

$$3 + 8 = 11 + 1 = 12 / 2 = 6 - 3 = 3 \times 4 = 12$$

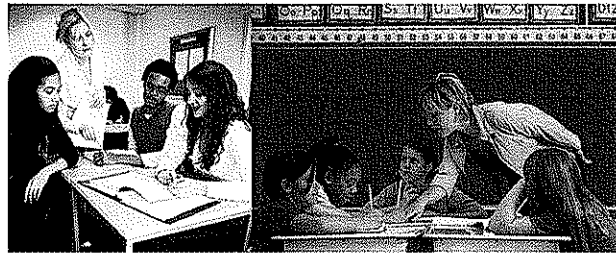
$$/ 3 = 8 + 2 = 10 - 5 = 5$$

HOW DO I KNOW WHAT THEY KNOW AND UNDERSTAND?

Instant Math Assessment Techniques

with

Beatrice Moore Luchin



Welcome to the Seminar!

Outcomes

By the end of the session, participants will . . .

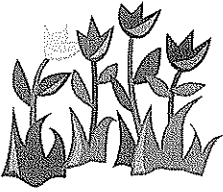
- Understand how the use of effective questioning strategies support preparation of students for the rigor of various assessments including: ACCESS for ELLs®, PAAP, MEA, NECAP, ACT, SAT, etc.
- Expand their understanding of various assessment strategies for individual and small group instruction
- Develop an understanding of the nature and function of questions related to increasing mathematical content knowledge
- Develop skills in question construction
- Learn how content and academic vocabulary can be developed and assessed through the uses of appropriate questioning strategies and the use of graphic organizers
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$$3 + 8 = 11 + 1 = 12 / 2 = 6 - 3 = 3 \times 4 = 12$$

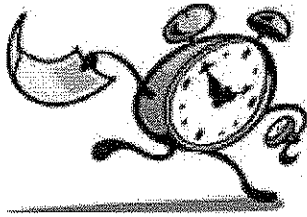
$$/ 3 = 8 + 2 = 10 - 5 = 5$$



Reflection Log

What I learned	How I learned it	My reaction	Ways I will use it
			 A small illustration in the bottom right corner of the 'Ways I will use it' column. It depicts a small, simple house with a chimney, surrounded by several tulips of varying heights and stages of bloom, growing from a patch of grass.

How Do I Know What They Know? Building Your Toolkit of Assessment Strategies



Assessment need not take time away from learning; assessments can be learning experiences in themselves. Active assessment strategies enhance student content understanding and promote skills that will be beneficial to students throughout their lives. The ability to see the big picture, develop effective oral and written reports and the ability to work cooperatively with their peers are skills that are promoted by active assessment.

Just as one size of learning doesn't fit all, one size of assessment doesn't suit either. So in assessing the learning, we need different approaches to check the learning and adjust the learning; the same as we have adjusted our instructional strategies to need the learner's needs.

We sometimes use the terms *assessment*, *evaluation*, and *grading* without necessarily having clearly distinctive definitions for each term. Assessment is often referred to as the gathering of data, evaluation is the judging of merits, and grading is assigning values to letters or numbers for reporting purposes (Rolheiser, Bower, & Stevahn, 2000).

Assessment as ongoing feedback is a necessary component of the learning process, not something that happens at the end of learning. It has been said that feedback is often too little, too late, too vague, presented in the wrong form, and therefore lacking in impact (Jensen, 1998a, p. 54). Our challenge is to find ways to facilitate ongoing feedback for students that will increase their chances to grow and improve their learning. The use of proper assessment strategies will help the teacher to make informed evaluations about the student's learning and equate grades to the content learned.

Begin to think about assessment in terms of the lesson cycle- **Pre-assessment, On-going Assessment, and Final Assessment**

- A. **Pre- Assessment:** Strategies to use before the instruction begins to determine prior knowledge. However the teacher wishes to devise this portion of assessment, it is very important to realize that this step can help set the learning environment, peak interest about the content, and initiate activities that will address the learning styles of the students.
- B. **Assessment During Learning:** As students are working, it is time for the teacher to provide assessment both informal and formal in order to provide feedback so improvement can be made. If the teacher waits to the end of instruction, it might be too late for skill development and to make corrections to information that present

incorrectly. By assessing the student during the learning situation, the teacher can alter his or her activities to re-teach or enhance the content.

