NUMBER CORNER®

SECOND EDITION

TEACHERS GUIDE

OCTOBER

GRADE 5

Published by The MATH LEARNING CENTER Salem, Oregon

Number Corner October

Teacher Masters

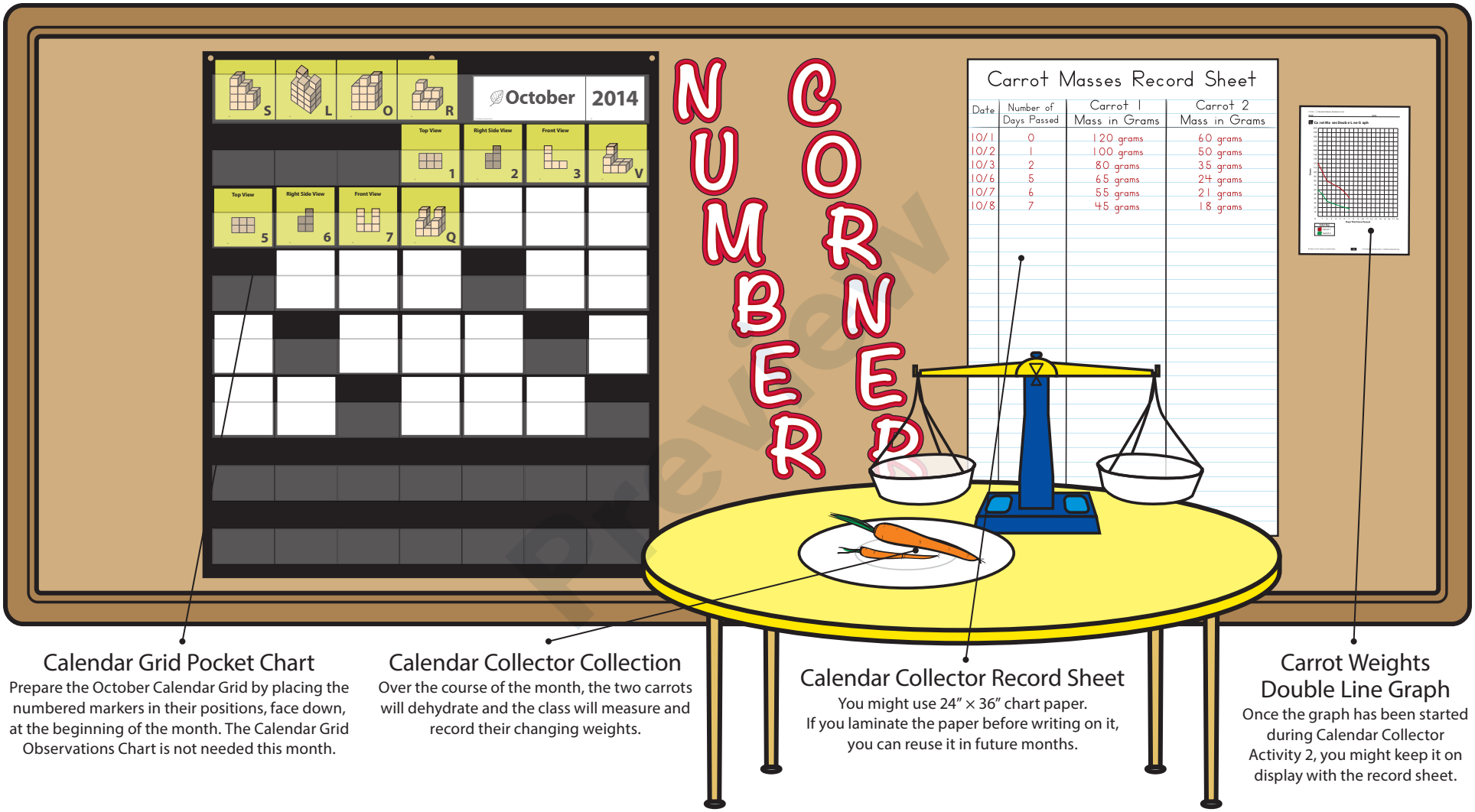
Pages renumber each month.

Number Corner Student Book Pages

Page numbers correspond to those in the consumable books.

October Sample Display

Of the items shown below, some are ready-made and included in your kit; you'll prepare others from classroom materials and the included teacher masters. Refer to the Preparation section in each workout for details about preparing the items shown. The display layout shown fits on a 10′ × 4′ bulletin board or on two 6′ × 4′ bulletin boards. Other configurations can be used according to classroom needs. If you have extra space to work with, a Number Corner header may be made from bulletin board letters, student-drawn letters, or other materials.



Calendar Grid Pocket Chart

Prepare the October Calendar Grid by placing the numbered markers in their positions, face down, at the beginning of the month. The Calendar Grid Observations Chart is not needed this month.

Calendar Collector Collection

Over the course of the month, the two carrots will dehydrate and the class will measure and record their changing weights.

Calendar Collector Record Sheet

You might use 24″ × 36″ chart paper. If you laminate the paper before writing on it, you can reuse it in future months.

Carrot Weights Double Line Graph

Once the graph has been started during Calendar Collector Activity 2, you might keep it on display with the record sheet.

October Daily Planner

Day	Date	Calendar Grid	Calendar Collector	Computational Fluency	Solving Problems	Problem Strings	Assessment
1			**Activity 1** Introducing the Carrot Graphing Experiment (p. 17)				
2			*Update*	**Activity 1** Introducing Grouping Symbols (p. 24)			
3		**Activity 1** Introducing & Discussing Markers (p. 8)	*Update*				
4		*Update*	*Update*	**Activity 2** Introducing the Game of Group It! (p. 26)			
5		*Update*	*Update*		**Activity 1** Introducing So Many Possibilities (p. 32)		
6		*Update*	**Activity 2** Graphing the Data (p. 18)				
7		*Update*	*Update*			**Activity 1** Problem String 4 (p. 42)	
8		*Update*	*Update*	**Activity 3** Partner Group It! (p. 29)			
9		**Activity 2** Thinking About Volume (p. 10)	*Update*				
10		*Update*	*Update*		**Activity 2** Discussing So Many Possibilities (p. 33)		
11		*Update*	*Update*		**Activity 3** Introducing Pattern Puzzles (p. 36)		
12		*Update*	**Activity 3** Discussing the Data (p. 20)				
13		**Activity 3** Views & Volumes (p. 12)	*Update if necessary*				
14		*Update*	*Update if necessary*	**Activity 4** Using Parentheses to Make Groups (p. 30)			
15		*Update*	*Update if necessary*		**Activity 4** Discussing Pattern Puzzles (p. 37)		
16		*Update*	*Update if necessary*			**Activity 1** Problem String 5 (p. 42)	
17		*Update*	*Update if necessary*				Number Corner Checkup 1, Part 1 (p. 48)
18		*Update*	*Update if necessary*				Number Corner Checkup 1, Part 2 (p. 49)
19		*Update*	**Activity 4** More Work with Double Line Graphs (p. 21)				
20		**Activity 4** Discussing Patterns (p. 12)					

Note *Calendar Grid and Calendar Collector workouts are updated by a student helper outside of Number Corner time, except when the workout is the subject of an activity. Computational Fluency, Problem Strings, Solving Problems, and Assessments do not have updates. Update routines are explained in detail in the workout text. Summaries of the update routines appear below.*

Calendar Grid – The student helpers turn one or more calendar markers face-up so that the Calendar Grid is complete up to the current date, and place the Mystery Building marker in the pocket chart when they think they know which it is.
Calendar Collector – The student helpers weigh both carrots and enter the measurements, date, and number of days passed on the class record sheet.

Number Corner
October

Overview

Students continue to absorb the rhythms and routines of Number Corner while working with key fifth grade skills and concepts including volume, data collection and coordinate graphing, writing and evaluating expressions with grouping symbols, and addition and subtraction of decimals and fractions with unlike denominators. Toward the end of the month, they complete the first of four Number Corner Checkups, paper and pencil assessments given over two days and designed to garner information on how students are doing with Number Corner skills and concepts addressed so far this year.

Activities

Workouts	Day	Activities	D	G	SB
Calendar Grid Mystery Buildings: Views & Volume This month's Calendar Grid pattern poses a new and engaging challenge. Every fourth day, students select a marker from a set of four different possibilities, based on clues from the previous three days' markers. These clues come in the form of the top, right side, and front views of three-dimensional structures. The structures increase in volume by predictable amounts, creating a numeric pattern that will be discussed toward the end of the month.	3	**1** Introducing & Discussing Markers	●		
	9	**2** Thinking About Volume	●		●
	13	**3** Views & Volume	●		●
	20	**4** Discussing Patterns	●		
Calendar Collector Carrot Graphing Experiment This month, students collect data to answer the following question: if you leave two fresh carrots sitting uncovered on a plate in a safe place somewhere in the classroom for a couple of weeks, what will happen? As students will discover within a few days of starting the experiment, the carrots simply wither and dry up, growing as tough and hard as beef jerky. As they dehydrate, they lose mass. Students measure the carrots's masses each day in grams and track the changes on a double line graph.	1	**1** Introducing the Carrot Graphing Experiment	●		
	6	**2** Graphing the Data	●		●
	12	**3** Discussing the Data	●		●
	19	**4** More Work with Double Line Graphs	●		●
Computational Fluency Group It! This month's activities involve writing and evaluating expressions that include parentheses.	2	**1** Introducing Grouping Symbols	●		●
	4	**2** Introducing the Game of Group It!	●	●	●
	8	**3** Partner Group It!		●	●
	14	**4** Using Parentheses to Make Groups			●
Solving Problems Solving Problems with Organized Lists The Problem Solving workout this month features two sets of problems. Students are given time to solve the problems and then discuss their solutions and problem-solving strategies as a class. The mathematical content of the two problem sets involves adding and subtracting decimals, and finding and extending patterns. In addition, the problems themselves will almost certainly help students understand that making organized lists and searching for patterns are useful problem-solving tools.	5	**1** Introducing So Many Possibilities			●
	10	**2** Discussing So Many Possibilities	●		●
	11	**3** Introducing Pattern Puzzles			●
	15	**4** Discussing Pattern Puzzles	●		●
Problem Strings Fraction Addition with Money & Clock Models This month, students use money and clock models to add unit and non-unit fractions with unlike denominators.	7, 16	**1** Problem Strings 4 & 5	●		●
Assessment Number Corner Checkup 1 The teacher administers a written assessment to the entire class in place of two regular Number Corner workouts during the last week of the month.	17	**Number Corner Checkup 1, Part 1** Completing Pages 1 & 2			
	18	**Number Corner Checkup 1, Part 2** Completing Pages 3 & 4			

D – Discussion, **G** – Game, **SB** – Number Corner Student Book

Teaching Tips

Focus on building a sense of community during Number Corner this month. In particular, help students develop their discussion skills. Encourage them to respond to each other's ideas, whether they agree and add on or offer a different idea. Help students understand that they are accountable for participating in Number Corner conversations.

Number Corner is a great opportunity to honor different strategies or approaches to the same problem. Sharing these different ideas includes more people in the conversation and helps students see that there is not one single correct way to solve a problem. Furthermore, when students are explaining their idea, they are learning as they solidify and refine their thinking as they talk.

In the beginning of the month, it is especially important to offer students time for observation, reflection, and thinking. Allow them to explore and develop ideas, especially about the Calendar Grid and Calendar Collector, that they can refine, revise, and confirm as the month continues. Avoid the temptation to teach or tell too much.

While this month offers a paper and pencil assessment, remember that Number Corner offers many opportunities for informal assessment, from students sharing observations to playing games to persevering with problems. Student Book pages can also provide information about student understanding.

Target Skills

The table below shows the major skills and concepts addressed this month. It is meant to provide a quick snapshot of the expectations for students' learning during this month of Number Corner.

Major Skills/Concepts Addressed	CG	CC	CF	SP	PS
5.OA.1 Write and evaluate numerical expressions with parentheses, brackets, or braces			●		
5.OA.3 Generate two numerical patterns given two different rules				●	
5.NBT.7 Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations and the relationship between addition and subtraction				●	
5.NBT.7 Use written numbers and symbols to represent strategies for computing with decimals to hundredths, and explain the reasoning behind strategies for computing with decimals to hundredths					●
5.NF.1 Add and subtract fractions with unlike denominators, including mixed numbers			●		●
5.NF.1 Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference					●
5.MD.4 Measure the volume of a solid figure by counting the number of cubic units that fill it, with no gaps or overlaps	●				
5.MD.5c Find the volume of a solid figure composed of two or more non-overlapping right rectangular prisms by calculating the volume of each prism and finding their sum	●				
5.MD.5c Solve story problems involving finding the volume of a solid figure composed of two non-overlapping right rectangular prisms	●				
5.G.1 Locate a point on a coordinate plane based on its ordered pair of coordinates		●			
5.G.2 Graph points in the first quadrant of the coordinate plane to represent a problem		●			
5.G.2 Describe the meaning of the values of coordinate points based on the context of a problem or situation		●			
5.MP.1 Make sense of problems and persevere in solving them			●	●	
5.MP.2 Reason abstractly and quantitatively	●		●		
5.MP.3 Construct viable arguments and critique the reasoning of others			●	●	
5.MP.4 Model with mathematics		●			●
5.MP.5 Use appropriate tools strategically					●
5.MP.6 Attend to precision	●	●			
5.MP.7 Look for and make use of structure	●	●			
5.MP.8 Look for and express regularity in repeated reasoning				●	●

CG – Calendar Grid, **CC** – Calendar Collector, **CF** – Computational Fluency, **SP** – Solving Problems, **PS** – Problem Strings

Assessments

Toward the end of the month, you will administer a four-page written assessment—Number Corner Checkup 1—in two parts: the first two pages during Number Corner on Day 17, and the last two during Number Corner the following day. The checkup replaces regular activities on both days. The table below lists the skills assessed in the first Number Corner Checkup.

Number Corner Checkup 1 provides a snapshot of individual students' current skills in areas that have been emphasized over the past two months—writing and evaluating expressions, identifying factors and multiples, adding fractions with unlike denominators, finding the volume of rectangular prisms as well as figures composed of two or more rectangular prisms, and locating and identifying points on a coordinate plane. If you want to gauge students' growth and progress over time with regard to the entire set of Common Core State Standards, you can use the optional Comprehensive Growth Assessment, located in the Grade 5 Assessment Guide.

Skills/Concepts Assessed

- Find all factor pairs for a whole number between 1 and 100 (4.OA.4)
- Demonstrate an understanding that a whole number is a multiple of each of its factors (4.OA.4)
- Determine whether a whole number between 1 and 100 is prime or composite (4.OA.4)
- Generate equivalent fractions (4.NF.1)
- Evaluate numerical expressions that contain parentheses (5.OA.1)
- Interpret numerical expressions without evaluating them (5.OA.2)
- Divide a 2-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division (5.NBT.6)
- Add fractions with unlike denominators (5.NF.1)
- Show that the volume of a right rectangular prism with whole number edge lengths can be found by multiplying the edge lengths, or by multiplying the base of the figure by its height (5.MD.5a)
- Use the formula $V = l \times w \times h$ or $V = b \times h$ to find the volume of a right rectangular prism with whole number edge lengths (5.MD.5b)
- Find the volume of a solid figure composed of two or more non-overlapping right rectangular prisms by calculating the volume of each prism and finding their sum (5.MD.5c)
- Locate a point on a coordinate plane based on its ordered pair of coordinates; identify the x- and y-coordinates of a given point in a coordinate plane (5.G.1)

Materials Preparation

Each workout includes a list of required materials by activity. You can use the table below to prepare materials ahead of time for the entire month.

Materials		Done
Copies	Run copies of Teacher Masters T1–T3, T5–T8, and T4 (optional) according to the instructions at the top of each master.	
	If students do not have their own Number Corner Student Books, run a class set of pages 8–22.	
	Run a single display copy of Number Corner Student Book pages 8–15 & 17–22.	
Charts	Prepare the Calendar Grid pocket chart according to preparation instructions in the workout.	
	Prepare the Calendar Collector Record Sheet according to preparation instructions in the workout.	
Special Items	Bring in 2 fresh carrots as described in preparation instructions in the Calendar Collector workout.	

October Calendar Grid

Mystery Buildings: Views & Volume

Overview

This month's Calendar Grid pattern poses a new and engaging challenge. Every fourth day, students select a marker from a set of four different possibilities, based on clues from the previous three days' markers. These clues come in the form of the top, right side, and front views of three-dimensional structures. The structures increase in volume by predictable amounts, creating a numeric pattern that will be discussed toward the end of the month.

Skills & Concepts

- Demonstrate an understanding that a cube with edge length of 1 unit is called a "unit cube" and has 1 cubic unit of volume (5.MD.3a)
- Demonstrate an understanding that unit cubes can be used to measure the volumes of other solid figures (5.MD.3a)
- Measure the volume of a solid figure by counting the number of cubic units that fill it, with no gaps or overlaps (5.MD.4)
- Demonstrate an understanding that volume is additive (5.MD.5c)
- Find the volume of a solid figure composed of two or more non-overlapping right rectangular prisms by calculating the volume of each prism and finding their sum (5.MD.5c)
- Solve story problems involving finding the volume of a solid figure composed of two non-overlapping right rectangular prisms (5.MD.5c)
- Reason abstractly and quantitatively (5.MP.2)
- Attend to precision (5.MP.6)
- Look for and make use of structure (5.MP.7)

Materials

Activities	Day	Copies	Kit Materials	Classroom Materials
Activity 1 Introducing & Discussing Markers	3	**TM T1** Introducing October Calendar Markers	• Calendar Grid pocket chart • Mystery Buildings Calendar Markers • Month, Day, and Year Cards • Omnifix cubes (see Preparation)	• a piece of paper to mask portions of the teacher master • half-sheets of unlined paper, class set • containers for cubes (see Preparation)
Activity 2 Thinking About Volume	9	**NCSB 8–9*** Thinking About Volume		
Activity 3 Views & Volume	13	**NCSB 10–11*** Views & Volume		
Activity 4 Discussing Patterns	20	**NCSB 10–11** Views & Volume (completed by students during Activity 3)		

TM – Teacher Master, **NCSB** – Number Corner Student Book
Copy instructions are located at the top of each teacher master.

** Run 1 copy of this page for display.*

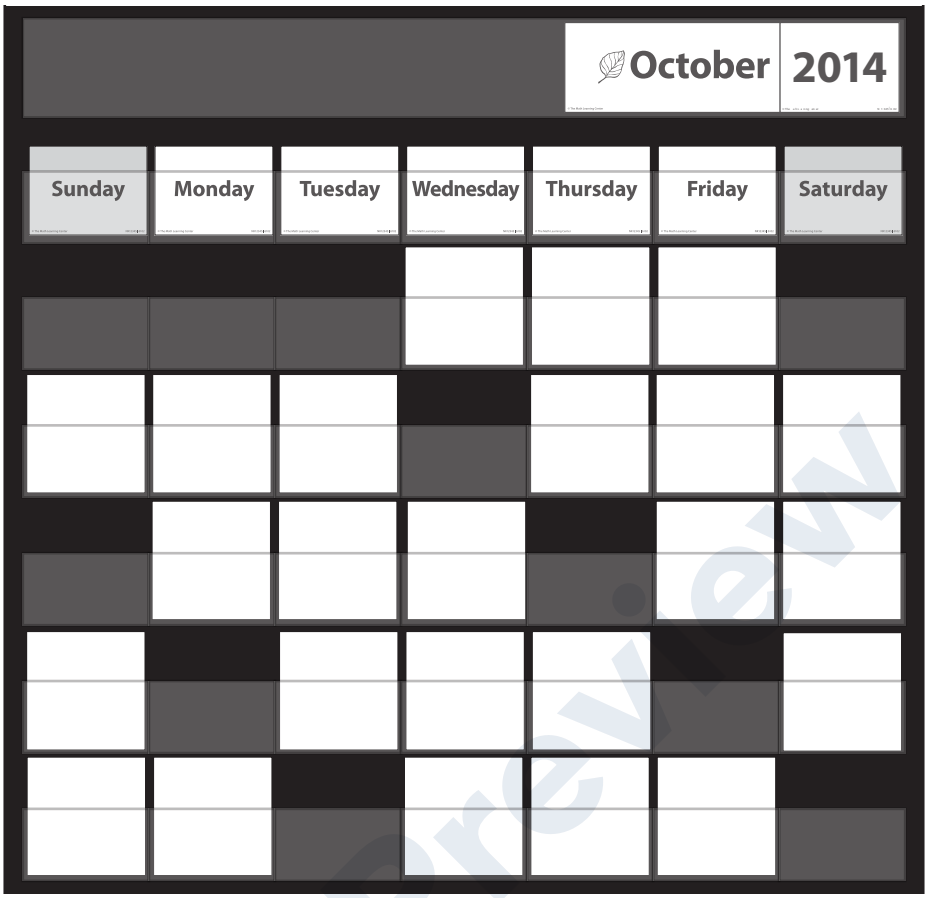
Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

base*
cubic unit*
pattern*
volume*

Preparation

- Before the first Calendar Grid workout, place the *numbered* Mystery Buildings Calendar Markers face-down, in sequence, in the Calendar Grid pocket chart, so that the visuals are hidden from students. Leave every fourth pocket empty, as these will be filled in at a later time. Also, leave space at the left side of the topmost row of the pocket chart to display a set of four of the lettered markers through the month.



