

Grade 4 Mid to End of Year Math Assessment – Number Sense



WHAT IS IT?

The grade 4 mid to end of year math assessment can be used to answer the question, “Did we get there?” In the fall, we determined a starting point for individual students and our class as a whole. After instruction, we want to know where each student presently sits in their learning. From the assessment results, we can see trends within the class and for each student. We learn quickly about their math knowledge and can fill any gaps before the end of the year, celebrate learning and be reflective about our math instruction.

The key understandings from the number sense strand covered in the grade 4 math assessment are: comparing / ordering fractions and decimals, multiples, place value, subtraction strategies, multiplication, division, partitioning and multiplicative problem solving.

HOW IS IT DELIVERED?

We like to administer this assessment as a team (class teachers, LST, CST, administrators, EA) and will spend 1 TO 2 hours in each classroom. The context of bicycle wheels can be used after watching this youtube clip of the Courtenay-born, world-class mountain biker, Geoff Kabush <http://www.youtube.com/watch?v=ZoK0S5SBDEk>. The Surrey Math problem (#9) is then read and explained to the students. Each student returns to their desk with the problem on a piece of paper to start solving it. During this quiet work time, each student is asked to conference with a teacher to complete the math assessment conference. Teachers follow the questions on the math assessment page, recording student answers, comments and noting their observations and judgments on the table on right side of the assessment page. At another time, questions 6, 7 and 8 can be completed as a whole class, in small groups, or as a conference. A class profile can also be created to assist data analysis.

THE ASSESSMENT IN YOUR CLASSROOM

In order to prepare for the assessment, please:

- Have a class list printed off
- Star the students on the class list that you would like assessed by a certain teacher (yourself, your CST, or LST...)
- Have a “busy” activity that is easy to organize for the EA to lead during the hour assessment so that you are free to assess as well
- Provide a small table and chairs and hopefully a quieter spot (for each adult assessing)
- Make sure all students have a pencil

Materials to complete this assessment include:

- Youtube link about Geoff Kabush (world-class mountain biker from Courtenay)

<http://www.youtube.com/watch?v=ZoK0S5SBDEk>

- One copy, per student of the #9 Word problem
- One copy, per student of questions 6,7
- One copy, per student of question 8
- One copy, per student of the Conference Recording Sheet
- One set of number cards per adult
- One copy of the number line per adult.
- 24 counters for division question if needed

3 1
— —
7 4

How many wheels?
There are _____ wheels in this picture.

7. Sam, Julie, Pete and Lisa each subtracted 28

a. Circle the method that most closely matches I solved the problem.

b. Explain whether each method makes sense mathematically.

Student Name: _____

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Assessment ideas: The Geoff Kabush YouTube clip can be shown to the entire class and the context of bikes can be used as a basis for manipulates and questions. Please note that some questions have multiple parts. Do not hesitate to adjust the numbers, or the quantity of tasks completed to suit the student. The Surrey math problem solving assessment might also be used as it uses this same context to assess problem solving and partitioning.

Student Conference

1. Place the numeral cards in front of the student and say, "Each card shows the number of kilometres that Geoff cycles. Can you sort them into an increasing order".

$\frac{1}{4}$ / 0.25 / $\frac{3}{7}$ / $\frac{1}{2}$ / 0.52 / $\frac{3}{3}$ / 1.02 _____

2. Geoff travels with 3 mountain bikes. How many wheels does he travel with? _____ Can you start at 6 and give the next 3 multiples of 6? 6, _____

3. The teacher says, If you saw _____ bicycles and then 1 more bicycle arrived, how many bikes would she see? (Prompt with, What is the next number? – if needed)

718 _____ 6 599 _____ 1 099 _____ 9999

4. On the number line, point to the following numbers:

4 000 _____ 64 _____ 2222 _____ $\frac{7}{8}$ _____ 0.50 _____

5. Geoff has 24 wheels to construct mountain bikes. How many bikes can he make? _____ (Provide counters, or paper/pencil for drawing if needed.)

8. Wheels task (**Use conference or whole class format**). Ask students to count the number of wheels on the page; note and record how students count and account for the missing tricycle.. Agree and record that there are 123 wheels all together. Point to the 3 and say, "Use a green pencil and put a circle around what this part of the number means in the set of wheels." Then point to the 2 and say, "Use a red pencil and put a circle around what this part of the number means in the set of wheels." Then point to the 1 and say, "Use a blue pencil and put a circle around what this part of the number means in the set of wheels." **Do not use the words value, amount, one hundred, twenty, nor three.**

***Students now complete the whole class questions independently (numbers 6,7.) Question 9 is the word problem that can be done independently as the conferences are taking place.