- C. **Final Assessment:** This is the time for the teacher to make both formal and in formal assessment about the learning which has taken place. The student can engage in reflections to the learning to encourage metacognition and process what has been learned at the closure of the lesson. This can be done at the end of each activity, the end of the day as students write in their journals, or at the end of the unit.

Discussion Notes:

Strategies for Practice and Application

A-B-C Summarize A form of review in which each student in a class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

Active Learning Any approach that engages learners by matching instruction to the learner's interests, understanding, and developmental level. Often includes hands-on and authentic activities.

Affinity A brainstorming approach that encourages less verbal members of a group to participate. First, all members of the group write responses to the problem or question on separate cards, then the cards are silently grouped by each member while the others observe. After a discussion, the agreed upon arrangement is recorded as an outline or diagram.

Brainstorming Group process where all ideas are accepted and recorded.

Closure Any activities which help students summarize key points learned and how the new knowledge relates to the objectives to be learned.

Cloze Procedure An activity created by the teacher to give students practice with language usage. The teacher selects a passage of text, marks out some of the words, then rewrites the text with blank lines where the marked out words were. The result is a "fill in the blank" that should be enjoyable for the student while at the same time giving the teacher information about the student's language skills.

Concept Attainment Model Inductive model of instruction where student are presented with examples and non-examples of a concept. Students generate hypotheses and attempt to describe (and sometimes name) the concept.

Concept Cards Cards created by students that link terms to the use of that term in context.

Data Gathering Students collect information in an organized way for use in statistical analysis, scientific research, or as support for arguments.

Descriptions When done by teachers, descriptions are usually used to introduce new information. When done by students, descriptions are used to demonstrate knowledge of a concept.

Error Analysis Error analysis takes two basic forms in the classroom. In the most common form, teachers analyze the errors students make (in mathematical computation, grammar, language, literature interpretation, and so on) and use that analysis to guide further instruction. In science classroom, some teachers teach students to analyze experimental errors to improve critical thinking skills.

Find Your Partner A method for assigning students to groups and at the same time reviewing previous concepts. Equations, sentences, or questions and answers are written on a single piece of paper, then the parts of the sets are cut apart. The parts are distributed to students who compare papers with other students until they find their match.

Fruyer Model Vocabulary development tool in which students use a graphic organizer to categorize their knowledge about a word.

Grab Bag Near the conclusion of a lesson, have a student draw an object from a bag. The student must explain or illustrate how the object is related to what they have learned.

Journal A form of writing. Typically done for a few minutes each day. The writing is done in a notebook and is often used to encourage reflection or exploration of ideas of interest to the students. Journal writing is typically not graded, and in some instances, is not read by anyone but the student. In other instances, the journal can be used to establish an ongoing written dialog between the student and the teacher.

Learning Log Students write responses to teacher questions as summary of what they have learned or what they do not understand. Used for reflection and to inform teacher of progress.

Numbered Heads Together Each student is assigned a number. Members of group work together to agree on answer. Teacher randomly selects one number. Student with that number answers for group.

Similarities and Differences A form of comparison in which students first list all the similarities they can find between the two objects or concepts being compared, then they list all the differences.

Graphic Organizers as Assessment Tools

Graphic Organizers are maps that represent student thinking. They involve students in skills like sequencing, comparing and classifying to create representations of concepts and processes. These mental maps depict complex relationships and can become "blue prints" that make abstract ideas more visible and concrete


Evaluation Purposes:

- They permit the visual comparison of student understanding to expert knowledge.
- They illuminate preconceptions.
- They help students make their thinking visible (developing and supporting visual learning modalities).
- They can be used as advanced organizers for students since they help students self-assess their current knowledge.