- Keep the *lettered* Mystery Buildings Calendar Markers near the Calendar Grid pocket chart for use through the month. As mystery buildings are identified and moved into place on the grid, new buildings will be added to the collection in the top row of the pocket chart. The chart below shows which markers belong where, and which marker to add to the set of choices each time.

  Markers R, O, W, and J are distractors, and will not appear anywhere in the completed sequence of markers at the end of the month.

Building Collection Chart

Group of choices	Students identify	Then add to the group of choices
V Q R S	V as marker 4	L
Q R S L	Q as marker 8	O
R S L O	S as marker 12	N
R L O N	L as marker 16	W G I (remove R & O)
N W G I	N as marker 20	J
W G I J	G as marker 24	B
W I J B	I as marker 28	None to add
W J B	B as marker 32	

Key Questions

Use the following questions to guide students' discussion this month:

- What do you notice about the Calendar Grid markers?
- What patterns are present?
- Does the pattern change over time? How?
- What is volume?
- What strategies, other than counting by 1s, can you use to determine volume?

- Organize the class set of Omnifix cubes into smaller containers so that pairs or table groups can easily access a set of 60–75 cubes.

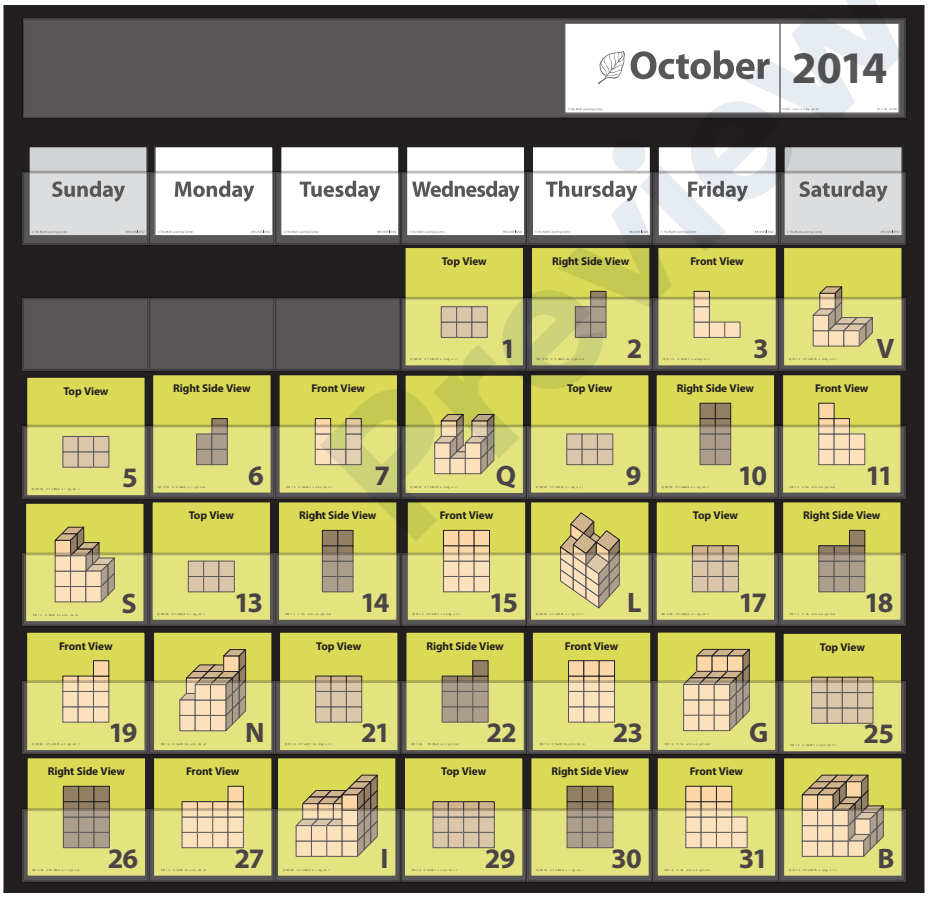
Mathematical Background

This month, students use Omnifix cubes to help determine the volume of combinations of rectangular prisms. The work helps students build the concept of volume in a concrete, experiential way they can draw on to make sense of volume formulas they will encounter later in Grade 5.

About the Pattern

Following is a description of the patterns found the October calendar marker set. Revealing one calendar marker each day allows students to make and test predictions and to discover the patterns as new markers are added and their predictions are confirmed or proven false. Don't tell them what the patterns are: instead, allow them to pursue their own ideas and investigations.

- There is an ABCD pattern in the views and buildings shown on the markers this month: top view, right side view, front view, mystery building; top view, right side view, front view, mystery building; and so on
- Each new mystery building has a greater volume than the one before it.
- The volumes of the mystery buildings increase by a pattern of 3 cubic units, 6 cubic units; 3 cubic units, 6 cubic units; and so on.



Update

Once you have conducted the first activity, have a student helper follow this update procedure every day that the Calendar Grid is not a featured activity.

Procedure

- Turn one or more calendar markers so that the Calendar Grid is complete up to the current date.
- Place a Mystery Building marker in the pocket chart when they think they know which one it is.

Note

Let students know that if they are called upon to update the grid and the chart on a Monday, they're responsible for revealing the markers for three days rather than one (Saturday, Sunday, and Monday).

Activity 1

Introducing & Discussing Markers — Day 3

1 Open the activity by reminding students that one of the goals of the Calendar Grid workout is to look for patterns that evolve over time. Let students know that this month's markers are centered around "Mystery Buildings" that will be shown from different viewpoints.

2 Distribute a container of Omnifix cubes to each pair or group of students. Explain that they'll build with these cubes this month to help figure out the calendar pattern.

3 Next, display the Introducing October Calendar Markers Teacher Master, covering problems 2-4 with a piece of paper. Read the text aloud and give students an opportunity to quickly build as directed on the teacher master.

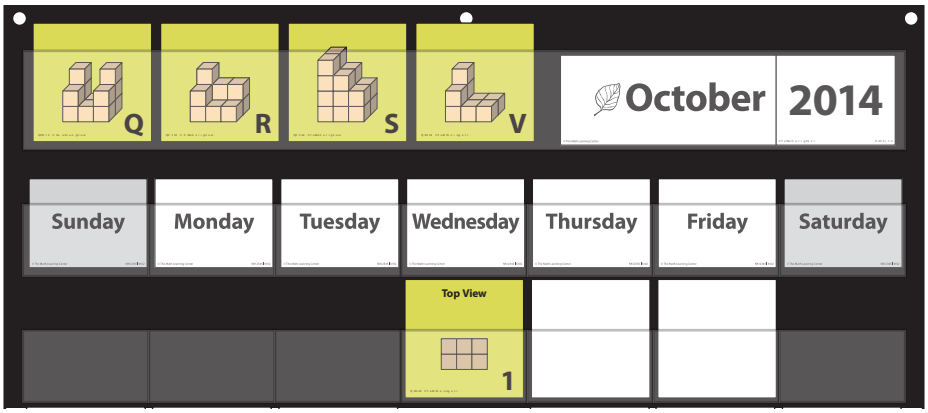
Ask students to collaborate with their partners on the first problem, but to each build their own cube constructions.

4 Then, reveal and have students work on problems 2–4, giving them their own half-sheets of unlined paper to sketch the three views for problem 4.

- Encourage students to stand up as necessary to get accurate views for their buildings as they sketch them from the front, right side, and top.
- If sketching the views will take too much time, have students just describe the views to their partners.

5 Next, draw students' attention to the Calendar Grid pocket chart as you place markers R, V, S, and Q in the top row. Explain that these markers belong somewhere in the pattern and the students will need to figure out where to include them as the month unfolds.

6 Display marker 1 and let students know that they'll use this marker and the ones that follow to identify one of the buildings on markers R, V, S, or Q as the one that belongs in the now empty fourth pocket.



7 Have pairs or groups of students work together to replicate the four buildings with their cubes, then look at each building from the viewpoint shown on the marker.

Ask students to consider if any of the lettered buildings can be selected or eliminated based on the view on the first marker, then discuss their reasoning.

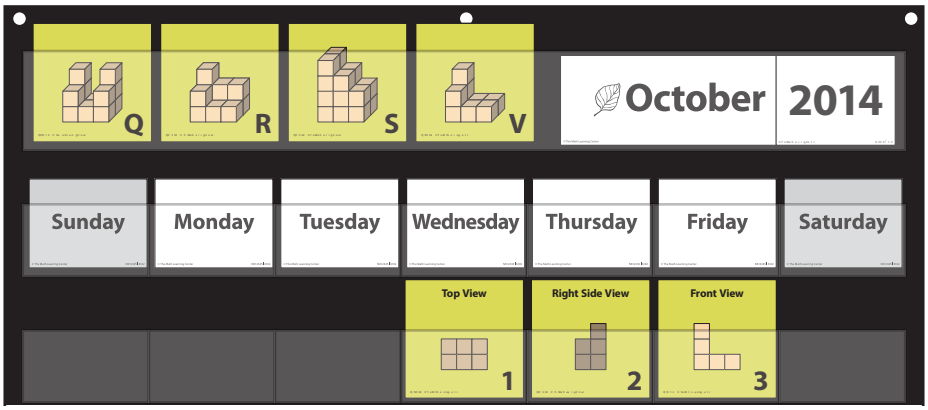
> ***Students*** *OK, the top view shows the top of six cubes.*
>
> *Hmm… I don't think it could be Q or S because they look too jaggedy.*
>
> *I disagree. I think if you stand far enough above all four of the building, you would see 6 cubes.*
>
> *Oh, I see what you mean.*
>
> *The top view of the marker doesn't tell us which building it is.*

8 Now display marker 2 and ask whether any of the buildings can be selected or eliminated based on the viewpoint shown.

Give students time to reexamine their four cube buildings and justify their thinking to their partner or group, then to the class.

Students should be able to eliminate building S, based on the clue from marker 2.

9 Finally, display the third marker and give students time to determine and discuss the building that fills the fourth position in the sequence.



> ***Students*** *Oh! I see which one it is now. It has to be R! That's exactly how R looks from the front.*
>
> *I don't think so. Look, R goes up 2 cubes in the middle and right.*
>
> *It's V, building V. That's the mystery building! Look, it matches all three views perfectly.*
>
> *If we had gotten marker 3 first, we would have figured it our right away! It's the only one with that front view…*

10 After students have reached a consensus about the identity of the first mystery building (V), place that marker in the fourth pocket of the grid.

Let students know that every fourth day, they'll have an opportunity to identify the next mystery building in sequence. Every time a mystery building is identified and moved from the top row into its correct place in the pocket chart, you'll replace it with another mystery building, so that they will have four possibilities each time until the last part of the month.

11 If necessary, follow the steps listed below to bring the Calendar Grid display up to today's date.

- Insert marker L in the top row of the pocket chart to keep the collection steady at a total of 4.
- Reveal each marker up through today, one at a time.
- Allow students time to view the marker revealed, and discuss whether they can positively identify or eliminate one of the mystery buildings in the top row. Have students justify their thinking to the class, and use their cubes as necessary.
- After the three view "clues," students should reach consensus about the correct building. Move the marker into its place in the pocket chart.

12 Wrap up today's Calendar Grid activity by explaining how students will update the Calendar Grid when students are not discussing the grid as a class.

Make sure students understand that when it's their turn to update the grid, they'll turn the marker for the day face-up and try to identify the next mystery building. As soon as they think they know which building it is, they can place it where it belongs in the pocket chart, with the understanding that the helper the following day may change the selection based on the new information provided by the next marker. Let students know that a supply of Omnifix cubes will be kept near the Calendar Grid area so they can replicate the buildings as needed to select the right one.

Note Each time one of the mystery buildings is removed from the top row of the pocket chart to take its place in the sequence, replace it with another. Refer to the chart in the Preparation section of this workout to see which mystery building to add to the set of 4 each time one is removed.

Activity 2

Thinking About Volume — Day 9

1 Open the workout by distributing Omnifix cubes to pairs or groups of students. Remind them that this month's workout examines various views of mystery buildings, which they can use as clues to determine the building that completes each sequence of four markers.

2 Even if students have already determined that building S is marker 12, give them a few minutes to examine the top, side, and front views shown on markers 9–11.

Invite students who identified building S as marker 12 to explain how they drew their conclusions based on the three views.

3 Then ask students to replicate building S with their Omnifix cubes and determine its volume.

- Review the fact that one measure of a solid figure is its volume, or the number of cubic units it takes to build it.
- Challenge students to come up with ways to determine the volume of their building, without counting each cube one at a time.

4 After giving them a minute to work and another to share their ideas with a partner, display marker 12.

Use a document camera or a projector, if available, to project the image of the marker onto the board so students can show their thinking without marking the calendar marker itself.

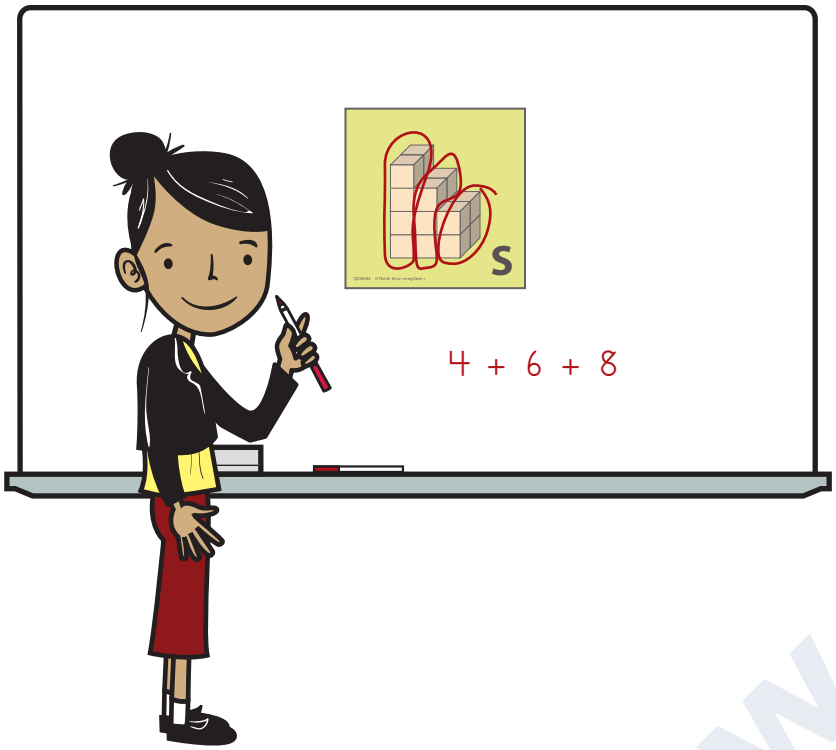
5 Invite a pair of volunteers to work directly on the board, looping the figure to show how they determined the total number of cubes. Then ask the class to generate an equation to match.

Remind them of the need to label the answer correctly as cubic units.

> ***Sam*** *We looked at it from the side and thought about how many cubes were in each slice. On the far right, there are 4 cubes. Then in the middle, there's 6 cubes. Then on the left, there's 8 cubes. That makes 18.*
>
> ***Teacher*** *What equation could we record to represent how Sam and Troy determined the volume of this building?*
>
> ***Maria Jose*** *We could write 4 + 6 + 8 = 18.*
>
> ***Teacher*** *Volume is measured in cubic units, so we should label our total that way. Since we don't know the actual measurement of these cubes, we can just call them cubic units. We can write the total as 18 cubic units.*

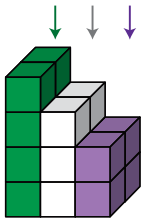
Notes About This Activity

The second Calendar Grid workout will probably take place around the 12th of the month.

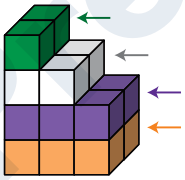


6 Erase the loops from the image projected onto the board and ask another volunteer or pair of volunteers to loop the collection in a different way and write a second equation to represent the total.

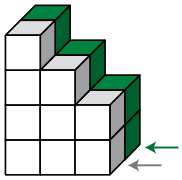
There are many different ways to loop the collection of cubes in this building, and many different (but equivalent) equations to represent total. Here are some examples.



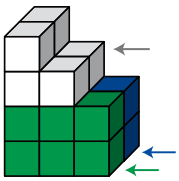
$8 + 6 + 4 = 18$ cubic units



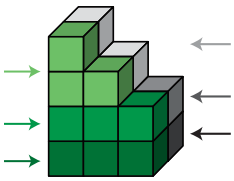
$6 + 6 + 4 + 2 = 18$ cubic units



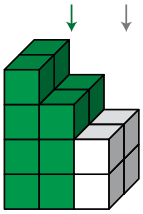
$2 \times 9 = 18$ cubic units



$3 \times 6 = 18$ cubic units



$2 \times (3 + 3 + 3) = 18$ cubic units



$14 + 4 = 18$ cubic units

7 After two or three such demonstrations, have students locate their Thinking About Volume Student Book page, as you place a copy on display.

8 Review the problems on the page briefly with the class, and clarify as needed. When students understand what to do, have them go to work.

ELL Read questions aloud or review vocabulary with students who need additional help.

SUPPORT Make cubes available to students who need to create the buildings and view them from various perspectives. Help struggling students record equations that describe their verbal descriptions of the buildings.

CHALLENGE Prompt students to look for efficient ways to determine the volume of each building. Encourage students to look for ways to use multiplication and subtraction in their equations by looking at the buildings as rectangular prisms that are missing some pieces, rather than as sets of smaller chunks added together.

9 As students complete the Thinking About Volume Student Book page, have them meet with classmates to share and compare their work.

Activity 3

Views & Volume — Day 13

1 Open the workout by displaying your copies of the Views & Volume pages and asking students to locate the assignment in their Number Corner Student Books.

2 Review the instructions on both pages with the class. When students understand what to do, have them work in partners to complete both pages.

Encourage students to collaborate with their partners, but ask them to complete their own sheets.

SUPPORT Make Omnifix cubes available to students who wish to use them.

CHALLENGE Encourage students who finish well ahead of their classmates to write more than one equation to determine the volume of building N on the first page.

3 Students will need their completed sheets for the fourth workout, so assign any unfinished work as homework, or have students complete the sheets during a designated seatwork time.

Activity 4

Discussing Patterns — Day 20

1 Open the final workout by asking students to share, first in pairs and then as a whole class, any patterns they have observed so far in this month's sequence of markers.

> ***Students*** *Well, it always goes top view, right side view, front view, and then a building.*
>
> *I think that the buildings are getting bigger.*

2 After students have had a chance to share some ideas, have them turn to the Views & Volume pages in their Student Books they completed the previous week.