Teacher Observations**Comments / Next Steps:**

Key: NP – Needs time, practice and /or support
DA – Developing appropriately
CI – Confidently and independently
Na- not assessed at this time

Task	NP	DA	CI	Na
1. Compares and orders fractions/ decimals				
1. Relates decimals and fractions				
2, 8,9. Multiples, multiplication				
3. One more... Large numbers				
3,4, 8. Place Value				
4. Number line representations				
5. Division				
6. Number table patterns				
7. Subtraction strategies				
9. Partitioning, Multiplication				
9. Problem Solving				

4. Number Line



6. This is a chunk taken from a number chart. Fill in the empty boxes with the correct numbers, and explain your thinking.

		8 067	
		8 087	
		8 098	

Explain why you chose the numbers you did:

7. Sam, Julie, Pete and Lisa each subtracted 28 from 67.

- a. Circle the method that most closely matches how you solved the problem.
- b. Explain whether each method makes sense mathematically.

A) Sam's Method

$$\begin{array}{r} 67 \\ - 28 \\ \hline + 40 \\ \hline -1 \\ \hline 39 \end{array}$$

B) Julie's Method

$$\begin{aligned} 67 - 28 &= 39 \\ 67 - 20 = 47 & \\ 47 - 10 = 37 & \\ 37 + 2 = 39 & \end{aligned}$$

C) Pete's Method

$$\begin{aligned} 67 - 28 &= 39 \\ +2 + 2 & \\ 69 - 30 &= 39 \\ & \end{aligned}$$

