

Dimensions Math

Grade 5 Letter Home #1

Chapter 1 Whole Numbers

Dimensions Math
Letters Home

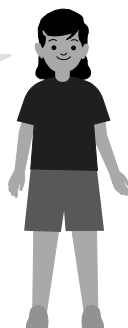
Home Connection

Welcome to Dimensions Math for Grade 5. The foundation that was established in previous years provides the stable, solid ground upon which the Grade 5 curriculum builds. This Home Connection is meant to be a window into the math classroom that will provide you with some insight into the math verbiage, language, and vocabulary used at school.

In Chapter 1, your child will work with numbers up to nine digits. The value of each digit within a number is determined by its position. For example, the value of the digit 5 in the number 149,597,871 is 500,000. The value of the digit 4 is 40 million, or 40,000,000.

Millions			Thousands			Ones		
Hundred Millions	Ten Millions	One Millions	Hundred Thousands	Ten Thousands	One Thousands	Hundreds	Tens	Ones
1	4	9	5	9	7	8	7	1

Every three places is called a **period**. We can place a comma in between each period to make large numbers easier to read.



1 4 9 , 5 9 7 , 8 7 1
↑ ↑ ↑
149 597 871
million thousand

Your child will further their understanding of place value by multiplying and dividing numbers within 1 billion by 10, 100, and 1,000.

Multiply by 10, 100, or 1,000

Hundred Thousands	Ten Thousands	One Thousands	Hundreds	Tens	Ones
			2	3	1
		2	3	1	0
	2	3	1	0	0
2	3	1	0	0	0

$\times 100$
 $\times 1,000$

$\times 10$
 $\times 10$
 $\times 10$



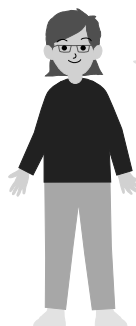
When a number is multiplied by 10, 100, or 1,000, each digit is 10, 100, or 1,000 times as much, respectively. On a place-value chart, each digit moves 1, 2, or 3 places to the left.

Divide by 10, 100, or 1,000

Hundred Thousands	Ten Thousands	One Thousands	Hundreds	Tens	Ones
2	3	1	0	0	0
	2	3	1	0	0
		2	3	1	0
			2	3	1

$\div 100$
 $\div 1,000$

$\div 10$
 $\div 10$
 $\div 10$



When a number is divided by 10, 100, or 1,000, each digit is $\frac{1}{10}$, $\frac{1}{100}$, or $\frac{1}{1,000}$ times as much, respectively. On a place-value chart, each digit moves 1, 2, or 3 places to the right.

Students will then learn to multiply and divide by multiples of 10, 100, and 1,000. To do this, they will learn to solve the problem for the leading non-zero digits first.

Multiply by Multiples of 10, 100, or 1,000

Multiply 27 by 300.

$$27 \times 300 = 27 \times 3 \times 100$$

$$\begin{array}{r} 27 \times 3 = 60 + 21 \\ \swarrow \quad \searrow \\ 20 \quad 7 \end{array}$$

$$= 81 \times 100$$

$$= 81,000$$



Multiply 400 by 800.

$$400 \times 800 = 400 \times 8 \times 100$$

We could also calculate like this:

$$400 \times 800 = 4 \times 8 \times 100 \times 100$$

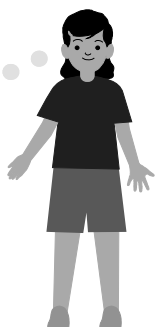
$$= 32 \times 10,000$$

$$= 320,000$$



Divide by Multiples of 10, 100, or 1,000

$$\frac{86,000}{200} = \frac{860}{2} = \frac{430}{1}$$



Divide 12,000 by 30.

$$12,000 \div 30 = 12,000 \div 10 \div 3 \\ = 400$$

$$\frac{12,000}{30}$$



Knowing how to do calculations like these will help your child estimate answers to problems involving large numbers, which they will work with the rest of the year and into Grade 6.

What can we do at home?

- Ensuring that Grade 5 math problems are accurately and successfully solved depends on the quick access of automaticity with multiplication facts 1–12. Daily practice and reinforcement are essential. You can use flash cards or digital apps and games. Your child's teacher will have some suggestions on current resources.
- Ask your child to tell you the value of each of the digits within a number. Example: What is the value of the digit 3 in the number 3,205,619? Answer: 3 million
- Ask your child to tell you what number is 10, 100, or 1,000 times greater than or less than a number. Example: What number is 100 times greater than 6,723? Answer: 672,300

Dimensions Math

Grade 5 Letter Home #2

Chapter 2 Writing and Evaluating Expressions

Dimensions Math
Letters Home

Home Connection

In Chapter 2, your child will learn how to write and evaluate expressions. An expression is a mathematical statement that uses numbers and operations to show a value (ex: $10 + 20$). An equation is a statement in which there are two or more expressions that are equal in value.

Examples of Equations

$$\begin{array}{ll} 10 + 20 = 30 & \frac{6}{2} = 3 \\ 4 \times 5 = 20 & 4 \div 3 = \frac{4}{3} = 1\frac{1}{3} \\ 6 \div 2 = 3 & 13 - 3 = 2 \times 5 \end{array}$$

Examples of Expressions

$$\begin{array}{ll} 30 & 6 \div 2 \\ 10 + 20 & \frac{2}{6} \\ 4 \times 5 & 4^2 \end{array}$$

This chapter also introduces your child to the order of operations, which is a set of conventions that explains how to evaluate expressions containing multiple operations. Students will learn the following:

$$\begin{array}{l} (50 + 70) \times 2 \\ = 120 \times 2 \\ = 240 \end{array}$$



If I don't use parentheses, and write $50 + 70 \times 2$, it will be $50 + 140$, which is not correct. Use parentheses to show what we should calculate first.

Order of operations

- Calculate the value in parentheses first.
- Multiply and/or divide, from left to right.
- Then add and/or subtract, from left to right.

$$\begin{array}{l} (50 \div 5) \times (4 + 3) - 20 = 10 \times 7 - 20 \\ = 70 - 20 \\ = 50 \end{array}$$

Multiply and/or divide, from left to right.

Finally, add and/or subtract, from left to right.

