

Notice, Conjecture, and Generalize Mathematical Properties

10×30 represented as 3 tens each taken 10 times

Each of the 3 tens becomes a hundred and moves to the left. In the product, the 3 in the tens place of 30 is shifted one place to the left to represent 3 hundreds. In 300 divided by 10 the 3 is shifted one place to the right in the quotient to represent 3 tens.

The main focus in fourth grade is to deepen your child's understanding of place value, fractions, and multiplication and division. Your child will use standard algorithms to fluently add and subtract. They will use methods based on place value and properties of operations supported by suitable representations to multiply and divide with multi-digit numbers.

Encourage your child to read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Prompt them to describe to you the role of commas when writing large numbers. In the base-ten system, the value of each place is 10 times the value of the place to the immediate right. Provide opportunities for your child to

represent numbers in a variety of ways and continue to compare and round numbers to help them generalize place value understanding.

"Your child will learn a fundamental property of equivalent fractions: multiplying the numerator and denominator of a fraction by the same non-zero whole number results in a fraction that represents the same number as the original fraction. This property forms the basis for much of their other work in grade 4, including the comparison, addition, and subtraction of fractions and the introduction of finite decimals". ([Progressions: number and Operations - Fractions, 3-5, p. 6](#))....

Encourage your child to use area models and number line diagrams to reason about equivalence. Ask them to describe what the unit pieces represent and what it corresponds to.

Encourage your child to use their understanding of equivalent fractions to compare fractions with different numerators and different denominators. Helping your child reason using benchmarks such as $\frac{1}{2}$ and 1. For example they see that $\frac{7}{8} < \frac{13}{12}$ because $\frac{7}{8}$ is less than 1 (and is therefore to the left of 1 on the numberline) And $\frac{13}{12}$ is greater than 1 (and is therefore to the right of 1). [Relational Thinking - Connecting Fractions and Algebra](#),

One of the most important skills in math that children learn in fourth grade is to work with fractions having denominators 10 and 100. Because it involves partitioning into 10 equal parts and treating the parts as numbers called one tenth and one hundredth, work with these fractions can be used as preparation to extend the base-ten system to decimals. For example, you can play games for decimals with your child that help them develop understanding of place value by combining and representing decimals. ([Teaching Channel Video: Grade 4 Games for Decimals](#))

4.NF.1 Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

Using an area model to show that $\frac{2}{3} = \frac{4 \times 2}{4 \times 3}$

The whole is the square, measured by area. On the left it is divided horizontally into 3 rectangles of equal area, and the shaded region is 2 of these and so represents $\frac{2}{3}$. On the right it is divided into 4×3 small rectangles of equal area, and the shaded area comprises 4×2 of these, and so it represents $\frac{4 \times 2}{4 \times 3}$.

Using the number line to show that $\frac{4}{3} = \frac{5 \times 4}{5 \times 3}$

$\frac{4}{3}$ is 4 parts when each part is $\frac{1}{3}$, and we want to see that this is also 5×4 parts when each part is $\frac{1}{5 \times 3}$. Divide each of the intervals of length $\frac{1}{3}$ into 5 parts of equal length. There are 5×3 parts of equal length in the unit interval, and $\frac{4}{3}$ is 5×4 of these. Therefore $\frac{4}{3} = \frac{5 \times 4}{5 \times 3} = \frac{20}{15}$.

Major Work - Multiplication and Division of Whole Numbers and Fractions		
Operations & Algebraic Thinking	Number & Operations in Base Ten	Number & Operations - Fractions
<ul style="list-style-type: none"> Use the four operations with whole numbers to solve problems. <p>Addition and subtraction situations by grade level</p> <p>Multiplication and Division Situations</p>	<ul style="list-style-type: none"> Generalize place value understanding for multi-digit whole numbers. Use place value understanding and properties of operations to perform multi-digit arithmetic. 	<ul style="list-style-type: none"> Extend understanding of fraction equivalence and ordering. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. Understand decimal notation for fractions, and compare decimal fractions. <p>Grade 4 expectations in this domain are limited to fractions with denominators 2,3,4,5,6,8,10, 12,100.</p>
Required Fluency Expectations		
<p>Add/subtract within 1,000,000</p> <p>The word fluent is used in the standards to mean “reasonably fast and accurate” and possessing the ability to use certain facts and procedures with enough facility that using such knowledge does not slow down or derail the problem solver as he or she works on more complex problems. Procedural fluency requires skill in carrying out procedures flexibly, accurately, efficiently, and appropriately. Developing fluency in each grade may involve a mixture of knowing some answers, knowing some answers from patterns, and knowing some answers through the use of strategies.</p>		

