2**: scores at or above the Passing Standard – **High School Equivalency** (150-169)
- **Performance Level 3**: performance indicative of college and career-readiness **GED® Score with Honors** (170 and above)

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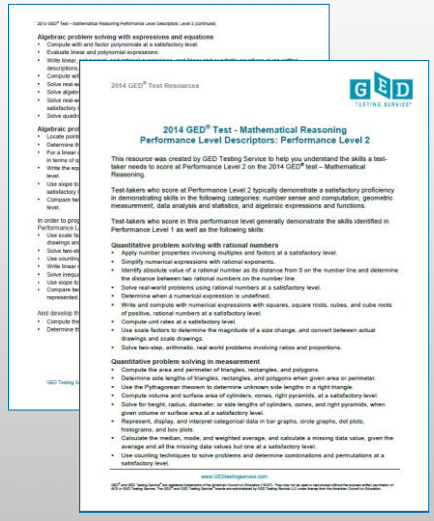
## PLDs


2014 GED® Test Resources

2014 GED® Test - Mathematical Reasoning
Performance Level Descriptors: Performance Level 2

This resource was created by GED Testing Service to help you understand the skills a test-taker needs to score at Performance Level 2 on the 2014 GED® test – Mathematical Reasoning.

Test-takers who score at Performance Level 2 typically demonstrate a satisfactory proficiency in demonstrating skills in the following categories: number sense and computation, geometric measurement, data analysis and statistics, and algebraic expressions and functions.

Test-takers who score in this performance level generally demonstrate the skills identified in Performance Level 1 as well as the following skills:

**Quantitative problem solving with rational numbers**

- Apply number properties involving multiples and factors at a satisfactory level.
- Simplify numerical expressions with rational exponents.
- Identify absolute value of a rational number as its distance from 0 on the number line and determine the distance between two rational numbers on the number line.
- Solve real-world problems using rational numbers at a satisfactory level.
- Determine when a numerical expression is undefined.
- Write and compute with numerical expressions with squares, square roots, cubes, and cube roots of positive, rational numbers at a satisfactory level.
- Compute unit rates at a satisfactory level.
- Use scale factors to determine the magnitude of a size change, and convert between actual drawings and scale drawings.
- Solve two-step, arithmetic, real world problems involving ratios and proportions.

**Quantitative problem solving in measurement**

- Compute the area and perimeter of triangles, rectangles, and polygons.
- Determine side lengths of triangles, rectangles, and polygons when given area or perimeter.
- Use the Pythagorean theorem to determine unknown side lengths in a right triangle.
- Compute volume and surface area of cylinders, cones, right pyramids, at a satisfactory level.
- Solve for height, radius, diameter, or side lengths of cylinders, cones, and right pyramids, when given volume or surface area at a satisfactory level.
- Represent, display, and interpret categorical data in bar graphs, circle graphs, dot plots, histograms, and box plots.
- Calculate the median, mode, and weighted average, and calculate a missing data value, given the average and all the missing data values but one at a satisfactory level.
- Use counting techniques to solve problems and determine combinations and permutations at a satisfactory level.

www.GEDtestingservice.com

Use PLDs to

- Assess student's current skill level
- Determine when student is ready to test
- Shape learning activities
- Add perspective to lesson plans

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# CHALLENGES IN SCIENCE

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## Science Practices

| | Science Practices |
|---|---|
| | Comprehending scientific presentations |
| | Investigation design (experimental and observational) |
| | Reasoning from data |
| ✓ | Evaluating conclusions with evidence |
| ✓ | Working with findings |
| ✓ | Expressing scientific information |
| ✓ | Scientific theories |
| | Probability and statistics |

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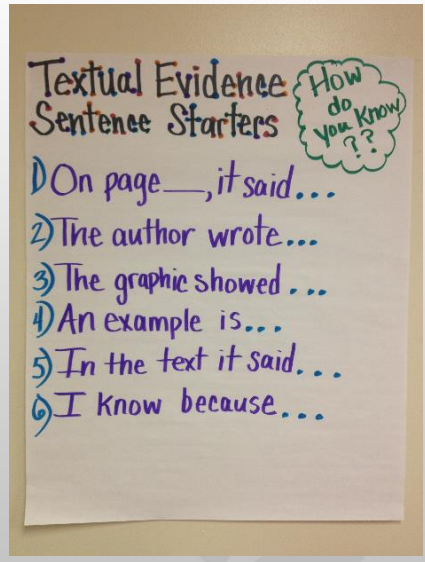
## Science Most Missed Items