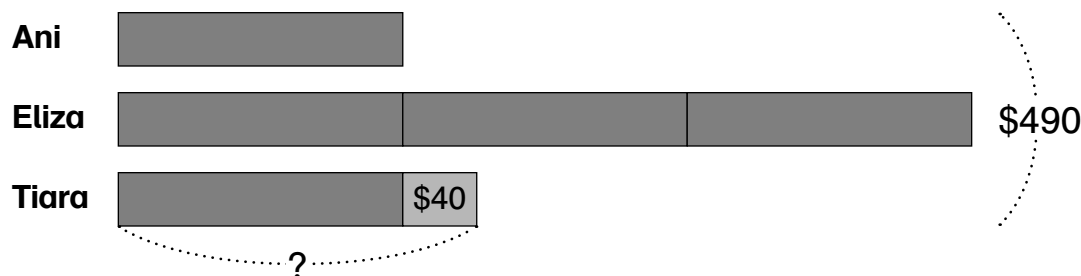
Find the value of the expression in parentheses first, using the correct order of operations.



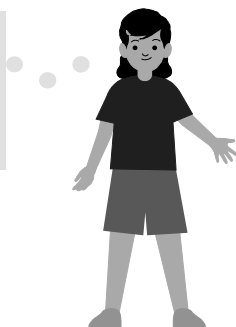
Multi-step word problems are also explored in Chapter 2. Your child will learn how to draw and interpret bar models when solving word problems. This allows students to begin solving algebraic problems before they are able to write algebraic equations.

Multi-Step Word Problems

Ani, Eliza, and Tiara have \$490 altogether. Eliza has 3 times as much money as Ani. Tiara has \$40 more than Ani. How much money does Tiara have?



$$\begin{aligned} 5 \text{ units} &\longrightarrow 490 - 40 \\ 1 \text{ unit} &\longrightarrow (490 - 40) \div 5 = 450 \div 5 = 90 \\ 90 + 40 &= 130 \end{aligned}$$



Tiara has \$130.

What can we do at home?

- Following the order of operations outlined above will help your child succeed as they learn these new concepts.
- You may remember learning “PEMDAS” when you were in school. The conventions used in the order of operations have not changed, however, PEMDAS is a bit of a misconception. The acronym implies that multiplication comes before division, and that addition comes before subtraction. Remember that they are equal in importance, and to just solve from left to right. This is the key to helping your child at home in Chapter 2.

Home Connection

In Chapter 3, all the work your child has done with multiplication, division, mental math, and estimation comes together as they learn how to multiply up to a five-digit number by a two-digit number, and how to divide up to a four-digit number by a two-digit number.

Multiplying Larger Numbers

In Dimensions Math 4A, your child learned to multiply a three-digit number by a two-digit number. As students move into multiplying greater numbers, it can be helpful to estimate the product before completing the calculation.



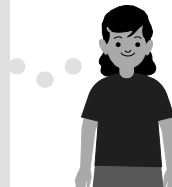
Round to close numbers that are easy to calculate. Sometimes we can get a better estimate by rounding one number down and the other number up. If the calculation is easy, we might round only one number.

Estimates for $8,416 \times 23$ might be:



$$\begin{array}{r} 8,416 \times 23 \\ \downarrow \quad \downarrow \\ 8,000 \times 20 = 160,000 \end{array}$$

$$\begin{array}{r} 8,416 \times 23 \\ \downarrow \quad \downarrow \\ 8,000 \times 25 = 200,000 \end{array}$$



Students are asked to think about which estimate will be closer to the actual product.

It is important to remember that when multiplying by a two-digit number, we are multiplying the digit in the ones place first, and then multiplying by the digit in the tens place, and then adding the two partial products.

$$8,416 \times 23 = (8,416 \times 3) + (8,416 \times 20)$$

The algorithm is the same as students have learned previously:

First, multiply 8,416 by 3:

$$\begin{array}{r} 8,416 \\ \times \quad 3 \\ \hline 25,248 \end{array}$$



Then, multiply 8,416 by 20.

$$\begin{array}{r} 8,416 \\ \times \quad 20 \\ \hline 168,320 \end{array}$$



Then, add the products.

$$\begin{array}{r} 8,416 \\ \times \quad 23 \\ \hline 25,248 \leftarrow 8,416 \times 3 \\ 168,320 \leftarrow 8,416 \times 20 \\ \hline 193,568 \leftarrow 8,416 \times 23 \end{array}$$

To multiply by 2 tens, we can first write a **0** in the ones place and then multiply by 2.



We can write the regrouped digits on top.

$$\begin{array}{r} 11 \\ 8,416 \\ \times \quad 23 \\ \hline \end{array}$$



Students can “check” if their answer is reasonable by comparing it to the estimate.

Since our estimate was between 160,000 and 200,000, this answer is reasonable.

Dividing by a Two-Digit Number

When dividing by a two-digit number (the divisor), estimating helps students find a starting point and check the reasonableness of their answer. For example, when solving $98 \div 31$, a good estimate would be $90 \div 30$, resulting in an estimated answer of 3. Your child can use this as a starting point and use 3 as the quotient.

$$\begin{array}{r}
 \text{divisor} \rightarrow 31 \overline{)98} \\
 \underline{93} \\
 5
 \end{array}$$

3 ← quotient
 98 ← dividend
 93 ← 31×3
 remainder → 5 ← $98 - 93$

Students can check their answer: $31 \times 3 + 5 = 98$. Later in Grade 5, students will express their remainder as a fraction.

This process continues as your child learns to work with three- and four-digit dividends.

The stable is having an awards luncheon for the riders. The cost of the luncheon is \$576. The cost will be shared equally by 16 donors. How much will each donor pay?

$$\begin{array}{r}
 3 \\
 16 \overline{)576} \\
 \underline{48} \\
 96
 \end{array}$$

48 ← $16 \times 3 \text{ tens} = 48 \text{ tens}$
 9 ← $57 \text{ tens} - 48 \text{ tens}$

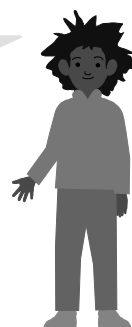
Students continue to use estimation at each step to complete the calculations.

Regroup 9 tens as 90 ones, then divide 96 ones by 16.

$$\begin{array}{r}
 36 \\
 16 \overline{)576} \\
 \underline{48} \\
 96 \\
 \underline{96} \\
 0
 \end{array}$$

96 ← $16 \times 6 \text{ ones}$
 0 ← $96 \text{ ones} - 96 \text{ ones}$

Since $100 \div 20 = 5$, I tried 5 in the ones place. It was too small, so then I tried 6.



