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INNOVATIONS

Learning Lab #4

Afternoon Handouts

1st

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Who lives here?

Grandpa is a funny guy. He says that at his house there are 14 feet and 2 tails. Who might live at Grandpa's house?

Show all your work. Explain in words how you found your answer. Tell why you took the steps you did to solve the problem.

Make sure you
— show all your work in solving the problem,
— clearly label your answer,
— write in words how you solved the problem,
— write in words why you took the steps you did to solve the problem, and
— write as clearly as you can.

Exemplars Math K-2 Sample (www.exemplars.com)

Placas de Automóvil / License Plates

Espanol

En un paseo reciente buscamos placas de automóviles que tuviereran 3 números. Demuestra todas las placas que encontramos con números que al sumarse equivalen al número 6.

Explica todo tu trabajo utilizando dibujos, números, y palabras.

English

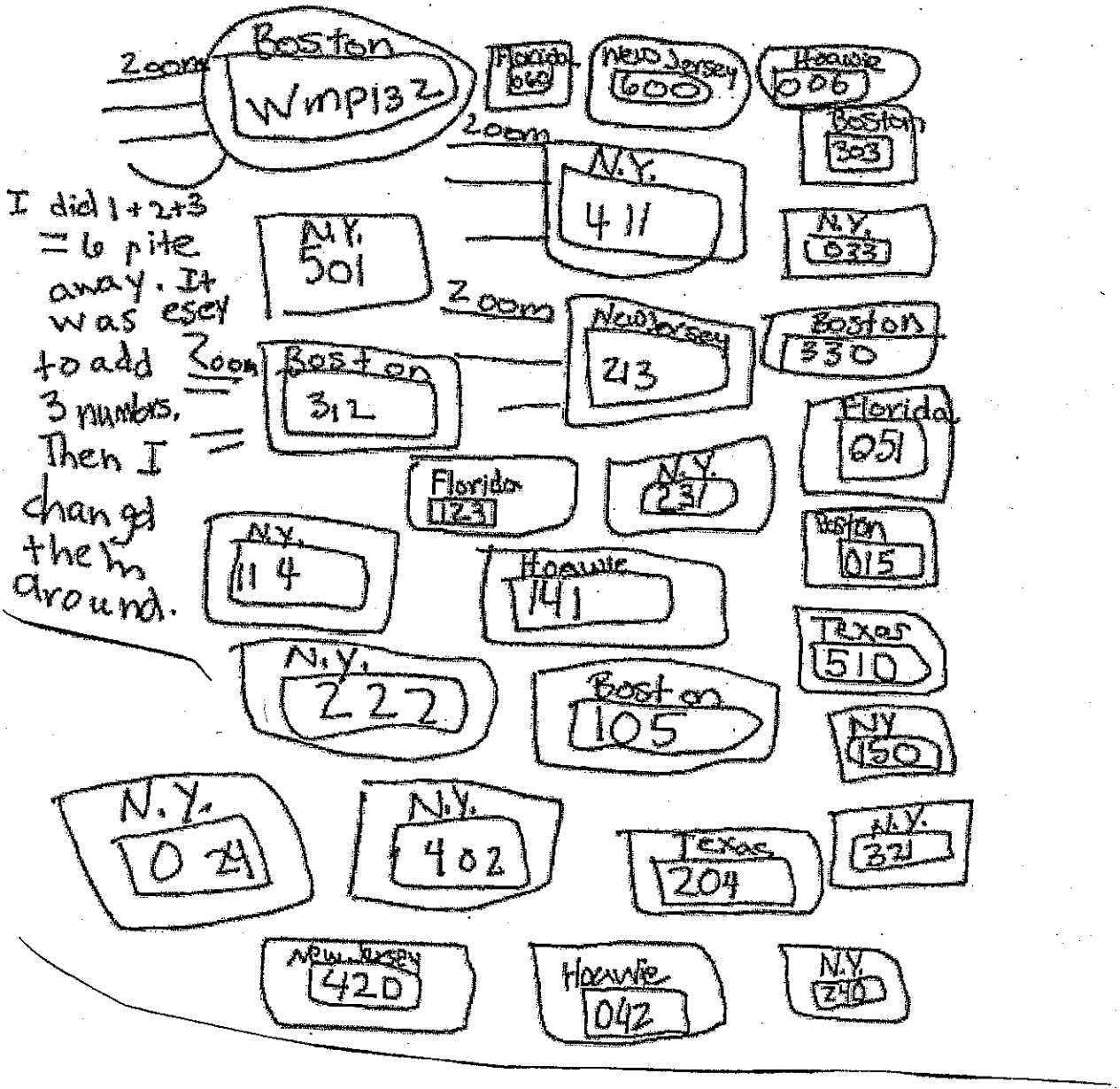
On a recent car trip we looked for license plates that had 3 numerals on them. Show all of the license plates that we found that had numbers that added up to 6.

