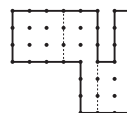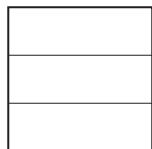# Equal Shares and Whole Number Operations

In Unit 9 children partition shapes into same-size parts, or equal shares. They practice using fraction vocabulary to name these equal shares and learn that equal shares do not necessarily have to be the same shape.

These equal shares are the same shape.   **These equal shares are not the same shape.**

Children also work with fractional units of length. They identify half-inches and quarter-inches on their rulers and measure objects to the nearest half-inch.

Later in the unit, children extend their work with place value to the thousands place and apply their understanding of place value to learn a new subtraction method called *expand-and-trade subtraction*. Children learn the expand-and-trade method by using expanded form to think about making trades.

Example: 45 − 27.

$$45 \rightarrow \overset{30}{\cancel{40}} + \overset{15}{\cancel{5}}$$
$$\underline{- 27} \rightarrow \underline{20 + 7}$$
$$10 + 8 = 18$$

Expand-and-trade subtraction will be reviewed in Grade 3. By the end of Grade 2, children are expected to subtract within 1,000 using any strategy or method.

In the final part of the unit, children review the values of coins and find coin combinations to pay for a variety of items using exact change. They use dimes and nickels as a context for finding multiples of 10 and 5 and also use doubling and doubles facts as a context for finding multiples of 2. These activities lay the foundation for multiplying by 2, 5, and 10 early in Grade 3.

Please keep this Family Letter for reference as your child works through Unit 9.
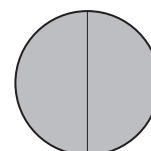
Vocabulary   Important terms in Unit 9:

one-half (1-half) A name for 1 out of 2 equal shares. The standard notation for one-half is $\frac{1}{2}$, but children do not use standard notations in Grade 2.

two-halves (2-halves) A name for the whole when it is divided into 2 equal shares. The standard notation for two-halves is $\frac{2}{2}$.
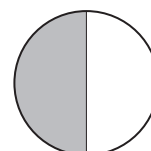
one–half   two–halves

one-fourth (1-fourth) A name for 1 out of 4 equal shares. The standard notation for one-fourth is $\frac{1}{4}$. Also called *one-quarter* or *1-quarter.*

four-fourths (4-fourths) A name for the whole when it is divided into 4 equal shares. The standard notation for four-fourths is $\frac{4}{4}$. Also called *four-quarters* or *4-quarters.*

one–fourth
or
one–quarter

four–fourths
or
four–quarters
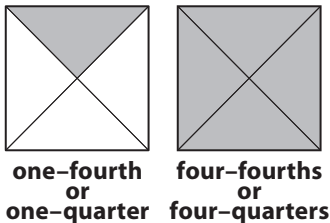
equal share Another name for equal parts. The result of dividing something into parts that are all the same size.

Home Links 9-1 and 9-2 provide more information about equal shares and the fraction language that appears in the definitions on this page.
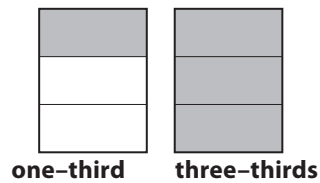
one-third (1-third) A name for 1 out of 3 equal shares. The standard notation for one-third is $\frac{1}{3}$.

three-thirds (3-thirds) A name for the whole when it is divided into 3 equal shares. The standard notation for three-thirds is $\frac{3}{3}$.

one–third   three–thirds

thousand cube In *Everyday Mathematics,* a base-10 block that measures 10 cm by 10 cm by 10 cm. A thousand cube consists of one thousand 1-centimeter cubes.
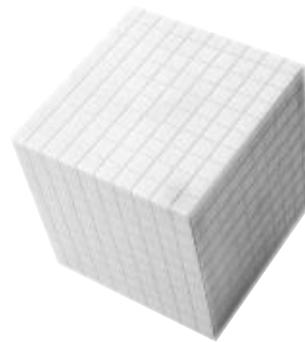
A thousand cube

expand-and-trade subtraction A subtraction algorithm in which expanded notation is used to facilitate place-value exchanges. Home Links 9-6 and 9-7 provide more information about expand-and-trade subtraction.

multiple The product of a certain number and any counting number. For example, the multiples of 2 are 2, 4, 6, 8, and so on (because those numbers are obtained by multiplying 2 by 1, 2, 3, 4, and so on, respectively). The multiples of 5 are 5, 10, 15, 20, and so on. And the multiples of 10 are 10, 20, 30, 40, and so on.