Check: $16 \times 36 = 576$

What can we do at home?

- Using multiplication and division math vocabulary will be greatly beneficial to your child's success. Examples to use are: "multiply" and "product" rather than "times" for multiplication problems, and "dividend," "divisor," "quotient," and "remainder" for division problems.
- Using graph paper or wide-ruled notebook paper turned sideways are great ways to help your child keep numbers lined up properly in columns when calculating their answers.

Dimensions Math

Grade 5 Letter Home #4

Chapter 4 Addition and Subtraction of Fractions

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Letters Home

Home Connection

In Chapter 4, your child will learn to add and subtract fractions with unlike denominators, including mixed numbers. In Dimensions Math 4A, students learned to add fractions where one denominator is a multiple of the other denominator by finding a common denominator. For example:

$$\frac{5}{6} + \frac{2}{3}.$$

Since 6 is multiple of 3, we need only find an equivalent fraction for $\frac{2}{3}$ to add:

$$\frac{2}{3} = \frac{4}{6}$$

$$\frac{5}{6} + \frac{4}{6} = \frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}.$$

As always, answers are expected to be given in simplest form.

In this chapter, students build on their prior knowledge to add and subtract unlike fractions. Unlike denominators are fractions where one denominator is not a multiple of the other, such as $\frac{1}{3}$ and $\frac{1}{5}$.

Students will begin this chapter by reviewing how to convert between improper fractions and mixed numbers and extending that knowledge to expressing remainders as a fractional amount.

Example: $38 \div 3$

$$\begin{array}{r} 12 \\ 3 \overline{) 38} \\ \underline{3} \\ 8 \\ \underline{6} \\ 2 \end{array}$$

$$2 \text{ ones} \div 3 = \frac{2}{3}$$

We can divide the remainder and express the result as a fraction.

$$2 \div 3 = \frac{2}{3}$$

$$12 + \frac{2}{3} = 12\frac{2}{3}$$



This will help them add and subtract mixed numbers.

Adding and Subtracting Fractions

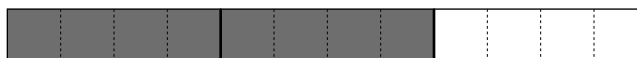
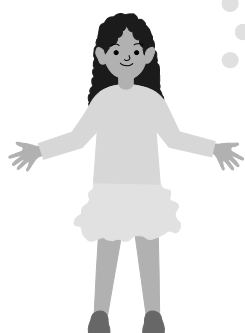
Your child can find a common denominator to add or subtract a fraction by multiplying the denominators together or by choosing the lowest multiple that both denominators share.

Addition example: $\frac{2}{3} + \frac{1}{4}$

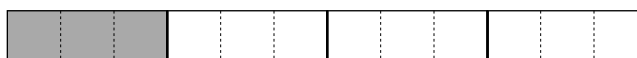
3, 6, 9, 12...

4, 8, 12...

12 is a common multiple
of both denominators.



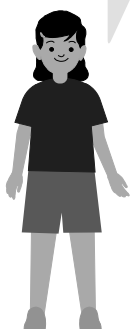
$$\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$



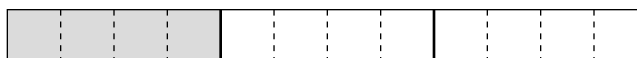
$$\frac{1 \times 3}{4 \times 3} = \frac{3}{12}$$

Subtraction example: $\frac{3}{4} - \frac{1}{3}$

12 is a common multiple of 3 and 4.



$$\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$



$$\frac{1 \times 4}{3 \times 4} = \frac{4}{12}$$

$$\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$$

Adding and Subtracting Mixed Numbers

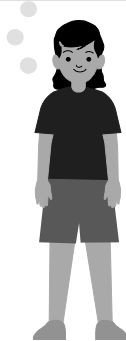
Your child will next learn multiple methods to add and subtract mixed numbers. Some of these methods might not be familiar to adults, but your child may find them easier to use!

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

Add the whole numbers first,
then the fractional part:

$$\begin{aligned} 1\frac{1}{2} + 1\frac{2}{3} &= 2\frac{1}{2} + \frac{2}{3} \\ &= 2\frac{3}{6} + \frac{4}{6} \\ &= 2\frac{7}{6} \\ &= 3\frac{1}{6} \end{aligned}$$

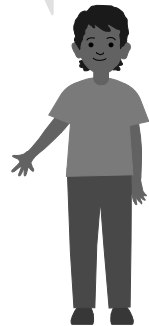
$$1\frac{3}{6} \xrightarrow{+1} 2\frac{3}{6} \xrightarrow{+\frac{4}{6}} ?$$



Add the whole numbers together and the
fractional parts together, separately:

$$\begin{aligned} 1\frac{1}{2} + 1\frac{2}{3} &= 1 + \frac{1}{2} + 1 + \frac{2}{3} \\ &= (1 + 1) + (\frac{3}{6} + \frac{4}{6}) \\ &= 2 + \frac{7}{6} \\ &= 2 + 1 + \frac{1}{6} \\ &= 3\frac{1}{6} \end{aligned}$$

I added the whole
number and fraction
parts separately.



Convert both mixed numbers to improper fractions:

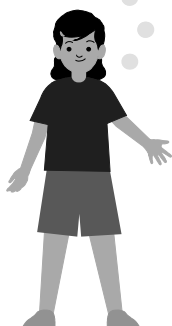
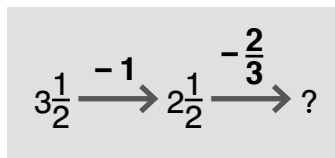
$$\begin{aligned} 1\frac{1}{2} + 1\frac{2}{3} &= \frac{3}{2} + \frac{5}{3} \\ &= \frac{9}{6} + \frac{10}{6} \\ &= \frac{19}{6} \\ &= 3\frac{1}{6} \end{aligned}$$

Similar strategies are used when subtracting mixed numbers.

$$3\frac{1}{2} - 1\frac{2}{3}$$

Subtract the whole numbers first, then regroup to subtract the fractional part:

$$\begin{aligned} 3\frac{1}{2} - 1\frac{2}{3} &= 2\frac{1}{2} - \frac{2}{3} \\ &= 2\frac{3}{6} - \frac{4}{6} \\ &= 1\frac{9}{6} - \frac{4}{6} \\ &= 1\frac{5}{6} \end{aligned}$$



Convert both mixed numbers to improper fractions:

$$\begin{aligned} 3\frac{1}{2} - 1\frac{2}{3} &= 3\frac{3}{6} - 1\frac{4}{6} \\ &= \frac{21}{6} - \frac{10}{6} \\ &= \frac{11}{6} \\ &= 1\frac{5}{6} \end{aligned}$$

Subtract the whole numbers and the fractional parts separately by regrouping:

$$\begin{aligned} 3\frac{1}{2} - 1\frac{2}{3} &= 3\frac{3}{6} - 1\frac{4}{6} \\ &\quad \begin{array}{l} \swarrow \quad \searrow \\ 2 \quad \frac{6}{6} \end{array} \\ &= 2\frac{9}{6} - 1\frac{4}{6} \\ &= 1\frac{9}{6} - \frac{4}{6} \\ &= 1\frac{5}{6} \end{aligned}$$

What can we do at home?

