

# Washington State K–8 Mathematics Standards

## April 2008

### Algebra Strand

In grades K–5, students prepare for algebra by learning about the properties of arithmetic and by describing rules for patterns. They begin to work with number sentences as they build an understanding of equality. As a transition from arithmetic to more formal algebra, students in grades 6–8 use numbers and variables in mathematical expressions to describe situations and use their understanding of numbers and operations to solve linear equations and deal with formulas. By the end of high school, students are working with many different types of functions, equations, and inequalities, including those involving quadratics and exponents.

*This is one of six strand documents that accompany the Washington State K–8 Mathematics Standards, tracking the development of important mathematical ideas and skills across grades K–8. Where content of an expectation may address more than one strand, that expectation may appear in more than one strand document.*

## Kindergarten

### K.2. Core Content: Patterns and operations

#### Performance Expectations

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Students are expected to:

K.2.A Copy, extend, describe, and create simple repetitive patterns.

K.2.B Translate a pattern among sounds, symbols, movements, and physical objects.

#### Explanatory Comments and Examples

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Students can complete these activities with specified patterns of the type AB, AAB, AABB, ABC, etc.

Examples:

- Make a type AB pattern of squares and circles with one square, one circle, one square, one circle, etc.
- Here is a type AAB pattern using colored cubes: red, red, blue, red, red, blue, red, red. What comes next?
- A shape is missing in the type AB pattern below. What is it?



*Red, red, yellow, red, red, yellow* could translate to *clap, clap, snap, clap, clap, snap*.

Students should be able to translate patterns among all of these representations. However, when they have demonstrated they can do this, they need not use all representations every time.

## Grade 1

### 1.2. Core Content: Addition and subtraction

#### Performance Expectations

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Students are expected to:

1.2.H Solve and create word problems that match addition or subtraction equations.

#### Explanatory Comments and Examples

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Students should be able to represent addition and subtraction sentences with an appropriate situation, using objects, pictures, or words. This standard is about helping students connect symbolic representations to situations. While some students may create word problems that are detailed or lengthy, this is not necessary to meet the expectation. Just as we want students to be able to translate 5 boys and 3 girls sitting at a table into  $5 + 3 = 8$ , we want students to look at an expression like  $7 - 4 = 3$  and connect it to a situation or problem using objects, pictures, or words.

### Performance Expectations

*Students are expected to:*

- 1.2.I Recognize, extend, and create number patterns.

## Grade 2

### 2.2. Core Content: Addition and subtraction

### Performance Expectations

*Students are expected to:*

- 2.2.F Create and state a rule for patterns that can be generated by addition and extend the pattern.

### Explanatory Comments and Examples

Example:

- For the equation  $7 + ? = 10$ , a possible story might be:  
Jeff had 7 marbles in his pocket and some marbles in his drawer. He had 10 marbles altogether. How many marbles did he have in his drawer? Use pictures, words, or objects to show your answer.

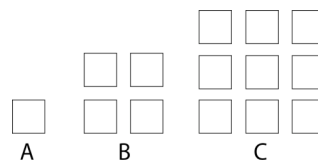
Example:

- Extend the simple addition patterns below and tell how you decided what numbers come next:  
1, 3, 5, 7, . . .  
2, 4, 6, 8, 10, . . .  
50, 45, 40, 35, 30, . . .

### Explanatory Comments and Examples

Examples:

- 2, 5, 8, 11, 14, 17, . . .
- Look at the pattern of squares below. Draw a picture that shows what the next set of squares might look like and explain why your answer makes sense.



### Performance Expectations

*Students are expected to:*

- 2.2.G Solve equations in which the unknown number appears in a variety of positions.

### Explanatory Comments and Examples

Students need this kind of experience with equivalence to accompany their first work with addition and subtraction. Flexible use of equivalence and missing numbers sets the stage for later work when solving equations in which the variable is in different positions.

