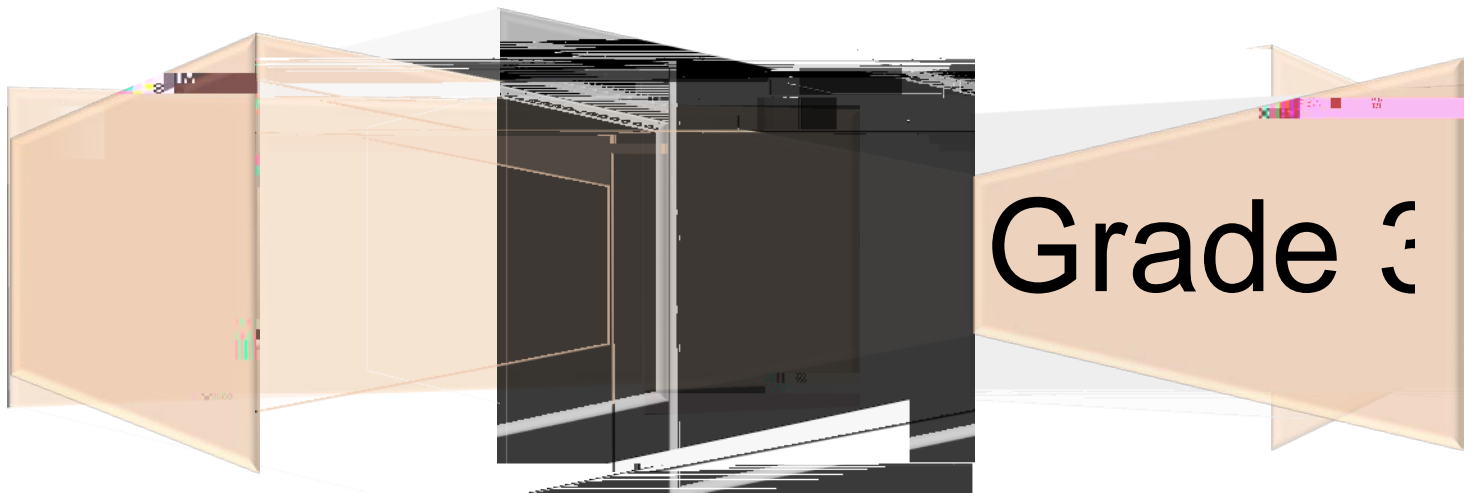


# Scaffolding Instruction for All Students:

A Resource Guide for Mathematics



The University of the State of New York  
State Education Department

# Scaffolding Instruction for All Students A Resource Guide for Mathematics Grade 3

## Acknowledgements

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The New York State Education Department Office of Curriculum and Instruction and Office of Special Education gratefully acknowledge the following individuals for their valuable contributions in the development of this guide:

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## Introduction

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The Ne



# Graphic Organizer (Z t ~ Z 0E Á U t 0E ]š%o š )

Display the word problem:

There are 83 girls and 76 boys in third grade. How many total students are in third grade?

T:  $u$  read  $u$  @  $\neq$

S (student):  $k$

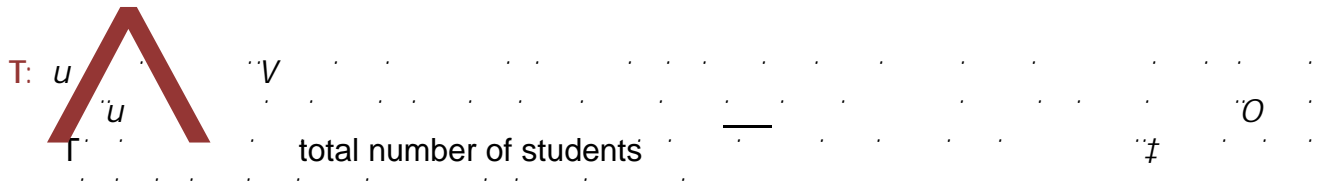
T:  $u$  @  $u$  =  $k$   $\neq u$

**Step 2 Draw and label.**

T:  $o$  draw and label  $\neq$

S: )

T: @ @  $\neq$  @



S: 0 0

T:  $k$  0 [Write  $T = 83 + 76$  on the  $k$ ]  
 $u$  while chorally reading it aghorally ~~1510~~



The bus took 52 students and 29 workers on its morning route. How many total people rode the bus this morning?

Our grocery store sells 41 gallons of chocolate ice cream and 87 gallons of vanilla ice cream every day. How many total gallons of chocolate and vanilla ice cream does our grocery store sell each day?

**Student actions**

Students chorally respond and complete the  $k) \neq u$  . Students may work in pairs or small groups to complete additional practice problems if needed.