- Practice, practice, practice multiplication and division math facts for speedy recall of multiples.

Dimensions Math

Grade 5 Letter Home #5

Chapter 5 Multiplication of Fractions

Dimensions Math
Letters Home

Home Connection

In Chapter 5, your child will learn how to multiply a fraction by a fraction.

Your child begins by reviewing how to multiply a fraction and a whole number, which they learned in Dimensions Math 4A.

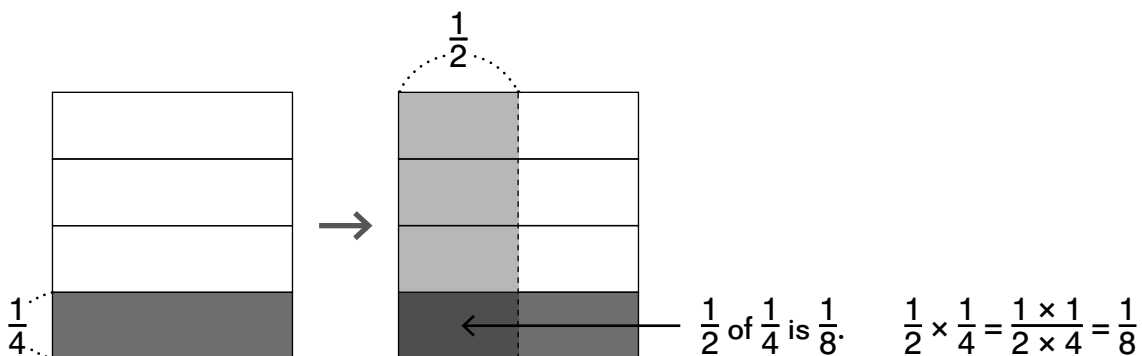
$$\begin{aligned} 6 \times \frac{2}{3} &= \frac{6 \times 2}{3} \\ &= \frac{12}{3} \\ &= 4 \end{aligned}$$

Or simplify the problem before calculating:

$$\begin{aligned} 6 \times \frac{2}{3} &= \frac{\cancel{6}^2 \times 2}{\cancel{3}_1} \\ &= 4 \end{aligned}$$

Note that students do not yet know how to multiply two fractions, so we don't show this problem as $\frac{6}{1} \times \frac{2}{3}$.

Next students will learn that when multiplying a fraction by a fraction, they simply need to multiply the numerators and then multiply the denominators.



After learning to multiply proper fractions (the numerator is less than the denominator), your child will learn how to multiply mixed numbers. To do this, the mixed number must first be converted to an improper fraction.

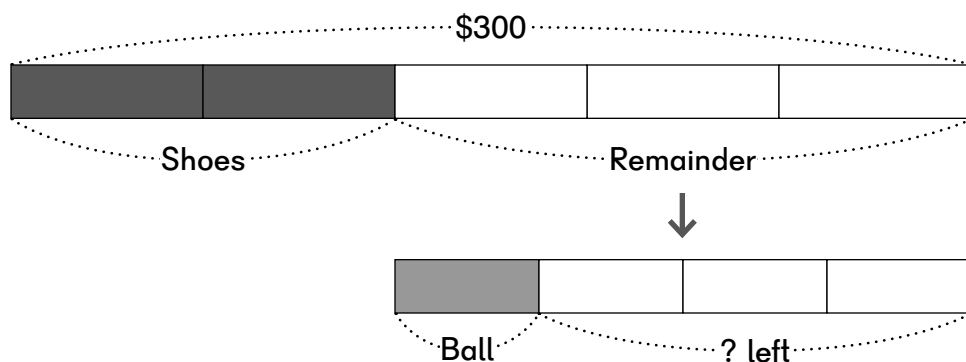
$$1\frac{1}{2} \times 1\frac{1}{3} = \frac{\cancel{3}^1}{\cancel{2}_1} \times \frac{\cancel{4}^2}{\cancel{3}_1} = 2$$



Express the mixed numbers as improper fractions.

Your child will learn to solve word problems involving the multiplication of fractions. Bar models can be helpful to solve this type of problem.

Yara had \$300. She spent $\frac{2}{5}$ of it on soccer shoes and $\frac{1}{4}$ of the remainder on a soccer ball. How much money does she have left?



From the model, students may solve the problem different ways:

5 larger units $\rightarrow$ 300

3 larger units $\rightarrow \frac{1}{5} \times 300 \times 3 = 180$

4 smaller units $\rightarrow$ 180

3 smaller units $\rightarrow \frac{1}{4} \times 180 \times 3 = 135$

Spent on shoes: $\frac{2}{5} \times 300 = 120$

Remainder: $300 - 120 = 180$

Spent on ball: $\frac{1}{4} \times 180 = 45$

Money left: $180 - 45 = 135$

Finally, in Chapter 5 your child will be introduced to reciprocals. A reciprocal is the number we multiply by to get a product of 1. For example, the reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$ because when we multiply $\frac{2}{3} \times \frac{3}{2}$, we get $\frac{6}{6}$, which is 1. This will be important to understand when students start dividing fractions in Chapter 6.