Examples:

- $8 + 3 = \square + 5$
- $10 - 7 = 2 + \square$
- $\square = 9 + 4 + 2$

## Grade 3

### 3.1. Core Content: Addition, subtraction, and place value

### Performance Expectations

*Students are expected to:*

- 3.1.E Solve single- and multi-step word problems involving addition and subtraction of whole numbers and verify the solutions.

### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

## Grade 3

### 3.2. Core Content: Concepts of multiplication and division

### Performance Expectations

*Students are expected to:*

- 3.2.C Determine products, quotients, and missing factors using the inverse relationship between multiplication and division.

### Explanatory Comments and Examples

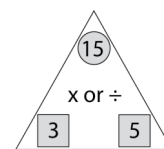
Example:

- To find the value of  $N$  in  $3 \times N = 18$ , think  $18 \div 3 = 6$ .

Students can use multiplication and division fact families to understand the inverse relationship between multiplication and division.

Examples:

- $3 \times 5 = 15$     $5 \times 3 = 15$   
 $15 \div 3 = 5$     $15 \div 5 = 3$



## Performance Expectations

*Students are expected to:*

- 3.2.F Solve and create word problems that match multiplication or division equations.

- 3.2.H Solve single- and multi-step word problems involving multiplication and division and verify the solutions.

## Explanatory Comments and Examples

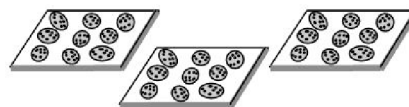
The goal is for students to be able to represent multiplication and division sentences with an appropriate situation, using objects, pictures, or written or spoken words. This standard is about helping students connect symbolic representations to the situations they model. While some students may create word problems that are detailed or lengthy, this is not necessary to meet the expectation. Just as we want students to be able to translate 5 groups of 3 cats into  $5 \times 3 = 15$ ; we want students to look at an equation like  $12 \div 4 = 3$  and connect it to a situation using objects, pictures, or words.

Example:

- Equation:  $3 \times 9 = ?$

[Problem situation:

There are 3 trays of cookies with 9 cookies on each tray. How many cookies are there in all?]



Problems include using multiplication to determine the number of possible combinations or outcomes for a situation, and division contexts that require interpretations of the remainder.

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, physical objects, or equations.

Examples:

- Determine the number of different outfits that can be made with four shirts and three pairs of pants.
- There are 14 soccer players on the boys' team and 13 on the girls' team. How many vans are needed to take all players to the soccer tournament if each van can take 5 players?

## Grade 3

### 3.3. Core Content: Fraction concepts

#### Performance Expectations

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Students are expected to:

- 3.3.D Solve single- and multi-step word problems involving comparison of fractions and verify the solutions.

#### Explanatory Comments and Examples

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The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, physical objects, or equations.

Examples:

- Emile and Jordan ordered a medium pizza.  
Emile ate  $\frac{1}{3}$  of it and Jordan ate  $\frac{1}{4}$  of it. Who ate more pizza? Explain how you know.
- Janie and Li bought a dozen balloons. Half of them were blue,  $\frac{1}{3}$  were white, and  $\frac{1}{6}$  were red. Were there more blue, red, or white balloons? Justify your answer.

## Grade 3

### 3.5. Additional Key Content

#### Performance Expectations

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Students are expected to:

- 3.5.A Determine whether two expressions are equal and use “=” to denote equality.

#### Explanatory Comments and Examples

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Examples:

- Is  $5 \times 3 = 3 \times 5$  a true statement?
- Is  $24 \div 3 = 2 \times 4$  a true statement?

A common error students make is using the mathematical equivalent of a run-on sentence to solve some problems—students carry an equivalence from a previous expression into a new expression with an additional operation. For example, when adding  $3 + 6 + 7$ , students sometimes incorrectly write:

$$3 + 6 = 9 + 7 = 16$$

Correct sentences:

$$3 + 6 = 9$$

$$9 + 7 = 16$$

## Grade 4

### 4.1. Core Content: Multi-digit multiplication

#### Performance Expectations

*Students are expected to:*

4.1.I Solve single- and multi-step word problems involving multi-digit multiplication and verify the solutions.