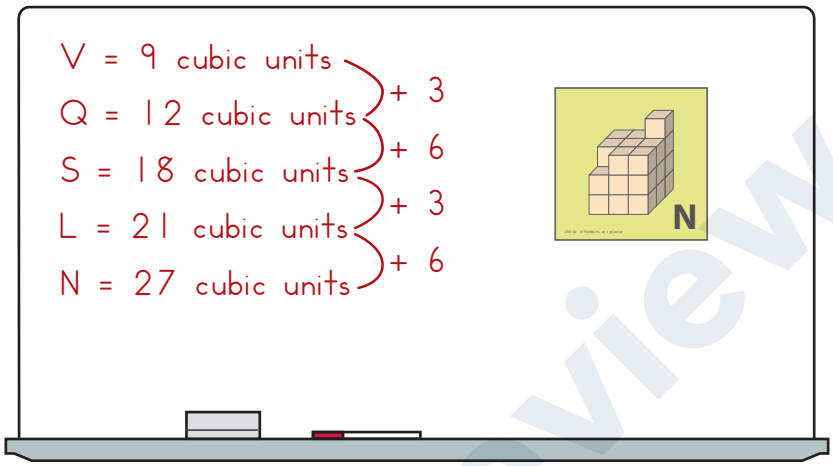
3 With input from the class, list the volumes of the first four buildings, V, Q, S, and L.

If anyone found the volume of building N, ask him or her to contribute that measurement to the list. If not, have students work in pairs to do so now.

4 Ask students to use this information to predict what the volume of the next building in the sequence will be.

If students have not yet noticed a pattern in the volumes, they will now.

> ***Kendra*** *I think it's going to be 30 because I see a pattern in how the building are getting bigger.*
>
> ***Teacher*** *Can you tell us about the pattern you see?*
>
> ***Kendra*** *The volumes go 9, 12, 18, 21, 27… They are getting bigger by 3, then 6, then 3, then 6.*
>
> ***Teacher*** *Does anyone see what Kendra is talking about?*
>
> ***Carlos*** *I do! The building are getting bigger like I thought, but don't always get bigger by the same amount.*
>
> ***Imani*** *I see it too. From 9 to 12 is 3 bigger, then from 12 to 18 is 6 bigger, then from 18 to 21 is 3 bigger, then from 21 to 27 is 6 bigger.*
>
> ***Max*** *So, the next building must have a volume that's 3 more than 27. That's 30.*



5 Now have students determine the volume of the remaining buildings in the sequence (G, I, and B).

There are pictures of buildings G, I, and B on the first page of the Views & Volume assignment. Ask students to find the volume of at least one of those buildings, and record one or more equations to represent their work. If they need more room to write, have them use a separate sheet.

6 Add the volumes of the last three buildings to your list and ask students to examine and discuss the numeric pattern again. Does it continue?

(Yes, the volumes of markers G, I, and B are 30, 36, and 39 cubic units respectively.)

7 Close the activity by summarizing some of the big ideas that were discussed in this month's Calendar Grid workout and letting students know a new pattern will be presented in the upcoming month.

Students who have been very engaged in the pattern this month might enjoy building alternative versions of the last building in the sequence. How many ways can they construct a building with the correct volume that also matches the views shown on markers 29–31?

October Calendar Collector

Carrot Graphing Experiment

Overview

This month, students collect data to answer the following question: if you leave 2 fresh carrots sitting uncovered on a plate in a safe place somewhere in the classroom for a couple of weeks, what will happen? As students will discover within a few days of starting the experiment, the carrots simply wither and dry up, growing as tough and hard as beef jerky. As they dehydrate, they lose mass. Student measure the carrots' masses each day and track the changes on a double line graph.

Note

It is best to start this experiment early in the week rather than on a Thursday or Friday because the carrots lose most of their water mass in the first few days. It takes only about two weeks for the carrots to lose all their water.

Skills & Concepts

- Locate a point on a coordinate plane based on its ordered pair of coordinates (5.G.1)
- Identify the x- and y-coordinates of a given point in a coordinate plane (5.G.1)
- Write the x- and y-coordinates of a given point in a coordinate plane as an ordered pair (5.G.1)
- Graph points in the first quadrant of the coordinate plane to represent a problem (5.G.2)
- Describe the meaning of the values of coordinate points based on the context of a problem or situation (5.G.2)
- Model with mathematics (5.MP.4)
- Attend to precision (5.MP.6)
- Look for and make use of structure (5.MP.7)

Materials

Activities	Day	Copies	Kit Materials	Classroom Materials
Activity 1 Introducing the Carrot Graphing Experiment	1		• pan balance scale	• 2 carrots (see Preparation) • paper plate • 1 new box of 16 crayons • Calendar Collector Record Sheet (see Preparation) • erasable marker • ruler or straight edge
Activity 2 Graphing the Data	6	**NCSB 12*** Carrot Masses Double Line Graph		• two different colored markers or colored pencils for each student and the teacher
Activity 3 Discussing the Data	12	**NCSB 12** Carrot Masses Double Line Graph		
Activity 4 More Work with Double Line Graphs	19	**NCSB 12** Carrot Masses Double Line Graph **NCSB 13–14*** Another Carrot Experiment		

TM – Teacher Master, **NCSB** – Number Corner Student Book
Copy instructions are located at the top of each teacher master.

** Run 1 copy of these pages for display.*

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

coordinate plane*
coordinates*
data*
ordered pair
origin*
quadrants*
x-axis*
y-axis*

Preparation

Calendar Collector Record Sheet

- Bring two very fresh carrots to school. One should have a mass somewhere between 60 and 80 grams, and the other should weigh roughly half as much. Place the carrots on a paper plate near the Calendar Collector Record Sheet, and set up the pan balance scale nearby for daily use.
  - » Note: if you choose to use any carrots larger than 80 grams, you will need additional weights for use with your pan balance scale.
- Erase the Calendar Collector Record Sheet from last month. Then redraw the lines to create four columns and label them. Post the sheet on your Number Corner display board.

Carrot Masses Record Sheet

Date	Number of Days Passed	Carrot 1 Mass in Grams	Carrot 2 Mass in Grams

Mathematical Background

Graphing ordered pairs (*x, y*) on a coordinate grid is an essential skill we do well to present in the context of collecting and interpreting experimental data. After students share predictions about how the carrots might change, the teacher works with input from the class to set up a system of collecting and recording data. Each day, students measure the masses of both carrots to the nearest gram and record the information on the Calendar Collector Record Sheet.

Each time Calendar Collector is the featured workout, all the students graph the data collected over the previous few days on a coordinate grid, representing the number of days and the mass of each carrot as ordered pairs. The numbers of days that have passed appear along the *x* axis, while the number of grams appear along the *y* axis. Tracking the changes in two carrots of very different starting masses helps students develop ideas around comparing two sets of related data.

Update

Starting after Activity 1, have a pair of student helpers follow this update procedure every day that the Calendar Collector is not a featured activity.

Procedure

- Carefully measure the mass of each carrot to the nearest gram.
- Enter the date, and number of days passed, and the masses of the carrots in grams on the Calendar Collector Record Sheet.

Key Questions

- What are the coordinates of a particular point? What meaning do those coordinates have in this experiment?
- What relationships, if any, exist in the corresponding terms on the line graphs?
- What information can be gathered based on the data recorded?
- What predictions can be made based on the data already recorded?

Mass & Weight

The difference between mass and weight can be confusing, especially since the terms are often not used precisely. Mass is the measure of how much matter an object contains. Weight is a measure of how heavy an object is, or more specifically, a measure of the pull of gravity on an object. The mass of an object doesn't change when the location of the object changes, but weight does vary with location. For instance, your weight would be less on the moon since the moon is smaller and exerts less gravitational pull. Your mass, however, would remain the same.

Mass is generally measured by using a balance to compare a known amount of matter to an unknown amount of matter. Weight is generally measured on a scale. The process of measuring both, however, is called "weighing," and this term will be used throughout this workout for the process of measuring mass.

Activity 1

Introducing the Carrot Graphing Experiment — Day 1

1 Introduce the Calendar Collector by explaining that like last month, students will collect and record data. This month, however, they will also graph the data they collect.

- Write the word *data* on the board and ask pairs to talk about anything they know about this term. After a few moments, invite two or three volunteers to share with the class.
- If students don't bring it up themselves, remind the class that data is a collection of information gathered by observing, asking questions, or measuring.
- Then explain that the students will gather data by making and recording observations about an experiment this month.

2 Explain the carrot experiment briefly.

- Show students the two carrots and ask them to imagine what would happen if you left both carrots sitting on a plate somewhere in your classroom out in the open, but not in direct sunlight, for a few weeks.
- Give students a minute or two to generate and share predictions with a partner.

3 Explain that when scientists set up experiments to answer a question, they make and record careful observations in a systematic way.

- Ask students which of the carrots' attributes might change over the next few weeks.
- Then ask which of these attributes can be measured with tools you have in the classroom.
- Explain that starting today and continuing for the next few weeks, students will measure and record the carrots' masses to the nearest gram each day.

Some students may also want to track changes in the carrots' lengths.

4 Ask students to estimate the mass of the larger carrot by comparing it to a familiar object of known mass.

- Show them a new box of 16 crayons, and tell them that it has a mass of 95 grams.
  - » If you like, use the pan balance scale to measure the mass of the box of crayons while students observe.
- Invite a few volunteers to heft the box of crayons, then the larger of the carrots in order to estimate its mass in grams.

5 After students have estimated the larger carrot's mass, introduce the pan balance scale as a tool for measuring mass (if you haven't already done so with the box of crayons).

Demonstrate proper procedures for using the pan balance and discuss how to determine the actual mass of the carrot.

6 Have students measure the mass of each carrot.

- Ask a student volunteer to weigh the larger carrot as accurately as possible on the pan balance and report the figure to the class.
- Ask students to use this information to estimate the mass of the smaller carrot.
- Then invite a second volunteer to weigh the second carrot.

7 Record the information on the Calendar Collector Record Sheet.

- Draw students' attention to the sheet, and give them a few moments to make note of the headings for each column.

- Record today's date, number of days passed, and the masses of both carrots on the sheet.

If necessary, clarify the fact that the "Number of Days Passed" is 0 and not 1 because no days have passed since you started the experiment.

8 Finally, explain the updating process that will take place each day of school.

- Two student helpers will weigh both carrots and enter the date, number of days passed, and the masses of both carrots on the class record sheet.
- While the students won't be able to take a reading each and every day this month due to weekends, holidays, or school events, it is crucial that they record the number of days that have passed accurately. Recording the date each time a new entry is made on the record sheet should help students to keep track of the number of days that have passed.

9 Close the activity by asking students to make predictions about what may happen to each of the carrots by the time the class revisits this workout.

Use questions like the following:

- Do you think that the mass of both carrots will decrease? Why?
- Will the carrots lose the same or different amounts of mass? Why?
- What do you estimate the mass of each carrot will be in one week?

Activity 2

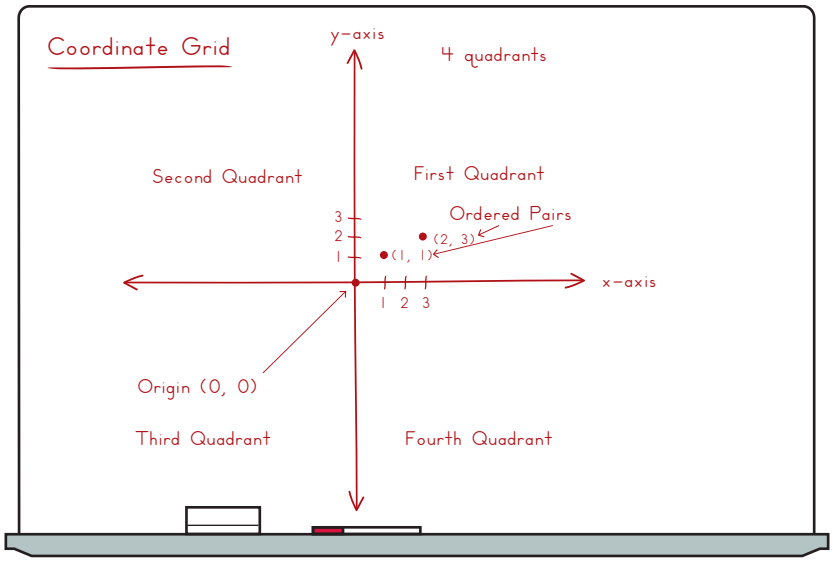
Graphing the Data — Day 6

1 Begin by asking students for general observations about the data collected for the carrots so far.

Ask students to comment on how closely their predictions and estimations matched with what actually occurred.

2 Let students know that today they will begin to organize the data that is being collected on a *coordinate grid*.

- Sketch a blank four-quadrant coordinate plane on the board.
- Label each of the following features of a coordinate grid as you introduce and briefly explain it to the class:
  - » an origin (0,0)
  - » four quadrants
  - » an x-axis (horizontal axis)
  - » a y-axis (vertical axis)
  - » points that are described by their distance from both the x- and y-axes



3 Let students know that since all of the information to be displayed involves positive numbers, you'll be working with a coordinate grid that shows only the first quadrant.

4 Display your copy of the Carrot Masses Double Line Graph Student Book page, and ask students to locate the corresponding page in their books.

- Ask them to share any observations they have about the coordinate grid on the page.
- Note the following with students:
  - » The numbers, which appear in increments of 1 along the x-axis, represent the number of days that have passed.
  - » The numbers, which appear in increments of 10 along the y-axis, represent the carrot masses in grams.
  - » There is a key at the bottom of the sheet the class will use to color-code the data entries for each carrot.

5 Explain to students that they will enter two different points, one for each carrot, on the grid for each day that the carrots have been weighed.

Decide on a color to represent each carrot, and fill in the key at the bottom of the page.

6 Have a student volunteer read the masses that have been entered on the record sheet to date. Record the masses one by one on your graph as the students do so on theirs.

You and the students may find it helpful to use the edge of a piece of paper to make sure you are entering the values on the correct days, and a ruler to connect the dots once all the values have been added.

If there are some days that data was not collected (like a weekend day), make sure students understand why there are no points for those days. Explain that when the dots are connected, you'll be able to get some idea of what happened with the carrots' masses even though you have no actual measurements.

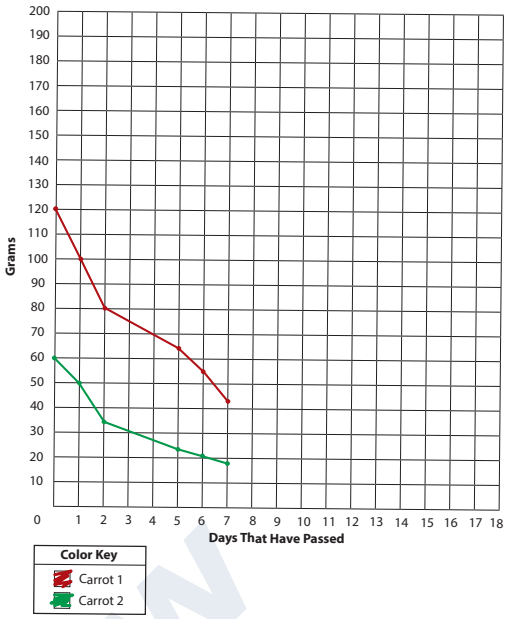
Carrot Masses Record Sheet

Date	Number of Days Passed	Carrot 1 Mass in Grams	Carrot 2 Mass in Grams
10/1	0	120 grams	60 grams
10/2	1	100 grams	50 grams
10/3	2	80 grams	35 grams
10/6	5	65 grams	24 grams
10/7	6	55 grams	21 grams
10/8	7	45 grams	18 grams

October | Calendar Collector Activities 2, 3 & 4

NAME | DATE

Carrot Masses Double Line Graph



7 After the data has been entered, take a few minutes to discuss the results so far.

Here are some key points you may ask students to address in their observations:

- What are the coordinates for this point? How would I write that as an ordered pair?
- What does this particular point mean? (After ___ days, the carrot had a mass of _____.)
- What has happened to the mass of the carrots since this experiment started?
- How much mass has each carrot lost? How can you tell?
- What other changes have you observed in the carrots? How do these changes compare with your original predictions?
- How can you explain the fact that the carrots are losing mass?
- What can you say about the rate at which each carrot is losing mass? Do they appear to be losing the same amount each day? Or has it changed over time?
- What relationships, if any, exist in the corresponding terms of the line graphs?
- How do the mass losses of the two carrots compare? Are they losing mass at roughly the same rate, or is one losing more quickly than the other? How do you know?
- Based on the data collected and graphed so far, what do you think the mass of each carrot will be tomorrow?

8 After some discussion about the data graphed, let students know that you will revisit the Calendar Collector about a week from now.

Remind students that someone will update the data each school day between now and then by weighing each carrot and recording the data on the class record sheet.

9 Close the activity by asking students to look again at the line graphs they created and mark two light Xs to show the mass they would predict for each carrot on Day 12, roughly two weeks into the experiment.

Activity 3

Discussing the Data — Day 12

1 Repeat the process described in Activity 2.

- Work with students to graph the data collected between the last activity and this one.
- Then revisit the questions listed under step 7 in Activity 2 with the class.

2 If time permits, pose and discuss the following question.

How might the shape of the data (i.e., the slope of the line) change if the class repeated the experiment but put the carrots in a different location in the classroom, such as a windowsill that gets plenty of direct sunlight each day, or in a dark closet?

If student interest in this experiment has been particularly high and you find that the topic of change connects well with your science or social studies curriculum, you may choose to repeat the experiment later in order to explore some of the variables that influence the rate of dehydration.

Note The rate at which the carrots dehydrate will vary from classroom to classroom, depending on a number of variables, including the initial conditions of the carrots (mass, size, freshness), room temperature during the day (and night), and humidity. In our classrooms, it has usually taken a little under 2 weeks for both carrots to dehydrate completely. It may take more or less time in yours, and may vary from year to year, but the experiment is pretty sure to be finished by mid-month.

Activity 4

More Work with Double Line Graphs — Day 19

1 Open by allowing time for students to update their Carrot Masses Double Line Graph page if necessary.

Invite students to share any further observations they might have about the data.

2 Then, explain to students that today they are going to do an assignment in their Student Number Corner Book, based on their work with the carrot experiment this month.

Have students locate their Another Carrot Experiment Student Book pages, as you place a copy of the first page on display.

3 Review the questions on both sheets briefly with the class, and clarify as needed. When students understand what to do, have them go to work.

SUPPORT Review key vocabulary (*x-axis, y-axis, ordered pair, coordinates, data*) as it relates to the new coordinate grid.

ELL Pair struggling readers with a partner who can read the questions to them, or gather a small group of students to work with you.

4 As students complete the assignment, have them meet with classmates to share and compare their work.

SUPPORT Give students who weren't able to complete the assignment during Number Corner additional time to finish over the next day or two, either at home or during a designated seatwork period.

October Computational Fluency

Group It!

Overview

This month's activities involve writing and evaluating expressions that include parentheses.

Skills & Concepts

- Write and evaluate numerical expressions with parentheses, brackets, or braces (5.OA.1)
- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Multiply a whole number by a fraction (5.NF.4a)
- Make sense of problems and persevere in solving them (5.MP.1)
- Reason abstractly and quantitatively (5.MP.2)
- Construct viable arguments and critique the reasoning of others (5.MP.3)

Materials

Activities	Day	Copies	Kit Materials	Classroom Materials
Activity 1 Introducing Grouping Symbols	2	**TM T2** Introducing Grouping Symbols **NCSB 15*** Grouping Symbols		
Activity 2 Introducing the Game of Group It!	4	**TM T2** Introducing Grouping Symbols **TM T3** Group It! **NCSB 15** Grouping Symbols (completed by students during Activity 1) **NCSB 16** Group It! Instructions & Record Sheet	• spinner overlay	• chart paper or space on the board • scratch paper • colored pencils in red and blue for students and teacher
Activity 3 Partner Group It!	8	**NCSB 17*** Partner Group It!	• spinner overlays, half-class set	• scratch paper • colored pencils in red and blue for students and teacher
Activity 4 Using Parentheses to Make Groups	14	**NCSB 18*** Using Parentheses to Make Groups		• calculators (optional, for support suggestion)

TM – Teacher Master, **NCSB** – Number Corner Student Book
Copy instructions are located at the top of each teacher master. ** Run 1 copy of this page for display.*

Mathematical Background

In earlier grades, students discover that addition and multiplication are commutative. In other words, the order in which numbers are added or multiplied does not change the resulting sum or product. Therefore, $4 + 5 = 5 + 4$, just as $3 \times 6 = 6 \times 3$. Subtraction and division, however, are not commutative. The order in which the numbers appear and in which the operations are performed do affect the result. For example, $5 - 4 \neq 4 - 5$, and $6 \div 3 \neq 3 \div 6$.

