

Units and Operations

Presented by the
Center for Literacy and Disability Studies
University of North Carolina at Chapel Hill



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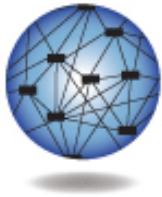


Created on May 13, 2014



UNITS AND OPERATIONS AGENDA

		Content	Activity
	<i>Introduction</i> 2-3 minutes	Review of Learning Objectives and handouts.	
<i>Section 1</i>	<i>Units</i> 25 minutes	Need for like or same sized units.	Supportive Instruction
<i>Section 2</i>	<i>Units and Operations</i> 27 Minutes	The importance of units when working with multiplication and fractions.	Unitizing
<i>Section 3</i>	<i>Summing It Up</i> 3 minutes	Groupings, place value, and operations in algebraic, geometric and fractional thinking.	
<i>Section 4</i>	<i>Wrap-up</i> 3-4 minutes	Closing information	Dismissal



Description

This guide describes the workshop preparation, flow, video segments, and 2 different activities. Facilitators should use the narrated movie and pause when prompted during the movie to facilitate learning activities with your participants. Each learning activity has an activity guide that includes a description, objectives(s), and facilitator instructions.

The entire workshop should take approximately 60 minutes when presented to a group.

Setting Up

✦ Equipment:

- Presenter's computer with movie version of the Units and Operations module. The movie of the module should be accessed at the Dynamic Learning Maps™ Professional Development web site and reviewed well before the training.
- LCD projector with external speakers or sound system.

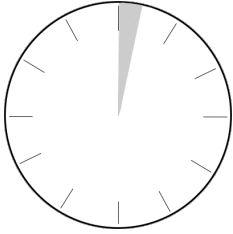
✦ Training Materials (Prior to the training create the appropriate number of packets with these materials to give to participants as they arrive at the training):

- Agenda
- 50 Counters (chips, bears, tiles, etc.) for each set of participants (3-5 people in a group)
- Handouts and Worksheets
 - Supportive Instruction—Activity 1 Handout
 - Unitizing—Activity 2 Handout

Learning Objectives

1. Participants will understand the learning behaviors associated with creating and counting groups of ten.
2. Participants will discuss instructional strategies and associated student behaviors when learning about counting and counting groups.
3. Participants will discuss the connections between units and operations.

Introduction



- Approximately 3 minutes
- **Greet participants**
- **State the title of the module and briefly review the learning objectives**

“Welcome everyone. The topic of today’s presentation is Units and Operations. This topic is a continuation of information provided in the Unitizing module.

- **See who is in your audience.**

“As we get started, I would like to know a bit about who is here today. Raise your hand if you are a classroom teacher. How many of you are speech-language pathologists? Are there any occupational therapists here today? Physical therapists? Teaching assistants? How about school psychologists? School administrators? Did I miss anyone? (Ask anyone who raises a hand to say what job he/she does).”

- **Review list of handouts.**

“I’m glad all of you could be here today. We will begin the recorded presentation in a few minutes, but before that, please take a moment to review the handout packet you received. You should have a copy of the following documents:

- *Today’s agenda*
- *Supportive Instruction – Handout #1*
- *Unitizing – Handout #2*

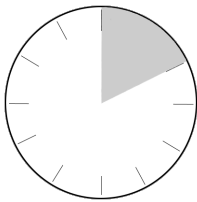
- **Make sure everyone has all of the handouts and start the module.**

“Does everyone have a copy of each of these?” (Supply extra handouts to anyone who needs them).

“You need these handouts for the 2 learning activities we will do during today’s session. Does anyone have any questions?” (Pause to see if there are questions and respond as appropriate).

“If there are no (more) questions, let’s go ahead and get started.”

Section 1 – Units



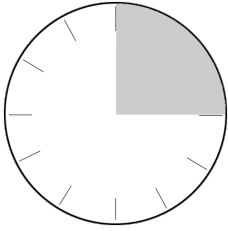
- Approximately 10 minutes

“Let’s watch the first section of the presentation to learn about the connections between units and operations. Then we will have a learning activity to reflect on our understanding of the information. “

- Start the video
- At the 10-minute mark you will see a message on the screen to pause the movie for Learning Activity #1.

“We’re going to pause the module for a moment now to complete a Learning Activity. Find the handout that is titled Supportive Instruction.”