Pull specific evidence from a written source to support a finding or conclusion

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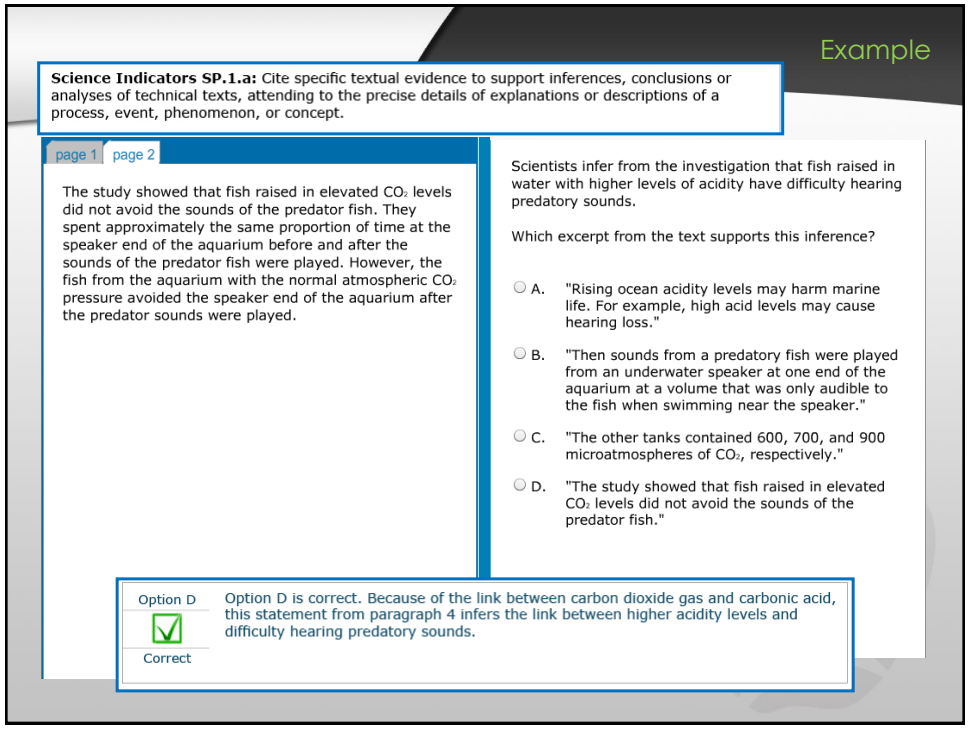
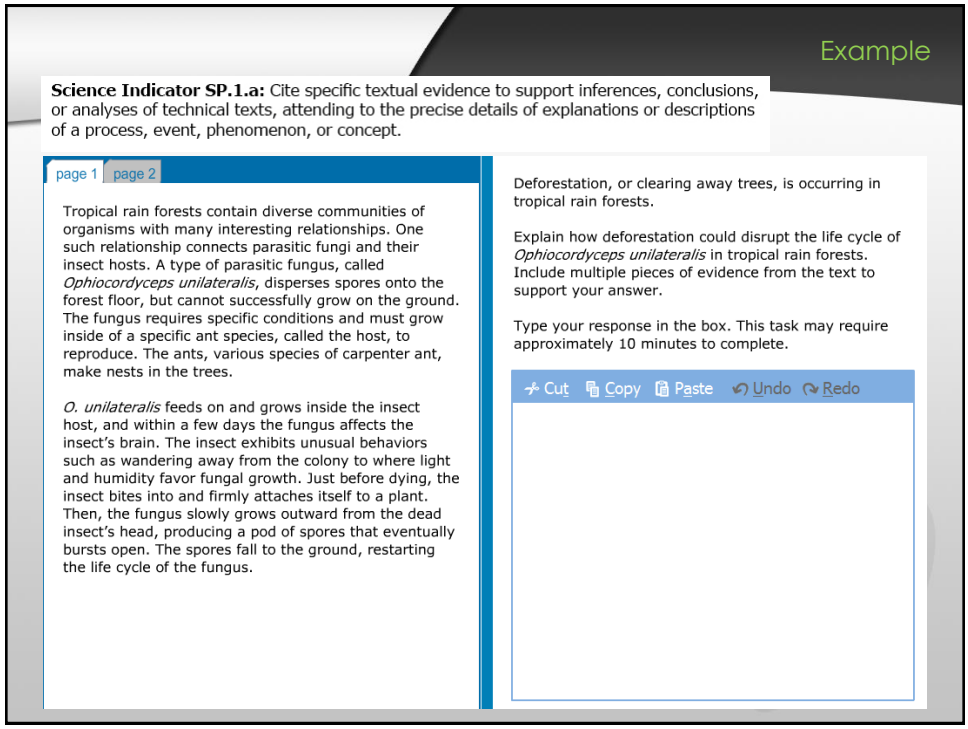