This concept is extended in Grade 5 as students learn to write and evaluate expressions that contain pairs of grouping symbols such as parentheses, brackets, or braces. By these conventions of mathematical communication, students learn to first evaluate parts of an expression enclosed by a pair of grouping symbols. For example, in evaluating the expression below, one would take the following steps:

2 × (4 + 3)

a add 4 + 3, which equals 7
b multiply 2 by 7, which equals 14

Sometimes, part of an expression enclosed by grouping symbols can be nested inside another set of grouping symbols. For instance look at how the pairs of parentheses are nested in this expression:

2 × (4 + (20 × 5) + 3)

In this case the expression would be evaluated in the following order:
a the inner most grouping would be evaluated first: (20 × 5) = 100
b Then, the outer grouping would be evaluated: (4 + 100 + 3) = 107
c Finally, the full expression would be evaluated: 2 × 107 = 214

Performing operations in an order determined by grouping symbols (parentheses, brackets, or braces) sets the stage for order of operations, which is taught in Grade 6. It should be noted that open and closed parentheses are the commonly used grouping symbols in elementary mathematics. *Bridges in Mathematics* follows this convention and does not include brackets or braces in expressions or equations.

During this month's Computational Fluency activities, students place parentheses in equations to make the equations true and compare expressions in which the numbers have been grouped differently. They discover, for example, that the expression 6 + 2 × 3 can be equal to 24 or 12, depending on the order in which the operations are performed. Students work together to figure out where to place parentheses to render both solutions true.

Key Questions

Use the following questions to guide students' discussion this month:

- Why do you think mathematicians started using grouping symbols?
- What strategies can be employed when playing Group It! to ensure a winning score?
- How can mental math and estimation be useful tools during game play?

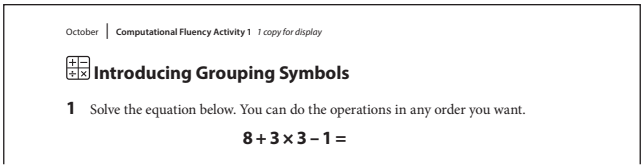
Activity 1

Introducing Grouping Symbols — Day 2

1 Open the first Computational Fluency workout by letting the students know they're going to do some work with equations this month.

2 Display the top section of the Introducing Grouping Symbols Teacher Master. Read the problem out loud and answer any questions students have about the task.

Explain, if necessary, that an operation is any mathematical action, in this case addition, multiplication, and subtraction.


October | **Computational Fluency Activity 1** *1 copy for display*

Introducing Grouping Symbols

1 Solve the equation below. You can do the operations in any order you want.

8 + 3 × 3 − 1 =

3 Ask students to work in pairs to find one or more answers.

- Have a helper place a stack of scratch paper on each table or near each cluster of desks, and invite students to record their work.
- If they can't think of any way to solve the equation other than working from left to right, use one or more of these questions and prompts to spark their thinking.
  - » What if you didn't go from left to right?
  - » What if you started in the middle?
  - » Last year a student got 16 when she solved the same equation. How do you think she got her answer?

4 After a minute or two, solicit answers from the class, and record them on the teacher master.

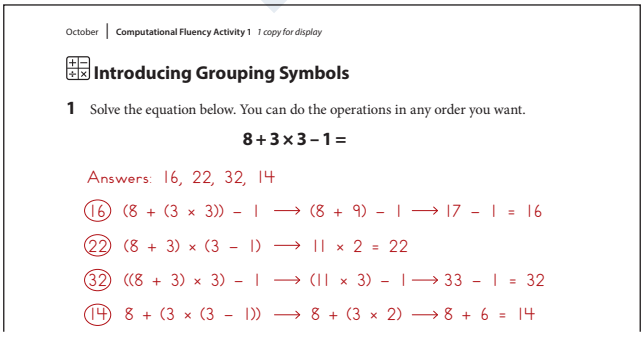
Depending on which operation they do first, students might arrive at values of 32, 22, 16, or 14, and there might be other values proposed as well.

5 Then invite student pairs to explain how they got their answers.

- Record students' thinking on the teacher master, inserting parentheses as needed to show the order in which they did the operations.
- As you record their thinking, note with students that parentheses can be referred to as *grouping symbols*.

> ***Brandon*** *We got 16.*
>
> ***Teacher*** *How did you get your answer?*
>
> ***Brandon*** *Well, first we did the 3 × 3.*
>
> ***Teacher*** *I'm going to record your thinking on my sheet here. I'll write this down using parentheses to show which operation you did first.*
>
> 8 + (3 × 3) − 1
>
> ***Teacher*** *What did you do after that?*
>
> ***Raven*** *Then we added 8 + 9. We got the 9 from doing 3 × 3.*
>
> ***Teacher*** *OK, so I'm going to use another set of parentheses to show what you did next. Notice how one set of parentheses is surrounds another set of parentheses. We call this* nesting *the parentheses, and we do the operation in the innermost set of parentheses first.*
>
> (8 + (3 × 3)) − 1
>
> ***Teacher*** *Which grouping is nested inside another grouping?*
>
> ***Raven*** *The 3 × 3 is in one set of parentheses inside another set of parentheses that has 8 times in it.*
>
> ***Brandon*** *So we do 3 × 3 first to get 9 , and then 8 + 9 to get 17.*

Here is how your teacher master might look after several pairs have shared. Leave it up through the remainder of the workout for students' reference.



October | **Computational Fluency Activity 1** *1 copy for display*

Introducing Grouping Symbols

1 Solve the equation below. You can do the operations in any order you want.

8 + 3 × 3 − 1 =

Answers: 16, 22, 32, 14

16 (8 + (3 × 3)) − 1 ⟶ (8 + 9) − 1 ⟶ 17 − 1 = 16

22 (8 + 3) × (3 − 1) ⟶ 11 × 2 = 22

32 ((8 + 3) × 3) − 1 ⟶ (11 × 3) − 1 ⟶ 33 − 1 = 32

14 8 + (3 × (3 − 1)) ⟶ 8 + (3 × 2) ⟶ 8 + 6 = 14

6 Display a copy of the Grouping Symbols Number Corner Student Book page and have students find the corresponding page in their books.

- Review the problems on the page with the class and answer any questions.
- Remind students that they will need to refer to the teacher master on display to help with the first problem.

7 When students understand what to do, give them any time remaining to work on the assignment.

- Give them the option of working alone or with a partner.
- As they finish, have them meet with classmates to share and compare their answers to the second problem.

8 Close the activity by letting students know that you'll discuss the second problem on this sheet and teach them a related game during the next Computational Fluency workout.

SUPPORT Give students who weren't able to complete the assignment additional time to finish it, either at home or during a designated seatwork period, before your next Computational Fluency workout.

Activity 2

Introducing the Game of Group It! Day 4

1 Display the lower half of the Introducing Grouping Symbols Teacher Master, and have students find the Grouping Symbols Number Corner Student Book page they completed during the previous activity.

2 Discuss two or three of the equations from problem 2.

- For each equation you discuss with the class, invite one or more volunteers to explain how they used parentheses to make the equation true.
- Record students' responses on the teacher master, and work with input from the class to prove them correct.

Below are the solutions to all 4 equations for your reference.

2 Mr. Delaney gave his fifth graders an equation to solve. The kids got four different answers, and Mr. Delaney said they were all correct.

a Place parentheses where they need to be in each equation to make it work.

b Do the operations in the order you've shown to prove that your solutions work.

$((10 \times 5) + 2) \div 2 = 26$ $(50 + 2) \div 2 = 52 \div 2 = 26$	$(10 \times 5) + (2 \div 2) = 51$ $50 + 1 = 51$
$(10 \times (5 + 2)) \div 2 = 35$ $(10 \times 7) \div 2 = 70 \div 2 = 35$	$10 \times (5 + (2 \div 2)) = 60$ $10 \times (5 + 1) = 10 \times 6 = 60$

Number Corner Grade 5 Teacher Masters T2 © The Math Learning Center | mathlearn ngcenter.org

3 Now explain that you're going to teach the students a new game that will help them learn more about how and when to use parentheses to write and solve equations.

4 Display a copy of the Group It! Teacher Master and ask students to find the Group It! Instructions and Record Sheet in their books.

- Summarize the directions and goal of the game, and explain to students that in order to learn how to play the game, they'll work as a team against you.

In the game of Group It!, the members of each team take turns spinning the spinner to find out if they have to use parentheses to get an answer that has already been determined, or to create an answer of their own choosing. Then the team circles one of the equations in the correct column, and uses parentheses to find the answer given or make the highest answer possible. Teams take turns until they've each had 3, and then they add their answers to get their total score. The team with the higher score wins.

5 Before you start, decide with the class who will play as the Red Team, and who will play as the Blue Team.

Record this information on the teacher master as students record it on their sheets and get out their red and blue colored pencils.

6 Begin the game by inviting a student volunteer to spin for the class, choose one of the equations in the designated column, and circle it in the class's color.

Have the rest of the students circle the same equation on their record sheet, using their team color.

7 Give students a minute or two to work on the given problem individually or in pairs, and then call on one or more volunteers to share answers and strategies.

- If their spin required the class to use parentheses to obtain a particular answer, call on a volunteer to show where he placed them. Then work with input from the students to perform the operations in that order to confirm the response.
- If their spin required students to use parentheses to try to get the highest possible result, solicit and record all answers, and invite students to share their strategies.
- Record solutions and strategies on the board or chart paper. When there is agreement about the answer, record it on the Group It! Teacher Master, along with the computations needed to prove it correct, and ask students to revise the work in their books if necessary.

Teacher *When Jade spun for the class, the spinner landed on Group to Create an Answer. Then Jade circled 12 ÷ 4 + 2 × 5 in the right-hand column, and all of you had an opportunity to place parentheses to get the best answer. What did you get?*

Students *We got 13.*

10 was our best answer, but I don't think it's the highest you can get.

We got 25.

Teacher *It sounds like we have several different answers. Who'd like to explain their thinking?*

Ivan *We got 13. We did 12 ÷ 4 to get 3, and then 2 × 5 to get 10. Then we added 3 + 10, and got 13.*

Teacher *OK, I'm going to record your thinking on the board—please watch carefully to see if I understand you correctly. So, I'm going to place parentheses around 12 ÷ 4 and also around 2 × 5. Does everyone agree that the result is 3 + 10, or 13?*

$$(12 \div 4) + (2 \times 5) = 13$$
$$3 + 10 = 13$$

Students *Yes.*

Maria Jose *We got a higher answer—25. We went 12 ÷ 4 = 3. Then we added 2, so that was 5. Then we multiplied that by 5 and we got 25.*

Teacher *Maria Jose, can you come up and show us where you placed the parentheses to get your answer?*

Maria Jose *Sure! We did 12 ÷ 4 first, so that part needs parentheses. Then we wanted to add 2 to the answer, so we had to use more parentheses. Then we just multiplied by 5.* ((12 ÷ 4) + 2) × 5

Teacher *Did anyone get an answer greater than 25? No? OK, looks like you scored 25 on your first turn—good work!*

8 Then take your turn to spin and circle an equation in the correct column on the teacher master. Have students circle that equation in your color in their books as well.

- Work with input from the class to solve the problem.
- Record the results on your sheet as students do so on theirs.

Teacher *When I spun, the spinner said group to get the answer. That means I have to choose one of the equations that already has the answer, and figure out how to place parentheses to make it true. I think I'll circle the second one in the left-hand column. All of you will need to circle that equation in blue for me on your sheets. Now what? Does anyone have any ideas about how we can group the operations in this equation to get an answer of 63?*

Students *The one you picked has a fraction in it, so I'm not sure what to do.*

Teacher *You're right. I circled 16 × ¼ + 5 × 7 = 63 because it looked interesting and challenging. If we add the ¼ and the 5, what's the answer?*

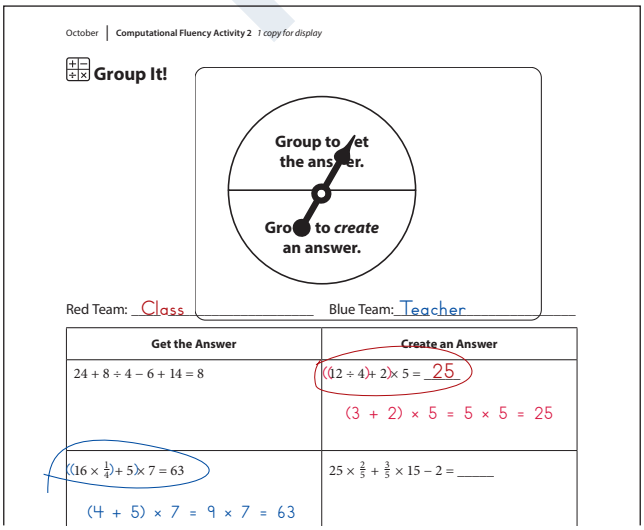
Sergio *It would be 5 ¼. It seems like it would be pretty hard to multiply that times 7 or 16.*

Teacher *Well, let's think about the other possibility. What's 16 × ¼?*

Serafina *I think it's 4, because it's like asking what's a fourth of 16, and that's 4. Plus, I know that there are 4 fourths in 1, so 16 fourths would be 4 in all.*

Xavier *I think I see how to do it! If you put parentheses around 16 × ¼, the answer's 4, right? Then put parentheses around that and the + 5 to show that you add 5 next. That's 9, and then multiply that by 7 to get 63!*

Teacher *Let's mark the equation that way, Xavier, and see if it works.*


October | Computational Fluency Activity 2 *1 copy for display*

Group It!

Group to get the answer.

Group to *create* an answer.

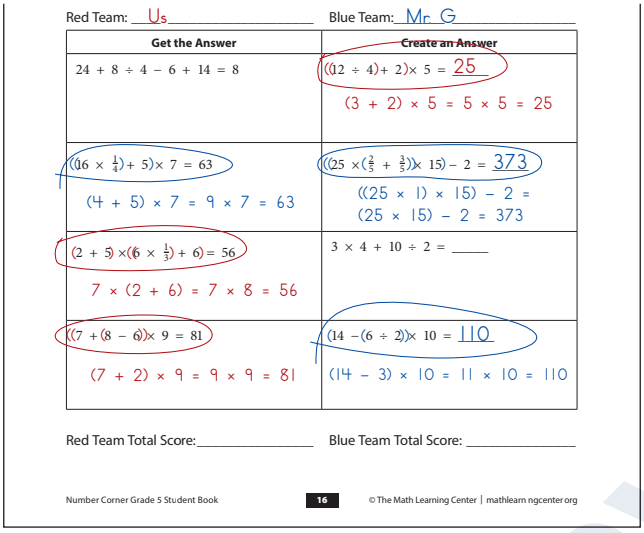
Red Team: Class Blue Team: Teacher

Get the Answer	Create an Answer
24 + 8 ÷ 4 − 6 + 14 = 8	((12 ÷ 4) + 2) × 5 = 25 (3 + 2) × 5 = 5 × 5 = 25
((16 × $\frac{1}{4}$) + 5) × 7 = 63 (4 + 5) × 7 = 9 × 7 = 63	25 × $\frac{2}{5}$ + $\frac{3}{5}$ × 15 − 2 = _____

9 Take turns with the class until both teams have had 3 turns.

There are 8 equations on the sheet, so 2 of them will go unused. If one team spins and all the equations in the designated column have been used, that team will need to select and work with an equation in the other column. Also, if you have the opportunity to use three levels of nested parentheses, do so, and explain the convention to the class.

10 When both teams have claimed solved 3 equations, have the students find the total of your answers and theirs to determine the winner.



Red Team: Us Blue Team: Mr. G

Get the Answer	Create an Answer
$24 + 8 \div 4 - 6 + 14 = 8$	$((12 \div 4) + 2) \times 5 =$ 25 $(3 + 2) \times 5 = 5 \times 5 = 25$
$((16 \times \frac{1}{4}) + 5) \times 7 = 63$ $(4 + 5) \times 7 = 9 \times 7 = 63$	$((25 \times (\frac{2}{5} + \frac{3}{5})) \times 15) - 2 =$ 373 $((25 \times 1) \times 15) - 2 =$ $(25 \times 15) - 2 = 373$
$(2 + 5) \times ((6 \times \frac{1}{3}) + 6) = 56$ $7 \times (2 + 6) = 7 \times 8 = 56$	$3 \times 4 + 10 \div 2 =$ _____
$((7 + (8 - 6)) \times 9 = 81$ $(7 + 2) \times 9 = 9 \times 9 = 81$	$(14 - (6 \div 2)) \times 10 =$ 110 $(14 - 3) \times 10 = 11 \times 10 = 110$

Red Team Total Score: _____ Blue Team Total Score: _____

Number Corner Grade 5 Student Book 16 © The Math Learning Center | mathlearn ngcenter.org

Students *Oh my gosh! Mr. G wiped us out!*

I had no idea that one with ⅖ and ⅗ could make such a huge answer.

Well, I saw the 25 × 15 part, and thought it might be big.

I'm going to pick equations with fractions next time.

I think it's better if you spin where you get to make the answer as big as you can. On the others, you're just stuck with what you get.

Activity 3

Partner Group It! Day 8

1 Open today's activity by letting students know they will play the game of Group It! in pairs today.

- Review how to play the game, and note with students that the instructions are on the Group It! Instructions and Record Sheet Student Book page they used during the previous activity.
- Note with the students that there are 10 equations on the Partner Group It! Student Book page they'll use today. That means that they can take 3, 4, or even 5 turns each before finding their totals.
- Let them know that each student pair will need one copy of the Partner Group It! Student Book page to share, a red and a blue colored pencil as well as their regular pencils, and a spinner overlay.

Encourage students to use scratch paper if they need extra space to do their figuring. Let them know that they can play the game a second time using the extra copy of the Partner Group It! Student Book page at another time.

2 When students understand what to do, assign or have them choose partners. Give them a minute to gather their materials, and have them get started.

As students play, circulate around the room, making observations and offering differentiated instruction.

SUPPORT If students struggle to record the parentheses to accurately reflect what they verbally describe, pair them with a supportive partner who will play collaboratively rather than competitively. Have students who always compute from left to right when they have the option of finding the largest answer possible use scratch paper and record at least two possibilities before making their final decision.

CHALLENGE Ask students to verbalize their strategies. Encourage students to create their own equations for a partner to solve, with larger numbers, fractions, or pre-determined answers. (In the third case, a partner has to use two levels of nested parentheses to show how his classmate arrived at those answers.)

3 At the end of Number Corner, have students clean up and put away materials. Conclude the activity by asking students to share any observations, insights, or tips they have for playing the Operations Game.

Activity 4

Using Parentheses to Make Groups — Day 14

1 Open the workout by explaining to students that they are going to do a page in their Student Number Corner Book today, based on their experiences playing Group It! this month.

2 Display a copy of the Using Parentheses to Make Groups Student Book page, and have students find the corresponding page in their books.

3 Review the problems on the sheet briefly with the class, and clarify as needed. When students understand what to do, have them go to work.

SUPPORT Consider allowing students who struggle with computation to use a calculator for this assignment, as the main goal is to develop skill at using parentheses.

CHALLENGE If students complete the Student Book page quickly and easily, challenge them to create equations that include the answers and share these with a classmate, who then has to place parentheses (possibly nesting pairs of them) to make each equation true.

4 As students complete the Using Parentheses to Make Groups Student Book page, have them meet with classmates to share and compare their solutions and strategies.

SUPPORT Give students who weren't able to complete the assignment during Number Corner additional time to finish over the next day or two, either at home or during a designated seatwork period.