Thoughts:

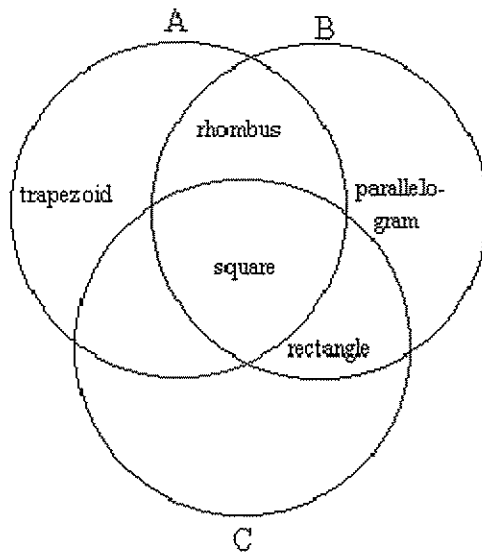
- Graphic organizers would be more creative, challenging, and fun than traditional essay or objective style questions on tests.
 - Graphic organizers could also be required within presentations and projects.
-

Samples of Graphic Organizers Used as Assessment strategies

Mathematics Application	Suggested Interventions
<p>30 Jordan started tennis camp with 4 cans of tennis balls. There were 3 balls in each can, as shown below.</p>  <p>At the end of camp, Jordan had lost 7 of his tennis balls. Which method can be used to find how many balls Jordan had left? Mark your answer.</p> <ul style="list-style-type: none"> <input type="radio"/> Multiply 3 by 4 and then subtract 7 from the product <input type="radio"/> Multiply 3 by 4 and then add 7 to the product <input type="radio"/> Add 3, 4, and 7 <input type="radio"/> Add 4 and 3 and then subtract 7 from the sum 	<ul style="list-style-type: none"> a. Remove all answer choices. b. Interventions for vocabulary in the form of the warm-up prior to doing this problem. Focus on the meaning of product and sum. c. Explaining procedures you would use to solve problems before solving them integrated into daily lesson discussion. d. Graphic organizer: <p style="text-align: center;">Chain of Events Chart</p> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div data-bbox="800 731 1026 822" style="border: 1px solid black; padding: 5px; width: 100px; height: 55px;">Event 1</div> <div style="text-align: center; margin: 5px 0;">↓</div> <div data-bbox="800 872 1026 963" style="border: 1px solid black; padding: 5px; width: 100px; height: 55px;">Event 2</div> <div style="text-align: center; margin: 5px 0;">↓</div> <div data-bbox="800 1012 1026 1103" style="border: 1px solid black; padding: 5px; width: 100px; height: 55px;">Event 3</div> </div> <div style="width: 40%;"> <p>First _____ _____ _____</p> <p>Next _____ _____ _____</p> <p>Finally _____ _____ _____</p> </div> </div>

Venn Diagram:

Set A is the set of quadrilaterals that are equilateral.
Set B is the set of quadrilaterals that have two pair of parallel sides.
Set C is the set of quadrilaterals that are equal-angular.



Assessment Checklist:

- Are the circle attributes described correctly?
 - Are overlapping subsets identified correctly?
 - Is the content accurate?
-

Note Taking/Note Making:

NOTE TAKING

What is multiplication?

A simplified way to do repetitive addition.

PICTURE MAKING

6 x 5

six groups of five each

NOTE MAKING

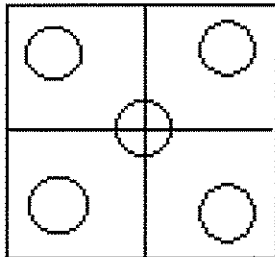
How would you cut a pan of brownies to feed 12 people?