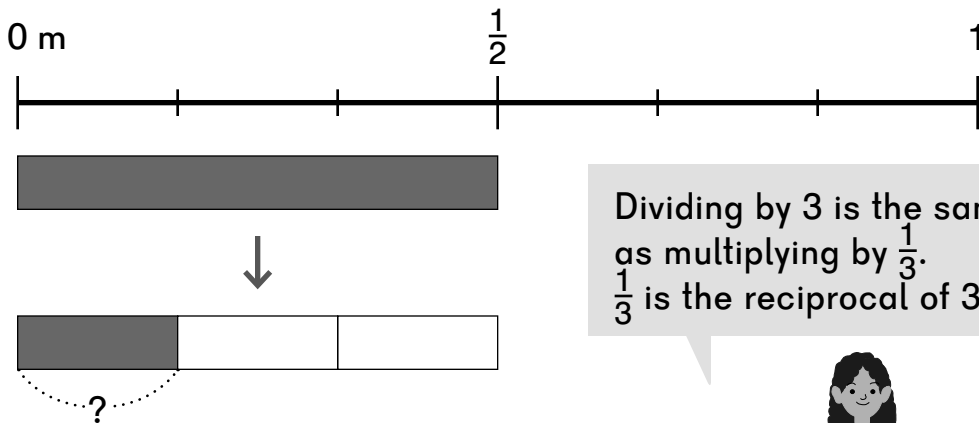
What can we do at home?

- Math games are a good way to have fun with fractions. “Greatest Product” is a game that uses a stack of number cards (1–9), which can be created with notecards. To play, each player gets 3 cards. Two of the cards become a fraction, and the third is the multiplier. The winner is determined by who can score the greatest product.
- Ask your child to tell you the reciprocal of a fraction or a mixed number to get them used to reciprocals. Keep in mind that a mixed number will have to be turned into an improper fraction first.

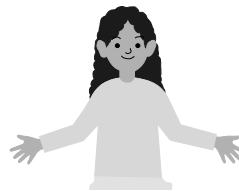
Home Connection

In Chapter 6, your child will learn how to divide a fraction by a whole number and a whole number by a fraction. Students begin by dividing a fraction by a whole number.

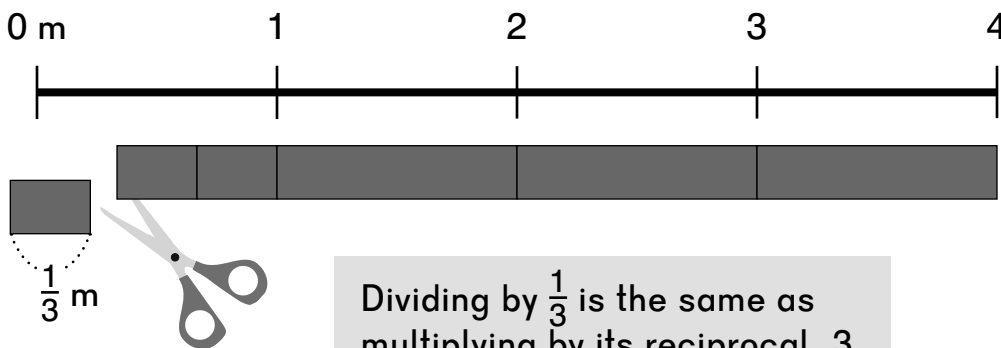
$$\frac{1}{2} \div 3$$



$$\begin{aligned}\frac{1}{2} \div 3 &= \frac{1}{3} \text{ of } \frac{1}{2} \\ &= \frac{1}{3} \times \frac{1}{2} \\ &= \frac{1}{6}\end{aligned}$$



Students will then learn how to divide a whole number by a fraction. This can be a little tricky at first. For example, we can think of $4 \div \frac{1}{3}$ as determining how many $\frac{1}{3}$ sized pieces there are in 4 wholes.



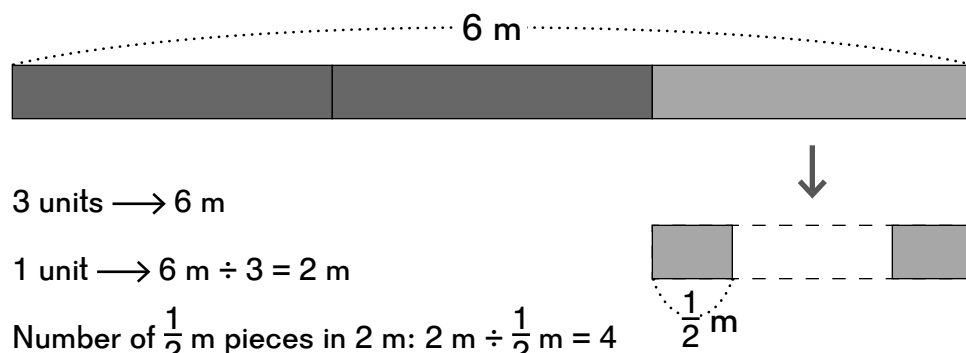
$$1 \div \frac{1}{3} = 3$$

$$\begin{aligned}4 \div \frac{1}{3} &= 4 \times 3 \\ &= 12\end{aligned}$$



Finally, your child will learn to solve multi-step word problems involving the division of a fraction and a whole number. Bar models can be helpful to solve this type of problem.

Alex had 6 m of ribbon. He used $\frac{2}{3}$ of it to wrap presents and the rest of it to make bows. He used $\frac{1}{2}$ m of ribbon for each bow. How many bows did he make?



OR

$$1 - \frac{2}{3} = \frac{1}{3}$$

$$\frac{1}{3} \times 6 \text{ m} = 2 \text{ m}$$

$$2 \text{ m} \div \frac{1}{2} \text{ m} = 4$$

By the end of Chapter 6, your child should conceptually understand why we multiply by the reciprocal when it comes to dividing fractions. In Dimensions Math 6, students will learn to divide a fraction by a fraction.

What can we do at home?

- A fun way to practice dividing fractions is playing fraction math games. One is called “Fraction 3 in a Row,” and the game is attached to this letter. You’ll need a die and something to cover the spaces with.
- “Greatest Quotient” is another fun game using 1–9 number cards (these can be made with blank notecards). Each player gets three cards. Two are used to make a fraction, and the third is the divisor. Divide the numbers and the player with the greatest quotient (answer to a division problem) gets a point. Whoever gets five points first wins.

Fraction 3 in a Row

Directions: On each turn, roll a die and choose a problem from that column. If you solve the problem correctly, cover the square with a counter. The winner is the first player to mark 3 in a row, column, or diagonal.