October Solving Problems

Solving Problems with Organized Lists

Overview

The Problem Solving Workout this month features two sets of problems. Students are given time to solve the problems and then discuss their solutions and problem solving strategies as a class. The mathematical content of the two problem sets involves adding and subtracting decimals, and finding and extending patterns. In addition, the problems themselves will almost certainly help students understand that making organized lists and searching for patterns are useful problem-solving tools.

Skills & Concepts

- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations and the relationship between addition and subtraction (5.NBT.7)
- Generate two numerical patterns given two different rules (5.OA.3)
- Make sense of problems and persevere in solving them (5.MP.1)
- Construct viable arguments and critique the reasoning of others (5.MP.3)
- Model with mathematics (5.MP.4)
- Attend to precision (5.MP.6)
- Look for and make use of structure (5.MP.7)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Activities	Day	Copies	Kit Materials	Classroom Materials
Activity 1 Introducing So Many Possibilities	5	**NCSB 19–20*** So Many Possibilities		• scratch paper
Activity 2 Discussing So Many Possibilities	10	**NCSB 19–20** So Many Possibilities		• scratch paper
Activity 3 Introducing Pattern Puzzles	11	**NCSB 21–22*** Pattern Puzzles		• scratch paper
Activity 4 Discussing Pattern Puzzles	15	**NCSB 21–22** Pattern Puzzles		• scratch paper

TM – Teacher Master, **NCSB** – Number Corner Student Book
Copy instructions are located at the top of each teacher master. ** Run 1 copy of these pages for display.*

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

combination
pattern*
possibility
square number*
triangular number

Preparation

Between Activities 1 and 2 and between Activities 3 and 4, you will look at student work and decide which students should share their work. See Activities 2 and 4 for additional guidance in selecting student work to feature during discussions.

Mathematical Background

Each of the problem sets this month includes three problems. The first two should be accessible to all of your students, while the third is meant to pose a challenge that may not be accessible to all. You'll want to tailor your expectations accordingly.

Activity 1

Introducing So Many Possibilities — Day 5

1 Follow the procedure you established in September to introduce this week's problem set.

- Display your copy of the So Many Possibilities Student Book page, revealing the first problem only. Read the general instructions at the top of the page to the class, and then invite a student to read the problem aloud.
- Ask students to turn to a partner and talk about what the problem is asking them to figure out, and identify the important information that will help them to solve the problem. Then, invite a few pairs to share their ideas.
- Once you are sure all students understand what the first problem is asking, have students find the So Many Possibilities pages in their Student Books and read the rest of the problems.
- Have students turn to a partner and begin thinking and talking about how they might solve the problems in this set.
- Solicit any questions students may have before they get started.

2 When students understand what to do, give them rest of the workout time to solve the problems with their partner.

Remind them to show their work.

3 As students work, circulate around the room, making observations, answering questions, and offering differentiated instruction.

ELL/SUPPORT Check with students to make sure they understand what the questions are asking. Help ELL students with vocabulary such as *possibilities* and *combinations*, as needed. Emphasize that the questions are not asking for just a few answers, but all possible solutions.

CHALLENGE In the allotted time, most students should be able to finish problems 1 and 2. If students determine the answers immediately, showing adequate work and writing a sentence, invite them to tackle the third problem.

4 As students finish the problems, have them check their work. Encourage them to think about whether or not their answers are reasonable.

5 Wrap up this activity by letting students know they will discuss their work they next time they do a Solving Problems activity, a few days from now.

If students did not have adequate time to complete most of the assignment (particularly problems 1 and 2), give them additional time before the next Solving Problems Activity on Day 10.

Key Questions

- What is the problem asking?
- What information in the problem will help you figure it out?
- What strategy can you use to figure it out?
- What model can you use to represent your thinking?
- Is your answer reasonable?
- How can you check your work after you have solved the problem?
- Can you write a story problem that uses the same math skills and concepts?

Activity 2

Discussing So Many Possibilities — Day 10

Look over students' work from Day 5, and select several pairs of students to share their thinking with the class. Look for one or more pairs of students who used an organized list of some sort to track and make sure they found all the possible combinations of ice cream flavors and toppings for problem 1. Look for one or more pairs of students who used an organized table, chart, or list to track and make sure they found all the possible combinations of party favors for problem 2.

1 Open today's activity by letting students know that they will share and discuss their work on the So Many Possibilities problems.

Review the procedures you established last month for sharing work, and reiterate your expectations for the class as a whole when student pairs are sharing their solutions and strategies.

2 Display your copy of So Many Possibilities, page 1, and ask students to find their work in their own Student Books.

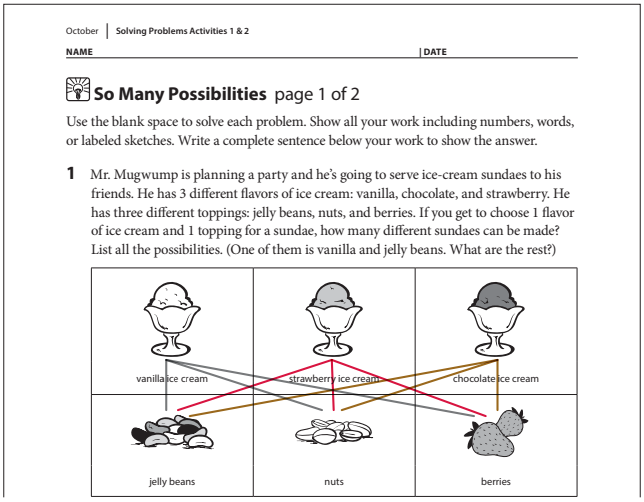
Take a few moments to review the problems students solved during the previous Solving Problems activity.

3 Let students know that you saw a lot of pairs list possibilities for the ice cream and topping combinations, but you are wondering how they can be sure they listed all the possibilities and not just some.

4 Invite the pairs of students whose work you selected ahead of time to share with the class.

- Have each pair place their work under a document camera or show how they solved the problem on your whiteboard or chalkboard.
- Encourage the other students to
  - » ask clarifying questions
  - » summarize each strategy after it's presented
  - » compare the strategies, noting differences and likenesses, as well as potential for being efficient and effective

Problem 1: Pairing the Possibilities in an Organized Way


October | Solving Problems Activities 1 & 2

NAME | DATE

So Many Possibilities page 1 of 2

Use the blank space to solve each problem. Show all your work including numbers, words, or labeled sketches. Write a complete sentence below your work to show the answer.

1 Mr. Mugwump is planning a party and he's going to serve ice-cream sundaes to his friends. He has 3 different flavors of ice cream: vanilla, chocolate, and strawberry. He has three different toppings: jelly beans, nuts, and berries. If you get to choose 1 flavor of ice cream and 1 topping for a sundae, how many different sundaes can be made? List all the possibilities. (One of them is vanilla and jelly beans. What are the rest?)

Darryl *We decided that we wanted to focus first on one kind of ice cream and pair all of the toppings with that ice cream.*

Big Idea

One way to work in a systematic way is to exhaust all the possibilities for one element (in this case, ice cream flavors) before moving on to the next.

Sam *So, first we did vanilla. We drew a line from vanilla to jelly beans. That's the first choice. Then we drew a line from vanilla to nuts, and then vanilla to berries. There are 3 choices that include vanilla ice cream.*

Darryl *And then we did the same thing for chocolate and got three more choices. And then strawberry with each topping, for 3 more choices. So there are 9 choices altogether.*

Teacher *What are the 9 choices?*

Darryl *Vanilla and jelly beans, vanilla and nuts, vanilla and berries, chocolate and jelly beans, chocolate and nuts, chocolate and berries, strawberry and jelly beans, strawberry and nuts, strawberry and berries.*

Teacher *OK, but can you tell us why you chose to focus on one kind of ice cream at a time?*

Sam *We wanted to make sure that we got all the choices, and we found that if we skipped around, it was easy to leave some out.*

Teacher *Let's take a look at another way that students used an organized system to make sure they got all the possibilities and then compare their thinking.*

Problem 1: Making a Written List of the Possibilities

Vanilla & jelly beans
Vanilla & nuts
Vanilla & berries

Chocolate & jelly beans
Chocolate & nuts
Chocolate & berries

Strawberry & jelly beans
Strawberry & nuts
Strawberry & berries

Kiara *We focused on one thing at a time like Darryl and Sam did, but we didn't draw lines because that got confusing. So we just made a list where we paired each kind of ice cream with all the different toppings. We wrote vanilla and jelly beans, then vanilla and nuts, then vanilla and berries, and then we did the same thing for chocolate, and then for strawberry.*

Teacher *And did you also get 9 choices?*

Whitney *Yes, the same 9. But it looks a little different just because we wrote them out.*

Big Idea

Having a system for keeping track of the possibilities is helpful in making sure you identify all the options without any duplications.

5 Ask students to turn their focus to the second problem in the set. Invite a pair of students who used a chart, or some form of an organized list, to share their work.

> ***Teacher*** *As I watched people working on this problem, I saw several pairs generating a random list of party favors, then calculating to make sure that the totals were $5.00. And I saw a variety of answers for the number of possibilities. Briana and Elisa, I'm interested in how you solved this problem. Will you talk to us about your strategy?*

Yo-yos: $1.50	Balls: $1.00	Pencils: $.50
0	0	10
0	1	8
0	2	6
0	3	4
0	4	2
0	5	0
1	3	1
1	2	3
1	1	5
1	0	7
2	2	0
2	1	2
2	0	4
3	0	1

> ***Briana*** *We wanted to make a list like we did for the first problem to keep track of all the combinations we found. We started by making a chart that we could put the combinations in. We decided that if we didn't buy any yo-yos or balls, that meant we could buy 10 pencils, so we wrote 0 yo-yos, 0 balls, and 10 pencils. Ten pencils would be $5.00 because they are 50 cents each.*
>
> ***Elisa*** *Then we said, if we wanted to buy 0 yo-yos and only 1 ball, we could still get 8 pencils. We had to keep track of how much money we were spending to make sure it was exactly $5.00.*
>
> ***Briana*** *Then, 0 yo-yos and 2 balls costs $2.00 so we had $3.00 left. That would leave enough money for 6 pencils.*
>
> ***Elisa*** *We kept going that way until we found all the possibilities for 0 yo-yos. Then we worked on the list for 1 yo-yo, 2 yo-yos, 3 yo-yos…*

After the students have presented and explained their work, ask their classmates to comment on the strategy.

> ***Teacher*** *Class, please take a careful look at the chart Briana and Elisa shared. Are you confident that they found all the possible combinations of party favors Maggie could buy with $5.00. If so, why? If not, why?*
>
> ***Students*** *They did sort of the same thing as the other kids with the ice cream problem. They focused on one thing at a time and kept going until they couldn't go any further. Like, they started with no yo-yos and 10 pencils, and kept trading 2 pencils for 1 ball until they ran out of ways to do that. Then they went on with 1 yo-yo, then 2, then 3. I think they got all the answers.*
>
> *I like how they focused on one party favor at a time. It's like they traded in one favor to get some others, when you look at their list.*

You know that you can't get 4 yo-yos because that's $6.00 and you only have $5.00.

And the most pencils you can buy is 10 because that's also $5.00.

I see some that we missed when we wrote our list.

With their list, you can tell when you run out of possibilities for 0 yo-yos, so then you can try with 1 yo-yo, and then 2, and then 3, and after that, you have to stop because 4 yo-yos cost more than $5.

6 If you have time, invite students to use the strategies discussed to solve or reexamine problem 3, then share their thinking.

7 At the end of this workout, ask students to reflect on their own work for this set of problems.

- What have you noticed about your own work after viewing the work of your classmates?
- What strategies could you use to make your work more organized or more efficient?
- What are some things you might do to make your work even clearer?
- How can you use what you discovered today in future problems?

Activity 3

Introducing Pattern Puzzles — Day 11

1 Display your copy of the Pattern Puzzles Number Corner Student Book pages and have students find the corresponding pages in their books.

- Invite a student to read the problems aloud.
- Then ask students to reflect on the title of the set—Pattern Puzzles.

David *I think they all sound like puzzles. We have to try to figure out what the answer is.*

Kelsey *There must be some sort of pattern that we can use to work on these.*

Lin *I am thinking that some of these sound like the problems we solved last time. I bet we can look for patterns in a list!*

2 Have students turn to a partner and begin thinking and talking about how they would solve the first two problems in the set.

Encourage them to think about what strategies they would use and what they might put on their paper to show their thinking.

3 When students understand what to do, give them the time remaining to solve the problems with their partner.

Remind them to show their work.

4 As students work, circulate around the room, making observations, answering questions, and offering differentiated instruction.

ELL/SUPPORT Review the problems from the previous set to find similarities. Ask students if the strategies their classmates shared for those problems might be helpful in solving these. Be sure students are not struggling with language such as *triangular* and *square* numbers, and have conversation about the patterns in these two sequences of numbers before students begin working.

CHALLENGE In the allotted time, most students should be able to finish problems 1 and 2. As time allows, challenge students to start problem 3. Partner students who can challenge each other to think of efficient strategies or work on communicating their thinking effectively.

5 As students finish the problems, have them check their work. Encourage them to think about whether or not their answers are reasonable.

6 Wrap up this activity by letting students know they will discuss their work they next time they do a Solving Problems activity, a few days from now.

If students did not have adequate time to complete most of the assignment (particularly problems 1 and 2), give them additional time before the next Solving Problems Activity on Day 15.

Activity 4

Discussing Pattern Puzzles — Day 15

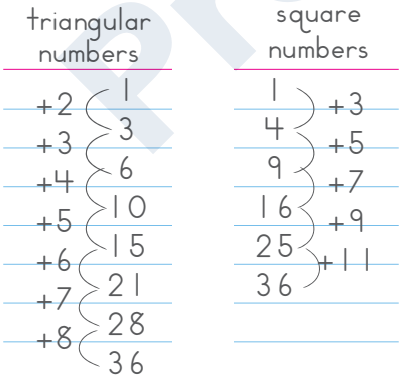
Look over students' work from Day 11 to see if you can find a sample in which the students found patterns that enabled them to extend the sequence of triangular and square numbers, and then compared the resulting sequences to find the first point of intersection, 36.

1 Display your copy of Pattern Puzzles, problem 2, and ask students to find the work they did on that problem in their own books.

Invite a student to read problem 2 aloud, and ask students to look over their solutions and strategies.

2 Invite a pair of students who discovered patterns that enabled them to extend and compare the number sequences to present and explain their work.

Pattern Puzzles Problem 2: Charting the Possibilities



Cody *The way that we solved this problem was to make a list, like we did in the last problems that we solved. But this time we had to make two lists instead of just one.*

Imani *First we looked at the triangular numbers to try to figure out how we were supposed to come up with more of them. We saw that there was a pattern to the shape that they followed, so we drew the next one and counted the number of little squares that made up the shape. We got 15, and then we realized that every new row adds 1 more, and for each new number, you add all the rows together.*

Cody *That made it so much easier, because then we also saw the number pattern it was following. From 1 to 3, you are adding 2, then from 3 to 6, you are adding 3, then from 6 to 10, you are adding 4.*

Imani *Does that make sense? So, really, it saved us time because we didn't need to draw any more.*

Cody *The list we made of triangular numbers was 1, 3, 6, 10, 15, 21, 28…*

Imani *And then we realized that we probably needed to look at the square numbers at the same time so we could answer the question! When we looked at the pattern of the numbers, we saw that they were getting bigger by adding 3, then 5, then 7—the next odd number every time.*

Cody *Once we figured that out, we just made a list that had all the numbers and we could just find the first time that a number was on both lists. It turned out to be 36.*

3 After the pair has presented their work and explained their thinking, ask another student to restate what his or her classmates did.

This will give the entire class time to reflect on the strategy shared, and help the students who shared see if their explanation was as clear as they hoped it would be.

Teacher *I'd like to ask if someone thinks they can put into words the strategy that Cody and Imani used to solve this problem. Anyone?*

Jade *I think I can. First they thought about the patterns that they found in the triangular numbers and wrote down a list of those numbers. Then they found the pattern that the square numbers followed and made a list of those. Then they kept going with both lists until they found a number that matched in both lists.*

4 Draw out conversation about the two patterns found in the organized lists and their use in solving the problem.

Teacher *I find it interesting that Imani and Cody said they found a pattern that made it possible to list the triangular numbers, but then realized after a little while that they needed to list the square numbers before they got too far. Talk to me about the patterns again.*

Students *The triangular numbers follow a pattern of adding 1 more each time.*

The square numbers follow a pattern of adding 2 more each time.

Both patterns are getting bigger.

Teacher *Why make the lists at the same time?*

Students *Because we were looking for the first time a number came up on both lists, so we really didn't know when to stop if we just did one at a time.*

Teacher *So, I noticed that some of you found the pattern that enabled you to list the triangular numbers, and you kept going.*

Raven *But we didn't find the answer because we just kept on going with those numbers. We didn't realize that we needed to work on the square numbers kind of at the same time.*

5 If you have time, invite students to use the strategies discussed to reexamine problem 3.

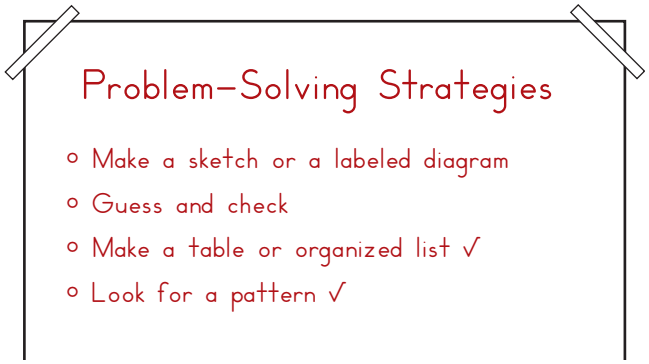
- Display your copy of the problem, and ask students to find the problem in their own Student Books.
- Invite a student to read the problem aloud. Then talk with them about the important information and patterns necessary to keep track of in this problem.

> ***Teacher*** *Let's talk briefly about what we would need to keep track of in this problem. Who can tell me one thing?*
>
> ***Maria Jose*** *You are trying to figure out how many times the clock chimes in 30 days. So the number of chimes is one thing.*
>
> ***Teacher*** *OK, and that pattern will be…?*
>
> ***Maria Jose*** *Um, just 1 more each time.*
>
> ***Teacher*** *Any other information we need to keep in mind?*
>
> ***Lin*** *Yeah, when the clock chimes. I mean, after how many minutes have gone by, and you can see it goes in a doubling pattern because it chimes after 1 minute, then it chimes again after 2 minutes, then again after 4 minutes, then 8, then 16, then 32, and it would keep going.*
>
> ***Teacher*** *So, two things to keep track of—how many chimes and when the chimes will happen. Anything else?*
>
> ***Kendra*** *Well, yeah. It says we want to know how many times it chimes in 30 days, so, somehow, we have to keep track of the days.*
>
> ***Brandon*** *Or the minutes that have gone by.*
>
> ***Kendra*** *I didn't really look at that problem before, but I think with the doubling pattern, it's not going to chime as many times as I thought. I mean, after the first 64 minutes, it's only chimed 7 times. 64 minutes is a little more than an hour, so then the next chime would come around 2 hours, then around 4 hours, then 8, then 16, then 32, and you're already up to a day and a half almost.*

6 Close the activity by reviewing the types of problem-solving strategies students have shared this month.

Remind students that developing a repertoire of problem-solving skills will allow them to have choice and become more flexible thinkers.

If you started a list of strategies last month, you can revisit it with the class and add the strategy of looking for a pattern. This list will continue to grow over the next few months, and you might leave it posted for ongoing reference.



October Problem Strings

Fraction Addition with Money & Clock Models

Overview

This month, students use money and clock models to add unit and non-unit fractions with unlike denominators.

Skills & Concepts

- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)
- Explain the reasoning behind strategies for computing with decimals to hundredths (5.NBT.7)
- Add fractions with unlike denominators (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Model with mathematics (5.MP.4)
- Use appropriate tools strategically (5.MP.5)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Activities	Day	Copies	Kit Materials	Classroom Materials
Activity 1 Problem Strings 4 & 5	7, 16	**NCSB Appendix** Problem String Work Space **TM T4** Clock Face Strips (optional, see Preparation)		

TM – Teacher Master, **NCSB** – Number Corner Student Book
Copy instructions are located at the top of each teacher master.