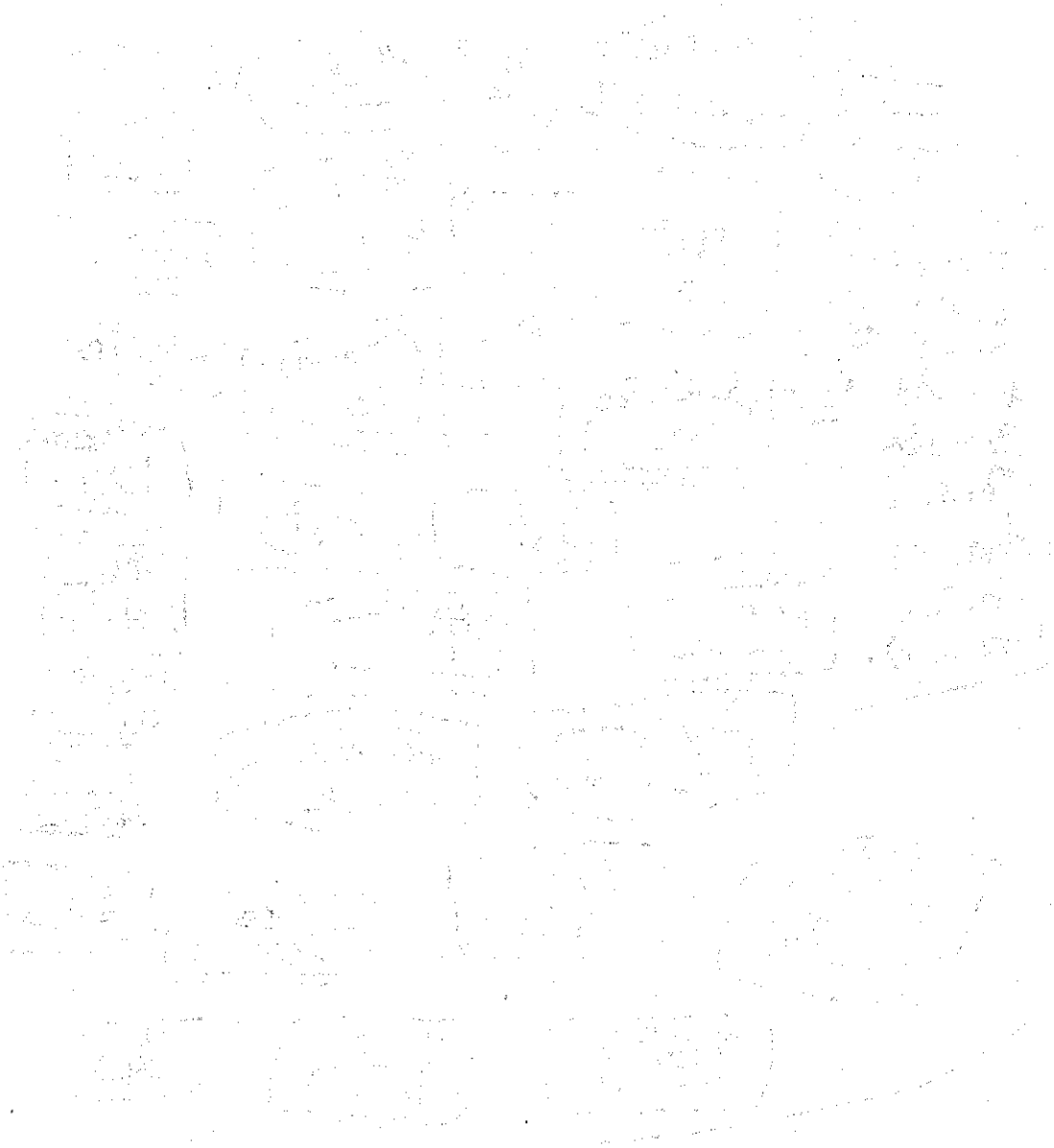
Explain all of your work using pictures, numbers, and words.

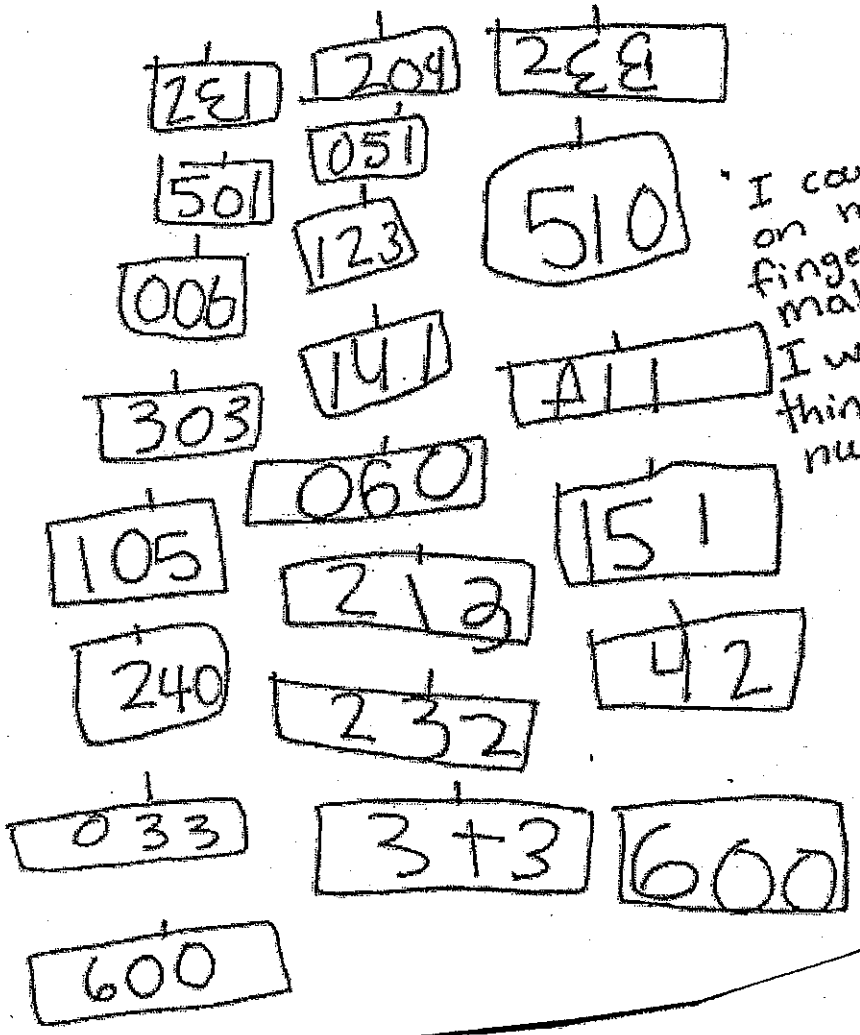
You have four samples of student solutions to this problem.

- Examine them and discuss them with others at your table.
- Put them in order of mathematical complexity – novice, apprentice, practitioner, expert.
- What evidence of student thinking can you see that helps you assign the samples to different levels of complexity?

