Tools for Promoting Active, In-Depth Learning

Sample Pack

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Second Edition
25 New Tools For:
• Activating Prior Knowledge
• Building Notemaking Skills
• Improving Writing
• Building Vocabulary
• Teaching and Practicing
• Assessing Student Performance

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Give One, Get One

**Purpose:** A technique used to initiate physical movement, to promote divergent thinking, and to generate many ideas quickly.

**Procedure:** The teacher poses a question and asks the students to record two responses. Students stand up and move around the room to make connections with other students. Every time a student “connects” with a new student, he or she needs to give the student a different idea and get another idea in return (new ideas should be added to student’s original list). If both participants have the same ideas, they need to work together to generate a new idea. They then can continue their journey, connecting with other students. The teacher provides the students with a goal for the number of different ideas to collect and a time limit within which they have to collect them. It is important that students are reminded to work with only one student at a time (before they move to another student). Students should not form small groups to collect ideas. The point of the strategy is for students to meet other students and to move from one person to another, sharing and revising ideas.

**STEPS:**

1. The teacher poses a question.
2. Students generate two ideas.
3. The teacher establishes a goal (number of ideas) and time limit (time to collect ideas).
4. Students stand up and “connect” with one other student to give an idea and get a new idea. (If both students have similar ideas, they brainstorm together to generate a new idea.)
5. Students return to their seats when they have met the goal for number of ideas. (They can share ideas in small groups and try to generate two or three additional ideas.)
6. The teacher collects and records ideas to be explored.

**Example:** *How is a leaf like a factory? Generate two (2) ideas. Move around the room, sharing ideas until you have given and collected six (6) additional ideas in two minutes.*
Math Notes

**Purpose:** A tool used to teach students how to use notemaking to examine the components of word problems and to develop thoughtful solutions.

**Procedure:** Word problems are a source of difficulty for many math students. Suddenly, math students have to become careful readers and determine how to set up the problem for themselves. What students need is a systematic way to gather the facts, determine the question, represent the problem, and think through the steps that will yield a solution.

To use Math Notes, the teacher chooses a word problem. Using a blank Math Notes organizer, the teacher helps the students identify the facts of the problem and decide what is missing. Students determine the main question that needs answering and search for hidden questions and assumptions. Next, the students look for a visual way to represent the problem and sketch it. Students identify what steps need to be taken to solve the problem and then solve it on the bottom of their organizer.

It is a good idea to have students keep a notebook of all the problems they solve using Math Notes. That way, when they encounter new problems, they can refer to their notebooks and look for methods they used to solve similar problems.

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**STEPS:**

1. Using a blank Math Notes organizer, the teacher models an example, allowing the students to hear the thinking out loud while breaking the problem down into:
   - The Facts Identify the facts of the problem and decide what is missing.
   - The Question Determine the main question that needs answering and search for hidden questions and assumptions.
   - The Diagram Sketch a visual representation of the problem.
   - The Steps Decide what steps need to be taken to solve the problem.

2. Students practice solving problems using Math Notes and collect their work in a problem-solving notebook.

3. As students encounter new problems, they review their notebooks and look for effective problem-solving models.
**Example:** *Math Notes in Fourth Grade*

**The Problem:** There are six fourth-grade classes in Joyce Kilmer Elementary school. All the classes have 24 students, except for one, which has 25 students. All the fourth-grade students are going on a field trip to the zoo. If vans hold eight students and buses hold 45, determine how many buses and how many vans will be needed to transport all the fourth-graders to the zoo.

<table>
<thead>
<tr>
<th>The Facts</th>
<th>The Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What are the facts?</strong>&lt;br&gt;-Vans hold 8 people.&lt;br&gt;-Buses hold 45 people.</td>
<td><strong>What steps can we take to solve the problem?</strong>&lt;br&gt;-Find out how many people are going on the trip.&lt;br&gt;-See how many will fit in buses because buses hold more people and fewer vehicles make less pollution for the environment.&lt;br&gt;-Put the leftovers in vans.&lt;br&gt;-Count the number of vehicles we used.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Question</th>
<th>The Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What question needs to be answered?</strong>&lt;br&gt;-How many vans and buses does our grade need?</td>
<td><strong>How can we represent the problem visually?</strong>&lt;br&gt;-How many people are going on the trip?&lt;br&gt;-Are empty seats ok?&lt;br&gt;-Should each vehicle be full?</td>
</tr>
</tbody>
</table>

- 8

- 145

- 45
## Math Notes Organizer

<table>
<thead>
<tr>
<th>The Facts</th>
<th>The Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the facts?</td>
<td>What steps can we take to solve the problem?</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>What is missing?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>The Question</td>
<td>The Diagram</td>
</tr>
<tr>
<td>What question needs to be answered?</td>
<td>How can we represent the problem visually?</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any hidden questions that need to be answered?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>The Solution</td>
<td></td>
</tr>
</tbody>
</table>
**4-2-1 Free Write**

**Purpose:** A tool used to review previously taught material and for students to identify collaboratively the one big idea that holds the material together.

**Procedure:** Students are given a 4-2-1 Free Write organizer. Individually, each student identifies the four important ideas previously presented in the lesson, unit of study, or reading. Each student meets with another student to compare ideas and decide on the two most important from their lists of four. The pair then meets with another pair. The groups of four discuss their two ideas and together arrive at a consensus on the single most important idea. The teacher collects and records the big ideas from each group on the board, then selects one from the list. Students free write for five minutes, explaining all that they know about the big idea. After writing, the students return to their groups of four to read and review their free writes, followed by a whole-class discussion about how the big idea has shaped the unit, lesson, or reading.