Example
Science Indicators SP.1.a: Cite specific textual evidence to support inferences, conclusions or analyses of technical texts, attending to the precise details of explanations or descriptions of a process, event, phenomenon, or concept.
page 1
page 2
The study showed that fish raised in elevated $CO_2$ levels did not avoid the sounds of the predator fish. They spent approximately the same proportion of time at the speaker end of the aquarium before and after the sounds of the predator fish were played. However, the fish from the aquarium with the normal atmospheric $CO_2$ pressure avoided the speaker end of the aquarium after the predator sounds were played.
Scientists infer from the investigation that fish raised in water with higher levels of acidity have difficulty hearing predatory sounds.
Which excerpt from the text supports this inference?
A. "Rising ocean acidity levels may harm marine life. For example, high acid levels may cause hearing loss."
B. "Then sounds from a predatory fish were played from an underwater speaker at one end of the aquarium at a volume that was only audible to the fish when swimming near the speaker."
C. "The other tanks contained 600, 700, and 900 microatmospheres of $CO_2$, respectively."
D. "The study showed that fish raised in elevated $CO_2$ levels did not avoid the sounds of the predator fish."
Option D
Correct
Option D is correct. Because of the link between carbon dioxide gas and carbonic acid, this statement from paragraph 4 infers the link between higher acidity levels and difficulty hearing predatory sounds.


Example
Science Indicator SP.1.a: Cite specific textual evidence to support inferences, conclusions, or analyses of technical texts, attending to the precise details of explanations or descriptions of a process, event, phenomenon, or concept.
page 1
page 2
Tropical rain forests contain diverse communities of organisms with many interesting relationships. One such relationship connects parasitic fungi and their insect hosts. A type of parasitic fungus, called *Ophiocordyceps unilateralis*, disperses spores onto the forest floor, but cannot successfully grow on the ground. The fungus requires specific conditions and must grow inside of a specific ant species, called the host, to reproduce. The ants, various species of carpenter ant, make nests in the trees.
*O. unilateralis* feeds on and grows inside the insect host, and within a few days the fungus affects the insect's brain. The insect exhibits unusual behaviors such as wandering away from the colony to where light and humidity favor fungal growth. Just before dying, the insect bites into and firmly attaches itself to a plant. Then, the fungus slowly grows outward from the dead insect's head, producing a pod of spores that eventually bursts open. The spores fall to the ground, restarting the life cycle of the fungus.
Deforestation, or clearing away trees, is occurring in tropical rain forests.
Explain how deforestation could disrupt the life cycle of *Ophiocordyceps unilateralis* in tropical rain forests. Include multiple pieces of evidence from the text to support your answer.
Type your response in the box. This task may require approximately 10 minutes to complete.
Cut
Copy
Paste
Undo
Redo

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## Science Most Missed Items

Express scientific information or findings in words

**GED Ready™: The Official Practice Test – Science**

The following pages present the textual stimulus and the prompt for the *Wind Energy* SA item that appears on GED Ready™ – Science.

**Stimulus**

Coal is a fossil fuel commonly used to generate e
for about 45% of the electricity generated. World
from coal. Experts estimate that there is enough

Power plants convert coal into electricity. In a co
the released heat converts water into steam. The
electric generator. The electricity flows through w
delivered to customers or stored for later use.

Burning coal has negative environmental impacts
contain impurities, such as nitrogen and sulfur. W
dioxide, sulfur dioxide, and nitrogen oxides are re
precipitation and increased levels of carbon dioxi
burning fossil fuels like coal.