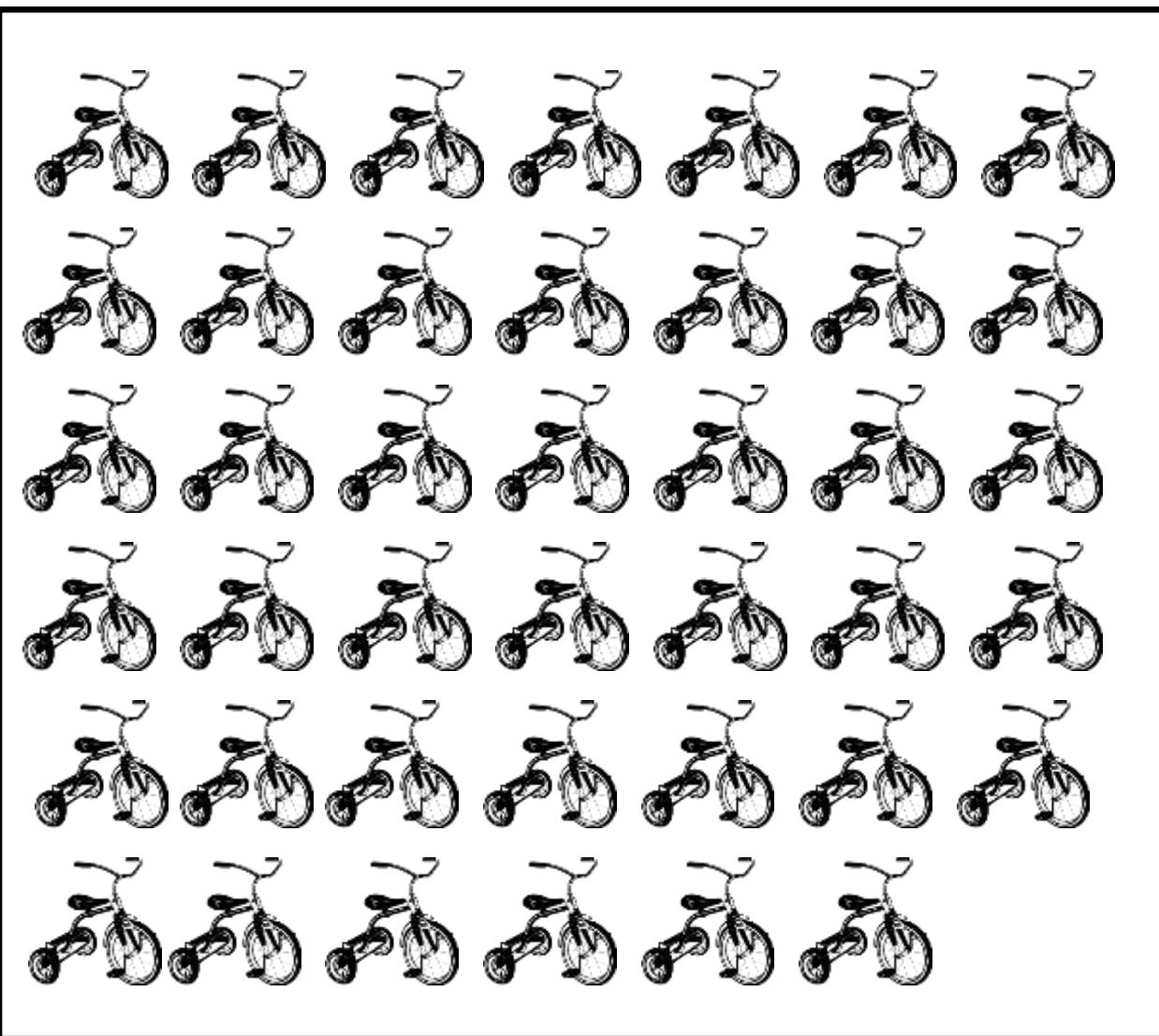
D) Lisa's Method

$$\begin{array}{r} 67 \\ - 28 \\ \hline 39 \end{array}$$

8. Name _____

How many wheels?

There are _____ wheels in this picture.



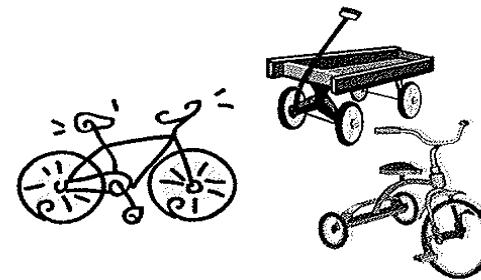
Krista Jernslet SD71

9. Name _____

Date _____

FINAL GRADE 4 PROBLEM SOLVING ASSESSMENT

You count a total of 216 wheels at the park.
There were bicycles, tricycles and wagons.
There were more than 10 of each.
How many of each might there be?
What other combination of wheels can you find?
Show all of your thinking.



Student Name: Student A

Grade 4 Mid to End of Year Math Assessment -Number Sense



Assessment ideas: The Geoff Kabush YouTube clip can be shown to the entire class and the context of bikes can be used as a basis for manipulates and questions. Please note that some questions have multiple parts. Do not hesitate to adjust the numbers, or the quantity of tasks completed to suit the student. The Surrey math problem solving assessment might also be used as it uses this same context to assess problem solving and partitioning.

Student Conference

1. Place the numeral cards in front of the student and say, "Each card shows the number of kilometres that Geoff cycles. Can you sort them into an increasing order".

$\frac{1}{4}$ / 0.25 / $\frac{3}{7}$ / $\frac{1}{2}$ / 0.52 / $\frac{3}{3}$ / 1.02 4 0.25 3 1/2 0.52 3 1.02
equal

2. Geoff travels with 3 mountain bikes. How many wheels does he travel with? 6 Can you start at 6 and give the next 3 multiples of 6? 6, 12 18 24

3. The teacher says, If you saw _____ bicycles and then 1 more bicycle arrived, how many bikes would she see? (Prompt with, What is the next number? – if needed)

718 719 6 599 6699 1 099 1199 9999 99999

4. On the number line, point to the following numbers:

4 000 ✓ 2222 ✓
 $\frac{7}{8}$ ✓ 0.50 ✓
64 ✓ 6500 ✓

5. Geoff has 24 wheels to construct mountain bikes. How many bikes can he make? 12

(needed counters – concrete)

8. Wheels task (Use conference or whole class format this). Ask students to count the number of wheels on the page; note and record how students count and account for the missing tricycle.. Agree and record that there are 123 wheels all together. Point to the 3 and say, "Use a green pencil and put a circle around what this part of the number means in the set of wheels." Then point to the 2 and say, "Use a red pencil and put a circle around what this part of the number means in the set of wheels." Then point to the 1 and say, "Use a blue pencil and put a circle around what this part of the number means in the set of wheels." Do not use the words value, amount, one hundred, twenty, nor three. ***Students now complete the whole class questions independently (numbers 6,7.) Question 9 is the word problem that can be done independently as the conferences are taking place.

