

## 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 decimal number, and a fraction; and (3) divide a whole number by a whole number.

(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 decimal number, and a fraction. Finally, they are expected to divide a whole number by a whole number. (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 situation.
- Write numerical expressions that represent a given situation. For example, express the calculation "add 8 and 7, then multiply by 2" as  $2 \cdot (8 + 7)$ . Recognize that  $3 \cdot (18932 + 921)$  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.
- 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. Understand also that rounding a multi-digit number to a given place means replacing all digits to the right of that place with zeros (or ones to the right of the decimal point) and replacing the digit in the given place with the appropriate digit.
- Read, compare, and order multi-digit numbers based on their place value.
  - Read a number and use a place value chart to represent the number. For example, 347.392 =  $3 \cdot 100 + 4 \cdot 10 + 7 \cdot 1 + 3 \cdot (1/10) + 9 \cdot (1/100) + 2 \cdot (1/1000)$ .
  - Compare two multi-digit numbers based on their place value. For example,  $50 > 49$ ,  $303 < 302$ ,  $4222 < 421$ .
- 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 add, subtract, multiply, and divide multi-digit whole numbers and decimals to hundredths using the standard algorithm.
- Apply and extend previous understandings of multiplication to multiply a multi-digit whole number by a multi-digit whole number.

## 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.  $5 \div \frac{1}{2} = 10$  because  $10 \times \frac{1}{2} = 5$ . For example, how much chocolate will each person get if 5 pounds of chocolate are shared equally among 10 people?



## 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 square with side length 4 units, a rectangle with length 5 units and width 3 units, a right triangle with legs of length 3 units and 4 units, a trapezoid with bases of length 3 units and 5 units and height 4 units, a parallelogram with base 5 units and height 3 units, a rhombus with side length 4 units, a kite with diagonals of length 6 units and 8 units, a pentagon with side lengths 3, 4, 5, 6, and 7 units, a hexagon with side lengths 3, 4, 5, 6, 7, and 8 units, a heptagon with side lengths 3, 4, 5, 6, 7, 8, and 9 units, an octagon with side lengths 3, 4, 5, 6, 7, 8, 9, and 10 units, a nonagon with side lengths 3, 4, 5, 6, 7, 8, 9, 10, and 11 units, a decagon with side lengths 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 units.)
- Recognize that the x-axis and y-axis are perpendicular lines that intersect at the origin (0, 0). The x-axis and y-axis are perpendicular lines that intersect at the origin (0, 0). The x-axis and y-axis are perpendicular lines that intersect at the origin (0, 0).

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 into categories based on their properties.