4.1.J Solve single- and multi-step word problems involving division and verify the solutions.

#### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Problems could include multi-step problems that use operations other than multiplication.

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Division problems should reinforce connections between multiplication and division. The example below can be solved using multiplication along with some addition and subtraction.

Example:

- A class of 20 students shares a box containing 385 animal crackers. What is each student's equal share? How many crackers are left over?

Division algorithms, including long division, are developed in fifth grade.

## Grade 4

### 4.2. Core Content: Fractions, decimals, and mixed numbers

#### Performance Expectations

*Students are expected to:*

4.2.I Solve single- and multi-step word problems involving comparison of decimals and fractions (including mixed numbers), and verify the solutions.

#### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

### ***Performance Expectations***

*Students are expected to:*

## **Grade 4**

### **4.3. Core Content: Concept of area**

### ***Performance Expectations***

*Students are expected to:*

- 4.3.F Solve single- and multi-step word problems involving perimeters and areas of rectangles and verify the solutions.

## **Grade 4**

### **4.4. Additional Key Content**

### ***Performance Expectations***

*Students are expected to:*

- 4.4.A Represent an unknown quantity in simple expressions, equations, and inequalities using letters, boxes, and other symbols.

### ***Explanatory Comments and Examples***

Example:

- Ms. Ortiz needs  $1\frac{1}{2}$  pounds of sliced turkey. She picked up a package labeled "1.12 lbs." Would she have enough turkey with this package? Explain why or why not.

### ***Explanatory Comments and Examples***

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Problems include those involving U.S. customary and metric units, including square units.

### ***Explanatory Comments and Examples***

Example:

- There are 5 jars. Lupe put the same number of marbles in each jar. Write an equation or expression that shows how many marbles are in each jar if there are 40 marbles total.
- $[5 \times \square = 40$  or  $5 \times M = 40$ ;  
M represents the number of marbles]

## Performance Expectations

*Students are expected to:*

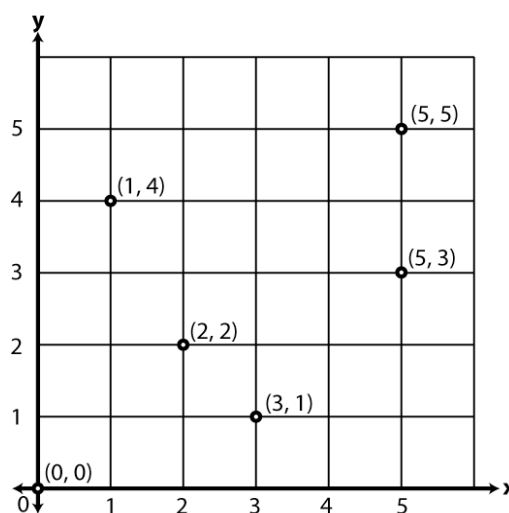
- 4.4.B Solve single- and multi-step problems involving familiar unit conversions, including time, within either the U.S. customary or metric system.
- 4.4.D Graph and identify points in the first quadrant of the coordinate plane using ordered pairs.

## Explanatory Comments and Examples

Examples:

- Jill bought 3 meters of ribbon and cut it into pieces 25 centimeters long. How many 25-centimeter pieces of ribbon did she have?
- How many quarts of lemonade are needed to make 25 one-cup servings?

Example:



## Grade 5

### 5.1. Core Content: Multi-digit division

## Performance Expectations

*Students are expected to:*

- 5.1.F Solve single- and multi-step word problems involving multi-digit division and verify the solutions.

## Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Problems include those with and without remainders.

## Grade 5

### 5.2. Core Content: Addition and subtraction of fractions and decimals

#### Performance Expectations

Students are expected to:

- 5.2.H Solve single- and multi-step word problems involving addition and subtraction of whole numbers, fractions (including mixed numbers), and decimals, and verify the solutions.

#### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Multi-step problems may also include previously learned computational skills like multiplication and division of whole numbers.