**Student handouts/materials**

$k) \neq u$  (found on page 6)

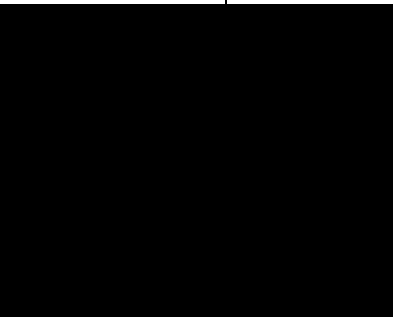


NAME: \_\_\_\_\_

### RDW Template

Read	Make a r after you read the problem. <input data-bbox="862 365 919 420" type="checkbox"/>
Draw and label	Draw a picture and label it.
Read again	Make a r after you read the problem again. <input data-bbox="862 1180 919 1234" type="checkbox"/>
Write	Write an equation.

Write	Write a sentence.
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## Frayer Model

### Exemplar from:

[Module 1: Topic A: Lesson 3](#): Concept Development

### Explanation of scaffold:

The Frayer model is a four-square graphic organizer that includes a student-friendly definition, a description of important characteristics, examples, and nonexamples. It provides a format to organize information and visual representations of the mathematical term being defined. Developing vocabulary skills is essential for students as they learn to \_\_\_\_\_ and develop their abstract reasoning and problem-solving skills. The following example demonstrates how to provide explicit instruction for those students who need information broken down into smaller, more manageable chunks as well as modeling and guided practice to effectively use this tool to learn new vocabulary words. The term \_\_\_\_\_ is used as an exemplar. However, the Frayer model can be used in any lesson to help students strengthen their conceptual knowledge and develop their understanding of unfamiliar vocabulary.

### Teacher actions/instructions

Select key mathematical terms. These terms should be limited in number and essential to developing a deeper understanding of the mathematical concepts or skills in the lesson.

Instruct students to complete Frayer models as follows:

1. Write the mathematical term in the middle circle.
2. Define the term, using student-friendly language, in the **Definition** box. Use your own words.
3. Write words to describe the term in the **Characteristics** box. Again, use your own words.
4. List examples of the definition in the **Examples** box. Draw a picture and/or write an equation to help you understand the term if needed.
5. List nonexamples of the definition in the **Nonexamples** box. Again, draw a picture and/or write an equation if needed.
6. Test yourself.

For students who require explicit instruction on how to use the Frayer model, the following sample script is provided to demonstrate one way instruction might look like :

#### Step 1: Write the mathematical term.

**T (teacher):** # \_\_\_\_\_ 7  
\_\_\_\_\_  
\_\_\_\_\_ @ \_\_\_\_\_  
\_\_\_\_\_  
y \_\_\_\_\_

Display a large version of the Frayer model on chart paper, or use a document camera to project your work. Hand out student copies, and direct students to complete their Frayer models as demonstrated.

T: †

S: "

T:  $0$  Examples factor

Step 5: List nonexamples

T:  $u$  Nonexamples  $u$  factors  
 $v$   $v$

S:

T:  $\neq$  factor

S: "

T:  $0$  factor factor #  
factor [Write down any reasonable answers.]

Step 6: Test yourself.

The study step is critical to student success in using vocabulary strategies such as the Frayer model. Students need to study the terms to internalize them for later use. Students can quiz each other during "down times," or the models/cards can be used as part of a center activity.

Instruct students to study their Frayer models as follows:

1. Cover each box of the Frayer model with a sticky note. Do not cover the math term in the middle circle.
2. Say the term in the middle and try to say the definition.
3. If you do not know the definition, uncover the **Characteristics** box, and try to say the definition.
4. If you do not know the definition, uncover the **Examples** box, and try to say the definition.
5. If you do not know the definition, uncover the **Nonexamples** box, and try to say the definition.
6. If you do not know the definition, uncover the **Definition** box.

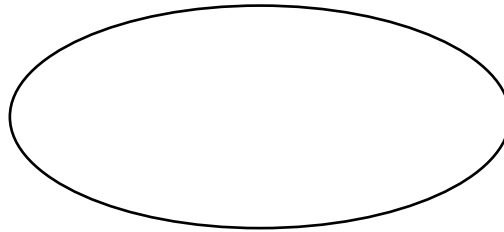
Repeat steps 1-6 for each Frayer model.