Learning Activity 1 – Supportive Instruction



- ◆ Approximately 15 minutes
- ◆ Materials
 - Supportive Instruction – Handout 1
- ◆ Objective
 - Participants will determine what instructional strategies support student learning.
 - Participants will discuss instructional strategies that support understanding of units and operations.

◆ Facilitator Directions

1. **Ask participants to locate Math handout #1 Supportive Instruction.**
2. **Provide instructions for page one of the handout.**

“Please take out your Supportive Instruction Handout. On page 1 of the handout there should be two columns. One labeled Instructional Strategies, the other labeled Behaviors Associated with Student Learning. Match the instructional strategy to the learning behavior it supports. You may work individually or in pairs.”

3. **Tell participants they have 3 minutes to complete the task.**

“You have 3 minutes to complete this activity, and then we will discuss your answers.”

4. **Pull the groups back together and have them share how and why they matched up the strategies and behaviors.**

“At this point let’s come back together as a large group. Who would like to share which behavior they matched up with #1 and why?” Go quickly through each of the 5 instructional strategies having participants briefly explain their reasoning.”

Answers:

1. A

2. D
3. B
4. C
5. E

5. **After the discussion direct participants to page 2 of the handout and ask them to complete two additional strategies with student behaviors associated with learning.**

“Okay, take a look at page 2. Now that we have talked about the strategies and behaviors that support various aspects of units and operations on page 1, I would like you to work in pairs and come up with two more learning strategies and associated behaviors to further support the concepts of units and operations.”

6. **Tell participants they have 3 minutes to complete the task.**

“You have 3 minutes to complete this activity, and I will ask you to share your thoughts.”

7. **Pull the groups back together and have them share their ideas.**

“Let me have your attention. I would like to take the last couple of minutes of this activity and have you all share your ideas about other strategies and behaviors that might also support the units and operations concepts.”

Allow participants to share ideas but the following are a couple of ideas in case discussion is slow.

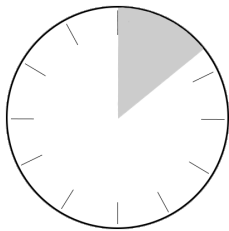
1. Instructional Strategy: Ask questions, such as, “How are these alike?” or “How many of each kind?”
 - a. Behavior: Student uses descriptive words or sorts objects into categories and counts each set.
2. Instructional Strategy: Read the book Big Fat Hen by K. Baker. A hen lays eggs in quantities that increase by two, up to a total of ten. This book features number

comparison, object grouping, addition, and subtraction.

- a. Student Behavior: Counts by two to ten.
3. Instructional Strategy: Use 5 and 10 frames to help students recognize patterns within the anchors of 5 and 10.
 - a. Student Behavior: describes numbers with reference to 5 or 10 (“3 and 2 more is 5” or “4 and 6 fill the ten frame”).

8. Direct participants’ attention back to the movie.

Section 2 – Units and Operations

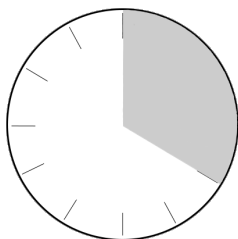


- Approximately 7 minutes

“We will continue the presentation with section 2 of our movie. Following this segment we will have another learning activity.”

- Start the video
- After approximately 6-minutes you will see a message on the screen to pause the movie for Learning Activity #2.

Learning Activity 2 – Unitizing



- ◆ Approximately 20 minutes
- ◆ Materials
 - Unitizing – Handout 1
- ◆ Objectives
 - Participants will play the unitizing game.
 - Participants will discuss the connection between unitizing and multiplication.
 - Participants will create an example of the connection between unitizing and division.

✦ Facilitator Directions

1. **Ask participants to locate Math handout #2 Unitizing.**
2. **Provide instructions for page one of the handout.**

“When I say go everyone will take out their Unitizing Handout, break up into groups of 3-5 people, and send up one person from your group to get a bag of counters. This needs to happen quickly so we can have plenty of time for the game and discussion. OK, go.”

3. Once everyone has their counters continue with the directions.

“Now place all the counters in the center of your group. Be sure everyone can reach them.”

“On the word “go” grab as many groups of two that you can before I says, “stop.” I don’t want you to count the number of sets right now I just want you to concentrate on making groups of two. Ready, GO. (Give them 10 seconds) STOP.”

“Now count the number of groups you have and fill in the sentence on your handout.”