					
$\frac{6}{9} \div 3$	$\frac{3}{5} \div 6$	$\frac{3}{4} \div 8$	$\frac{2}{9} \div 4$	$\frac{1}{3} \div 8$	$\frac{9}{10} \div 5$
$\frac{1}{6} \div 6$	$\frac{3}{8} \div 5$	$\frac{1}{3} \div 4$	$\frac{3}{4} \div 2$	$\frac{3}{6} \div 8$	$\frac{3}{6} \div 6$
$\frac{1}{3} \div 9$	$\frac{10}{11} \div 5$	$\frac{1}{4} \div 2$	$\frac{2}{6} \div 3$	$\frac{2}{3} \div 10$	$\frac{2}{5} \div 4$
$\frac{7}{4} \div 4$	$\frac{8}{3} \div 4$	$\frac{6}{5} \div 5$	$\frac{8}{5} \div 2$	$\frac{9}{6} \div 6$	$\frac{10}{11} \div 11$

Directions: On each turn, roll a die and choose a problem from that column. If you solve the problem correctly, cover the square with a counter. The winner is the first player to mark 3 in a row, column, or diagonal.

					
$\frac{4}{3} \div 8$	$\frac{3}{5} \div 6$	$\frac{9}{10} \div 5$	$\frac{3}{4} \div 8$	$\frac{6}{9} \div 3$	$\frac{2}{9} \div 4$
$\frac{2}{3} \div 4$	$\frac{3}{4} \div 2$	$\frac{3}{6} \div 8$	$\frac{3}{6} \div 6$	$\frac{4}{6} \div 6$	$\frac{3}{8} \div 5$
$\frac{2}{3} \div 10$	$\frac{2}{5} \div 4$	$\frac{1}{4} \div 2$	$\frac{1}{3} \div 9$	$\frac{10}{11} \div 5$	$\frac{2}{6} \div 3$
$\frac{10}{11} \div 11$	$\frac{9}{6} \div 6$	$\frac{8}{3} \div 4$	$\frac{6}{5} \div 5$	$\frac{8}{5} \div 2$	$\frac{7}{4} \div 4$

Home Connection

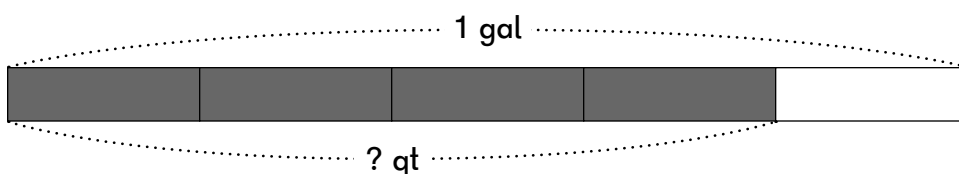
In Chapter 7, your child will review measurement conversions and learn how to find the area of rectangles and triangles. They will also learn how to find the area of figures composed of multiple rectangles as well as figures composed of rectangles and triangles. The side lengths of the rectangles will consist of fractional lengths, building on the skills that students learned in Chapter 5.

For the measurement-conversion lessons, your child will be provided with a common measurement conversion chart. This can be used as a reference when solving problems.

Customary Conversions		Metric Conversions	
1 ft 12 in	1 lb 16 oz	1 km 1,000 m	1 L 1,000 mL
1 yd 3 ft	1 day 24 h	1 m 100 cm	1 kg 1,000 g
1 qt 4 c	1 min 60 s	1 cm 10 mm	
1 gal 4 qt	1 h 60 min		

Example:

A jug holds 1 gal of water. It is $\frac{4}{5}$ full. How many quarts of water are in the jug? Express the answer as a mixed number in simplest form.

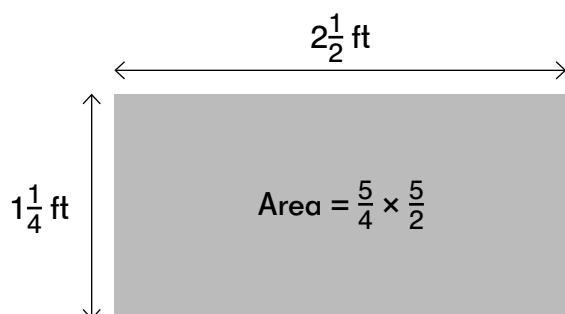


$$1 \text{ gal} = 4 \text{ qt}$$

$$\begin{aligned} \frac{4}{5} \text{ gal} &= \frac{4}{5} \times 4 \text{ qt} \\ &= \frac{16}{5} \text{ qt} \\ &= 3\frac{1}{5} \text{ qt} \end{aligned}$$

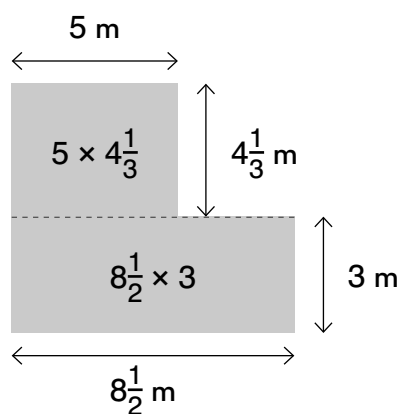


When calculating the area of a rectangle, your child may remember from Dimensions Math 4 the formula $\text{Area} = \text{Length} \times \text{Width}$. In this chapter, students will solve problems where there may be fractional side lengths. As students have learned, mixed numbers will need to be converted into improper fractions before solving.



$$\text{Area} = \text{Length} \times \text{Width} \longrightarrow 1\frac{1}{4} \times 2\frac{1}{2} \longrightarrow \frac{5}{4} \times \frac{5}{2} = \frac{25}{8} = 3\frac{1}{8} \text{ ft}^2$$

When finding the area of figures composed of multiple rectangles, your child will calculate the figures separately and then add them together.

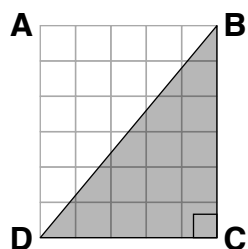


$$\text{To solve: } (5 \times 4\frac{1}{3}) + (8\frac{1}{2} \times 3)$$

Another way to determine the area of the above figure would be to calculate the area of the entire shape as if it were whole, and then subtract the missing portion.

$$\text{To solve: } (8\frac{1}{2} \times 7\frac{1}{3}) - (4\frac{1}{3} \times 3\frac{1}{2})$$

The final concept that your child will learn in Chapter 7 is how to find the area of a triangle. They will learn that every triangle is one half of a rectangle, regardless of shape or size. Your child will learn how to identify a base and a height for the triangle, and how to use $\text{Area} = \frac{1}{2} \times B \times H$ to solve.