**Stimulus *(Wind Energy – continued)***

**Differences Between Various Energy Sources**

| Fuel Type | $CO_2$ Emissions per kWh | Power Availability | Ongoing Fuel Costs | Other Environmental Impact |
|---|---|---|---|---|
| Coal | About 200 pounds | 24x7, 365 days per year | Yes | Strip mining & groundwater contamination<br>Airborne mercury contamination<br>Non-renewable fuel source |
| Natural Gas | About 130 pounds | 24x7, 365 days per year | Yes | Non-renewable fuel source |
| Nuclear | Zero | 24x7, 365 days per year | Yes | Extremely dangerous toxic waste<br>Non-renewable fuel source |

**Prompt**

Cite multiple pieces of data from the table that support why wind energy would be a preferred energy source over coal. Explain how a significant increase in the use of wind energy would affect the energy supply of coal.

Type your response in the box. This task may require approximately 10 minutes to complete.

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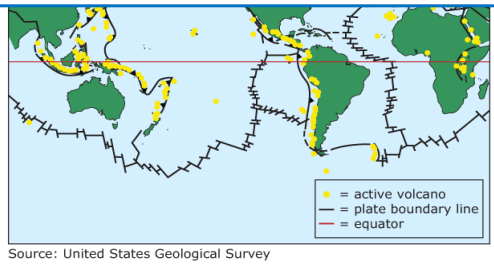
## Example

**Science Indicator SP.6.c:** Express scientific information or findings verbally

The map shows Earth's continents, the outlines of the plates that make up Earth's outer shell, and the locations of volcanoes.

Option C ☑ Correct

Option C is correct. The map shows that volcanoes are mostly located along the black lines on the graph, which represent the plate boundary lines.




Source: United States Geological Survey

Which conclusion can be reached from the information on the map?

- A. Volcanoes are scattered randomly across Earth.
- B. Volcanoes are only located along edges of continents.
- C. Volcanoes are mostly located along boundaries between plates.
- D. Volcanoes are distributed equally in the Northern and Southern Hemispheres.

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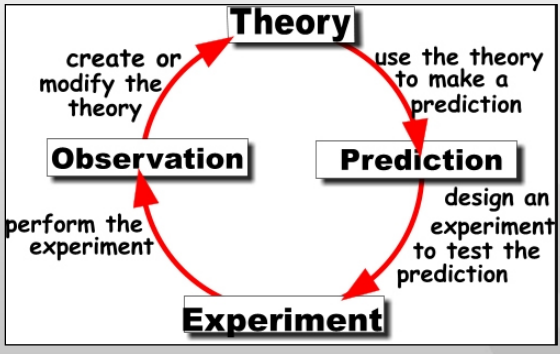
## Science Most Missed Items

Understand and apply scientific models, theories, and processes

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## Example

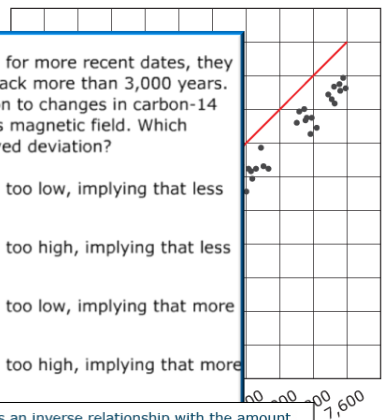
**Science Indicator SP.3.d:** Analyze key issues and assumptions in scientific models, theories, or experiments.

Carbon-14 is a radioactive isotope of carbon that decays at a known rate. Plants take in both carbon-14 and carbon-12 for use in photosynthesis. However, when the plant dies, it can no long
over time the radio
while the carbon-1
results in the ratio
12 decreasing. By
of carbon-12 and c
is possible to deter
sample. The age of
related to the amou
in the sample.

Since some tree sp
of years, it is possi
rings to determine
radiocarbon dating
removed from a pa

In the graph, the d
comparison of one
both carb
line repre
two meas

**Comparison of Radiometric Carbon-14 and Tree Ring Ages**



While the two age measurements agree for more recent dates, they often do not agree for samples dating back more than 3,000 years. Scientists attribute most of this deviation to changes in carbon-14 production caused by changes in Earth's magnetic field. Which statement correctly analyzes the observed deviation?

- A. Radiometric carbon-14 ages are too low, implying that less carbon-14 was present.
- B. Radiometric carbon-14 ages are too high, implying that less carbon-14 was present.
- C. Radiometric carbon-14 ages are too low, implying that more carbon-14 was present.
- D. Radiometric carbon-14 ages are too high, implying that more carbon-14 was present.