Preparation

Consider running several copies of the Clock Face Strips Teacher Master and cutting them apart to form strips that can be used to model students' thinking during Problem String 5. The use of these strips is optional but probably more efficient than sketching clock faces freehand as you work with the students.

Mathematical Background

The first string introduces the idea of using money to add the following pairs of fractions: $\frac{1}{4} + \frac{1}{2}$, $\frac{1}{4} + \frac{1}{10}$, $\frac{1}{20} + \frac{1}{2}$, $\frac{1}{10} + \frac{1}{20}$, $\frac{5}{100} + \frac{1}{20}$, $\frac{2}{20} + \frac{10}{100}$, and $\frac{25}{100} + \frac{2}{4}$. While these combinations require that common denominators be found, posing them in the context of money makes this easier and more intuitive than it would be otherwise. If you ask fifth graders to add half a dollar and a fourth of a dollar, many will quickly respond with a total of 75 cents, or 0.75, or $\frac{75}{100}$, or perhaps $\frac{3}{4}$ because a half dollar is the same as 2 quarters, and $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$. Allow students to use whatever units they like in solving the problems, including coins, money-decimal representations, fractions out of 100, or the fractions of a dollar represented by the coins themselves (e.g., a nickel is $\frac{1}{20}$ of a dollar, a dime is $\frac{1}{10}$ of a dollar, and so on). As you pose the problems in the first string, at least two correct answers for each combination. For example, $\frac{5}{100} + \frac{1}{20} = 10$ cents, \$0.10, $\frac{1}{10}$, and $\frac{10}{100}$. Challenge students to explain why these answers are equivalent.

The second string introduces the idea of using a clock face to add fraction pairs that include thirds, sixths, and twelfths. If the problem is $\frac{1}{4} + \frac{1}{3}$, for example, students might use the clock model like this: 15 minutes and 20 minutes is 35 minutes out of 60 minutes, therefore $\frac{1}{4} + \frac{1}{3} = \frac{35}{60}$. Since there are seven 5-minute chunks in 35 minutes and twelve 5-minute chunks in 60 minutes, $\frac{35}{60} = \frac{7}{12}$.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

common denominator
decimal notation
decimal*
denominator*
equivalent fractions*
hundredth*
numerator*
tenth*

Activity 1

Problem Strings 4 & 5 — Day 7, 16

1 Follow the procedure you established in September to deliver each of the Problem String workouts this month.

- Ask students turn to the next blank page of the Problem String Work Space in their Number Corner Student Books and write today's date.
- Deliver each problem in the string one at a time.
  - » Have students record and solve the problem in their Student Books.
  - » Have them put up their thumbs when they are ready to share their solutions and strategies.
  - » When you see several thumbs up, invite a few students to share the answer. Record all answers without comment or indication that any of them are correct or incorrect.
  - » Then invite two or three volunteers to explain how they got their answers.
  - » Record students' thinking on the board (or a piece of chart paper) for everyone to see.

2 Conclude the activity by asking students to reflect briefly on the string.

- Ask students to share, first in pairs and then as a group, a one-sentence statement about something they learned in today's string.
- Invite students to write a simple statement beneath their work in the Student Book describing what they learned while doing this string.

> ***Students*** [Referring to Problem String 4] *It's easy to add fractions if you think about money.*
>
> *Especially fractions like halves and fourths.*
>
> *Tenths and hundredths are good too, because those are like dimes and pennies.*
>
> *I don't think money would work for all fractions, like thirds would be hard because there's no coin that's like a third of a dollar.*

> ***Students*** [Referring to Problem String 5] *Adding fractions with a clock is pretty easy too.*
>
> *There are lots of ways to think about fractions on a clock, like you can think about how many minutes out of an hour, or how many quarter-hours, or how many 5-minute chunks there are.*
>
> *I think clocks work really well for some of the fractions that you can't really do with money, like thirds and sixths and twelfths. But money works better for tenths and hundredths.*

Key Questions

Use these questions to help your students investigate this month's strings.

- What do you know that could help you solve this problem?
- What strategy could you use?
- How can you show your thinking?
- What model could you use to show your thinking?
- How can you use that model?
- How can solving one problem in a string help you solve another problem, later in the string?
- What is the big idea of this string?
- How can your work with this string help you with other problems?

Problem String 4 — Day 7

Problems	Sample Strategies & Recording	Connections
$\frac{1}{4} + \frac{1}{2}$	$\frac{1}{4} + \frac{1}{2} = 0.25 + 0.50 = 0.75 = \frac{75}{100}$ $\frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}$ $\frac{75}{100} = \frac{3}{4}$	By posing each of these problems in terms of money—fractions of a dollar—you enable students to build intuitions about common denominators in a relatively easy way because most fifth graders are accustomed to thinking of coins and combinations of coins in terms of pennies. **Big Idea** Adding $\frac{1}{4}$ and $\frac{1}{10}$ can be thought of as adding a quarter and a dime. The answer is 35¢ or \$0.35 or $\frac{35}{100}$ of a dollar. This strategy essentially involves using a common denominator of 100, though, of course, one could also use a common denominator of 20 or 40 for this problem. The advantage of thinking in terms of money, however, is that it invites students to operate with whole numbers, because think of each fraction as some number of cents. **CHALLENGE** As you go through the string, encourage students to try to find other equivalencies that make sense in the problems. If some students have correctly solved a problem while others are still working, ask them to figure out the problem using dimes or nickels instead of pennies.
$\frac{1}{4} + \frac{1}{10}$	$\frac{1}{4} + \frac{1}{10} = 0.25 + 0.10 = 0.35 = \frac{25}{100} + \frac{10}{100} = \frac{35}{100}$ $\frac{5}{20} + \frac{2}{20} = \frac{7}{20} = \frac{35}{100}$	
$\frac{1}{20} + \frac{1}{2}$	$\frac{1}{20} + \frac{1}{2} = 0.05 + 0.50 = 0.55 = \frac{5}{100} + \frac{50}{100} = \frac{55}{100}$ $\frac{55}{100} = \frac{11}{20}$	
$\frac{1}{10} + \frac{1}{20}$	$\frac{1}{10} + \frac{1}{20} = 0.10 + 0.05 = 0.15$ $= \frac{10}{100} + \frac{5}{100} = \frac{15}{100}$ $= \frac{2}{20} + \frac{1}{20} = \frac{3}{20}$	
$\frac{5}{100} + \frac{1}{20}$	$\frac{5}{100} + \frac{1}{20} = \frac{5}{100} + \frac{5}{100} = \frac{10}{100} = \frac{1}{10}$ $= \frac{1}{20} + \frac{1}{20} = \frac{2}{20}$ $= 0.05 + 0.05 = 0.10$	Look for students who simplified one or both fractions before adding, those who simplified the total after finding the sum, and those who used prior knowledge of equivalence.
$\frac{2}{20} + \frac{10}{100}$	$\frac{2}{20} = \frac{1}{10}$ and $\frac{10}{100} = \frac{1}{10}$ $\frac{1}{10} + \frac{1}{10} = \frac{2}{10} = 0.20 = \frac{20}{100} = \frac{1}{5}$	
$\frac{25}{100} + \frac{2}{4}$	$\frac{25}{100} = \frac{1}{4}$ $\frac{1}{4} + \frac{2}{4} = \frac{3}{4} = 0.75 = \frac{75}{100} = \frac{16}{20}$	

Notes About This Activity

This string, and context, is designed to elicit the use of money as a model for adding fractions. Represent student thinking with equations, referring to money equivalents whenever possible.

Sample Dialog

$\frac{1}{4} + \frac{1}{2}$

Teacher *The first problem is ¼ of a dollar and ½ of a dollar. How much money is that? How could we write that as a fraction of a dollar?*

$$\frac{1}{4} + \frac{1}{2} = 0.25 + 0.50 = 0.75 = \frac{75}{100}$$

Mei *I also thought about how a half dollar is the same as 2 quarters, so it's like 1 quarter plus 2 quarters is 3 quarters, and that's worth 75¢.*

$$\frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

$$\frac{75}{100} = \frac{3}{4}$$

¼ + 1/10

Teacher *How much is ¼ of a dollar and 1/10 of a dollar?*

Imani *That's like a quarter and a dime—35 cents.*

$$\frac{1}{4} + \frac{1}{10} = 0.25 + 0.10 = 0.35 = \frac{25}{100} + \frac{10}{100} = \frac{35}{100}$$

Teacher *I'm wondering if there are any other ways to think about this amount. Is there a way to think about 35/100 in terms of nickels?*

David *Well, there are 7 nickels in 35¢, and each nickel is 1/20 of a dollar, so 35¢ must be the same as 7/20, right?*

Sara *Oh yeah! 25 cents is 5 nickels and 10 cents is 2 nickels, so that would work.*

$$\frac{5}{20} + \frac{2}{20} = \frac{7}{20} = \frac{35}{100}$$

1/20 + ½

Students *I got 55 cents.*
I got 55/100, but that's the same.

Teacher *Tell us about 55/100.*

Lin *Well, 1/20 is the same as 5/100, right? A nickel. And ½ is the same as 50/100, so together, that's 55/100. I like to think of them both out of 100 pennies.*

$$\frac{1}{20} + \frac{1}{2} = 0.05 + 0.50 = 0.55 = \frac{5}{100} + \frac{50}{100} = \frac{55}{100}$$

Teacher *I see a lot of 5s jumping out at me and it makes me wonder if we can think of nickels in some way. Are there any other equivalencies we could add?*

Akiko *I didn't do it this way, but I am thinking now that I could have thought about 1/20 as 1 nickel and ½ as 10 nickels. So that would be 11 nickels.*

Teacher *And can we write that as a fraction?*

Akiko *Yeah. 11/20. Add that to the list!*

$$\frac{55}{100} = \frac{11}{20}$$

5/100 + 1/20

DJ *I thought about making this one easier by turning 1/20 into 5/100. Then I added 5/100 and 5/100 to get 10/100. And I know that is also 1/10.*

$$\frac{5}{100} + \frac{1}{20} = \frac{5}{100} + \frac{5}{100} = \frac{10}{100} = \frac{1}{10}$$

Elisa *I did almost the same thing but the other way around. I simplified 5/100 to 1/20, and then I just added 1/20 and 1/20 to get 2/20, which is 1/10.*

$$= \frac{1}{20} + \frac{1}{20} = \frac{2}{20}$$

Darryl *I remembered that we just talked about 1/20 being a nickel and I know 5/100 is also a nickel, so I just knew it was 10 cents, 0.10.*

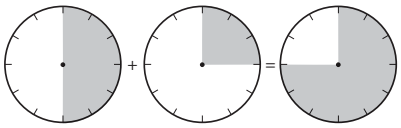
$$= 0.05 + 0.05 = 0.10$$

Problem String 5 — Day 16

Before you begin the string, review the work students did with clock models in the September Calendar Grid workout by posing the following questions and recording students' responses on the board where they can refer to the information as you move through the string.

- How many minutes are in ½ of an hour? How can I write that as a fraction? Is there more than one way?
- What about ¼ of an hour? ⅓ of an hour? ⅙ of an hour? 1/12 of an hour?

Problem String 5

Problems	Sample Strategies & Recording	Connections
½ + ¼	 ½ + ¼ = 6/12 + 3/12 = 9/12 ½ + ¼ = 30/60 + 15/60 = 45/60 or 45 minutes	As students share and you discuss and record their ideas during this string, help them think about the number of minutes in each fraction as a chunk. For example, in ⅓ of an hour, there is one set of 20 minutes out of three 20-minute chunks, or two sets of 10 minutes out of six 10-minute chunks, or four sets of 5 minutes out of twelve 5-minute chunks. This will help them build understanding of equivalence and lay the foundation for working with common denominators.
¼ + ⅓	 ¼ + ⅓ = 15/60 + 20/60 = 35/60 or 35 minutes ¼ + ⅓ = 3/12 + 4/12 = 7/12 = 35/60	Before leaving these two problems, ask students to look for connections between the two combinations, and to think about how they might use the solutions from the first one to help solve the second one.
½ + ⅓	 ½ + ⅓ = 30/60 + 20/60 = 50/60 or 50 minutes ½ + ⅓ = 3/6 + 2/6 = 5/6 ½ + ⅓ = 6/12 + 4/12 = 10/12	
¼ + 1/12	 ¼ + 1/12 = 3/12 + 1/12 = 4/12 = ⅓ of an hour ¼ + 1/12 = 15/60 + 5/60 = 20/60 or 20 minutes	Continue to reinforce the idea of using information from previous problems in the string to help solve new combinations.
1/12 + ½	1/12 + ½ = 5/60 + 15/60 + 15/60 = 35/60 or 35 minutes	
½ + ⅙	½ + ⅙ = 30/60 + 5/60 + 5/60 = 40/60 or 40 minutes ½ + ⅙ = 6/12 + 2/12 = 8/12	

Sample Dialog

½ + ¼

Teacher *What is ½ of an hour and ¼ of an hour?*

Kendra *I got 9/12.*

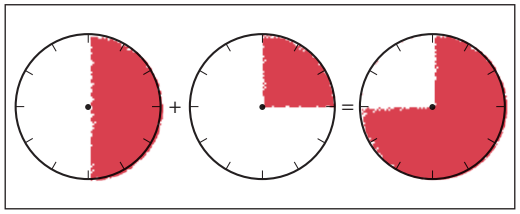
Teacher *9/12? That's interesting. Can you tell us how you got that?*

Kendra *I was thinking about a clock and I remembered that ½ of the clock goes to the big 6, and that ¼ of the clock goes to the big 3, so if you add those together, you would be at the 9. That's 9 out of 12, so it's 9/12.*

Notes About This Activity

This string, and context, is designed to elicit the use of a clock as a model for adding fractions. Represent student thinking with equations and sketches of clock faces, referring to equivalents whenever possible (e.g., half an hour is the same as 30 minutes out of 60 or two quarter-hours). Run several copies of the Clock Face Strips, cut them apart, and use the strips to record students' thinking if you like.

Teacher *Let me see if I can sketch out what you just said so that we can all follow your thinking.*



$\frac{1}{2} + \frac{1}{4} = \frac{6}{12} + \frac{3}{12} = \frac{9}{12}$

Max *I thought about minutes. So, ½ an hour is 30 minutes, or ³⁰⁄₆₀, and ¼ of an hour is 15 minutes, or ¹⁵⁄₆₀. So when I added them together I got ⁴⁵⁄₆₀.*

Teacher *And is that equivalent to what Kendra just said?*

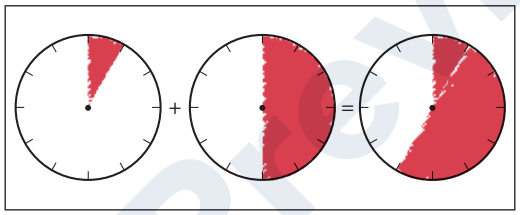
Max *Yeah, you can actually use the same pictures you just drew, but focus on the minutes.*

Teacher *Nice. Let me record your thinking here.*

$\frac{1}{2} + \frac{1}{4} = \frac{30}{60} + \frac{15}{60} = \frac{45}{60}$ or 45 minutes

1⁄12 + 1⁄2

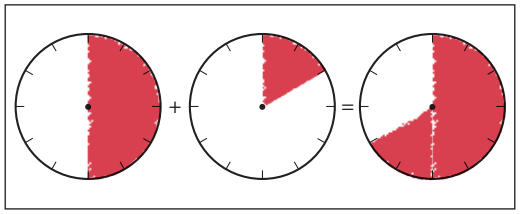
Carlos *We just did ¼ plus ½ on the last problem, and ½ is the same as ²⁄₄, so we can just add 15 more minutes to the answer from last time. That's 35 minutes.*



1⁄12 + 1⁄2 = ⁵⁄₆₀ + ¹⁵⁄₆₀ + ¹⁵⁄₆₀ = ³⁵⁄₆₀ or 35 minutes

1⁄2 + 1⁄6

Briana *I already know the answer is 40 minutes because we just did ½ + ¹⁄₁₂, and ⅙ is the same as ²⁄₁₂, so it's just like adding 5 more minutes to the answer from last time.*



1⁄2 + 1⁄6 = ³⁰⁄₆₀ + ⁵⁄₆₀ + ⁵⁄₆₀ = ⁴⁰⁄₆₀ or 40 minutes

Craig *It's also really easy if you think about how many sets of 5 minutes there are in each fraction. Half an hour is 6 sets of 5 minutes, and ⅙ of an hour is 2 sets of 5 minutes.*

1⁄2 + 1⁄6 = ⁶⁄₁₂ + ²⁄₁₂ = ⁸⁄₁₂

October Assessment

Number Corner Checkup 1

Overview

During the last week of the month, the teacher administers a written assessment to the entire class, half in place of Number Corner workouts one day, and the other half in place of workouts the following day. Number Corner Checkup 1 is designed to help teachers ascertain students' current skills with writing and evaluating expressions, identifying factors and multiples, adding fractions with unlike denominators, finding the volume of rectangular prisms as well as figures composed of two or more rectangular prisms, and locating and identifying points on a coordinate plane.

Skills & Concepts

- Find all factor pairs for a whole number between 1 and 100 (4.OA.4)
- Demonstrate an understanding that a whole number is a multiple of each of its factors (4.OA.4)
- Determine whether a whole number between 1 and 100 is prime or composite (4.OA.4)
- Evaluate numerical expressions that contain parentheses (5.OA.1)
- Interpret numerical expressions without evaluating them (5.OA.2)
- Divide a 2-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division (5.NBT.6)
- Add fractions with unlike denominators (5.NF.1)
- Show that the volume of a right rectangular prism with whole number edge lengths can be found by multiplying the edge lengths, or by multiplying the base of the figure by its height (5.MD.5a)
- Use the formula $V = l \times w \times h$ or $V = b \times h$ to find the volume of a right rectangular prism with whole number edge lengths (5.MD.5b)
- Find the volume of a solid figure composed of two or more non-overlapping right rectangular prisms by calculating the volume of each prism and finding their sum (5.MD.5c)
- Locate a point on a coordinate plane based on its ordered pair of coordinates; identify the *x*- and *y*-coordinates of a given point in a coordinate plane (5.G.1)

Materials

Assessments	Day	Copies	Kit Materials	Classroom Materials
Number Corner Checkup 1, Part 1 Completing Pages 1 & 2	17	**TM T5–T6** Number Corner Checkup 1, pages 1–2	• Omnifix cubes	• scratch paper
Number Corner Checkup 1, Part 2 Completing Pages 3 & 4	18	**TM T7–T8** Number Corner Checkup 1, pages 3–4	• Omnifix cubes	• scratch paper

TM – Teacher Master, **NCSB** – Number Corner Student Book
Copy instructions are located at the top of each teacher master.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

coordinates*
coordinate plane*
cubic unit*
cubic centimeters
cubic meters
equation*
factor*
grouping symbols
multiple*
operation*
ordered pair
parentheses*
plot
point
rectangular prism*
sum or total*
volume*

Mathematical Background

Number Corner Checkup 1 give teachers an opportunity to gauge students' proficiency with some of skills that have been most heavily addressed in the first two months of Number Corner instruction: writing and evaluating expressions, identifying factors and multiples, adding fractions with unlike denominators, finding the volume of rectangular prisms as well as figures composed of two or more rectangular prisms, and locating and identifying points on a coordinate plane.

Having conducted these assessments, teachers will be in a better position to plan daily instruction and make the minute-to-minute instructional decisions so crucial to good teaching. On the basis of students' strengths and weaknesses, teachers may decide to emphasize certain aspects of Number Corner instruction while minimizing others, and will have more of the information needed to pitch questions and prompts at levels appropriate to different students. The results of the first Number Corner Checkup will also reflect, to some extent, how effective the instruction has been for each student, and provide information that might be shared with stakeholders other than the classroom teacher (e.g., parents, administrators, paraprofessionals and resource room teachers) about each child's current proficiency with key grade level skills.