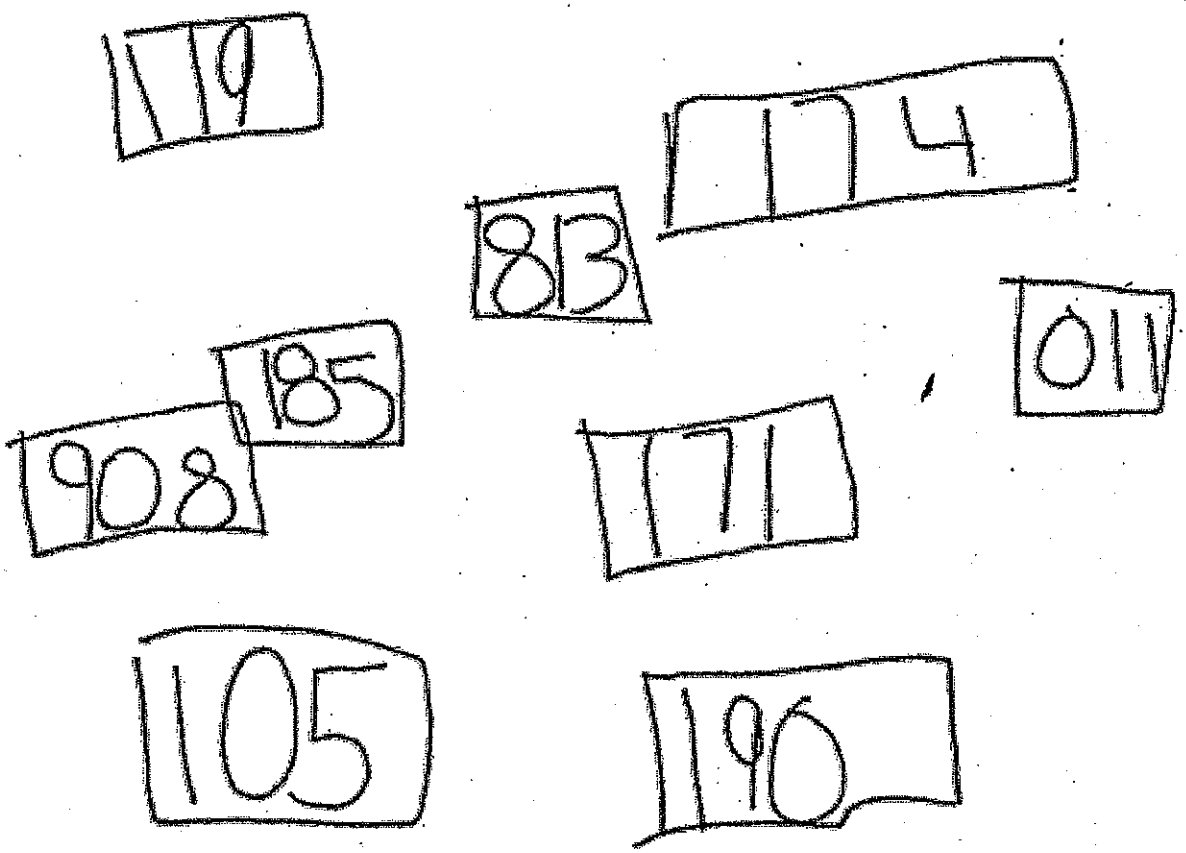
Level	*What you notice about student work sample*
Novice	
Apprentice	
Practitioner	
Expert	


Boston
WMP132
Zoom
Florida
669
New Jersey
600
Hawaii
006
Boston
303
Zoom
N.Y.
411
N.Y.
033
N.Y.
501
Zoom
New Jersey
213
Boston
330
Zoom
Boston
312
Florida
051
Florida
123
N.Y.
237
N.Y.
114
Boston
015
Hawaii
141
Texas
510
N.Y.
222
Boston
105
NY
150
N.Y.
024
N.Y.
402
Texas
204
N.Y.
321
New Jersey
420
Hawaii
042
N.Y.
240
I did 1+2+3 = 6 right away. It was easy to add 3 numbers. Then I changed them around.





I counted on my fingers to make 6. I was just thinking of numbers.



I poot homrs on plates.

222 +ripls 2+2+2=6

114 dobl #s 1+1+4=6

141 Swich around- 1+4+1=6

411 4+1+1=6

006 dobl 0's 0+0+6=6

060 Swich arond

600

330 dobl 3's 0+3+3=6

303 Swich

033

The 0 can be any plase.

123 1+2+3=6

321 →backwrds

231 3+2+1=6

132

312

213

510 5+1+0=6

015 If then are 3 numbrs then ther are 6 paterns

150

051

501

105

1+0+5=6

420

024 4+2+0=6

240

042 The same

204

402

1st grade EDM

8•4 Application: Shopping at the School Store

Objective To provide practice solving number stories that involve addition and subtraction.

1 Teaching the Lesson

Key Activities

Children make up, solve, and record number stories based on the cost of items that might be available in a school store.

Key Concepts and Skills

- Express amounts of money using dollars-and-cents notation. [Number and Numeration Goal 3]
- Make up, solve, and record money number stories and discuss solution strategies. [Operations and Computation Goal 4]
- Show amounts of money with the fewest number of coins. [Measurement and Reference Frames Goal 2]
- Write number sentences to match solution strategies. [Patterns, Functions, and Algebra Goal 2]

materials

- ☐ *Math Journal 2*, pp. 158–160
- ☐ Home Link 8•3
- ☐ Transparencies (*Math Masters*, pp. 228 and 229; optional)
- ☐ slate
- ☐ tool-kit coins
- ☐ overhead coins (optional)

2 Ongoing Learning & Practice

Children play *Base-10 Exchange* to practice exchanging 10 cubes for 1 long and 10 longs for 1 flat.

Children practice and maintain skills through Math Boxes and Home Link activities.

Ongoing Assessment: Recognizing Student Achievement Use journal page 161. [Operations and Computation Goal 1]

materials

- ☐ *Math Journal 2*, p. 161
- ☐ Teaching Master (*Math Masters*, p. 224)
- ☐ Home Link Masters (*Math Masters*, p. 230)
- ☐ base-10 blocks (flats, longs, and cubes)
- ☐ dice (2 per partnership)

3 Differentiation Options

READINESS

Children use counters to model number stories.

ENRICHMENT

Children shop for ten-dollars worth of items.

materials

- ☐ slate
- ☐ counters
- ☐ advertisements from discount stores
- ☐ calculator

Technology

Assessment Management System
Math Boxes, Problem 3
See the ITLG.

Getting Started

Mental Math and Reflexes

To practice place-value and rounding skills, have children write answers on their slates to the following:

- ●○○ Is 14 closer to 10 or 20? 10 Is 16 closer to 10 or 20? 20
- ●●○ Is 39 closer to 30 or 40? 40 Is 21 closer to 20 or 30? 20
- ●●● Is 83 closer to 80 or 90? 80 Is 77 closer to 70 or 80? 80

Math Message

Turn to journal page 158. Pretend you have 1 quarter, 2 dimes, and 2 nickels. Do you have enough money to buy a pencil and a pair of scissors?

Home Link 8•3 Follow-Up

Briefly go over the answers.

1 Teaching the Lesson

▶ Math Message Follow-Up

WHOLE-CLASS ACTIVITY

Ask children to describe how they found the answer. Model (or have a volunteer model) the solution with overhead coins, or draw the coins on the board. They can buy either the pencil or the scissors, but not both.

▶ Making Up and Solving Number Stories

WHOLE-CLASS ACTIVITY

(*Math Journal 2*, pp. 158 and 159)

Tell children that they will be making up and solving each other's number stories. Explain the importance of listening carefully to the stories.

Children will use the School Store Mini-Posters on journal pages 158 and 159 as a source for number stories. If children are having difficulty making up number stories, model several stories before asking them to invent their own (see page 695 for suggestions). You can use transparencies of the posters (*Math Masters*, pages 228 and 229) for this activity.