For more details see [CA Mathematics Standards, Fourth Grade, p. 28-33](#)

Speak Like a Mathematician

Mathematical discussion is key to making meaning. You can support your child's mathematical thinking by having informal conversations about mathematics. Encourage your child to articulate their thinking about number quantities, comparisons, patterns, and solving problems when doing daily tasks, playing games, going on walks, or errands together.

- [Growth Mindset Feedback Tool](#)

Growth mindset language motivates learners to ensure they remain persistent, resilient, and focused on the process of learning. It is important to give learners feedback about how their process leads to a result so they can understand that their abilities will develop with effort.
- Have discussions with your child about how they are thinking about the mathematics in the problem they are solving. The [Achievement Level Descriptors](#) describe four areas you can discuss with your child when solving mathematical tasks; Applying mathematical concepts and procedures; problem

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solving/ modeling and data analysis; communicating reasoning. Phil Daro describes further in the Vimeo Video: [Answer Getting vs. Learning Mathematics](#) (5 minutes)

- Encourage your child to use academic language when discussing how they are thinking about and solving mathematical tasks. [CA Framework Mathematics Glossary: Terms, Tables, and Illustrations](#).

Think Like a Mathematician ([Standards for Mathematical Practice, see p. 3, 6-8](#))

The Standards for Mathematical Practice go hand-in-hand with the content standards, describing varieties of expertise that learners are expected to practice when learning and doing mathematics throughout K-12.

Standards for Mathematical Practice	Examples - What you can do at home
<p>Make sense of problems and persevere in solving them.</p>	<p>In grade four, children know that doing mathematics involves solving problems and discussing how they solved them. Children explain to themselves the meaning of a problem and look for a variety of ways to solve it. Students may use visual models to help them conceptualize and solve problems.</p> <p>At home, create word problems about everyday settings, e.g., At a restaurant, the waiter brings 12 sandwiches for 16 children to share so that everyone gets the same amount. How much can each child have?</p> <p>Encourage your child to draw what the problem represents. Then give them time to think and solve. When your child is ready, listen to your child's thinking and use it to guide specific questions that helps your child determine how to make sense of the problem and articulate what they thought when solving and checking if their answer makes sense. (Common answers for 16 children sharing 12 include $12/16$, $6/8$, $3/4$, and $1/2 + 1/4$).</p>
<p>Reason abstractly and quantitatively.</p>	<p>Grade-four students recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Children write simple expressions, record calculations with numbers, and represent or round numbers using place-value concepts. Students might use array or area drawings to demonstrate and explain 154×6 as 154 added six times, and so they develop an understanding of the distributive property. For example:</p> $154 \times 6 = (100 + 50 + 4) \times 6$ $= (100 \times 6) + (50 \times 6) + (4 \times 6)$ $= 600 + 300 + 24 = 924$ <p>To reinforce your child's reasoning and understanding, you might ask, "How do you know?" or "What is the relationship of the quantities?"</p>
<p>Construct viable arguments and critique the reasoning of others.</p>	<p>Children may construct arguments using concrete referents, such as objects, pictures, drawings, and actions. You can help your child practice their mathematical communication skills by having mathematical discussions with them and asking them questions such as "How did you get that?", "Explain your thinking," and "Why is that true?" Encourage your child to not only explain their own thinking, but also listen to others' explanations and ask questions. Children learn to explain and defend their</p>