Multiplication is:

Visual Reminders:

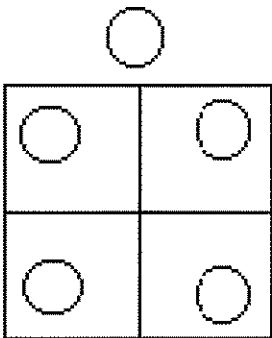
Ways to Think About Dividing with Remainders

5 divided by 4



$1 \frac{1}{4}$ or 1.25

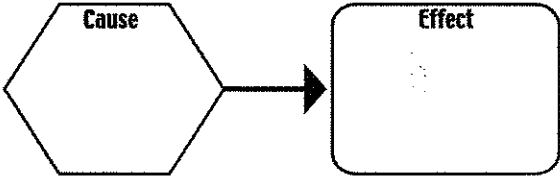
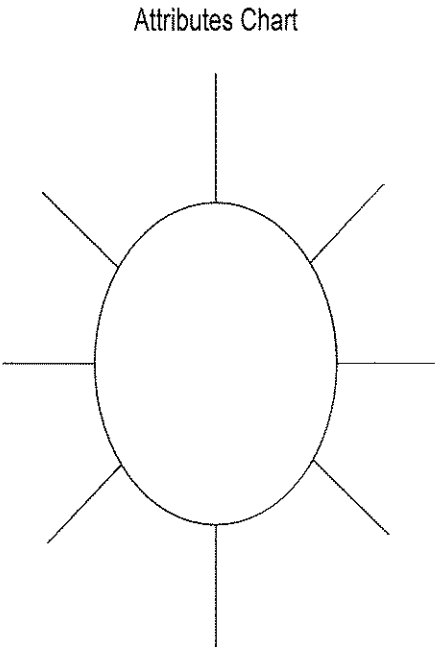
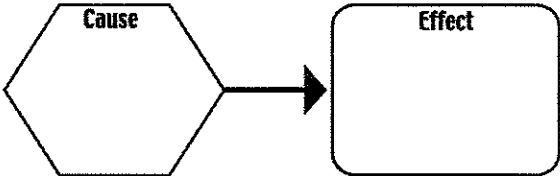
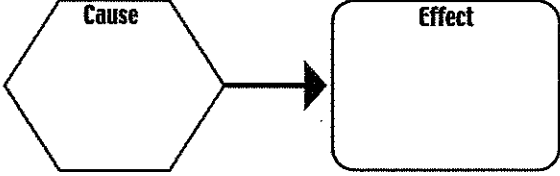
To divide five objects into four groups you get one and one quarter in each group



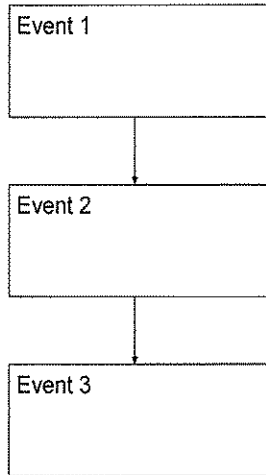
1 remainder 1

To divide five objects into four groups you get one in each group with one remaining.

Select Graphic Organizer Templates

<p>Cause</p>  <p>Effect</p> <p>A hexagonal box labeled 'Cause' is connected by a right-pointing arrow to a rounded rectangular box labeled 'Effect'.</p>	<p>Attributes Chart</p>  <p>An oval with six lines radiating from its perimeter, representing an attributes chart.</p>
<p>Cause</p>  <p>Effect</p> <p>A hexagonal box labeled 'Cause' is connected by a right-pointing arrow to a rounded rectangular box labeled 'Effect'.</p>	
<p>Cause</p>  <p>Effect</p> <p>A hexagonal box labeled 'Cause' is connected by a right-pointing arrow to a rounded rectangular box labeled 'Effect'.</p>	

Chain of Events Chart



First _____

Next _____

Finally _____

Summary and Paraphrase

Summary – a restatement which covers only the main points
Paraphrase - a restatement of a text or work giving the meaning in another form

The summary reduces the passage to just the most important points, and a paraphrase restates it in another more easily understood way.

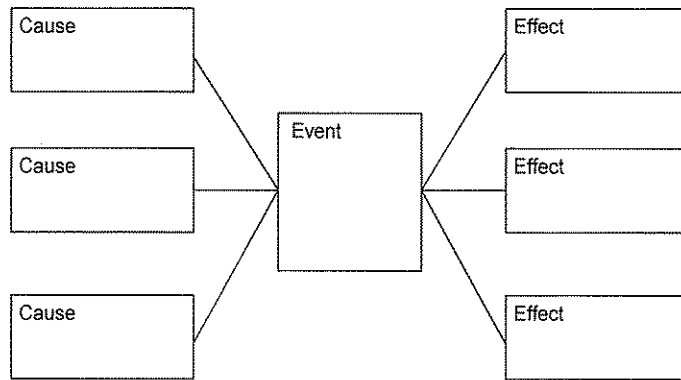
How to Write a Summary

1. Read the entire selection.
2. Circle the most important words and phrases.
3. Write 8 of the most important words or phrases on the lines below.
4. Use the list to create a summary restating the main points.