Student actions

NAME: \_\_\_\_\_

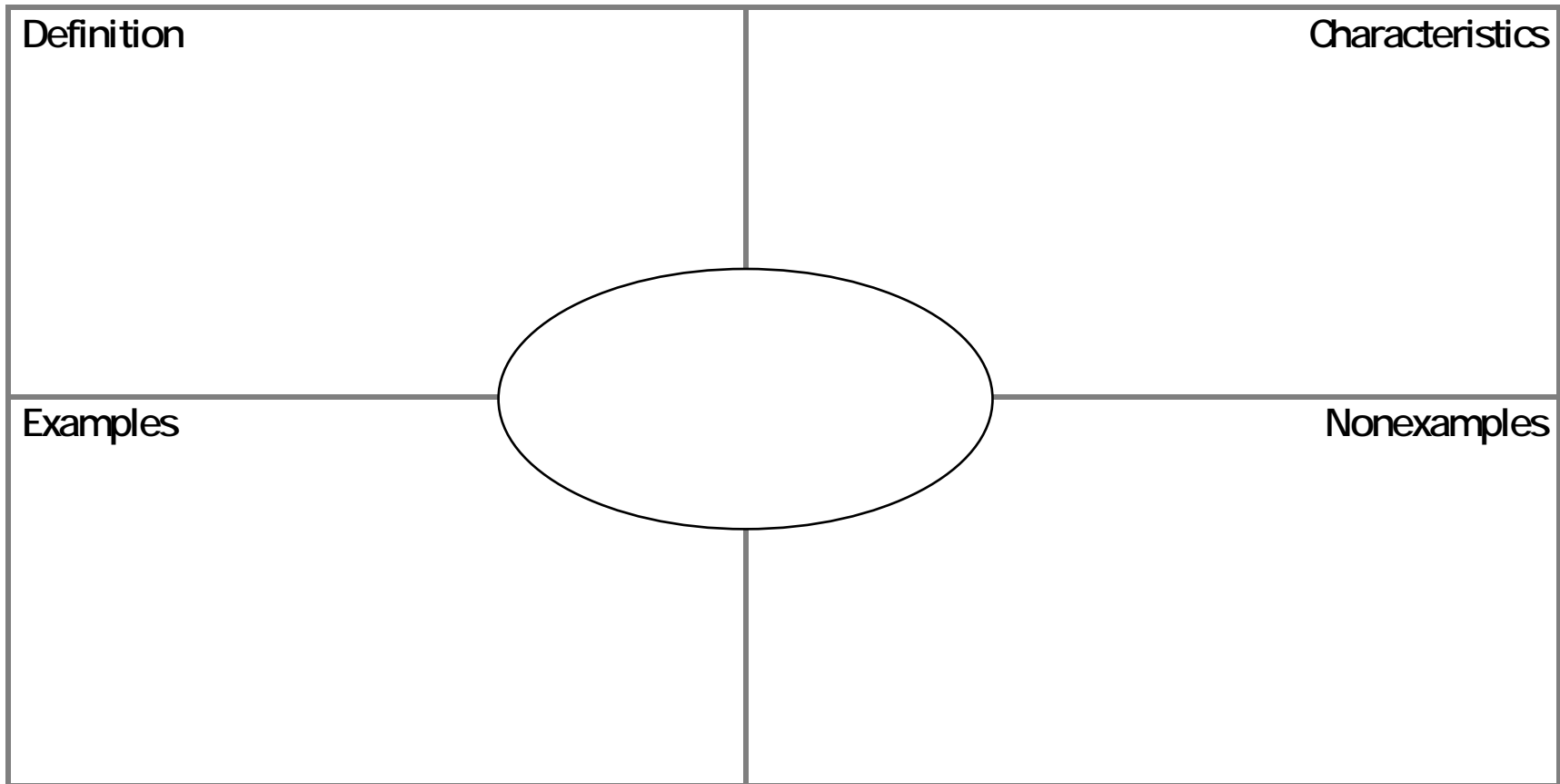
Framer Model (example)

Definition



NAME: \_\_\_\_\_

### Frayer Model





## Desk Reference Sheet (How to Round Numbers)

### Exemplar from:

[Module 2: Topic C: Lesson 12](#): Concept Development

### Explanation of scaffold:

The  $\frac{1}{2}$   $k$   $\frac{1}{2}$  desk reference sheet supports students who have difficulty understanding the concept of rounding and recalling the multistep process involved. An explicit rule for rounding numbers provides additional support to students who need to develop a concrete understanding of this mathematical process which is important to the content of the lesson and will be necessary to use in the future. Although the  $\frac{1}{2}$   $k$   $\frac{1}{2}$  desk reference sheet connects to and uses the concept development section in this lesson as an exemplar, desk reference sheets can be used as a visual support in any lesson until students build fluency remembering key mathematical terms, concepts, processes, and/or skills.