Do-Anytime Activities

To work with your child on Grade 2 concepts, try these interesting and rewarding activities:

1. Ask your child to divide food items or other objects into 2, 3, or 4 equal parts. For example, ask your child to fairly share a sandwich with a sibling or cut a piece of paper into four pieces that are the same size. Ask your child to name the parts of the object using language such as *one-half, 1-third,* or *1 out of 4 equal parts.* Then ask your child to name the whole object using language such as *whole, three-thirds,* or *4-fourths.*

2. Have your child measure the lengths of objects to the nearest inch and use the measurements to compare the objects. When your child is comfortable measuring to the nearest inch, have him or her measure the same objects to the nearest half-inch.

3. Pose subtraction problems involving 2-digit numbers and ask your child to explain his or her strategy for solving them.

4. Point to an item in a store or an ad and have your child tell you what coins and bills he or she could use to pay for the item with exact change.

Building Skills through Games

In Unit 9 your child will play the following games to practice his or her mathematical skills.

Array Concentration
Players arrange a set of *Array Concentration* Number Cards and Array Cards facedown in front of them. A player flips over one of each type of card. If the cards "match"—that is, if the number on the number card equals the total number of dots in the array—the player takes the cards and takes another turn.

Shape Capture
Players have a set of Shape Cards spread out in front of them. One at a time players draw an Attribute Card and "capture" all the shapes that have that attribute. The player who captures the most shapes wins.

Beat the Calculator
One player is the Caller, who names two 1-digit numbers. Another player is the Brain, who adds the two numbers mentally. A third player is the Calculator, who adds the numbers with a calculator. The Brain tries to find the sum faster than the Calculator.
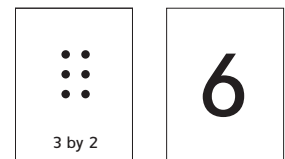
**These cards match because there are 6 dots in the array.**

Hit the Target
Players choose a 2-digit multiple of 10 (such as 10, 20, or 30) as a target number. One player chooses a starting number less than or greater than the target number, which the second player enters into a calculator. The second player tries to change it to the target number by adding or subtracting on the calculator.

As You Help Your Child with Homework

When your child brings home assignments, you may want to go over the instructions together, clarifying them. The answers listed below will guide you through the Unit 9 Home Links.

Home Link 9-1
1. one-half; 1-half; 1 out of 2 equal parts; 2-halves; two-halves; 2 out of 2 equal parts
2. 1 out of 4 equal parts; 1-fourth; one-quarter; whole; four-fourths; 4 out of 4 equal parts
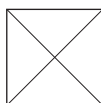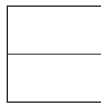
Home Link 9-2
1. Sample answer: 1 out of 2 equal parts; 2 out of 2 equal parts
2. Sample answer: 1-third; three-thirds

Home Link 9-3

1. Sample answer:

2. Sample answer: Cut the rectangle out and fold it along the lines to see if the parts are the same size.
3. Sample answers: 1-fourth; one-quarter
4. Sample answers: four out of four equal shares; 4-fourths
5. 107   **6.** 47   **7.** 82

Home Link 9-4

1. About 2 inches
2. Possible answers: 3 and one-half; 3 and 1-half
3. About 2 inches   **4.–7.** Answers vary.

Home Link 9-5

1. 329   **2.** 183
3. Three hundred twenty-nine; one hundred eighty-three
4. $400 + 90 + 1$ $400 + 70 + 1$ $491 > 471$
5. $<$ **6.** $>$ **7.** 158   **8.** 26   **9.** 102

Home Link 9-6

1. Sample estimates: $50 - 30 = 20$; $60 - 35 = 25$
   Sample sketch:

 Answer: 19

2. Sample estimate: $60 - 30 = 30$
   Sample sketch:

 Answer: 36

Home Link 9-7

1. Sample estimate: $60 - 40 = 20$

   $$\begin{array}{c|c} 40 & 15 \\ \cancel{50} & \cancel{5} \\ -\ 30 & 7 \\ \hline 10 & 8 \end{array} \quad 10 + 8 = 18$$

