

Mathematics | Grade 5

In Grade 5, students are expected to understand operations with fractions: (1) add and subtract fractions with like denominators, and multiply a fraction by a fraction, a whole number, and a mixed number; (2) multiply a whole number by a whole number, a multiple-digit whole number, and a decimal to the hundredths place; and (3) divide whole numbers and decimals to the hundredths place.

(1) Students are expected to understand operations with fractions. They are expected to add and subtract fractions with like denominators, and multiply a fraction by a fraction, a whole number, and a mixed number. They are also expected to multiply a whole number by a whole number, a multiple-digit whole number, and a decimal to the hundredths place. They are also expected to divide whole numbers and decimals to the hundredths place. (Note: This standard does not require students to understand operations with fractions with unlike denominators.)

Operations and Algebraic Thinking

5.OA

Write and interpret numerical expressions.

- Use operations, brackets, and parentheses to write expressions that represent a given calculation. For example, $2 \times (8 + 7)$.
- Write numerical expressions that represent a given calculation. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.

Analyze patterns and relationships.

- Generate two arithmetic sequences starting with 0. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.

Number and Operations in Base Ten

5.NBT

Understand the place value system.

- Recognize that in a multi-digit number, a digit in one place represents ten times what it represents in the adjacent place to its right. For example, 70 is 10 times as many as 7, and 7,000 is 1,000 times as many as 7.
- Understand that in a multi-digit number, a digit in one place represents one-tenth what it represents in the adjacent place to its left. For example, 700 is 10 times as many as 70, and 7,000 is 100 times as many as 70.
- Read, write, and compare multi-digit numbers based on their place value.
 - Read a number and write its decimal expansion, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
 - Compare two multi-digit numbers based on their place value. For example, $70 > 7$, $100 < 1,000$, and $100 = 100$.
- Use place value to round multi-digit numbers to a given place.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

- Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- Fluently multiply multi-digit whole numbers using the standard algorithm. For example, $14 \times 12 = 168$.
- Find the greatest common factor of two whole numbers less than or equal to 100, and recognize an equivalent factor pair of a whole number less than or equal to 100. For example, the greatest common factor of 30 and 42 is 6, because $6 \times 5 = 30$ and $6 \times 7 = 42$.

Number and Operations—Fractions

5.NF

Use equivalent fractions as a strategy to add and subtract fractions.

1. Add $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$. For example, $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. (In general, $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$.)

2. Subtract $\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd}$. For example, $\frac{2}{3} - \frac{5}{4} = \frac{8}{12} - \frac{15}{12} = -\frac{7}{12}$. (In general, $\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd}$.)

a. $\frac{1}{3} \div 4 = \frac{1}{12}$ because $\frac{1}{12} \times 4 = \frac{1}{3}$. For example, create a story context for $\frac{1}{3} \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $\frac{1}{3} \div 4 = \frac{1}{12}$ because $\frac{1}{12} \times 4 = \frac{1}{3}$.

b. $4 \div \frac{1}{5} = 20$ because $20 \times \frac{1}{5} = 4$. For example, create a story context for $4 \div \frac{1}{5}$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div \frac{1}{5} = 20$ because $20 \times \frac{1}{5} = 4$.

c. $3 \div \frac{1}{2} = 6$ because $6 \times \frac{1}{2} = 3$. For example, how much chocolate will each person get if 3 pounds are shared equally among 6 people? Use a visual model to represent $3 \div \frac{1}{2}$. For example, how much chocolate will each



Geometry

5.G

Graph points on the coordinate plane to solve real-world and mathematical problems.

- Use a coordinate plane to graph polygons in the first quadrant. Write the coordinates of the vertices of the polygon. Describe the polygon. (e.g., a rectangle with vertices at (0, 0), (4, 0), (4, 3), and (0, 3) is a rectangle with a length of 4 units and a width of 3 units.)
- Recognize that the x-axis and y-axis intersect at the origin (0, 0). Use a coordinate plane to graph a line. Describe the line. (e.g., a line with a slope of 2 and a y-intercept of 3 is a line that passes through the points (0, 3), (1, 5), (2, 7), and (3, 9).)

Classify two-dimensional figures into categories based on their properties.

- Understand that all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- Classify two-dimensional figures based on the number of sides and angles. (e.g., a square is a quadrilateral and a rectangle is a quadrilateral.)