**STEPS:**

1. Students study information learned in class.
2. Students record the four big ideas individually on their organizer.
3. Students meet in pairs to share their ideas and agree on the two most important ideas from their lists.
4. Student pairs meet with another pair, share their two ideas, and reach a consensus on which idea is the most important.
5. The teacher collects the most important ideas from each student group and records them on the board.
6. The teacher selects the one most important idea and asks each student to free write for 5 minutes. (Write without stopping; if students are stuck, they have to write about why they are stuck. The purpose is for students to explain what they know about the big idea so someone who was not in the class would understand it.)
7. Students return to their groups of four to listen to each other’s written responses.
8. The teacher leads a discussion of the big idea.
4-2-1 Free Write Organizer

Individually: Four Ideas

Pairs: Two Central Ideas

Groups of Four: The One Big Idea

Free Write
**Q-SPACE**

**Purpose:** This set of behaviors, adapted from the work of Strong, Hanson, and Silver (1995), is used when responding to students' answers and will increase the depth of students' thought.

**Procedure:** The way in which teachers receive and respond to students' answers plays an important role in determining the depth and type of thinking that follows. Once a student has responded to a question, the teacher can do one of three things: withhold response, ask further questions, or make a statement. By consciously weaving these options together, the teacher can create a Questing-Space (Q-SPACE) that can be used to deepen and strengthen student thinking. Q-SPACE consists of the following components:

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**COMPONENTS:**

**Question:** The quest is a journey or exploration of content initiated by the posing of a focus question.

**Silence and wait time:** Students need time to think prior to responding, while responding, and following a response. The teacher should wait at least 5 seconds and maintain eye contact before responding. Depending on the type of questions and the thinking required, up to 15 seconds of wait time may be appropriate.

**Probing:** Responding to an answer with another question or request forces students to explain or support their response and will expose as much of the students' thinking as possible.

- *What evidence do you have to support that idea?*
- *Explain how you came to that conclusion.*
- *What do you mean by ___________________?*

**Accepting:** Accepting all answers without judging them is important. If answers are considered provisional, then all answers have the potential for being acceptable. Provisional acceptance of thinking and of communicating the thinking is important.

- *I see.*
- *That's possible.*
- *Let me record your ideas.*
Clarifying and correcting: Take action by paraphrasing a student's response. Clarifying helps students to hear, understand, and reflect upon their own thinking.

- *What I hear you saying...*
- *Can someone else restate what John has said?*

Elaborating and extending: Ask students to expand on an idea. Where probing looks for reasons behind a particular answer, elaborating looks to where the answer might lead. It can also encourage students to make generalizations that unite and explain a variety of data.

- *Can you give another example?*
- *What conclusions can you draw from this?*
Mastery Review

**Purpose:** A tool used to involve all students in reviewing essential content and to correct misunderstandings about content.

**Procedure:** Students are first given the opportunity to study information they have covered in class. Since the brain learns better when information is placed in a context, the teacher then orally reviews the content in a story format, emphasizing what is essential for students to know and understand. Within the story, the teacher periodically frames questions for the students to answer. The students record their responses on paper. While the students are responding, the teacher writes the answer on the board or overhead for the students to use as a check to determine if their responses are correct. The teacher then continues the process of developing the story while increasing the level of difficulty of the questions. At the conclusion of the review, the teacher asks the students to discuss how well they did, to reflect on what they know and understand, and to decide what they need to work on to improve their understanding.

**STEPS:**

1. Students study information learned in class.

2. The teacher narrates a content story and periodically asks a question to the class.

3. Students respond to the question in writing.

4. The teacher records the answer to the question on the board while the students are writing their responses.

5. Students review the answer and check and correct if necessary.

6. The teacher invites the students to reflect on their understanding of the questions.

7. The teacher and students discuss what they know, understand, and have to work on.
SUBJECT: Biology

TOPIC: Cells

As we began our study of **living things, which are better known as _____________ (organisms)**, we discussed the characteristics that distinguish that which is living, or once living, from that which was never alive. We were able to develop a list of several characteristics. As we looked over our list we noticed that it included such items as the ability to reproduce, to grow, to develop, and to use energy. However, one characteristic was different than the others and did not describe a process.

**What was that characteristic?** *(Living things are made of basic units of structure called cells.)* This characteristic was one of the last defined by scientists. **What invention allowed this characteristic to be added to the list? And who was its inventor?** *(the microscope, Anton von Leeuwenhoek)*

Once the discovery of cells was made and as microscopes became more and more sophisticated, scientists began to learn more about this incredible building block of organisms. One of the first structures discovered was the outermost boundary of the cell that selectively controls what enters and leaves. **What is this boundary called and what word is used to describe its selective property?** *(cell membrane, semi-permeable)* **Draw and label it.** As we move into the cell, we find that there are many structures within the cell, each with its own special design and function. **What term is used to describe these parts?** *(organelles)* The organelles of the cell are suspended in a material that fills the cell. **What is this gelatinous material called?** *(cytoplasm)*

As we begin our journey through the cell, the first major organelle that we come upon is the nucleus. **Draw and label it. What is its function?** *(controls all cell activities)* But wait! What's this? Something appears to be wrong with our cell! It does not seem able to provide useful energy for its activities! **What organelle is missing?** *(mitochondria)* **Add the mitochondria to your drawing and label it.***

The cell is often compared to a factory. **If this is true, what structures would represent the storage areas, packaging plants, transportation centers, and garbage disposal areas?** **Draw and label them.** *(vacuoles, Golgi bodies, endoplasmic reticulum (ER), and lysosomes)*

As we leave the cell and look back at it, with all of its organelles, we realize that it is not just the basic unit of structure of all living organisms but it is also the basic unit of function as well. **Explain why this statement is true.** *(All of the functions that are carried out at a cellular level are carried out in a grander scale at the organism level.)*