2. Sample estimate: $80 - 30 = 50$

   $$\begin{array}{c|c} 70 & 11 \\ \cancel{80} & \cancel{1} \\ -\ 20 & 8 \\ \hline 50 & 3 \end{array} \quad 50 + 3 = 53$$

Home Link 9-8

1. Possible answers: 10¢ or $0.10; 50¢ or $0.50; 100¢ or $1.00; 250¢ or $2.50
2. Answers vary.

Home Link 9-9

1–2. Sample explanations given.
1. No. 59¢ is almost 60¢, and 49¢ is almost 50¢. 60¢ + 50¢ is more than $1.
2. No. $30 + 10 = 40$ and 2 and 8 make another 10, so the total for the radio and headphones is $50. I couldn't buy the calculator, too.
3. 38   **4.** 91   **5.** 25

Home Link 9-10

1. 14 fingers; $7 + 7 = 14$
2. 4 shells; $4 + 4 = 8$
3. 58   **4.** 130   **5.** 25

Home Link 9-11

1. 10 cents, 10, 10; 30 cents, 30, 30
2. 40 cents, 40, 40; 70 cents, 70, 70
3. 80 cents, 80, 80; 40 cents, 40, 40
4. 140   **5.** 43   **6.** 175

End-of-Year: Family Letter:

Congratulations!

By completing *Second Grade Everyday Mathematics,* your child has accomplished a great deal. Thank you for your support!

This Family Letter is provided as a resource for you to use throughout your child's vacation. It includes an extended list of Do-Anytime Activities, directions for games that can be played at home, and a sneak preview of what your child will be learning in *Third Grade Everyday Mathematics.* Enjoy your vacation!

Do-Anytime Activities

Mathematics concepts are more meaningful and easier to understand when they are rooted in real-life situations. To help your child review some of the concepts he or she has learned in second grade, we suggest the following activities for you and your child to do together over vacation. Doing so will help your child maintain and build on the skills learned this year and help prepare him or her for *Third Grade Everyday Mathematics.*

1. Pose addition and subtraction number stories about everyday life. For example, ask your child to count the number of grapes he or she has and then ask: *How many will you have if you eat 6 of them? How many will you have if you eat 2 of them and then I eat 3 more?* Here's another example: *If you have 1 quarter, 3 dimes, and 2 nickels, how many cents do you have?*

2. Review and practice addition and subtraction facts. Your child can use Fact Triangle cards to practice or play *Addition Top-It* or *Subtraction Top-It* as described on the second page of this letter.

3. Select everyday objects and have your child estimate their lengths and then measure to check the estimates. Your child could also measure objects to determine how much longer one thing is compared with another.

4. Ask your child to tell you the time to the nearest 5 minutes. Encourage your child to specify whether it is A.M. or P.M.

5. Encourage your child to identify and describe geometric shapes that can be seen in the world. For example: *I see rectangles in that bookcase. They all have 4 right angles.* You can also play *I Spy* to practice identifying and describing shapes. For example: *I spy a shape with 5 sides. All of the sides are the same length.*

6. Ask your child to share food items or other objects fairly with 1, 2, or 3 other people by dividing them into equal shares.

7. Count on or back by 10s and 100s from any given number.

Building Skills Through Games

This section describes games that can be played at home. The number cards used in some games can be made from 3"-by-5" index cards or from a regular playing-card deck. (Use jacks for zeros and write the numbers 11 through 20 on the four queens, four kings, and two jokers.)

Addition Top-It

Materials   4 cards for each of the numbers 0–10
Players   2 or more
Skill   Adding two numbers
Object of the game   To have the most cards

Directions

Shuffle the cards and place them facedown in a pile. Each player turns up a pair of cards from the deck and says the sum of the numbers. The player with the greater sum takes all the cards from that round. Players continue turning up cards and saying the sums until there are no more cards left in the draw pile. The player with the most cards at the end of the game wins.

Variation: *Subtraction Top-It*

Add cards for the numbers 11–20 to the *Addition Top-It* deck. Each player turns up a pair of cards from the deck and says the difference between the two numbers. The player with the greater difference takes all the cards from that round.

Salute!