Assessment Guide

See the Grade 5 Assessment Guide for scoring and intervention suggestions.

Number Corner Checkup 1, Part 1

Completing Pages 1 & 2 — Day 17

1 Open the session by reviewing what a Number Corner Checkup is and describing how you'd like students to work on the assessment they will start today during Number Corner and complete in the next day or so.

Explain that you would like students to do the following things as they work on the Number Corner Checkup:

- Listen carefully to the instructions for the checkup.
- Work independently.
- Raise your hand if you have a question.
- Try to answer all of the problems, even those you don't fully understand.
- Explain how you solved a problem when the directions ask you to. You can use pictures, numbers, and words in your explanations.

1 Display your copy of Number Corner Checkup 1, pages 1 and 2, and give each student a copy.

- Give students a few moments to examine both sheets quietly.
- Have students write their name and date at the top on the lines provided

2 Ask students if they have any questions about the checkup. Then, remind them to work quietly and independently and have them get started.

- Place a small stack of scratch paper at each table or near each cluster of desks and let students know they can use it to help with any of the problems on the checkup.
- Let students know you can read questions aloud if it would be helpful.
- While students work independently, circulate to observe how they work and answer questions as needed.
- Ask students who finish before their classmates to double-check their work, and then read or draw quietly until everyone else is done.

SUPPORT None of the items on this assessment need to be timed. If there are students who are unable to complete the assessment, have them finish it later, perhaps during math stations or a seatwork period.

ELL If necessary, read questions aloud to ELL students and help them understand the content of the questions.

Number Corner Checkup 1, Part 2

Completing Pages 3 & 4 — Day 18

1 Let students know that they are going to do the second half of the Number Corner Checkup today.

- Have them get out their pencils in preparation for taking this part of the assessment
- Ask helpers to give each student a sheet of scratch paper, and place one or more containers of Omnifix cubes on each table or near each cluster of desks.

2 Display your copy of Number Corner Checkup 1, pages 3–4, and give each student a copy.

- Give students a few moments to examine the sheets quietly.
- Provide clarification as needed, and answer students' questions.

3 When students understand what to do, give them time to complete the second half of the assessment.

- Place a small stack of scratch paper at each table or near each cluster of desks and let students know they can use it to help with any of the problems on the checkup.
- While students work independently, circulate to observe how they work and answer questions as needed.
- Ask students who finish before their classmates to double-check their work, and then read or draw quietly until everyone else is done.

SUPPORT None of the items on this part of the assessment need to be timed. If there are students who are unable to complete the second part of the assessment in the given amount of time, have them do so later, perhaps during math stations or a seatwork period.

Teacher Masters

GRADE 5 – OCTOBER

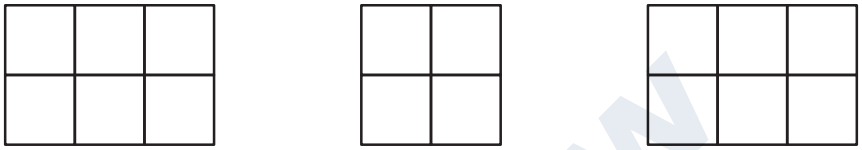
NUMBER® CORNER

Introducing October Calendar Markers

Have you ever used a set of plans to build a model house, castle, or spaceship? If you have, you know what it's like to use a two-dimensional (flat) picture to build a three-dimensional structure.

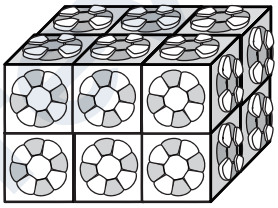
Or perhaps you've drawn plans for something you wanted to build. If you have, you know what it's like to draw a 2-D picture of something that's 3-D.

1 Whether you're drawing plans or building something from a set of plans, you need to either show or see the structure from several different views. Here's an example. Use the three views below to build a structure with your cubes.

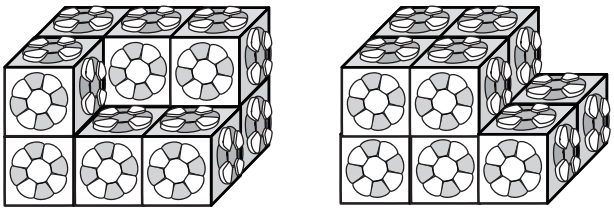


front view | right side view | top view

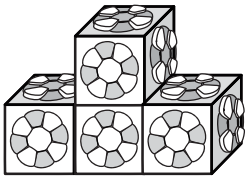
2 Perhaps your finished structure looks like this, but there are other possibilities. Can you find one?



3 Use your cubes to find out whether either of these two buildings match the views above.



4 Now build this structure with your cubes and then sketch the front, right side, and top views.



front view	right side view	top view

Introducing Grouping Symbols

1 Solve the equation below. You can do the operations in any order you want.

$$8 + 3 \times 3 - 1 = \_\_\_\_\_$$

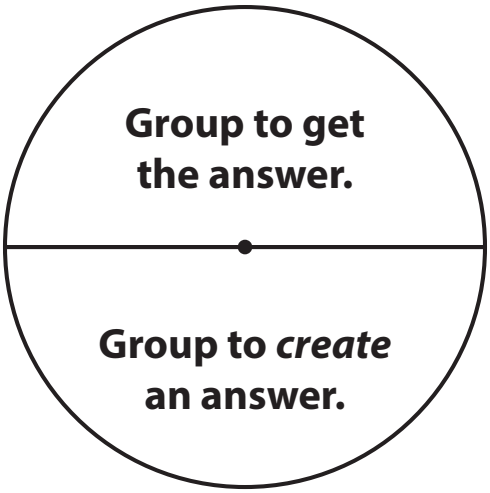
2 Mr. Delaney gave his fifth graders an equation to solve. The kids got four different answers, and Mr. Delaney said they were all correct.

a Place parentheses where they need to be in each equation to make it work.

b Do the operations in the order you've shown to prove that your solutions work.

$10 \times 5 + 2 \div 2 = 26$	$10 \times 5 + 2 \div 2 = 51$
$10 \times 5 + 2 \div 2 = 35$	$10 \times 5 + 2 \div 2 = 60$

Group It!



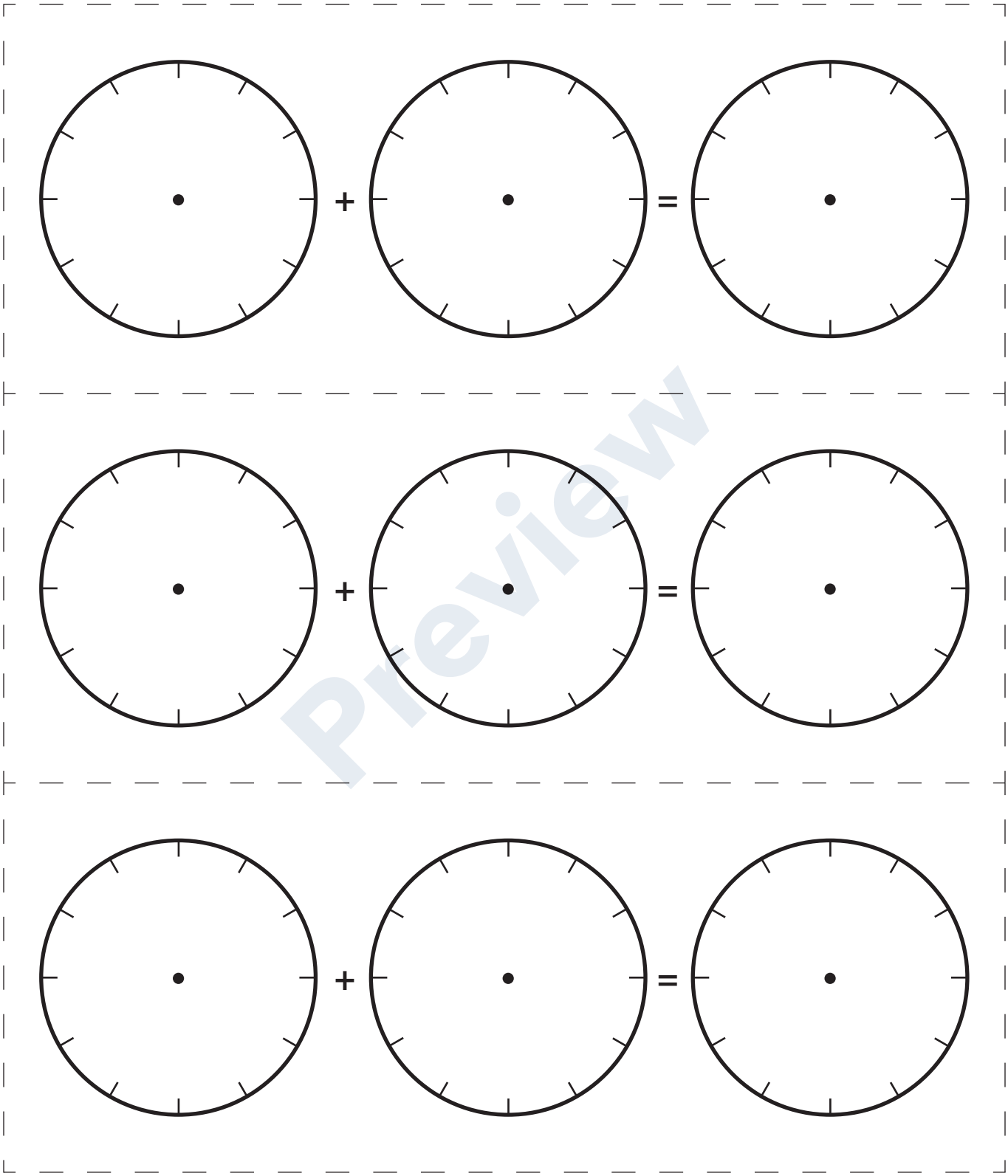
Red Team: _____ Blue Team: _____

Get the Answer	Create an Answer
$24 + 8 \div 4 - 6 + 14 = 8$	$12 \div 4 + 2 \times 5 =$ _____
$16 \times \frac{1}{4} + 5 \times 7 = 63$	$25 \times \frac{2}{5} + \frac{3}{5} \times 15 - 2 =$ _____
$2 + 5 \times 6 \times \frac{1}{3} + 6 = 56$	$3 \times 4 + 10 \div 2 =$ _____
$7 + 8 - 6 \times 9 = 81$	$14 - 6 \div 2 \times 10 =$ _____

Red Team Total Score: _____ Blue Team Total Score: _____

NAME | **DATE**

Clock Face Strips



NAME | **DATE**

Number Corner Checkup 1 page 1 of 4

1 For the three equations below:

- Use parentheses to make each equation true.
- Then do the operations in the order you've shown to prove that you have placed the grouping symbols correctly. Show your work.

a $10 + 3 \times 4 \div 2 = 26$

b $10 + 3 \times 4 \div 2 = 11$

c $10 + 3 \times 4 \div 2 = 16$

2 What is the volume of a rectangular prism that has a base with area 32 cm^2 and height of 6 cm? Show your work, and label the answer with the correct units.

3 What is the volume of a rectangular prism that measures 8 meters by 4 meters by 5 meters? Show your work, and label the answer with the correct units.

(continued on next page)

NAME | **DATE**

Number Corner Checkup 1 page 2 of 4

4 Marco's homework has ketchup spilled on it!
What number should be where the spot is? _____

$96 = 4 \times 6 \times$ 

5 Fill in the blanks in the equations below.

a $5 \times (4 \times 4) = 5 \times ($ _____ $\times 2)$

b $(3 \times 4) \times 6 = 18 \times$ _____

c $(2 \times 3) \times$ _____ $= (4 \times 3) \times 6$

d $246 - 19 =$ _____ $- 20$

e $98 + 57 = 100 +$ _____

f $8.1 - 4.3 =$ _____ $- 4.0$

6 List the factors for each number below. Write P next to numbers that are prime and C next to numbers that are composite.

a 39:

b 45:

c 71:

7 List all of the factors that 24 and 48 have in common.

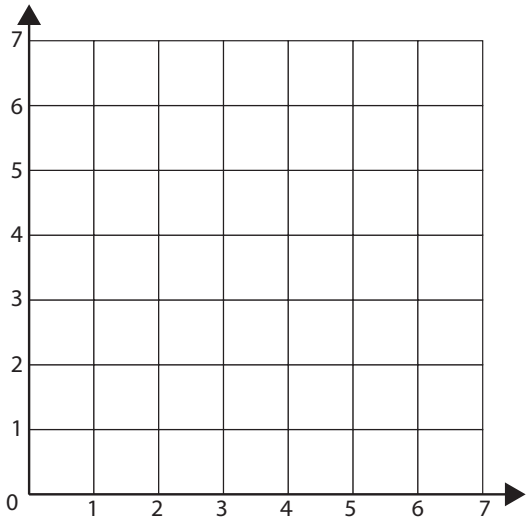
8 What are two multiples that 8 and 5 have in common?

(continued on next page)

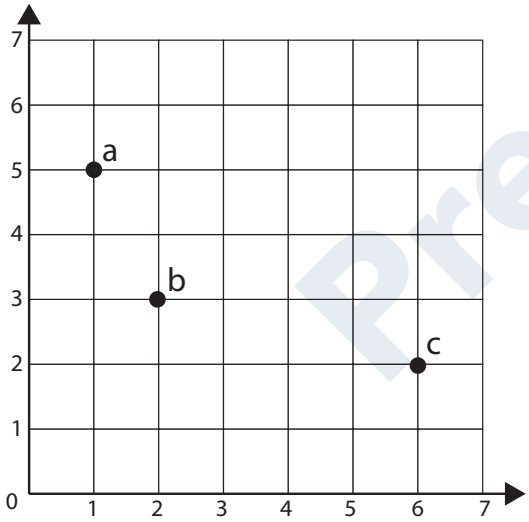
NAME | **DATE**

Number Corner Checkup 1 page 3 of 4

9 Plot and label the points (2,5) (4,1) (1,3) on the first quadrant of this coordinate plane.



10 What are the coordinates of the points marked on this coordinate grid?



a (___, ___)

b (___, ___)

c (___, ___)

11 Find the sums.

a $\frac{25}{100} + \frac{2}{4} =$ ____

b $\frac{1}{10} + \frac{1}{20} =$ ____

c $\frac{1}{2} + \frac{1}{4} =$ ____

d $\frac{1}{6} + \frac{1}{3} =$ ____

e $\frac{1}{4} + \frac{1}{12} =$ ____

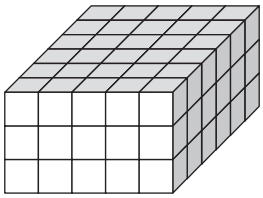
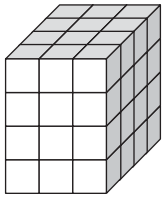
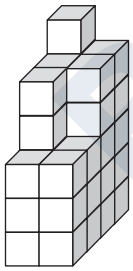
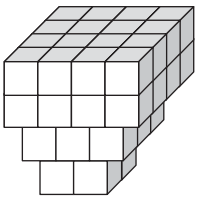
f $\frac{5}{6} + \frac{1}{3} =$ ____

(continued on next page)

NAME | **DATE**

Number Corner Checkup 1 page 4 of 4

12 What is the volume of each figure? Show your work and label your answer with the correct units.

Figure	Volume
a 	
b 	
c 	
d 	

Student Book

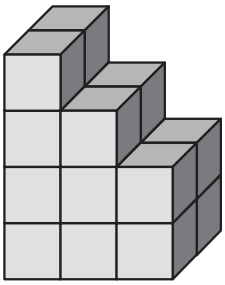
GRADE 5 – OCTOBER

NUMBER® CORNER

NAME | DATE

Thinking About Volume page 1 of 2

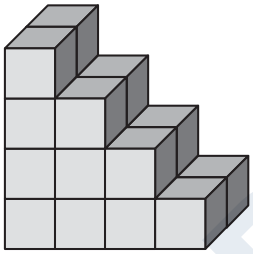
One measure of a three-dimensional figure is its volume. The volume of a solid figure is the number of cubes of a given size it takes to build that figure. Volume is measured in cubic units, or cubes.



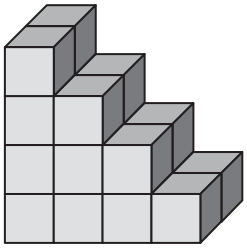
1 Build this figure and then find its volume. Label the volume as *cubic units*.

2 One way you can find the volume of a figure is to count the cubes one by one. A more efficient way to find the volume of a figure is to look for groups of cubes that can be added together. Find two different ways (that don't involve counting the cubes one by one) to determine the volume of the buildings in each pair below. Use loops or arrows to show your groups and write an equation to represent your work. Be sure to label each total as *cubic units*.

a

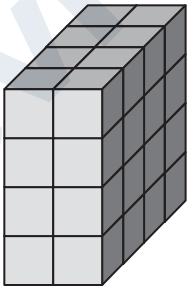


equation

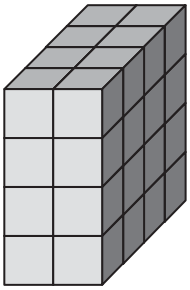


equation

b

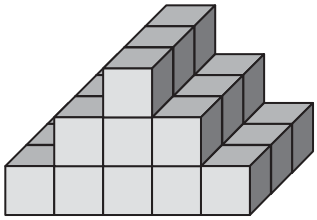


equation

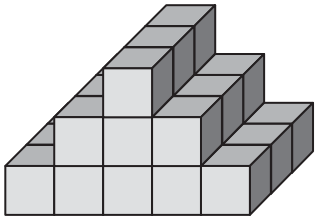


equation

c



equation



equation

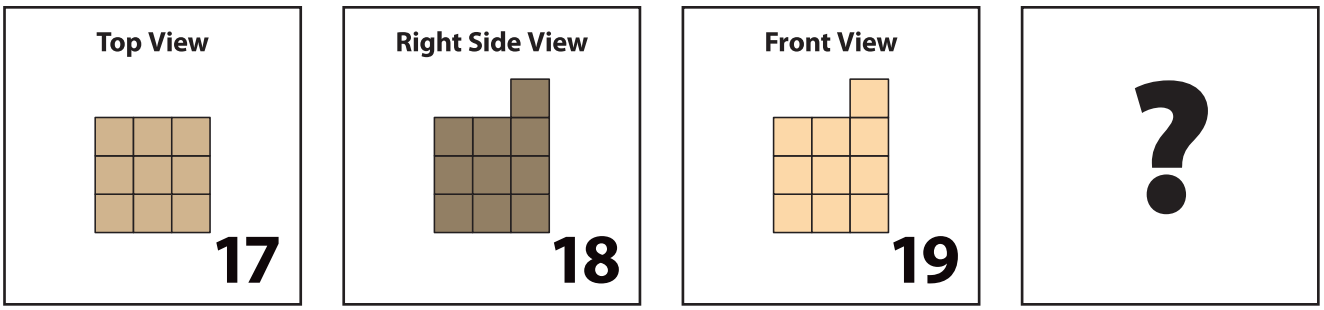
NAME | DATE

Thinking About Volume page 2 of 2

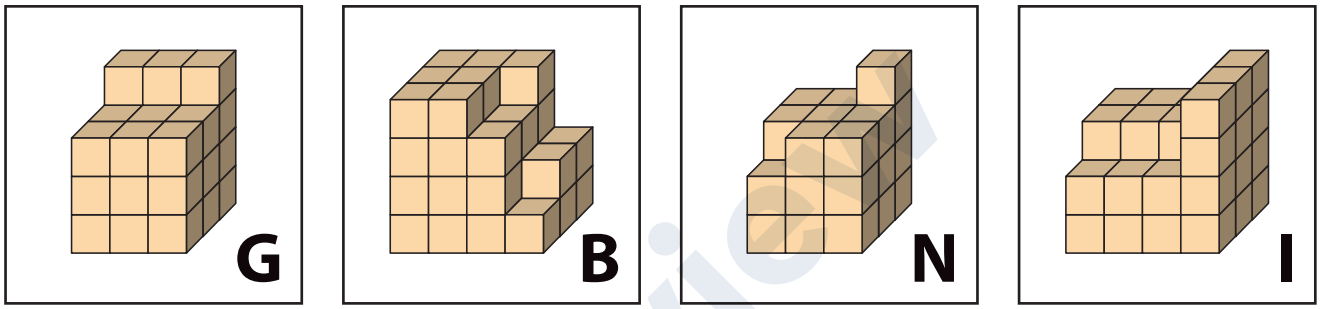
3 Gabby and her little sister, Elena, were making cube buildings. One of the buildings Gabby made had a 3×4 base and was 2 layers tall. Elena added a tower on top of Gabby's building that had a 2×2 base and was 3 layers tall. What was the volume of the sisters' building? Show all your work.