Option C ☑ Correct

Option C is correct. The age of a sample has an inverse relationship with the amount of carbon-14 in the sample. Because the radiometric dates on the graph are too low, there must be more carbon-14 than expected in the organism at the time of its death.

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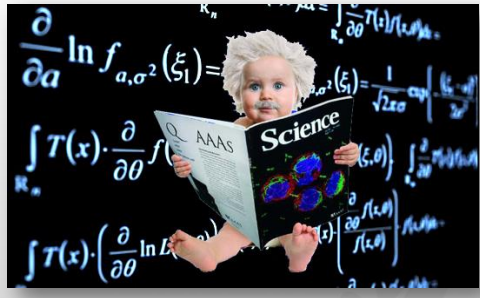


# PUT THE STRATEGIES TO WORK

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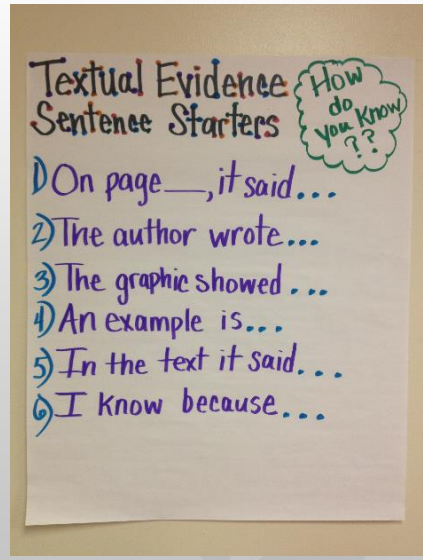
Strategies for the Classroom

Teach students how to:

- Analyze text for claims and evidence in non-fiction (explicit and inferences)
- Answer text-dependent questions

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Strategies for the Classroom

## Breaking It Down

Passage → Analysis/ Conclusion → Evidence/ Details

| | |
|---|---|
| 1 Passage from the text | |
| Your analysis or conclusion | |
| Evidence and details that support or disprove your conclusion | |

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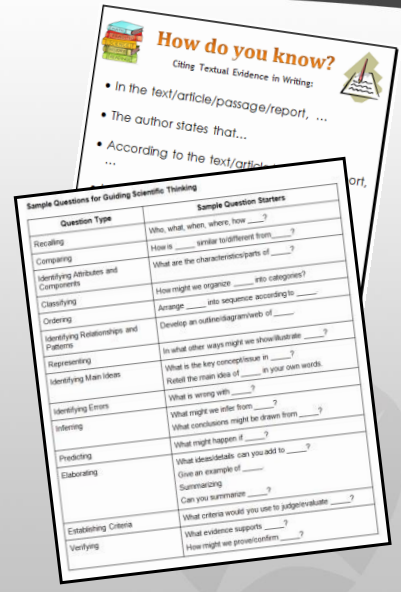
Strategies for the Classroom

## How do you know?

Sentence starters for citing textual evidence

Asking the right question

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## Strategies for the Classroom


Effective instructional strategy that addresses close reading and using text-dependent questions

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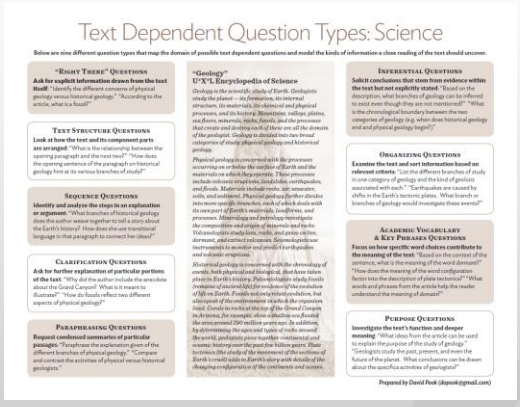
## Strategies for the Classroom



Text Dependent Question Types: Science

Below are nine different question types that map the domain of possible text dependent questions and model the kinds of information a close reading of the text should uncover.

**"Right There" Questions**
**Ask for explicit information drawn from the text itself:** "Identify the different concerns of physical geology versus historical geology." "According to the article, what is a fossil?"

**Text Structure Questions**
**Look at how the text and its component parts are arranged:** "What is the relationship between the opening paragraph and the next two?" "How does the opening sentence of the paragraph on historical geology hint at its various branches of study?"