Teacher Observations

- place value - 1 more large numbers

Comments / Next Steps:

Key: NP – Needs time, practice and /or support

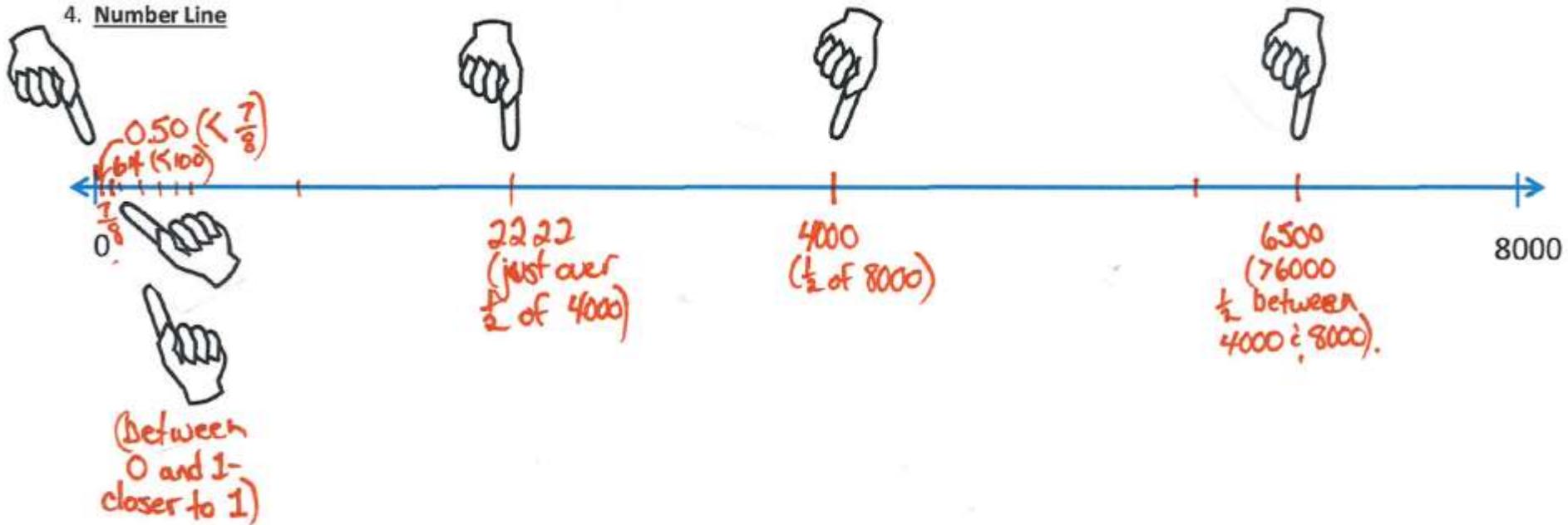
DA – Developing appropriately

CI – Confidently and independently

Na- not assessed at this time

Task	NP	DA	CI	Na
1. Compares and orders fractions/ decimals			✓	
1. Relates decimals and fractions			✓	
2, 8,9. Multiples, multiplication				
3. One more... Large numbers			✓	
3,4, 8. Place Value	large numbers ✓		123	
4. Number line representations				
5. Division	✓			
6. Number table patterns			✓	
7. Subtraction strategies			✓	
9. Partitioning, Multiplication				
9. Problem Solving				

4. Number Line



Sample.

6. This is a chunk taken from a number chart. Fill in the empty boxes with the correct numbers, and explain your thinking.

			8058
8065		8 067	
	8076		
8085		8 087	
			8 098

Explain why you chose the numbers you did:

- I used skip counts
by 10s down columns
and 1 more / 1 less,
2 more / 2 less.

7. Sam, Julie, Pete and Lisa each subtracted 28 from 67.

- a. Circle the method that most closely matches how you solved the problem.
- b. Explain whether each method makes sense mathematically.

A) Sam's Method

$$\begin{array}{r} 67 \\ - 28 \\ + 40 \\ \hline -1 \\ \hline 39 \end{array}$$

? don't know.

B) Julie's Method

$$\begin{aligned} 67 - 28 &= \\ 67 - 20 = 47 & \\ 47 - 10 = 37 & \\ 37 + 2 = 39 & \end{aligned}$$

-Smart! $\begin{array}{r} 20 \\ \swarrow \\ 10 \end{array}$
-subtracted 30 first,
then adjusted it (+2)
to 28.

C) Pete's Method

$$\begin{aligned} 67 - 28 &= \\ +2 + 2 & \\ 69 - 30 &= \\ &= 39 \end{aligned}$$

-changed the
question, but that
is OK.