Adjusting the Activity

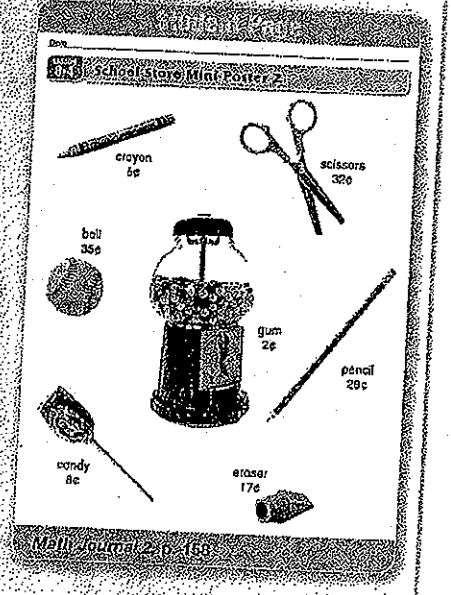
ELL

As a story is read, write it on the board.

AUDITORY • KINESTHETIC • TACTILE • VISUAL

Consider using the following procedure:

1. All children try to solve the stories using whatever means they can. Since the number stories involve money, children can use tool-kit coins to find the answers. However, counting on fingers, counting on the number line or number grid, making tallies, or drawing doodles are all perfectly acceptable. Some



Math Journal 2, p. 158

children may do the computation entirely in their heads. The goal of *Everyday Mathematics* is to have more and more children use mental calculations to solve problems.

2. When most of the children are finished, have volunteers share their answers and record them on the board.

3. Ask several children to share how they got their answers. As children think aloud, model how to communicate mathematical thinking by representing their thoughts with written words and pictures.

When a child suggests an especially interesting or useful method, you might pose another problem and ask the whole class to use the new method to solve the problem. In addition to helping children learn new methods, this approach also encourages them to listen more carefully to other children. From time to time you may want to require all children to use a particular method you propose. *For example:*

- Use base-10 blocks to find how much the pencil and eraser would cost together.
- Chen has 18¢. How can you use the number grid to figure out how much more money he needs to buy a pencil?

NOTE If children get into a pattern of telling one kind of story, ask them to tell other kinds. Give them an example, if necessary.

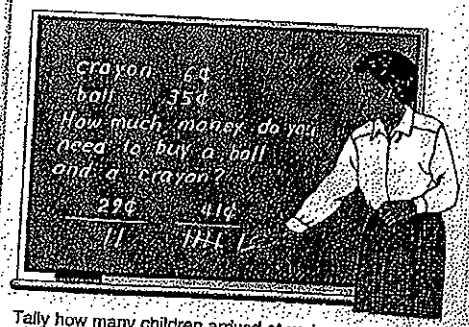
4. Summarize each proposed solution with a situation diagram.

Ask children to suggest number models to summarize their solutions. Keep in mind that more than one number model may fit a problem. For example, for the number story: *How much more does a 28¢ pencil cost than a 17¢ eraser?* both the subtraction number model $28¢ - 17¢ = 11¢$ and the addition number model $17¢ + 11¢ = 28¢$ are correct.

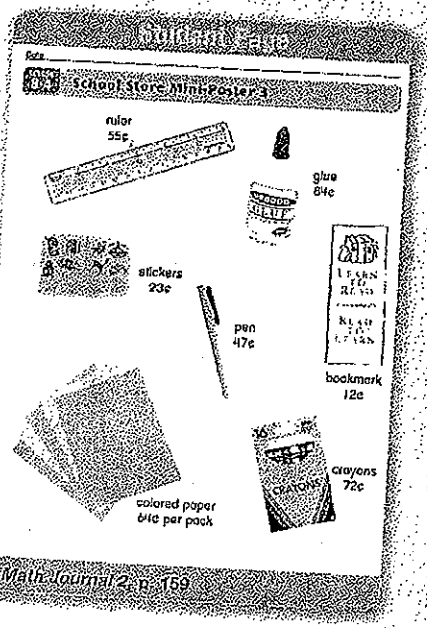
Some of the numbers on the posters are more difficult to use in computations than others. Use whichever items on the posters best fit the abilities of your class. The following number stories use the items on journal page 158.

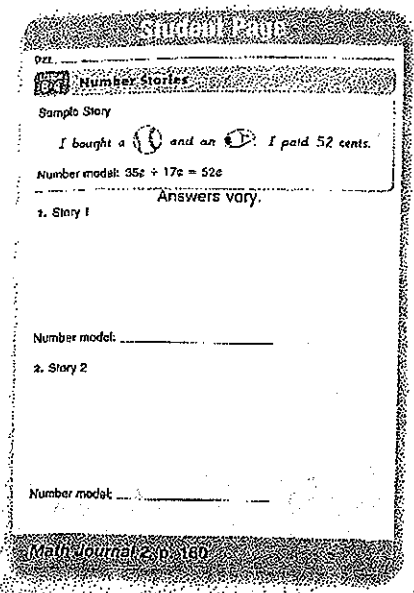
- (Parts-and-total) Malcolm bought a toy truck and a ball. How much did he pay? Toy truck: 8¢; ball: 35¢; total: 43¢
- (Parts-and-total: 3 addends) What is the cost of a pencil, a crayon, and an eraser? Pencil: 28¢; crayon: 6¢; eraser: 17¢; total: 51¢
- (Parts-and-total: part missing) Lisa spent 49 cents. She bought a pair of scissors and an eraser. How much did she pay for the eraser? Scissors: 32¢; eraser: 18¢
- (Comparison) A pencil costs how much more than a crayon? Pencil: 28¢; crayon: 6¢; difference: 22¢
- (Change-to-more) Riva has 20 cents. How much more does she need to buy a ball? Ball: 35¢; amount needed: 15¢

NOTE If there is disagreement about answers, tally how many children arrived at various answers as you list them on the board. Encourage children to come to a consensus. If they settle on an incorrect answer, examine the reasoning that led to that answer. Then guide the class toward a sound strategy.



Tally how many children arrived at various answers.





- (Change-to-less) A ball that I want to buy is smaller than the ball on the poster, so it costs 10 cents less than the baseball. How much does the smaller ball cost? Baseball: 35¢; small ball: 25¢
- (Multiples) How much money will I need to buy 2 crayons? How much money will I need for 4 crayons? 1 crayon: 6¢; 2 crayons: 12¢; 4 crayons: 24¢
- (Two-step problem) How much money will I need to buy 4 sets of jacks and a toy truck? Jacks: 2¢; 4 sets of jacks: 8¢; toy truck: 8¢; total: 16¢

▶ Recording Number Stories

PARTNER ACTIVITY

(*Math Journal 2*, p. 160)

Partners record two number stories in words or by drawing pictures on journal page 160. They can use stories that came up in the whole-class activity or make up new ones. Have them write a number model to show how they solved each number story.