## Grade 5

### 5.3. Core Content: Triangles and quadrilaterals

#### Performance Expectations

Students are expected to:

- 5.3.I Solve single- and multi-step word problems about the perimeters and areas of quadrilaterals and triangles and verify the solutions.

#### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

## Grade 5

### 5.4. Core Content: Representations of algebraic relationships

#### Performance Expectations

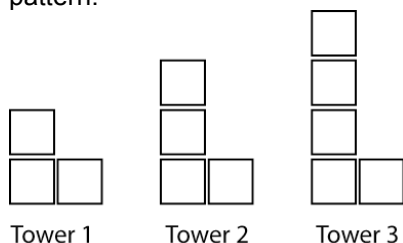
Students are expected to:

- 5.4.A Describe and create a rule for numerical and geometric patterns and extend the patterns.

#### Explanatory Comments and Examples

Example:

- The picture shows a sequence of towers constructed from cubes. The number of cubes needed to build each tower forms a numeric pattern. Determine a rule for the number of cubes in each tower and use the rule to extend this pattern.



## Performance Expectations

Students are expected to:

- 5.4.B Write a rule to describe the relationship between two sets of data that are linearly related.

- 5.4.C Write algebraic expressions that represent simple situations and evaluate the expressions, using substitution when variables are involved.

- 5.4.D Graph ordered pairs in the coordinate plane for two sets of data related by a linear rule and draw the line they determine.

## Explanatory Comments and Examples

Rules can be written using words or algebraic expressions.

Example:

- The table below shows numerators (top row) and denominators (bottom row) of fractions equivalent

to a given fraction ( $\frac{1}{3}$ ). Write a rule that could be used to describe how the two rows could be related.

1	2	3	4
3	6	9	?

Students should evaluate expressions with and without parentheses. Evaluating expressions with parentheses is an initial step in learning the proper order of operations.

Examples:

- Evaluate  $(4 \times n) + 5$  when  $n = 2$ .
- If 4 people can sit at 1 table, 8 people can sit at 2 tables, and 12 people can sit at 3 tables, and this relationship continues, write an expression to describe the number of people who can sit at  $n$  tables and tell how many people can sit at 67 tables.
- Compare the answers to A and B below. Why aren't the answers the same?

$$A: (3 \times 10) + 2$$

$$B: 3 \times (10 + 2)$$

Example:

- The table shows the total cost of purchasing different quantities of equally priced DVDs.

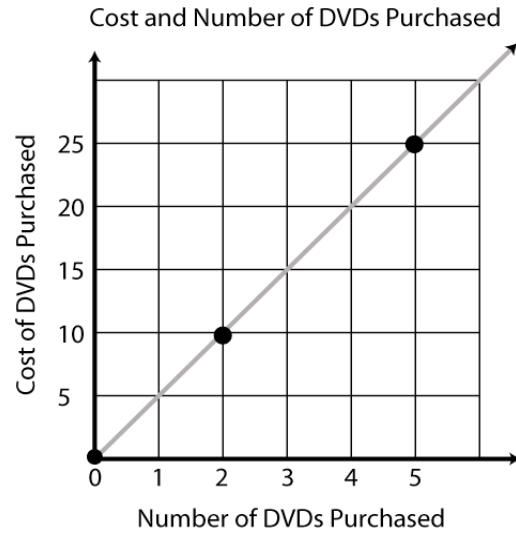
number purchased	0	2	5
total cost	\$0	\$10	\$25

Graph the ordered pairs (0,0), (2,10), and (5, 25) and the line connecting the ordered pairs. Use the line to determine the total cost when 3 DVDs are purchased.

**Performance Expectations**

*Students are expected to:*

**Explanatory Comments and Examples**



**Grade 6**

**6.1. Core Content:** *Multiplication and division of fractions and decimals*

**Performance Expectations**

*Students are expected to:*

6.1.H Solve single- and multi-step word problems involving operations with fractions and decimals and verify the solutions.

**Explanatory Comments and Examples**

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Example:

- Every day has 24 hours. Ali sleeps  $\frac{3}{8}$  of the day. Dawson sleeps  $\frac{1}{3}$  of the day. Maddie sleeps 7.2 hours in a day. Who sleeps the longest? By how much?