D) Lisa's Method

$$\begin{array}{r} 67 \\ - 28 \\ \hline 39 \end{array}$$

I do this for
practice ~~on~~ on
my laptop.

S. Name _____

Example

How many wheels?

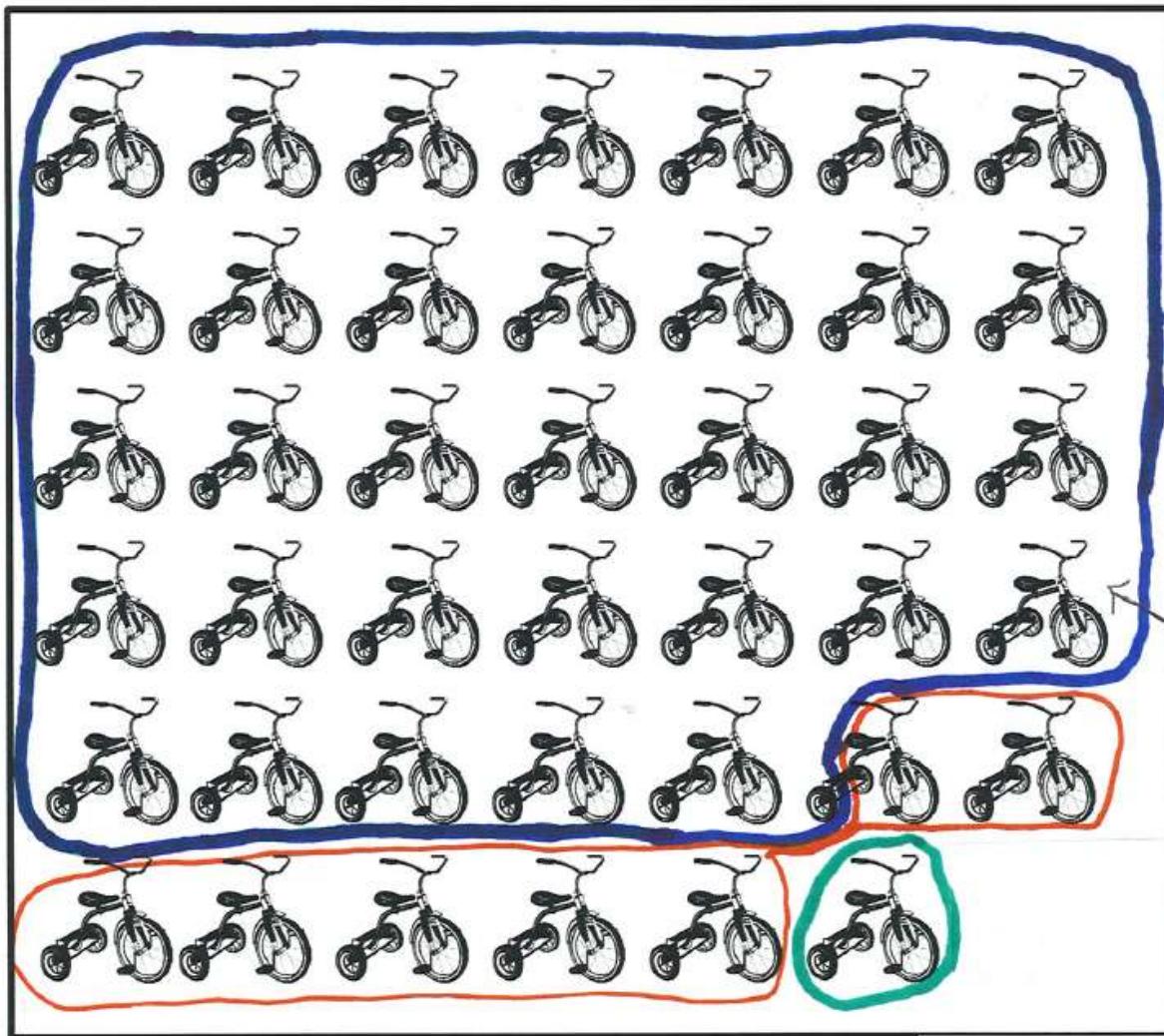
There are 123 wheels in this picture.