_____	_____
_____	_____
_____	_____

Summary:

Cause and Effect Chart



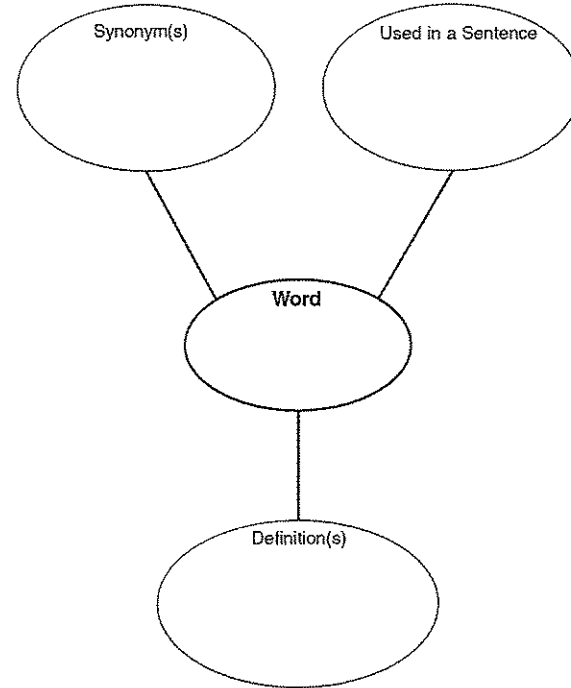
Process Grid

Topic:

Effect	Description	Results or Outcome	Other Interesting Facts

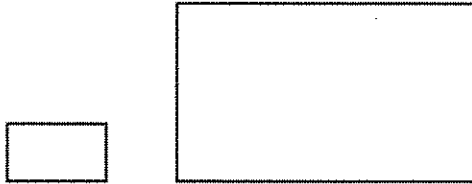
Vocabulary Sketches

Word/Definition	Sketch	Word/Definition	Sketch	Word/Definition	Sketch



Problem(s)

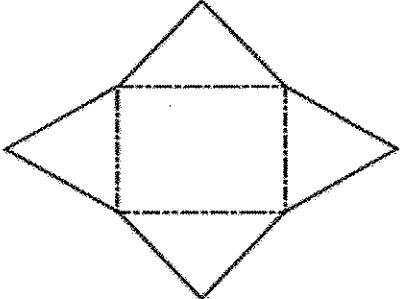
- 10 The two rectangles shown below are similar. The ratio of the length of the larger rectangle to the length of the smaller rectangle is 3:1.



Which of the following statements is true?

- F The area of the smaller rectangle is $\frac{1}{4}$ the area of the larger rectangle.
- G The area of the larger rectangle is 3 times the area of the smaller rectangle.
- H The perimeter of the smaller rectangle is $\frac{1}{3}$ the perimeter of the larger rectangle.
- J The perimeter of the larger rectangle is 6 times the perimeter of the smaller rectangle.

Suggested Interventions

Objective	Problem(s)	Suggested Interventions
	<p data-bbox="485 239 1052 285">B Lily folded the net below along the dashed line segments.</p>  <p data-bbox="527 674 989 720">Which of the following best describes the shape of the folded object?</p> <ul data-bbox="527 740 800 863" style="list-style-type: none"><li data-bbox="527 740 726 764">A Square prism<li data-bbox="527 773 758 797">B Square pyramid<li data-bbox="527 806 768 830">C Triangular prism<li data-bbox="527 839 800 863">D Triangular pyramid	

Cooperative Group Task

Oscar made a scale drawing of his backyard. In his drawing, $\frac{1}{2}$ inch represents 5 feet.