By counting the 1 cm by 1 cm squares, we can see:

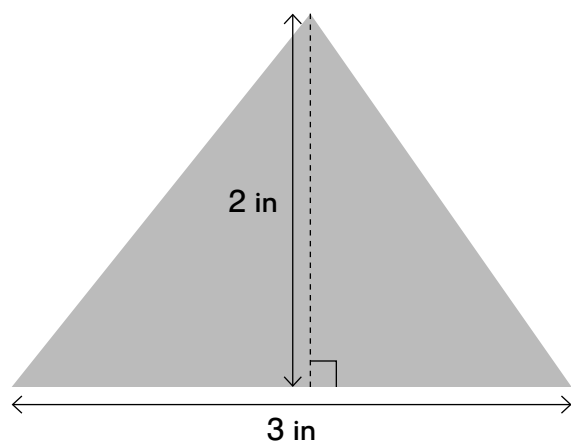
$$\text{Area of Rectangle ABCD} = 5 \times 6 = 30 \text{ cm}^2$$

$$\text{Area of Triangle BCD} = \frac{1}{2} \times 5 \times 6 = 15 \text{ cm}^2$$

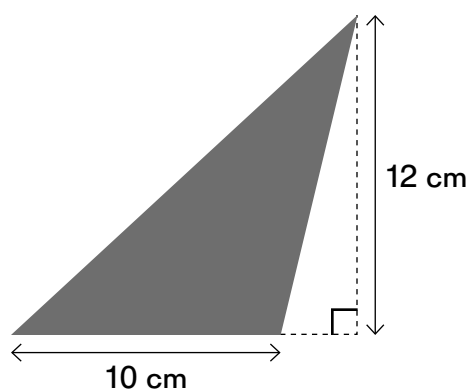
We could instead make a larger triangle ACD and subtract the area of Triangle BCD.



In some cases, the height needs to be found by drawing a line perpendicular to the base.

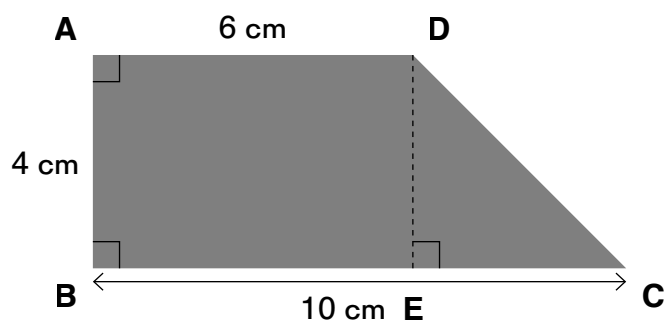


$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 3 \times 2 \\ &= 3 \text{ in}^2 \end{aligned}$$

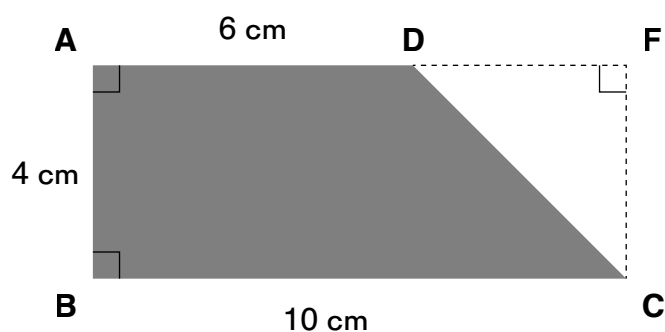


$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 10 \times 12 \\ &= 60 \text{ cm}^2 \end{aligned}$$

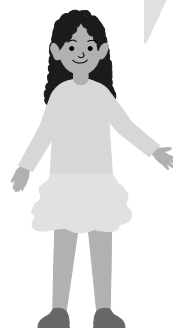
Finally, students will find the area of shapes composed of rectangles and triangles:



I cut the figure into a rectangle and a triangle and added the areas.



I made a larger rectangle and subtracted the area of triangle CDF.



$$\text{Area of Rectangle } ABCF = 10 \times 4 = 40 \text{ cm}^2$$

$$\text{Area of Triangle } CDF = \frac{1}{2} \times (10 - 6) \times 4 = 8 \text{ cm}^2$$

$$\text{Area of Figure } ABCD = 40 - 8 = 32 \text{ cm}^2$$

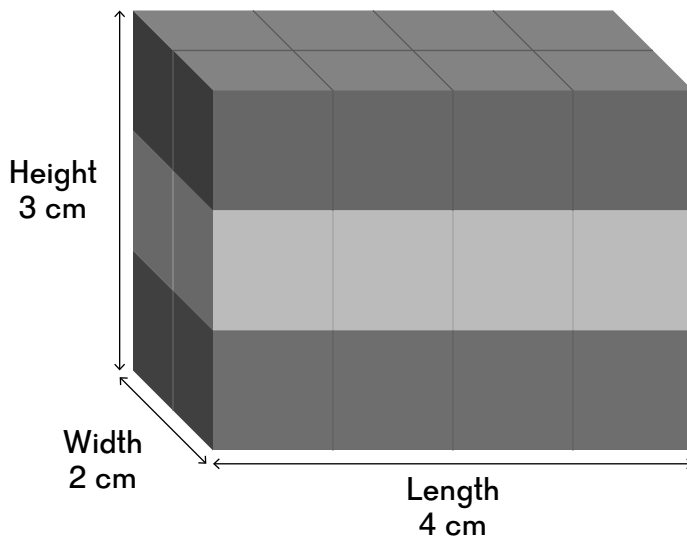
What can we do at home?

- Involving your child in the kitchen can be a fun way to practice measurement. Try doubling the recipe, halving the recipe, and converting measurements.
- A fun way to practice calculating the area of a rectangle at home is to measure a wall and calculate the area. Take it up a level to determine how many gallons of paint would be needed to cover the space. How many cups or pints would that be?

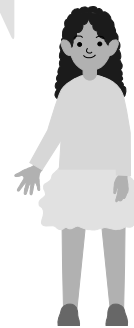
Home Connection

In Chapter 8, your child will learn how to find the volume of cuboids and figures composed of cuboids (also known as rectangular prisms). They will find the unknown length of a cuboid when given the volume and two of the three side lengths, or the area of one face of the figure. Your child will also learn how to convert between cubic centimeters and milliliters.