**Sequence Questions**
**Identify and analyze the steps in an explanation or argument:** "What branches of historical geology does the author weave together to tell a story about the Earth's history? How does she use transitional language in that paragraph to connect her ideas?"

**Clarification Questions**
**Ask for further explanation of particular portions of the text:** "Why did the author include the anecdote about the Grand Canyon? What is it meant to illustrate?" "How do fossils reflect two different aspects of physical geology?"

**Paraphrasing Questions**
**Request condensed summaries of particular passages:** "Paraphrase the explanation given of the different branches of physical geology." "Compare and contrast the activities of physical versus historical geologists."

**"Geology" U*X*L Encyclopedia of Science**
*Geology is the scientific study of Earth. Geologists study the planet — its formation, its internal structure, its materials, its chemical and physical processes, and its history. Mountains, valleys, plates, sea floors, minerals, rocks, fossils, and the processes that create and destroy each of these are all the domain of the geologist. Geology is divided into two broad categories of study: physical geology and historical geology.*

*Physical geology is concerned with the processes occurring on or below the surface of Earth and the materials on which they operate. These processes include volcanic eruptions, landslides, earthquakes, and floods. Materials include rocks, ice, seawater, soils, and sediment. Physical geology further divides into more specific branches, each of which deals with its own part of Earth's materials, landforms, and processes. Mineralogy and petrology investigate the composition and origin of minerals and rocks. Volcanology studies lava, rocks, and gases ejected, dormant, and extinct volcanoes. Seismologists use instruments to monitor and predict earthquakes and volcanic eruptions.*

*Historical geology is concerned with the chronology of events, both physical and biological, that have taken place in Earth's history. Paleontologists study fossils (remains of ancient life) for evidence of the evolution of life on Earth. Fossils not only record evolution, but also speak of the environment in which the organisms lived. Fossils in rocks at the top of the Grand Canyon, in Arizona, for example, show a shallow sea flooded the area around 200 million years ago. In addition, by determining the ages and types of rocks around the world, geologists piece together continental and oceanic history over the past five billion years. Plate tectonics (the study of the movement of the sections of Earth's crust) adds to Earth's story with details of the changing configuration of the continents and oceans.*

**Inferential Questions**
**Solicit conclusions that stem from evidence within the text but not explicitly stated:** "Based on the description, what branches of geology can be inferred to exist even though they are not mentioned?" "What is the chronological boundary between the two categories of geology (e.g. when does historical geology and and physical geology begin)?"

**Organizing Questions**
**Examine the text and sort information based on relevant criteria.** "List the different branches of study in one category of geology and the kind of geologist associated with each." "Earthquakes are caused by shifts in the Earth's tectonic plates. What branch or branches of geology would investigate these events?"

**Academic Vocabulary & Key Phrases Questions**
**Focus on how specific word choices contribute to the meaning of the text.** "Based on the context of the sentence, what is the meaning of the word *oil dormant*?" "How does the meaning of the word configuration factor into the description of plate tectonics?" "What words and phrases from the article help the reader understand the meaning of *domain*?"

**Purpose Questions**
**Investigate the text's function and deeper meaning:** "What ideas from the article can be used to explain the purpose of the study of geology." "Geologists study the past, present, and even the future of the planet. What conclusions can be drawn about the specifics activities of geologists?"

Prepared by David Pook (dpook@gmail.com)

Create text-dependent questions when selecting science texts for lessons.

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*"The limits of my language are the limits of my mind. All I know is what I have words for."*

— Ludwig Wittgenstein

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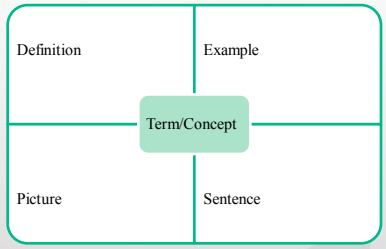
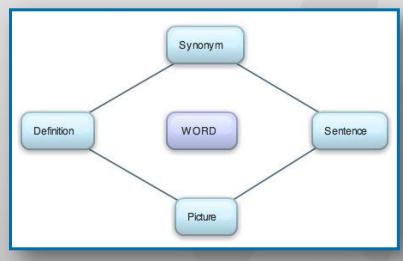
## Strategies for the Classroom

**Content-Area Vocabulary: A Critical Key to Conceptual Learning**

Teach students how to:

- Apply the vocabulary of science
- Discuss the big ideas or concepts of science

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## Strategies for the Classroom

Learning new words is a cumulative task.