Table	Graph
Pictorial	Algebraic

Cooperative Group Task

Marilyn was studying the effects of tripling the dimensions of 4 rectangles. The table below shows these effects.

Area of Rectangles

Original Area (square centimeters)	New Area (square centimeters)
4	36
36	324
324	2,916
2,916	26,244

Pictorial

Formula

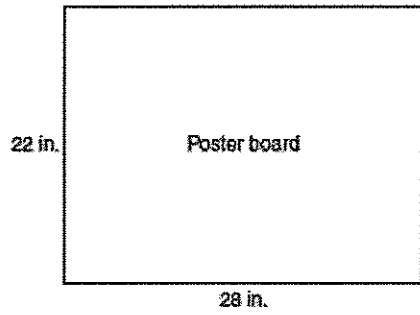
Verbal

A line passes through the point $(9, 2)$ and has a y -intercept of $(0, 5)$

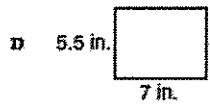
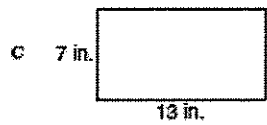
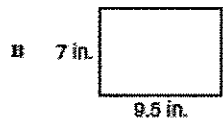
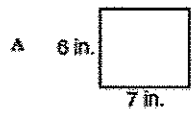
Graphic

Algebraic

Tabular



Which rectangle can be dilated to fit the exact dimensions of this poster board?

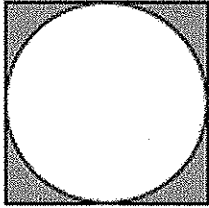


Verbal

Algebraic

Cooperative Group Task Jig-Saw

29 Jeff drew a circle inside a square, as shown below.



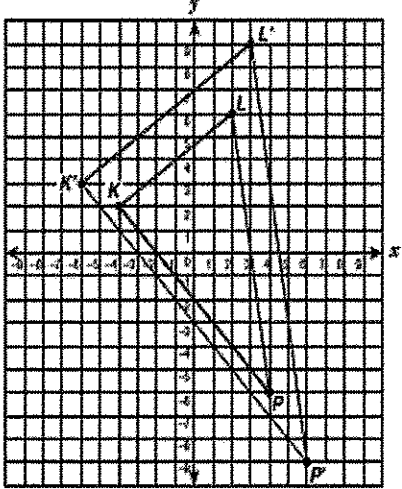
What is the area of the shaded part?

Formula needed

Dimensions needed

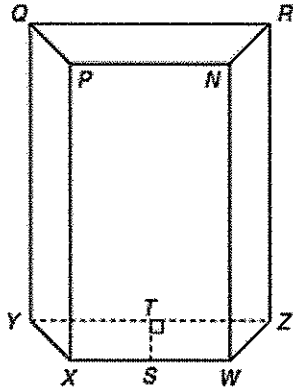
Verbal explanation of the process

Algebraic Representation and Solution

Objective	Problem(s)	Suggested Interventions
	<p data-bbox="338 303 1146 348">20 $\triangle KLP$ has vertices $K(-4, 2)$, $L(2, 6)$, and $P(4, -6)$. It is dilated to form $\triangle K'L'P'$ with the origin as the center of dilation.</p>  <p data-bbox="373 938 972 959">If the coordinates of K' are $(-6, 3)$, what scale factor was used to form $\triangle K'L'P'$?</p>	

Problem(s)

29 In the trapezoidal prism shown below, $NP = 8$ centimeters, and $QR = 12$ centimeters. The height of the prism is 15 centimeters.



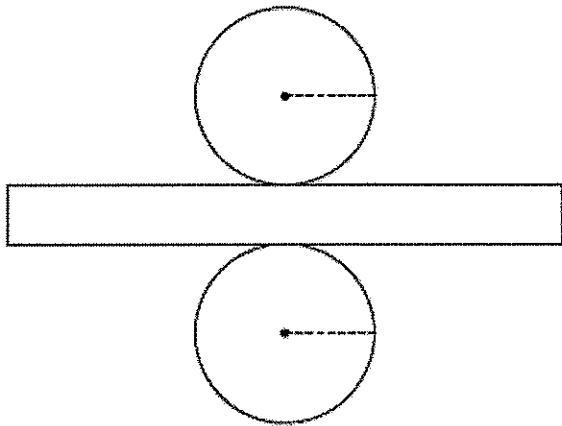
Which additional information can be used to determine the volume of the prism?