6 tricycles per column with 3 wheels = 18

$$7 \text{ columns} \times 18 =$$

$$70 + 56 = 126$$

$$- 3 \text{ wheels} = 123$$



$$7 \times 3 = 21 / \text{row}$$

$$\begin{aligned} &6 \text{ rows of } 21 \\ &= 126 \\ &- 3 \text{ wheels} = \\ &123 \end{aligned}$$

- 100
- 20
- 3

1

—

4

0.25

3

—

7

1

—

2

0.52

3

—

3

1.02

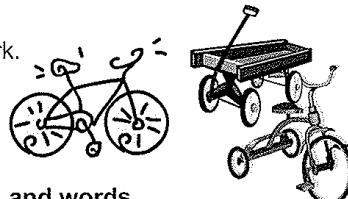
FINAL GRADE 4 PROBLEM SOLVING ASSESSMENT
(Teacher Instructions)

MATERIALS:

- multi-link cubes
- base ten blocks
- place value mats
- mini Ten Frames
- transparency of student copy

PROBLEM

One day, we counted a total of 216 wheels at the park.
There were bicycles, tricycles and wagons.
There were more than 10 of each.
How many of each might there be?
What other combination of wheels can you find?



Show all of your thinking using models, numbers and words.

BEFORE:

- Ask the students to make a collection of 48 items using the manipulatives that help them with their thinking.
- Tell the students that you visited a farm and counted 48 legs.
- Ask students to arrange the legs for ducks and cats, using all of the legs.
- Have the students record their solution on paper.
- Ask for volunteers to share their solutions and strategies.

DURING:

- Present the problem to the students e.g. using the transparency
- Clarify the problem, vocabulary and expectations of the task. (**Note:** this is not an opportunity to “teach” a lesson.)
- Explain to the students that they may use any thinking tools e.g. base ten blocks, place value mats etc that may help them reach a solution
- Distribute student copies.
- Remind the students to use words, numbers and diagrams / pictures to explain their thinking as they complete the task.
- Circulate amongst the students as they are completing the assessment to further clarify student’s thinking as needed.
- As the students finish and submit the task, conference with students as necessary to get a clearer picture of their thoughts and strategies.

- Here are some suggested questions (BLM Supporting Student Thinking) that may help “uncover” their thinking:

1. How do you know?
2. How did you start solving this problem?
3. Tell me what you are thinking? What can that look like in pictures or words?
4. Show me what you know.
5. What do you see in your head?
6. What questions did you ask yourself?
7. Why do you think that?
8. Could there be a different answer?
9. What strategies did you use to ...?
10. How does your strategy make sense to you?
11. What tools help you?

AFTER:

- Conduct a “Show and Share” session encouraging the students to share their strategies / thinking and to explain their reasons for their choices to complete the task.
- Refer to the Assessment Rubric to guide your inquiries.
- Consider the following questions before recording information on the Assessment Rubric:

1. How well did the students understand the question?
2. What strategies did the student use to solve the problem?
3. How much support did the student require?
4. How did the student represent and communicate their thinking?
5. How well did the students reason or justify the solution?
6. In what way/s did the student make connections to other mathematical concepts or real life situations?

WHERE'S THE MATH?

Students have the opportunities to demonstrate their knowledge about number sense, multiplication (2- or 3-digit by 1 digit) and division (2-digit dividend by 1-digit divisor) in the problem. Understanding that products/dividends and their relationship to their factors and divisors respectively is critical in working out the multiplication and division processes, i.e. there can be more than one multiplication / division sentence for a product / quotient.

These problems provide real life context that enable the students to use a variety of strategies for generating, recording and organizing their thoughts in order to find possible solutions. Some students may discover their solutions through strategies such as trial and error, whereas others may be able to reason that strategic placement of digits will produce desired outcomes, i.e. larger products/smaller quotients.

EXPECTATIONS:

The students will be able to ...

- Demonstrate an understanding of multiplication and division.
- Complete 2 or 3-digit by 1-digit multiplication
- Find more than one possible solution.
- Find more than one strategy to solve the problem.
- Communicate and represent their mathematical thinking.
- Justify their reasoning.
- Make connections with other mathematical concepts and the real world.

EXTENSIONS AND ADAPTATIONS:

Ask the students to:

- Make the quantity smaller, i.e. 2-digit number.
- Make the quantity larger, i.e. 4-digit number.
- Change the number of wheels on a vehicle, i.e. unicycle or a pair of in-line blades.
- Taking digital recordings (pictures/video/audio) of students' concrete representations and/or verbal explanations.
- Arrange the various vehicles into rows with the same number in each row ... what are the different combinations of arrangements.