“Place all the counters back in the middle of the group. We are going to do the same thing but with groups of three. Ready, GO. (Give them 10 seconds) STOP.”

“Again count the number of groups you have and fill in the sentence on your handout.”

“Last time but now we are going to make groups of 4. Ready, GO. (Give them 10 seconds) STOP.”

“Complete your sentence.”

4. Facilitate a discussion about the activity.

1. *"I want us to have a brief discussion about the game. What kind of thinking were you doing as you were making groups?"* Give the participants the opportunity to generate their own ideas but be sure ultimately they arrive at the following answer.
 - a. Answer: Unitizing- recognizing that a group of objects can be considered as a single entity.
2. *"So what would this activity tell you about students' thinking?"* Again allow participants time to generate their own ideas.
 - a. Answer: It depends on how they needed to count.
 - i. If they build groups of 2, 3, or 4 by counting each individual counter then they will likely need more practice with creating small groups.
 - ii. If they are able to create the groups but then are not able to count the number of groups, they are likely not seeing the groups as a whole unit and need further instruction on counting units.
 - iii. If they need to count each individual object to find the total they may need further instruction on skip counting.
 - iv. If they are able to do this activity with few or no supports (i.e., number line, or hundreds chart) they need to move to a more symbolic representation of multiplication.

5. Give the directions for page 2 of the handout.

"On page two of the handout, you will create a visual representation for each of the word problems."

"Let's take a look at the example; Ms. Lori's class is having a bake sale. They are putting cookies on plates to sell. They put 4 cookies on each plate, and they sold 6 plates. How many cookies did they sell?"

"You can see that there are 6 plates with 4 cookies on each plate. So there are 6 groups of 4. Which is the same as saying 6 times 4."

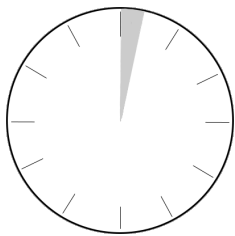
"Work in pairs or individually to complete the other word problem but I also want you to think about or talk about the discussion question then we will talk about it as a group."

6. Facilitate a discussion about units.

1. *“Let me have your attention again. Who would like to share their word problem?”* Allow participants time to share their ideas.
 - a. Possible Answer: Ms. Lori’s class had a bake sale. They sold 24 cookies to 6 people. How many cookies did each person receive?
2. *“How does having an understanding of units make multiplication and division problems easier?”* Allow participants time to share their ideas.
 - a. Possible answer: Students begin to work on multiplication and division by looking at contexts in which things come in groups or units, or in which a group or unit of things needs to be shared. This involves solving problems like how many hands or fingers in our classroom, and counting things by groups such as 2's, 5's, and 10's. Later, students more systematically explore things that come in groups, from 2's to 12's, using them to solve equations.

7. Direct participants’ attention back to the movie.

Section 3 – Summing It Up

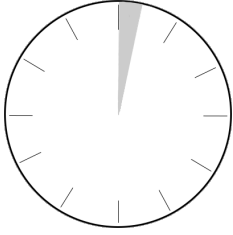


- Approximately 3 minutes

“I’m going to restart the movie now so we can finish the last minute or so of the presentation.”

- Start the video

Section 4 – Wrap Up



- Approximately 3 minutes
- Have participants complete any final paperwork that is needed (e.g., an evaluation, sign out to document attendance, etc.)

“That completes the Math: Units and Operations module. Thanks for your attention and participation.”



SUPPORTIVE INSTRUCTION
UNITS AND OPERATIONS
ACTIVITY 1

Match the instructional strategy to the learning behavior it supports.

Instructional Strategies	Behaviors Associated with Student Learning
1. Provide opportunities to make concrete and visual models of the operations (e.g., use real objects, interlocking cubes, craft sticks, ten frames, five frames, number lines, tally marks).	A. Actively involved in adding to or taking away from groups.
2. Provide many experiences with quantities that are more than, less than, and the same as other quantities.	B. Take part in active problem solving involving adding or taking away objects, especially problem solving related to their real-life experiences (e.g., if asked, "How do we make sure everyone has a chair to sit on?" they physically work on moving chairs).
3. Use everyday situations as contexts for problems (e.g., "There are 4 students absent today. How many are here?").	C. Build three beds out of Legos, one for each of the bears in the story <i>Goldilocks and the Three Bears</i> .
4. Use games and storybooks to create motivation, to introduce skills or understanding, and to provide a context.	D. Compare quantities by indicating more, less, or same.
5. Use DLM core vocabulary to model and help students learn to describe equations and real-life problem solving experiences.	E. When counting, names what he or she is counting (i.e., dogs, blocks, red, squares).