2 Ongoing Learning & Practice

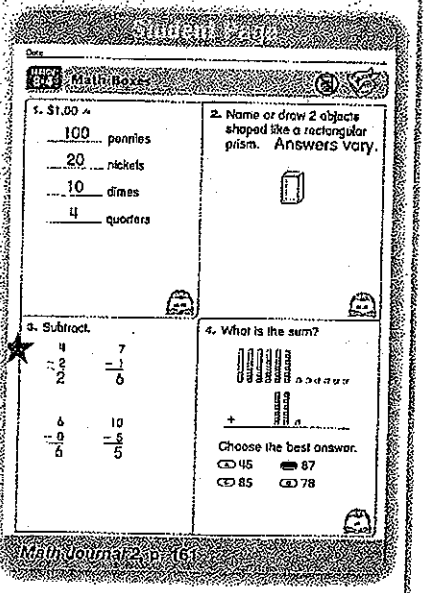
▶ Playing *Base-10 Exchange*

PARTNER ACTIVITY

(*Math Masters*, p. 224)

Children practice base-10 exchanges by playing an extension of the *Base-10 Exchange* game they learned in Lesson 5-3. To extend the game, players use the Place-Value Mat on *Math Masters*, page 224. This will allow them to exchange 10 longs for a flat.

Players take turns putting base-10 blocks on their Place-Value Mats according to the roll of the dice. Whenever possible, they exchange 10 cubes for 1 long and 10 longs for 1 flat. The first player to get 3 flats wins.



▶ Math Boxes 8•4

INDEPENDENT ACTIVITY

(*Math Journal 2*, p. 161)

Mixed Practice Math Boxes in this lesson are paired with Math Boxes in Lesson 8-2. The skills in Problem 4 preview Unit 9 content.

Ongoing Assessment: Recognizing Student Achievement

Math Boxes Problem 3

Use Math Boxes, Problem 3 to assess children's knowledge of subtraction facts. Children are making adequate progress if they are able to correctly answer the problems.

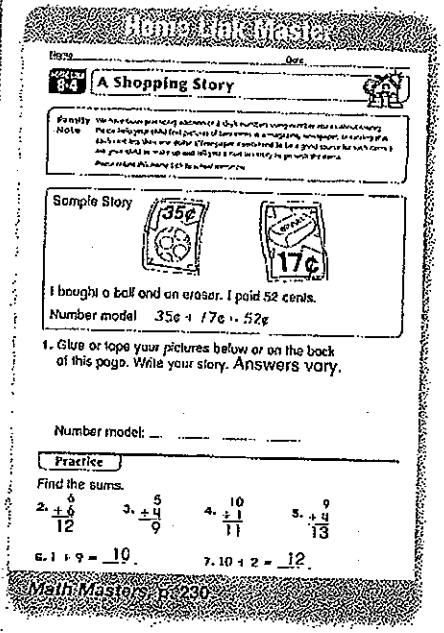
[Operations and Computation Goal 1]

▶ Home Link 8•4

(*Math Masters*, p. 230)

INDEPENDENT ACTIVITY

Home Connection Children find pictures in a magazine, newspaper, or catalog. They make up a number story and write a number model to go with the pictures.



3 Differentiation Options

READINESS

SMALL-GROUP ACTIVITY

15–30 Min

▶ Using Counters to Model Number Stories

To explore number stories, children use counters to model the stories and review their solutions by drawing situation diagrams. Have children suggest number models to go with the stories. *Suggestions:*

- Brandi had 3 red crayons and 4 blue crayons. How many crayons did she have altogether? Children draw a line to divide their slates in half. They place 3 counters on one side and 4 on the other. Then they erase the line to get 7. Draw a parts-and-total diagram to record the answer.
- Ricardo has 5 cookies. Renee has 7 cookies. How many more cookies does Renee have than Ricardo? Children take 5 counters and 7 counters and line them up one-to-one next to each other. Two of Renee's "cookies" will not have a match, so Renee has 2 more cookies than Ricardo. Draw a comparison diagram to record the answer.
- The snow was 2 inches deep in the morning. By lunch, 3 more inches of snow had fallen. How much snow had fallen by lunch time? Sample answer: Children start with 2 counters on their slates. They add 3 more counters. This could be a parts-and-total diagram or a change-to-more diagram, depending on how children view it.

ENRICHMENT

PARTNER ACTIVITY

15–30 Min

▶ Spending Ten Dollars

To apply children's understanding of money concepts, have them create a shopping list of items that cost about ten dollars in all. Distribute advertisements from discount stores. Tell children to pretend they have ten dollars to go shopping at the advertised store. They work with a partner to come up with a list of at least five items they can buy for a total of about ten dollars. Children record the name of each item (or draw a picture of it) and list its cost in dollars-and-cents notation. They write a number model for finding the exact total cost of their items and then use a calculator to find the total.

Lesson 3 Dimes, Nickels, and Quarters

Estimated Class Sessions: 2

Lesson Overview

Students review and compare values of pennies, nickels, dimes, and quarters. They compare how long it takes to count using pennies to how long it takes to count using larger coins. Students discuss the usefulness of using coins with higher values. Finally, they determine different combinations of coins that add up to 100.

Key Content

- Grouping and counting a collection of coins by fives and tens.
- Solving problems using multiples of fives and tens.
- Partitioning 100 ($1.00) into two and three parts using coins.
- Translating between representations of numbers (coins and number sentences).
- Introducing the value of a quarter.
- Finding the value of a collection of nickels, dimes, and quarters.

Math Facts Strategies

DPP items G, H, and J provide practice with addition and subtraction math facts.

Homework

Assign the *Shuttle Bus #50* Homework Page as homework or as an assessment.

Assessment

Use Assessment Indicators A2 and A5 and the *Observational Assessment Record* to document students' abilities to use multiples of fives and tens to solve problems and to find the value of a collection of nickels, dimes, and quarters.