- Present words in multiple contexts and multiple meanings words (e.g., variable, matter)
- Use word charts
- Play word games
- Encourage “science talk” brainstorming
- Identify affixes and root words
- Teach words in relation to other words

*Remember, productive vocabulary must extend beyond word definitions.*

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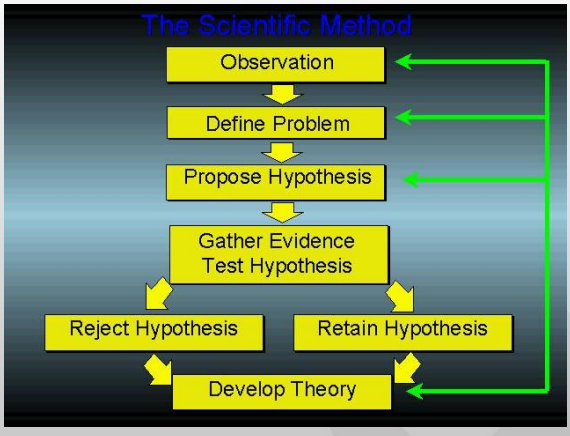
Strategies for the Classroom

Teach experimental design through real-world application and reporting

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Strategies for the Classroom

## Two Short Answer Responses

### Short Answer Type 1
- Respond to textual stimulus material
- Examine relationships

### Short Answer Type 2
- Design a scientific investigation
- Describe the experiment

Remember! Each SA has its own Scoring Rubric and Scoring Tool!

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Strategies for the Classroom

Students need to know how to:
- Design a scientific investigation
- Understand and apply fundamentals of scientific investigation design
- Describe experimental set-up for a controlled experiment
  - Describe method for collecting data
  - Justify line of reasoning to decide if hypothesis is valid

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Strategies for the Classroom

## Three Key Elements

1. Is the experimental design well designed and complete?
2. Is there a method provided for collecting data?
3. Is there an explanation of the criteria for evaluating the hypothesis?


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3 Key Elements

Description of Experiment

**The farmer would have to set up 3 experiments. The first would be a years worth of traditional farming methods (plowing and no cover crop) on 5 x 5 acres of land.** He would have to measure the top soil in every month throughout the year and record it in a data table. For the second experiment the farmer would have to farm a plot of land 5x5 acres using a no-till plan. He would have to measure the top soil every month for a year and record it in a data table. Finally the farmer would farm a 5x5 acres of land with winter cover crop and measure the top soil and record it in a lab table. *At the end of the year the farmer would have to compare the 2 methods agaisnt the traditional methid and determine if he is correct.*

Data Collection System

**Explanation**

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"The meaning of 'knowing' has shifted from being able to remember and repeat information to being able to find and use it."

— National Research Council, 2007



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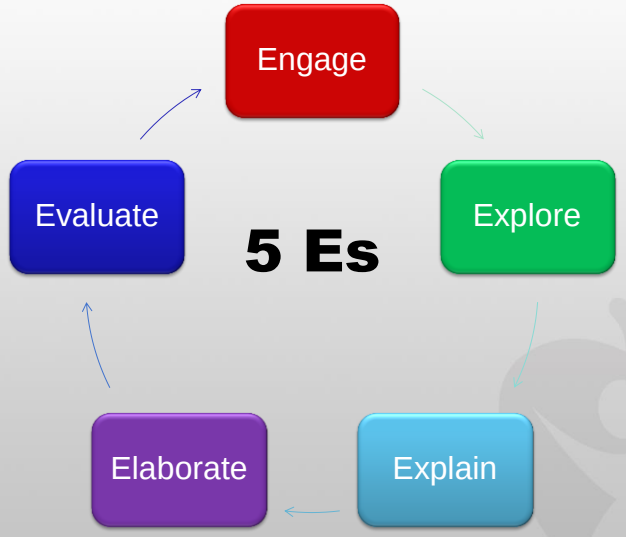
## Teaching the Big Ideas of Science



## 5 Es – The Learning Cycle

Make sure that science lessons

| | |
|---|---|
| **Engage** | students and stimulate their scientific curiosity |
| **Explore** | the meaning of the concept through hands-on activities and questions |
| **Explain** | how a concept applies to real-world situations and is supported by evidence |
| **Elaborate** | on meaning or application in different contexts |
| **Evaluate** | student understanding by providing time for review and reflection |

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## A Final Thought

To increase science reading and writing skills…


"Each student needs to read like a detective…
And write like an investigative reporter."