After a discussion of the above pairings, list two additional instructional strategies with the behavior associated with student learning.

Instructional Strategies	Behaviors Associated with Student Learning
6.	F.
7.	G.



UNITIZING
UNITS AND OPERATIONS
ACTIVITY #2

Unitizing is the ability to recognize that a group of objects can be considered as a single entity. For example, 10 objects can be considered as one group of 10.

Task 1 Directions: Work in small groups (3-5 participants).

- Place a large amount of counters (approximately 50) in the middle of the table.
- On the word “go” grab as many groups of two that you can before the facilitator says, “stop.”
- Don’t count the total number of sets, just concentrate on making groups of two.
- After the facilitator says “stop,” count how many groupings you have and complete the following sentence:

_____ groups of 2 is _____

- Return the counters to the middle of the table.
- On the word “go” grab as many sets of three that you can before the facilitator says, “stop”.
- Don’t count the total number of sets, just concentrate on making groups of three.
- After the facilitator says “stop,” count how many groupings you have and complete the following sentence:

_____ groups of 3 is _____

- Return the counters to the middle of the table.
- On the word “go” grab as many sets of four that you can before the facilitator says, “stop”.
- Again, don’t count the total number of sets, just concentrate on making groups of four.
- After the facilitator says “stop,” count how many groupings you have and complete the following sentence:

_____ groups of 4 is _____

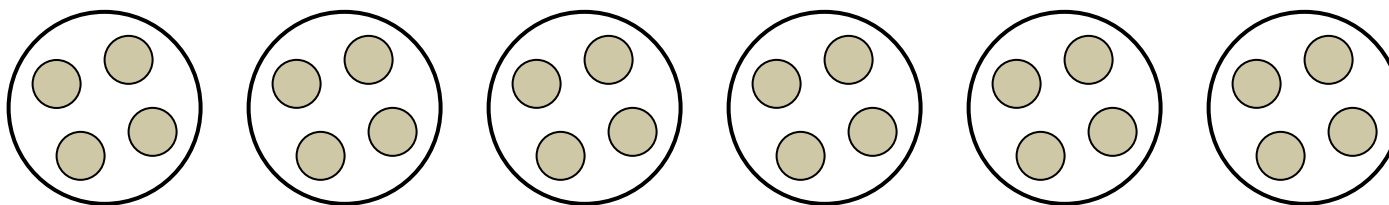
Discussion: What kind of thinking were you doing as you were making groups? What would this activity tell you about students’ thinking?

Task 2 Directions: In the above game we began to make some connections between unitizing and multiplication. The following task is more explicit in making this connection. Create a visual representation of the following word problems.

Example: Ms. Lori's class is having a bake sale. They are putting cookies on plates to sell. They put 4 cookies on each plate, and they sold 6 plates. How many cookies did they sell?

6 groups of 4 is 24

$$6 \times 4 = 24$$



1. Ms. Lori's class was looking at the cars in the school parking lot. They saw 7 cars. How many wheels did they see?

_____ groups of _____ is _____

$$\text{_____} \times \text{_____} = \text{_____}$$

2. Michael wanted to give each of the 9 students 3 pencils. How many pencils will he need?

_____ groups of _____ is _____

$$\text{_____} \times \text{_____} = \text{_____}$$

Discussion: How would the example of the bake sale change if we wanted the students to complete a division problem? Create a word problem that would reflect a division problem.



Name: _____

Date: _____

1. If you gave a student the number 23 and ask the student to tell you the value that these digits represent – which of the following responses would be INCORRECT.
 - a. Two tens and three ones
 - b. Twenty three ones
 - c. One ten and thirteen ones
 - d. Twenty three tens

2. Unitizing is not a pre-skill for counting.

TRUE

FALSE

3. What is the value of the digit 1?
 - a. It depends on the location of the digit in the number (ex. one in the tens place indicates one unit of ten)
 - b. One is just one
 - c. One less than two

4. We do not need to teaching unitizing until we start to teach fractions.

TRUE

FALSE

5. Children can begin unitizing before they understand number.

TRUE

FALSE