NAME | DATE

Views & Volume page 1 of 2



1 Circle the marker that should come next in the sequence above.



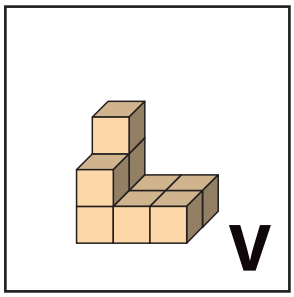
2 How did you figure it out? Use labeled sketches, words, or numbers to explain. (You can use your cubes to help if you want.)

NAME | DATE

Views & Volume page 2 of 2

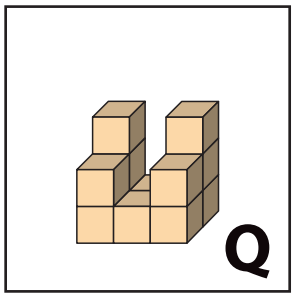
3 Find the volume of each solid figure shown below, using a method other than counting the cubes one by one. For each figure, use loops and an equation to show your method. Don't forget to label your answers as cubic units.

a



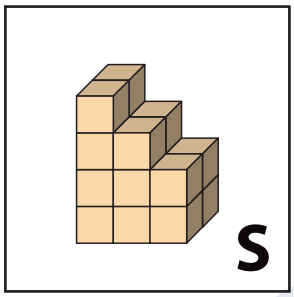
volume: _____

b



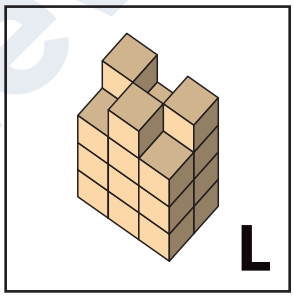
volume: _____

c



volume: _____

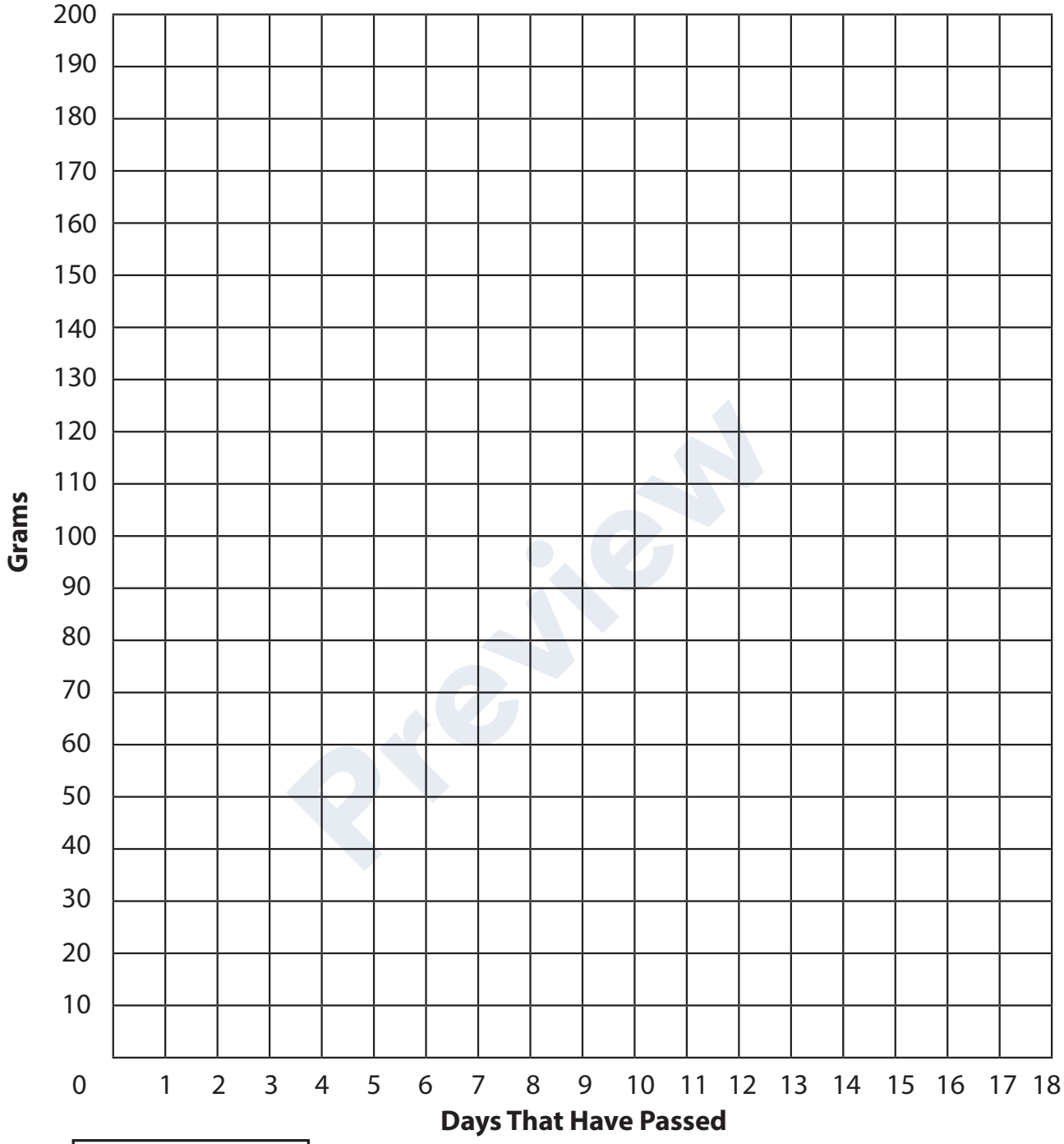
d



volume: _____

NAME | DATE

Carrot Masses Double Line Graph

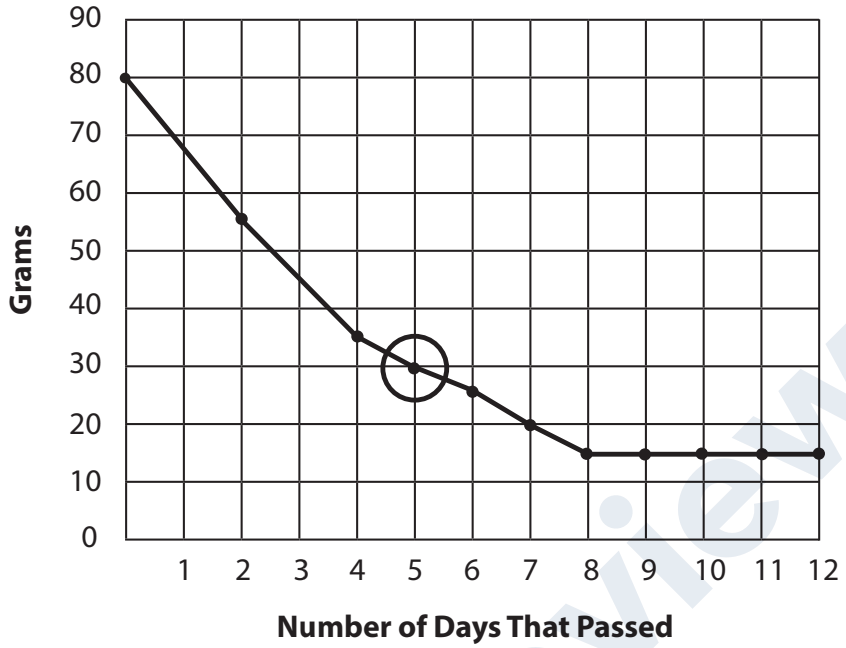


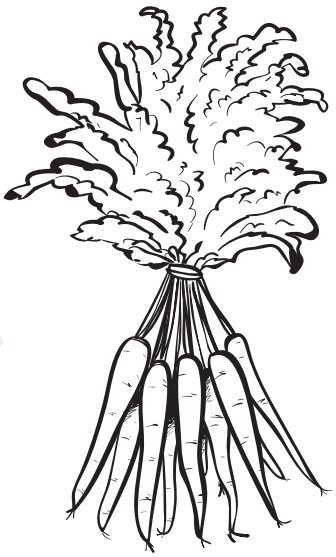
Color Key
☐ Carrot 1
☐ Carrot 2

NAME | DATE

Another Carrot Experiment page 1 of 2

Mrs. Ozuna's class left a carrot sitting out for 12 days. The students measured its mass nearly every day and made a line graph to show what happened. Use the graph to answer the questions.





1 What was the carrot's mass when the experiment started (Day 0)?

2 How much mass did the carrot lose in the first 2 days?

3 How many days did it take until the carrot stopped losing any mass at all?

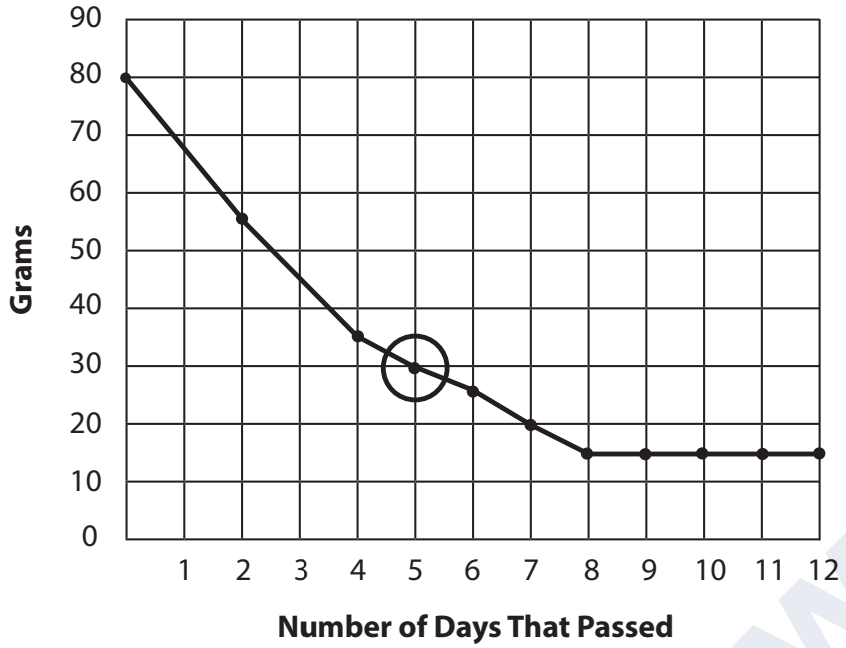
4 On which day was the mass of the carrot 35 grams?

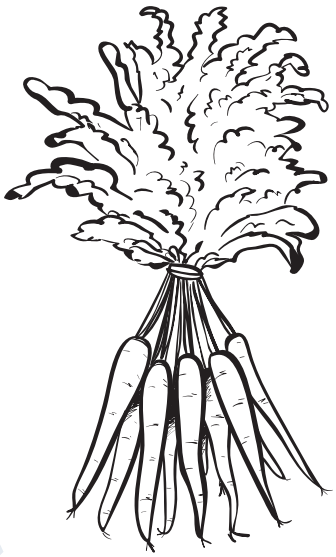
5 How much more mass did the carrot lose during the first four days (Days 0–4) than during the four days after that (Days 4–8)?

6 What is the meaning of the circled point on the graph? Use carrots, ounces, and days in your answer.

NAME | DATE

Another Carrot Experiment page 2 of 2





7 The class left a second carrot sitting out for 12 days. Here's the data they collected. Enter it on the graph above.

Day	Mass	Day	Mass	Day	Mass
Starting Weight	90 grams	Day 6	52 grams	Day 10	40 grams
Day 2	75 grams	Day 7	50 grams	Day 11	40 grams
Day 4	60 grams	Day 8	45 grams	Day 12	40 grams
Day 5	53 grams	Day 9	40 grams		

8 Write at least four sentences about how this carrot experiment was similar to and different from your own class's carrot experiment.

NAME | DATE

Grouping Symbols

1 Use the information from the teacher master on display to help answer questions a and b below.

a List at least three of the different answers you and your classmates found for $8 + 3 \times 3 - 1$.

b For each different answer, write $8 + 3 \times 3 - 1$ with parentheses to show how you got that answer.

2 Mr. Delaney gave his fifth graders an equation to solve. The kids got four different answers, and Mr. Delaney said they were all correct.

a Place parentheses where they need to be in each equation to make it true.

b Do the operations in the order you've shown to prove that your solutions work.

$10 \times 5 + 2 \div 2 = 26$	$10 \times 5 + 2 \div 2 = 51$
$10 \times 5 + 2 \div 2 = 35$	$10 \times 5 + 2 \div 2 = 60$

NAME | DATE

Group It! Instructions & Record Sheet

1 Decide who will be the Red Team and who will be the Blue, and record your names.

2 On your turn, spin the spinner to find out if you have to use grouping symbols to get the answer, or to create the answer.

3 After you spin, circle one of the equations in the correct column with your team's color. Then use parentheses to find the answer given or make the highest answer possible.

Do the operations in the order you've shown to prove that your solutions work.

4 Take turns until each team has had 3 turns. Then add up your answers to get your total score. The team with the higher score wins the game.

If you spin and all the equations in the designated column have been used, you have to choose one of the equations in the other column.

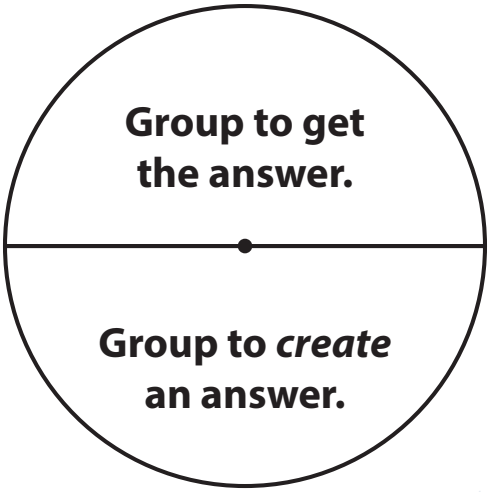
Red Team: _____ Blue Team: _____

Get the Answer	Create an Answer
$24 + 8 \div 4 - 6 + 14 = 8$	$12 \div 4 + 2 \times 5 =$ _____
$16 \times \frac{1}{4} + 5 \times 7 = 63$	$25 \times \frac{2}{5} + \frac{3}{5} \times 15 - 2 =$ _____
$2 + 5 \times 6 \times \frac{1}{3} + 6 = 56$	$3 \times 4 + 10 \div 2 =$ _____
$7 + 8 - 6 \times 9 = 81$	$14 - 6 \div 2 \times 10 =$ _____

Red Team Total Score: _____ Blue Team Total Score: _____

NAME | DATE

Partner Group It!



Red Team: _____ Blue Team: _____

Get the Answer	Create an Answer
$48 \div 4 - 3 + 1 \times 5 = 40$	$7 \times 6 - 9 + \frac{1}{3} \times 15 \div 2 =$ _____
$13 - 6 \div 2 + 1 = 11$	$36 \div 4 + 2 \times 7 =$ _____
$15 \div 3 + 2 \times 5 - \frac{1}{2} = 14\frac{1}{2}$	$\frac{1}{2} \times 60 + 15 \div 3 =$ _____
$8 \times 8 - 6 \times 6 = 96$	$6 \times 3 + 7 - 1 \times 4 =$ _____
$\frac{1}{3} \times 60 + 15 \div 3 = 25$	$20 \times \frac{1}{4} + \frac{3}{4} + 6 =$ _____

Red Team Total Score: _____ Blue Team Total Score: _____

NAME | DATE

Using Parentheses to Make Groups

1 Solve each equation. Remember to do the operations in the innermost set of parentheses first, then work your way out, evaluating each group of parentheses until you have evaluated the full expression. Show your work.

a $463 - (180 \div (3 \times (3 + 3))) =$ _____

b $((249 - 222) \div 3) \times 12 =$ _____

c $((36 + 14) \times (182 - 164)) \div 10 =$ _____

2 Insert parentheses to create the *largest* answer possible, and record your answer. Do the operations in the order you've shown to prove that your solutions work.

a $16 \times 2 + 7 \times 5 =$ _____

b $4 + 2 \times 5 - 12 \div 6 =$ _____

c $65 + 18 \div 2 + \frac{1}{2} \times 10 =$ _____

3 Insert parentheses to make each equation true. Do the operations in the order you've shown to prove that your solutions work.

a $3 \times 9 + 18 + 36 \div 9 = 33$

b $140 \div 2 + 12 - 4 \times 2 = 2$

NAME | DATE

So Many Possibilities page 1 of 2

Use the blank space to solve each problem. Show all your work including numbers, words, or labeled sketches. Write a complete sentence below your work to show the answer.

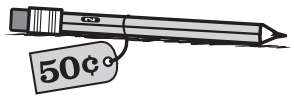
1 Mr. Mugwump is planning a party and he's going to serve ice-cream sundaes to his friends. He has 3 different flavors of ice cream: vanilla, chocolate, and strawberry. He has three different toppings: jelly beans, nuts, and berries. If you get to choose 1 flavor of ice cream and 1 topping for a sundae, how many different sundaes can be made? List all the possibilities. (One of them is vanilla and jelly beans. What are the rest?)

 vanilla ice cream	 strawberry ice cream	 chocolate ice cream
 jelly beans	 nuts	 berries

NAME | DATE

So Many Possibilities page 2 of 2

2 Maggie is buying party favors for her birthday party. She has $5.00 to spend. She can buy pencils for $.50 each, rubber balls for $1.00 each, and yo-yos for $1.50 each. How many different combinations of these party favors can she buy with her $5.00? Show your work. Use a separate sheet of paper if necessary.



pencil

rubber ball

yo-yo

3 Dana went to the Dollar Store with a few coins in her pocket, including pennies, nickels, dimes, and quarters. She knew that she could pay for any item from 1¢ up to $1.00 without getting any change back. If something cost 7¢ or 18¢ or 23¢ or 89¢ or any other price up through exactly $1.00, she could use her coins to pay for it exactly. How many coins did Dana have in her pocket and what were they? (Find the fewest number of coins possible.)

NAME | DATE

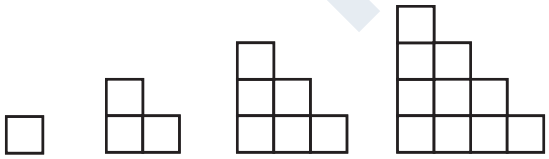
Pattern Puzzles page 1 of 2

Use the blank space to solve each problem. Show all your work including numbers, words, or labeled sketches. Write a complete sentence below your work to show the answer.

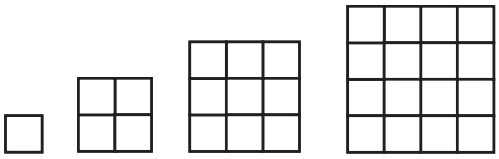
1 How many different ways are there to make 20¢ with pennies, nickels, and dimes?

2 What is the smallest number (greater than 1) that is both triangular and square?

1, 3, 6, and 10 are called triangular numbers because they can be arranged like this:



1, 4, 9, and 16 are called square numbers because they can be arranged like this:



NAME | DATE

Pattern Puzzles page 2 of 2

3 Mr. Mugwump invented an unusual clock. When you take it out of the box and press the start button, it chimes once after the first minute has passed. It chimes again after 2 more minutes have passed. It chimes again after another 4 minutes have passed, then again after another 8 minutes have passed, then again after another 16 minutes have passed, and so on. How many times will this clock have chimed when 30 days have passed?