Materials List

Supplies and Copies

Student	Teacher
Supplies for Each Student Pair • 10–12 pennies or 2 strips from *Pennies Money Master,* optional (*Unit Resource Guide* Page 43) • 10 dimes or 1 strip from *Dimes Money Master,* optional (*Unit Resource Guide* Page 44) • 24–25 nickels or 3 strips from *Nickels Money Master,* optional (*Unit Resource Guide* Page 56) • 4–5 quarters or 1 strip from *Quarters Money Master,* optional (*Unit Resource Guide* Page 57) • calculators, optional • connecting cubes or other counters, optional	**Supplies** • overhead pennies, nickels, dimes, and quarters or cutouts from transparencies of *Pennies, Nickels, Dimes,* and *Quarters Money Masters* (*Unit Resource Guide* Pages 43–44 and 56–57) • scissors
Copies • extra copies of *100 Chart* as needed (*Unit Resource Guide* Page 59)	**Copies/Transparencies** • 1 transparency of *Arapaho County Fair* (*Unit Resource Guide* Page 58)

All blackline masters including assessment, transparency, and DPP masters are also on the Teacher Resource CD.

Student Books

Twins' Day at the County Fair (*Student Guide* Page 211)
Shuttle Bus #100 (*Student Guide* Page 212)
Shuttle Bus #50 (*Student Guide* Page 213)

Daily Practice and Problems

DPP items G–J (*Unit Resource Guide* Pages 20–21)

Assessment Tools

Observational Assessment Record (*Unit Resource Guide* Pages 13–14)

Daily Practice and Problems

Suggestions for using the DPPs are on page 54.

G. How Many in the Bag? (URG p. 20)

I have ___ beans in the bag. Now I am taking out ___ beans. How many beans are left in the bag?

What number sentence describes what we just did?

H. Addition and Subtraction (URG p. 20)

1. 2 + 4 = ☐
2. 4 + 2 = ☐
3. 6 − 4 = ☐
4. 6 − 2 = ☐

Discuss your strategies.

I. What Is the Area? (URG p. 21)

1. First use pennies to estimate the area.
2. Then, use quarters to estimate the area.
3. Then, use square-inch tiles to find the area.

J. Addition Facts 2 (URG p. 21)

A. ☐ = 2 + 0

B. 2 + 2 = ☐

C. ☐ = 1 + 1

D. 2 + 4 = ☐

Teaching the Activity

Part 1 Coins

Begin by giving a volunteer 100 pennies and asking the student to give you 30¢. When the student is finished, point out to the class how long it takes to count individual pennies. Ask them to imagine how long it would take to count out 100 pennies. Now, have another child hold 10 dimes, reminding students that a dime is worth 10 cents, or 10 pennies. Ask the student to give you 30¢ in dimes. Point out how much faster it is to count by tens to 30 than by ones to 30. Discuss:

- *Why is it useful to have coins of higher value than pennies?*
- *Name coins other than pennies or dimes that are commonly used. How much are they worth in cents?* (nickel—5¢, quarter—25¢)

Make sure students understand the value of each coin in terms of pennies (e.g., a quarter is the same as 25 pennies). Pose and discuss the following questions:

- *If we had nickels instead of dimes, how many nickels would we need for 30¢?* (6)
- *How many dimes are the same value as 100 pennies?* (10)
- *How many nickels are the same value as 100 pennies?* (20)
- *How many quarters are the same value as 100 pennies?* (4)

You can use the overhead coins to show students different combinations of coins for amounts that you specify. For example, ask:

- *Show me some possible coin combinations for 20 cents on the overhead projector.* (20 pennies; 4 nickels; 2 dimes; 10 pennies and 2 nickels; 10 pennies and 1 dime; 5 pennies, 1 dime, and 1 nickel; 15 pennies and 1 nickel; 5 pennies and 3 nickels).

Make sure students can create the different combinations for a quarter. Encourage students to use coins to help them think of different combinations. Students can use calculators to check their answers or to try out different combinations.

Part 2 At the Fair

Read the following paragraphs to students as an introduction to the *Twins' Day at the County Fair* Activity Page.

It's Twins' Day at the Arapaho County Fair. Sets of twins can participate in any event for the price of one ticket. Every event costs $1.00.

Arapaho County Fair

Ferris Wheel..... $1.00
Balloon Toss..... $1.00
Target Range..... $1.00
Bumper Cars..... $1.00
Petting Zoo.....$1.00

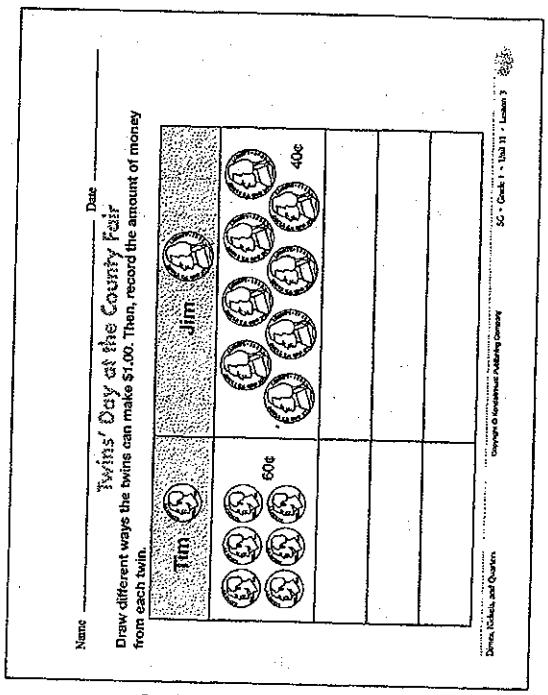
Figure 2: *$1.00 events at the Arapaho County Fair*

Gramps thinks it's a good day to take the twins, Tim and Jim, to the County Fair. He gives a stack of coins to each. Tim has dimes and Jim has nickels. Gramps tells them there are some rules they have to follow to share the cost of each ticket:

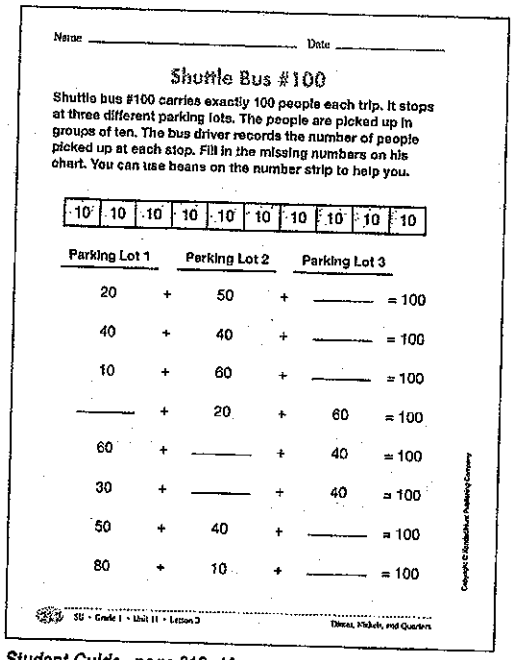
1. *Each twin must contribute at least one coin for each ticket.*
2. *They must use a different combination of coins for each ticket.*
3. *They must keep a record of how they spend their money.*
4. *The coins the twins give must add up to $1.00.*

The twins thank Gramps and agree to meet him at the Lemonade Stand at 12:30 for lunch. They are eager to buy tickets, but need some help. Let's help Tim and Jim.