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	<p>answers and solution strategies as they answer questions that require an explanation. Example: Teaching Channel video: Multiple Whole Numbers and Fractions</p>
<p>Model with mathematics.</p>	<p>Children experiment with representing problem situations in multiple ways, including writing numbers; using words (mathematical language); creating math drawings; using objects; making a chart, list, or graph; and creating equations. Children need opportunities to connect the different representations and explain the connections. Provide opportunity for your child to use all of these representations as needed. Encourage your child to answer questions such as “What math drawing or diagram could you make and label to represent the problem?” or “What are some ways to represent the quantities?” Fourth-graders evaluate their results in the context of the situation and reflect on whether the results make sense. For example, a child may use an area/array rectangle model to solve the following problem by extending from multiplication to division: “A fourth-grade teacher bought 4 new pencil boxes. She has 260 pencils. She wants to put the pencils in the boxes so that each box has the same number of pencils. How many pencils will there be in each box?”</p>
<p>Use appropriate tools strategically.</p>	<p>Children consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they might use graph paper, a number line, or drawings of dimes and pennies to represent and compare decimals, or they might use protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units. Ask your child questions such as, “Why was it helpful to use ?”</p>
<p>Attend to precision.</p>	<p>As fourth-graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning.</p> <p>Encourage your child to write like a mathematician, to check their work to make sure they are specifying units of measure and state the meaning of the symbols they choose.</p>
<p>Look for and make use of structure.</p>	<p>Children look closely to discover a pattern or structure. For instance, children use properties of operations to explain calculations (partial products model). They generate number or shape patterns that follow a given rule.</p> <p>When doing math with your child ask them, “What do you notice when?” or “How do you know if something is a pattern?”</p> <p>Teaching Channel Video - Reasoning About Division</p>
<p>Look for and express regularity in repeated reasoning.</p>	<p>Fourth-graders notice repetitive actions in computation to make generalizations. Children learn to use models to explain calculations and understand how algorithms work. They examine patterns and generate their own algorithms. For example, a child might use visual fraction models to write equivalent fractions.</p> <p>Encourage your child to answer questions such as “What is happening in this situation?” or “What predictions or generalizations can this pattern support?”</p>

Table above IUSD adapted from [CA Mathematics Framework, Grade 4](#)

Course Materials

- [IUSD Mathematics TextBooks 2016-17](#) (List of current textbooks)

Types of Arithmetic Situations

Grades K-2 focused on & upper grades continue to review: [Addition and subtraction situations by grade level](#)

Grades 3-5 focus on & upper grades continue to review: [Multiplication and Division Situations by Grade Level](#)

Standards for Mathematical Practice (SMP) Translations

- SMP - [English](#)
- SMP - [Chinese](#)
- SMP - [Korean](#)
- SMP - [Armenian](#)
- SMP - [Tagalog](#)
- SMP - [Spanish](#)

Academic Language

- [CA Framework Mathematics Glossary: Terms, Tables, and Illustrations.](#)
- [Math Visual Vocabulary Cards, K-7](#)

Math Literature

Books create contexts for math. The mathematical problems and solutions that children encounter in books are deeper and more nuanced than most of the word problems they encounter, thus providing opportunity for students to be captivated by the problem and eager to devise a solution.

- University of Chicago [School Math Project - Fourth Grade Reading List](#) (organized by topic)
- Marilyn Burns List of [Math Literature \(All ages\)](#)

Additional Parent Resources

Math Tasks, Games, Apps

- Khan Academy - [Fourth Grade](#)
- Illustrative Mathematics - [Grade 4 Tasks](#)
- YouCube - [Mathematical Tasks for Grade 4](#)
- Math App and Games - [YouCube Recommendations](#)

Parent Guides

- [CA PTA Grade 3 - Grade 5 Brochure for Parents/Guardians](#)
These brochures on the mathematics standards showcase example problems and highlight the progression of learning through the grade levels. The brochures also offer suggestions for parents/guardians to support their child's' learning and a list of additional resources
- [CALIFORNIA'S NEW STATE STANDARDS: THE FUTURE BELONGS TO YOUR CHILD](#)
Parents' guide available in multiple languages, by grade level, includes information about state assessments
- [Jo Boaler, YouCube Parent Resources](#)
Articles, research on growth mindset, how brain learns mathematics, etc...