### Teacher actions/instructions

Instruct students in the process for rounding numbers and use of the  $\frac{1}{2}$   $k$   $\frac{1}{2}$  desk reference sheet as follows:

1. Find and label the benchmarks/endpoints.
2. Find and label the midpoint/halfway point.
3. Plot and label the number you need to round.
4. Round using the rule:  $\frac{1}{2}$   $k$   $\frac{1}{2}$

For students who require explicit instruction on how to use the How to Round Numbers desk reference sheet to round a number, the following sample script (based on the language found in the concept development section of Module 2, Topic C, Lesson 12) is provided to demonstrate one way instruction might look like:

#### Step 1: Find and label the benchmarks/endpoints

**T (teacher):**  $\frac{1}{2}$   $k$   $\frac{1}{2}$

Display a large version of the  $\frac{1}{2}$   $k$   $\frac{1}{2}$



T: -

**Step 4: Round using the rule.**

T: V

S: 0

T: †

If the number is below the midpoint/halfway point, then round down. If the number is at the midpoint/halfway point or above, then round up.

S:

T: #

As students become more familiar with the process, fade the use of modeling and guided practice, and provide opportunities for students to work in pairs or small groups. Once students demonstrate the ability to round numbers with limited prompting, provide multiple, independent practice opportunities to ensure success. Explain that the vertical number line can be used even when the units of measurement change.

**Additional practice for rounding to the nearest ten:**

- 61 centimeters
- 38 minutes
- 25 grams

**Student actions**

Students chorally respond and use the = k V desk reference sheet to follow along with the teacher's model. Students then work in pairs, small groups, or independently as appropriate to round numbers using the = k V desk reference sheet as needed.

Student handouts/°      ts      de r      Asefh-9(en) Tc 0 tw 1.57 0 Tj(r)Tj86TEMC q54.

## How to Round Numbers (example)

1. Find and label the benchmarks/endpoints.
2. Find and label the midpoint/halfway point.
3. Label the number you need to round.

4. Round using the rule:  $\text{if } \frac{1}{2} \leq \text{benchmark} - \text{number} < 1$ , round up to the next benchmark.





T: @@ ..... k ..... @@ ..... @@ .....  
@ ..... o ..... @

S

T: u ..... V ..... @ .....  
k ..... @ .....  
..... † ..... k .....  
..... †

S 8

T:

S:  $u^2 + 2u + 1$

T:  $u^2 + 2u + 1$





**T:** -

Following from the second array, a similar approach can be used to translate the breaking down of  $7 \times 6$  into two easier facts, using five facts.

Seven groups of six is the same as seven groups of five plus seven groups of one.

$$7 \times 6 = (7 \times 5) + (7 \times 1)$$

$$7 \times 6 = 35 + 7$$

$$7 \times 6 = 42$$

Provide additional opportunities for students to reinforce their understanding of the commutative and distributive properties while using their familiar multiplication five facts to complete problems using concrete, representational, and/or abstract means. As students become more familiar with the strategy, fade the use of modeling and guided practice.

Additional problems from the module lesson:

$$6 \times 9$$

One group of 9 is the same as a group of five plus a group of \_\_\_\_\_.

Six groups of 9 is the same as six groups of five plus six groups of \_\_\_\_\_.

$$6 \times 9 = (6 \times 5) + ( \quad )$$

$$9 \times 6$$

One group of 6 is the same as a group of five plus a group of \_\_\_\_\_.

Nine groups of 6 is the same as nine groups of five plus nine groups of \_\_\_\_\_.

$$9 \times 6 = (9 \times 5) + ( \quad )$$

$$6 \times 6 = ?$$

### Student actions

Students chorally respond, arrange Rekenrek or linking cubes, and work in pairs to complete problems.

### Student handouts/materials

Rekenrek or linking cubes (two different colors)

Personal white boards

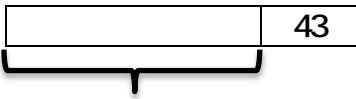
\*\*\*Note: Students may choose to use other pictorial representations, such as number bonds, to represent problems and distribute differently depending on their use of the commutative property.



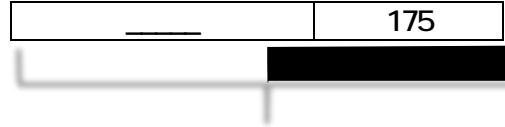


3. Erica makes a banner using 4 sheets of paper. Each paper measures 9 inches by 10 inches. What is the total area of Erica's banner?

5. Kim's black kitten weighs 175 grams. Her gray kitten weighs 43 grams less than the black kitten. What is the total weight of the two kittens?



Gray kitten



## References

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Archer, A and Hughes, C. (2011). - - - - - New York, NY The Guilford Press.