- A The area of rectangle $PXWN$
- B The area of rectangle $QYZR$
- C The length of \overline{NR}
- D The length of \overline{TS}

Suggested Interventions

Problem(s)

35 The net of a cylinder is shown below. Use the ruler on the Mathematics Chart to measure the dimensions of the net to the nearest $\frac{1}{4}$ inch.

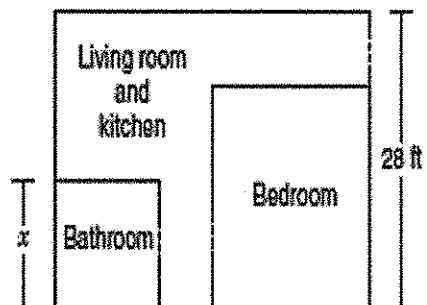


Which of these is closest to the total surface area of the cylinder?

Suggested Interventions

Problem(s)**Suggested Interventions**

- 40 The diagram below shows the floor plan of an apartment with a rectangular floor. The ratio of the width of the bathroom floor to the width of the entire apartment floor is 3:7.



What is x , the width of the bathroom in inches?

- F 112 in.
- G 40 in.
- H 144 in.
- J 48 in.

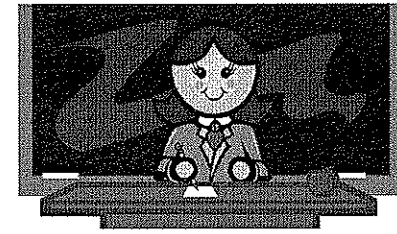
Time to Synthesize

Think about how each of the following strategies may be used with the content you teach. Be specific.

You have 10 minutes.

Now select 3-4 other strategies from today and complete chart with your ideas on points of use.

Assessment Strategy	Process and Purpose of Assessment
Questioning/ Brainstorming	Use questioning and brainstorming to determine how much students know about _____
Jig-Saw	
Attributes Chart	
Cause and Effect	



Assessment After the Learning

After the learning situation is over, now is the time to instantly discover what the students have retained about the content. This can be an informal assessment as described below or it may be a formal situation where the student is tested. There are many strategies available to the teacher to encourage the child to think and reflect on the material learned. Telling what you learned or writing what you learned is an excellent way to reinforce the information. It also gives the teacher a look into the ways that students learn and how he or she may change instruction to meet the learning styles. Listed below are a few examples of informal ways to assess the learning of the child.

Strategy	Procedures
Wraparounds	Participants form a circle. Each individual takes a turn telling: a. Something he will use from information or activities learned today b. Something he will remember from today c. A significant AHA! from this session
Talking Topic	1. Form A/B partners 2. A tells a fact to B 3. B gives another fact back 4. Partners keep swapping facts back and forth
Conversation Circles	Form a conversation circle with a group of three students. The following is a way to use circles to improve communication. 1. Individuals assume A, B, or C names 2. "A" starts talking and continues until given signal

	<ol style="list-style-type: none"> 3. "B" continues with the topic 4. Then "C" picks up the topic 5. Continue until there are no more fact or ideas to add to the topic
Donut	<p>Draw a donut shape</p> <ol style="list-style-type: none"> 1. On the outside, write "I am learning." 2. On the inside, write "I know."
Rotation Reflection	<ol style="list-style-type: none"> 1. Post charts around the room with a related topic written on each sheet. 2. Small groups gather at each location to give ideas on the chart topic. 3. A recorder fills in the charts with great ideas generated. 4. A signal is given for the groups to move to the next chart and respond to the topic. 5. Groups continue around the room, visiting each chart in turn and adding ideas. 6. The last group remains at the chart, consolidates information and reports it to the large group.

(Gregory & Chapman, 2002)