David Coleman
Co-author of ELA Common Core State Standards

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## A Few Strategies to Get Started

- Dedicate time to close reading and evidence-based writing strategies
- Be *explicit* about how activities and content relate to of science
- Model scientific behaviors, strategies, language
- Integrate questions for scientific brainstorming
- Use videos, pictures, graphics to teach concepts
- Provide time for hands-on science activities and discussion
- Keep students engaged

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## Florida IPDAE Upcoming Events


Putting the Resources to Work in Your Program

# BUILDING YOUR KNOWLEDGE

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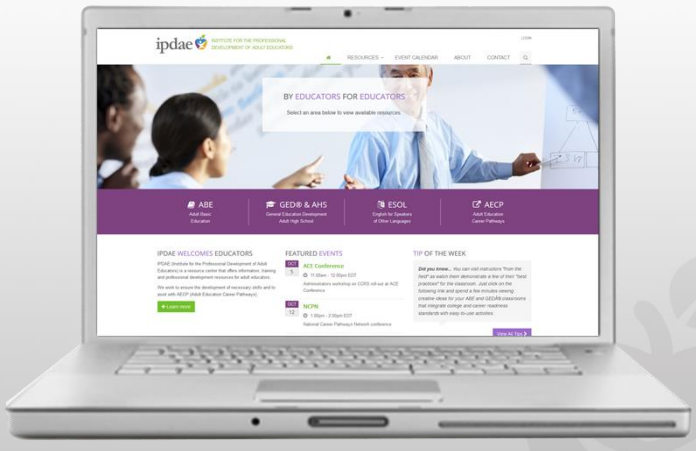
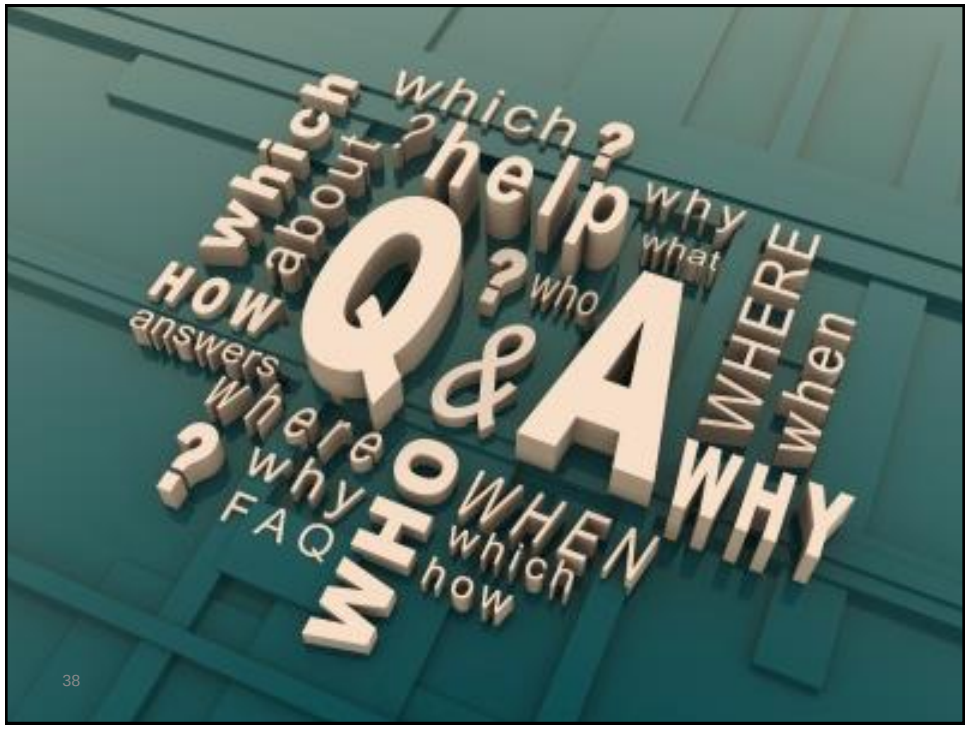
## IPDAE Website




Stay tuned to the IPDAE Website

www.floridaipdae.org





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www.floridaipdae.org

**"The best professional development is ongoing, experiential, collaborative, and connected to and derived from working with students."**

**Edutopia 2014**


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**Susan Pittman**
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