Display a transparency of the *Arapaho County Fair* Transparency Master, which reiterates Gramps's rules. Have student pairs record on the *Twins' Day at the County Fair* Activity Page different ways the twins can combine the coins to make $1.00. Circulate around the room to make sure all students understand the assignment. When everyone is finished, invite students to share their answers with the class. Write some of the combinations on the board and discuss them as a group.



Student Guide **- page 211** *(Answers on p. 60)*



Name _____ Date _____

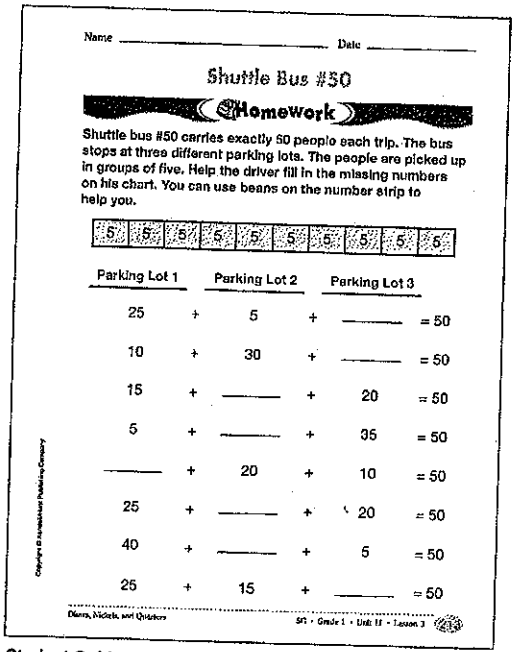
Shuttle Bus #100

Shuttle bus #100 carries exactly 100 people each trip. It stops at three different parking lots. The people are picked up in groups of ten. The bus driver records the number of people picked up at each stop. Fill in the missing numbers on his chart. You can use beans on the number strip to help you.

10	10	10	10	10	10	10	10	10	10

Parking Lot 1		Parking Lot 2		Parking Lot 3	
20	+	50	+	_____	= 100
40	+	40	+	_____	= 100
10	+	60	+	_____	= 100
_____	+	20	+	60	= 100
60	+	_____	+	40	= 100
30	+	_____	+	40	= 100
50	+	40	+	_____	= 100
80	+	10	+	_____	= 100

Student Guide - page 212 *(Answers on p. 60)*



Name _____ Date _____

Shuttle Bus #50

Homework

Shuttle bus #50 carries exactly 50 people each trip. The bus stops at three different parking lots. The people are picked up in groups of five. Help the driver fill in the missing numbers on his chart. You can use beans on the number strip to help you.

5	5	5	5	5	5	5	5	5	5

Parking Lot 1		Parking Lot 2		Parking Lot 3	
25	+	5	+	_____	= 50
10	+	30	+	_____	= 50
15	+	_____	+	20	= 50
5	+	_____	+	35	= 50
_____	+	20	+	10	= 50
25	+	_____	+	20	= 50
40	+	_____	+	5	= 50
25	+	15	+	_____	= 50

Student Guide - page 213 *(Answers on p. 61)*

Part 3 On the Bus

Students may practice working with multiples of ten with the *Shuttle Bus #100* Activity Page. Encourage them to tell the strategies they use to find the number of people in each parking lot. Students can use counters and place them over the number strip on the activity page to find missing addends, they can use a calculator, a *100 Chart,* or they might skip count by tens to 100.

Math Facts Strategies

DPP item G provides practice with subtraction facts by reviewing the activity *How Many in the Bag?* Items H and J provide practice with the addition math facts in Group A. Item H relates addition and subtraction strategies.

Homework and Practice

- Give students more practice working with multiples of five by assigning the *Shuttle Bus #50* Homework Page. This page can also be used as an assessment.
- DPP item I provides practice with measuring area. First, students estimate the area of a rectangle using pennies and quarters. Then, they find the area using square-inch tiles.

Assessment

Use the *Observational Assessment Record* to document students' abilities to solve addition problems using multiples of five and ten to find the value of a collection of nickels, dimes, and quarters.

Extension

Have students skip count by ones on a calculator as fast as they can for 10 seconds. If students have a calculator with a hot equals key (a constant function), they can push 1 + 1 = = =. Students then estimate what number will be in the window if they skip counted by fives for ten seconds. Try it. Then, repeat with tens and twenty-fives.

Literature Connections

- Dee, Ruby. *Two Ways to Count to Ten.* Econo-Clad Books, Topeka, KS, 1999. This book shows different ways to count to ten.
- Hoban, Tana. *26 Letters and 99 Cents.* Mulberry Books, New York, 1995. The book provides an excellent visual representation of exchanging coin values.

Exemplars® Standards-Based Math Rubric*

	Problem Solving	Reasoning and Proof	Communication	Connections	Representation
Novice	No strategy is chosen, or a strategy is chosen that will not lead to a solution. Little or no evidence of engagement in the task present.	Arguments are made with no mathematical basis. No correct reasoning nor justification for reasoning is present.	No awareness of audience or purpose is communicated. or Little or no communication of an approach is evident or Everyday, familiar language is used to communicate ideas.	No connections are made.	No attempt is made to construct mathematical representations.
Apprentice	A partially correct strategy is chosen, or a correct strategy for only solving part of the task is chosen. Evidence of drawing on some previous knowledge is present, showing some relevant engagement in the task.	Arguments are made with some mathematical basis. Some correct reasoning or justification for reasoning is present with trial and error, or unsystematic trying of several cases.	Some awareness of audience or purpose is communicated, and may take place in the form of paraphrasing of the task. or Some communication of an approach is evident through verbal/written accounts and explanations, use of diagrams or objects, writing, and using mathematical symbols. or Some formal math language is used, and examples are provided to communicate ideas.	Some attempt to relate the task to other subjects or to own interests and experiences is made.	An attempt is made to construct mathematical representations to record and communicate problem solving.