Volume measures the amount of space a solid figure occupies. In class, we first use cubes that measure 1 cubic centimeter to find the volume of a cuboid. By doing so, students learn that there are two ways to calculate the volume of a cuboid:



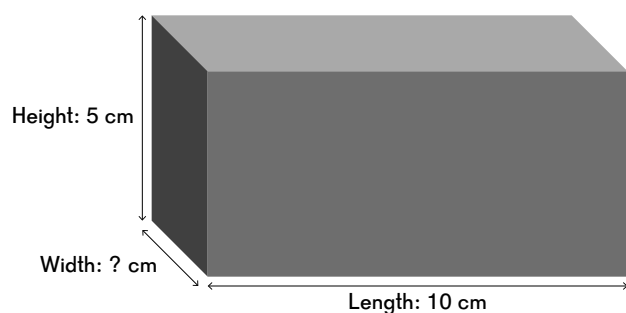
The base has an area that is equal to the number of cubes in the bottom layer. The height is the same value as the number of layers.



$$\begin{aligned}\text{Volume of a Cuboid} &= \text{Area of Base} \times \text{Height} \\ &= \text{Length} \times \text{Width} \times \text{Height}\end{aligned}$$

$$\text{Volume} = (2 \text{ cm} \times 4 \text{ cm}) \times 3 \text{ cm} = 24 \text{ cm}^3$$

Your child will learn how to find the missing edge of a cuboid when given the volume and two edge lengths. To solve this, they will first multiply the two known edges to get the area of one side. Next, they will divide the volume by the area. This number is the missing edge length.

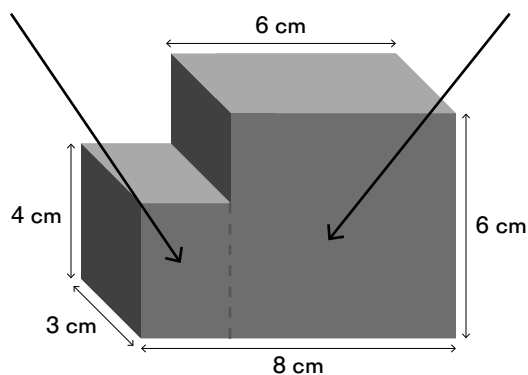


$$\begin{aligned}\text{Volume} &= 200 \text{ cm}^3 \\ L \times W \times H &= \text{Volume} \\ 10 \times W \times 5 &= 200 \\ \text{Width} &= \frac{200}{10 \times 5} \\ &= 4 \text{ cm}\end{aligned}$$

Your child will learn how to find the volume of solid figures made from multiple cuboids. There are different ways to solve these. One option is to partition the shape into separate cuboids (left and right or upper and lower are most commonly used), solve for each, and add them together.

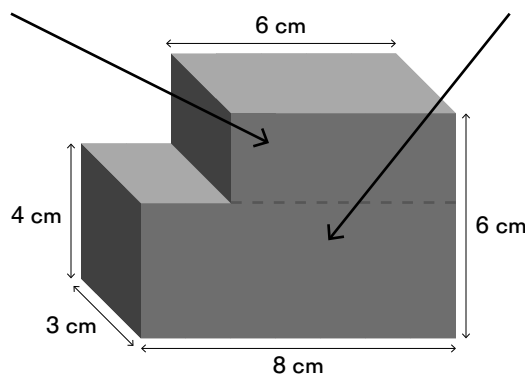
Left cuboid: $(8 - 6) \times 3 \times 4 = 24 \text{ cm}^3$

Right cuboid: $6 \times 3 \times 6 = 108 \text{ cm}^3$

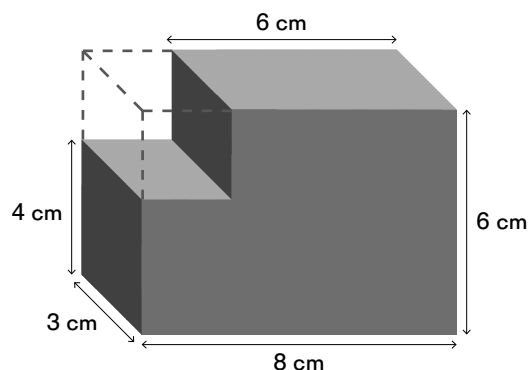


Upper cuboid: $6 \times 3 \times (6 - 4) = 36 \text{ cm}^3$

Lower cuboid: $8 \times 3 \times 4 = 96 \text{ cm}^3$



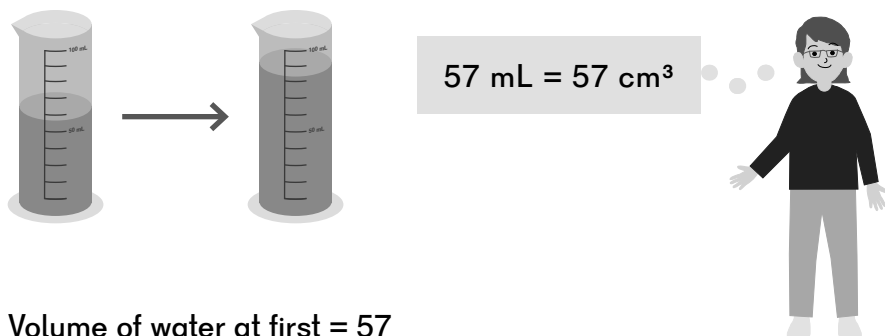
Another method for finding the volume is to calculate the volume of the total cuboid, as if there were no missing parts, and then subtract the missing part at the end.



$$\begin{aligned}\text{Volume of whole cuboid: } & 8 \times 6 \times 3 = 144 \text{ cm}^3 \\ \text{Volume of missing part: } & (8 - 6) \times 3 \times (6 - 4) = 12 \text{ cm}^3 \\ \text{Total volume: } & 144 - 12 = 132 \text{ cm}^3\end{aligned}$$

Finally, in Chapter 8, your child will learn how to convert liquid measurements (in mL and L) to cubic measurements (cm^3). They will learn to solve problems that involve placing a solid object into water. When they do this, they can see that the volume of the object is equal to the amount of water displaced.

A measuring cylinder has 57 mL of water. After Alex dropped some pebbles in it, the water level rose to 82 mL. What is the volume of the pebbles in cubic centimeters?



Volume of water at first = 57

Volume of water + pebbles = 82

Volume of pebbles = $82 - 57 = 25$

The volume of the pebbles is 25 cm^3 .

What can we do at home?

- Place objects (that can be fully submerged) into a measuring cup with water to practice determining the volume of the object.
- Draw solid figures on dot paper to help with visualizing solid figures. Start with one square cube and build on it.