Materials   4 cards for each of the numbers 0–10
Players   3
Skill   Finding missing addends
Object of the game   To have the most cards

Directions

Shuffle the cards and place them facedown in a pile. One person is the Dealer and gives the two Players one card each. Without looking at the numbers, the Players place the cards on their foreheads facing out, so everyone can see the numbers. The Dealer, who sees both numbers, says the sum of the two cards. The others use the sum and the number on the other card to figure out the number on their foreheads. The Player that finds his or her number first takes both cards. Players rotate roles, with someone new taking over as Dealer in each round. Play continues until everyone has been Dealer five times. The one with the most cards at the end is the winner.

Sample round:

Tom is the Dealer. He gives Raul a 5 and Cheri a 7. Tom looks at both cards and says, "The sum is 12." Raul can see Cheri's 7 and thinks, "What plus 7 is 12?" Raul says, "My number is 5." Because he figures out his number faster than Cheri figures out hers, Raul takes both cards.

Name That Number

Materials	4 cards for each of the numbers 0–10
	1 card for each of the numbers 11–20
Players	2 or 3
Skill	Adding or subtracting numbers to reach a target number
Object of the game	To have the most cards

Directions

Shuffle the cards and place them facedown in a pile. Turn the top five cards faceup and place them in a row. Turn over the next card and place it faceup by the pile. This is the target number.

Players take turns trying to name the target number by adding or subtracting the numbers on two or more of the five cards that are faceup. Cards may be used only once for each turn. When a player is unable to name the target number using the faceup cards, his or her turn is over. The target is replaced with a card drawn from the top of the deck.

When players are able to name the target number, they collect the cards they used to name it along with the target-number card. Replacement cards for the five faceup cards are drawn from the deck. The next card from the top of the deck is the new target number.

Play continues until there are not enough cards left in the deck to replace the faceup cards. The player who has collected the most cards wins.

Sample turn:

Mae's turn:

4	10	8	12	2		6
4	10	8	12	2		6
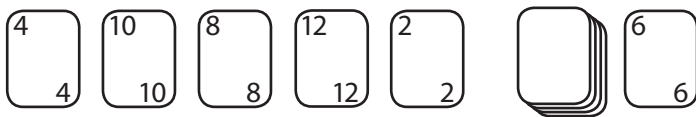
The target number is 6. Mae names it with $12 - 4 - 2$. She could also have used $4 + 2$ or $8 - 2$. Mae takes the 12, 4, 2, and 6 cards. She replaces them by drawing cards from the deck as well as a new target number. Now it is Mike's turn.

Hit the Target

Materials   calculator
record sheet (see example below)

Target number: 30

Starting Number	Change	Result	Change	Result	Change	Result
17	+23	40	−10	30		

Players	2
Skill	Finding differences between 2-digit numbers and multiples of 10
Object of the game	To reach the target number.

Directions

Players agree on a multiple of 10 (10, 20, 30, 40, and so on) as a target number and write it on the record sheet. Player 1 names a starting number that is less than or greater than the target number and records it on the record sheet. Player 2 enters the starting number on a calculator and tries to hit the target number by adding or subtracting a number to it. Player 2 continues adding and subtracting until he or she reaches the target number, recording the change and results on the record sheet. Then players switch roles: Player 2 chooses a starting number and Player 1 tries to change the starting number to the target number by adding and subtracting on the calculator. The player who reaches the target number in fewer tries wins the round.

Sample turn:

Kylie and Aiden agree on 30 as the target number. Kylie chooses 17 as the starting number. Aiden tries to change 17 to 30 by adding 23 but gets a result of 40. He subtracts 10, hitting the target in two tries. His record sheet looks like the one shown on page 284.

Fact Power

Another way addition and subtraction facts can be practiced is by using the Addition/Subtraction Facts Table shown below. The table can also be used to keep a record of facts that have been learned. For example, your child might color the squares for the sums that he or she knows from memory.

+,−	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Looking Ahead:
Third Grade Everyday Mathematics

Next year your child will . . .

- Learn multiplication facts.

- Explore the relationship between multiplication and division.

- Write number models for addition, subtraction, multiplication, and division number stories.

- Further explore addition and subtraction of 2- and 3-digit numbers.

- Continue partitioning figures and number lines to build an understanding of fractions.

- Tell time to the nearest minute.

- Measure length to the nearest quarter inch.

- Find perimeters and areas of rectangles.

- Further explore the attributes of shapes.

Again, thank you for your support this year. Have fun continuing your child's mathematical adventures throughout the vacation.