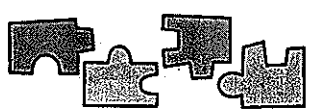
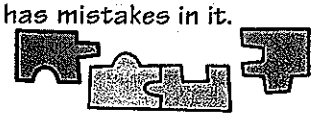
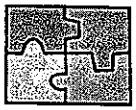
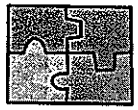
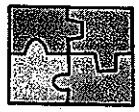
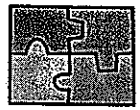
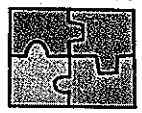
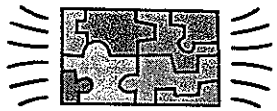
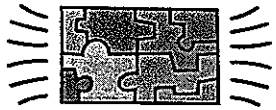
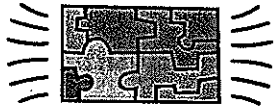
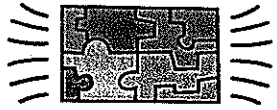
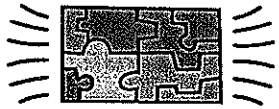
*Based on revised NCTM standards.

Exemplars® Standards-Based Math Rubric (cont.)*

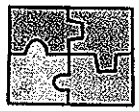
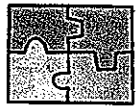
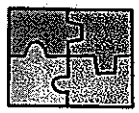
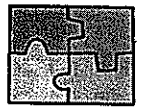
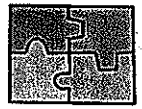
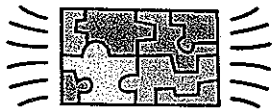
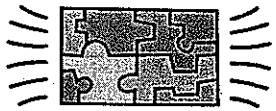
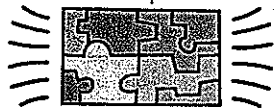
	Problem Solving	Reasoning and Proof	Communication	Connections	Representation
Practitioner	A correct strategy is chosen based on mathematical situation in the task. Planning or monitoring of strategy is evident. Evidence of solidifying prior knowledge and applying it to the problem solving situation is present. Note: The practitioner must achieve a correct answer.	Arguments are constructed with adequate mathematical basis. A systematic approach and/or justification of correct reasoning is present. This may lead to... • clarification of the task. • exploration of mathematical phenomenon. • noting patterns, structures and regularities.	A sense of audience or purpose is communicated. and/or Communication of an approach is evident through a methodical, organized, coherent sequenced and labeled response. Formal math language is used throughout the solution to share and clarify ideas.	Mathematical connections or observations are recognized.	Appropriate and accurate mathematical representations are constructed and refined to solve problems or portray solutions.
Expert	An efficient strategy is chosen and progress towards a solution is evaluated. Adjustments in strategy, if necessary, are made along the way, and / or alternative strategies are considered. Evidence of analyzing the situation in mathematical terms, and extending prior knowledge is present. Note: The expert must achieve a correct answer.	Deductive arguments are used to justify decisions and may result in formal proofs. Evidence is used to justify and support decisions made and conclusions reached. This may lead to... • testing and accepting or rejecting of a hypothesis or conjecture. • explanation of phenomenon. • generalizing and extending the solution to other cases.	A sense of audience and purpose is communicated. and/or Communication at the Practitioner level is achieved, and communication of argument is supported by mathematical properties. Precise math language and symbolic notation are used to consolidate math thinking and to communicate ideas.	Mathematical connections or observations are used to extend the solution.	Abstract or symbolic mathematical representations are constructed to analyze relationships, extend thinking, and clarify or interpret phenomenon.

*Based on revised NCTM standards.

Exemplars® Jigsaw Student Rubric

Level	Problem Solving	Reasoning and Proof	Communication	Connections	Representation
Novice Makes an effort No or little understanding	I did not understand the problem. 	My math thinking is not correct. 	I used no math language and/or math notation. 	I did not notice anything about the problem or the numbers in my work. 	I did not use a math representation to help solve the problem and explain my work. 
Apprentice Ok, good try Unclear if student understands	I only understand part of the problem. My strategy works for part of the problem. 	Some of my math thinking is correct. 	I used some math language and/or math notation. 	I tried to notice something, but it is not about the math in the problem. 	I tried to use math representation to help solve the problem and explain my work, but it has mistakes in it. 
Practitioner Excellent Clear Strong understanding Meets the standard	I understand the problem and my strategy works. My answer is correct. 	All of my math thinking is correct. 	I used math language and/or math notation throughout my work. 	I noticed something about my math work. 	I made a math representation to help solve the problem and explain my work, and it is labeled and correct. 
Expert Wow, awesome! Exceptional understanding!	I understand the problem. I used a rule, and/or verified that my strategy is correct. 	I showed that I knew more about a math idea that I used in my plan. Or, I explained my rule. 	I used a lot of specific math language and/or notation throughout my work. 	I noticed something in my work, and used that to extend my answer and/or I showed how this problem is like another problem. 	I used another math representation to help solve the problem and explain my work in another way. 

Rúbrica Rompecabezas de Exemplars® para Estudiantes

Nivel	Solución de Problemas	Razonamiento y Pruebas	Communicación	Conexiones	Representación
Novato Hace un esfuerzo Ninguna o poca comprensión	No comprendí el problema. 	Mi razonamiento matemático no es correcto. 	No usé ni lenguaje matemático ni anotación matemática. 	No observé nada sobre el problema ni los números en mi trabajo. 	No usé una representación matemática para ayudar a solucionar el problema ni para explicar mi trabajo. 
Aprendiz Está bien, un buen esfuerzo No está claro si el estudiante comprende el problema o no	Comprendo sólo una parte del problema. Mi estrategia funciona para parte del problema. 	Parte de mi razonamiento matemático es correcto. 	Usé algo del lenguaje matemático y/o anotación matemática. 	Intenté observar algo, pero no es sobre las matemáticas en el problema. 	Intenté usar una representación matemática para ayudar a solucionar el problema y explicar mi trabajo, pero hay errores. 
Practicante Excelente Claro Comprensión fuerte Llega al estandard	Comprendo el problema y mi estrategia funciona. Mi respuesta es correcta. 	Todo mi pensamiento matemático es correcto. 	Usé lenguaje matemático y/o anotación matemática en todo mi trabajo.. 	Observé algo sobre mi trabajo matemático. 	Hice una representación matemática para ayudar a solucionar el problema y explicar mi trabajo y está claramente indicada y correcta. 
Experto ¡Wow! ¡Qué chévere! ¡Comprensión excepcional!	Comprendo el problema. Usé una regla y/o verifiqué que mi estrategia es correcta. 	Demostré que sabía más sobre una idea matemática que lo que usé en mi plan. O, expliqué mi regla. 	Usé mucho lenguaje matemático específico y/o anotaciones en todo mi trabajo. 	Observé algo en mi trabajo y lo usé para extender mi respuesta y/o mostré cómo este problema se parece a otro problema. 	Usé otra representación matemática para ayudar a solucionar el problema y explicar mi trabajo de otra manera.