## Grade 6

### 6.2. Core Content: Mathematical expressions and equations

#### Performance Expectations

Students are expected to:

6.2.A Write a mathematical expression or equation with variables to represent information in a table or given situation.

6.2.B Draw a first-quadrant graph in the coordinate plane to represent information in a table or given situation.

6.2.C Evaluate mathematical expressions when the value for each variable is given.

6.2.E Solve one-step equations and verify solutions.

#### Explanatory Comments and Examples

Examples:

- What expression can be substituted for the question mark?

x	1	2	3	4	...	x
y	2.5	5	7.5	10	...	?

- A t-shirt printing company charges \$7 for each t-shirt it prints. Write an equation that represents the total cost,  $c$ , for ordering a specific quantity,  $t$ , of these t-shirts.

Example:

- Mikayla and her sister are making beaded bracelets to sell at a school craft fair. They can make two bracelets every 30 minutes. Draw a graph that represents the number of bracelets the girls will have made at any point during the 6 hours they work.

Examples:

- Evaluate  $2s + 5t$  when  $s = 3.4$  and  $t = 1.8$ .

- Evaluate  $\frac{2}{3}x - 14$  when  $x = 60$ .

Students solve equations using number sense, physical objects (e.g., balance scales), pictures, or properties of equality.

Example:

- Solve for the variable in each equation below.

$$112 = 7a$$

$$1.4y = 42$$

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

$$\frac{y}{45} = \frac{7}{15}$$

### Performance Expectations

*Students are expected to:*

- 6.2.F Solve word problems using mathematical expressions and equations and verify solutions.

### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Example:

- Zane and his friends drove across the United States at an average speed of 55 mph. Write expressions to show how far they traveled in 12 hours, in 18 hours, and in  $n$  hours. How long did it take them to drive 1,430 miles? Verify your solution.

## Grade 6

### 6.3. Core Content: Ratios, rates, and percents

### Performance Expectations

*Students are expected to:*

- 6.3.D Solve single- and multi-step word problems involving ratios, rates, and percents, and verify the solutions.

### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Examples:

- An item is advertised as being 25% off the regular price. If the sale price is \$42, what was the original regular price? Verify your solution.
- Sally had a business meeting in a city 100 miles away. In the morning, she drove an average speed of 60 miles per hour, but in the evening when she returned, she averaged only 40 miles per hour. How much longer did the evening trip take than the morning trip? Explain your reasoning.

## Grade 6

### 6.4. Core Content: Two- and three-dimensional figures

#### Performance Expectations

*Students are expected to:*

- 6.4.C Solve single- and multi-step word problems involving the relationships among radius, diameter, circumference, and area of circles, and verify the solutions.

#### Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Example:

- Captain Jenkins determined that the distance around a circular island is 44 miles. What is the distance from the shore to the buried treasure in the center of the island? What is the area of the island?

## Grade 7

### 7.1. Core Content: Rational numbers and linear equations

#### Performance Expectations

*Students are expected to:*

- 7.1.E Solve two-step linear equations.
- 7.1.F Write an equation that corresponds to a given problem situation, and describe a problem situation that corresponds to a given equation.
- 7.1.G Solve multi-step contextual problems involving rational numbers and justify the solutions.

#### Explanatory Comments and Examples

Example:

- Solve  $3.5x - 12 = 408$  and show each step in the process.

Examples:

- Meagan spent \$56.50 on three blouses and a \$25 pair of jeans. If each blouse costs the same amount, write an algebraic equation that represents this situation and helps you determine how much one blouse costs.
- Describe a problem situation that could be solved using the equation  $15 = 2x - 7$ .

Justifications can include numbers, words, pictures, physical objects, or equations. Students should be able to use all of these representations as needed. To justify a particular solution, students should be able to explain or show their work using at least one of these representations and verify that their answer is reasonable.

## ***Performance Expectations***

*Students are expected to:*

## **Grade 7**

### **7.2. Core Content:** *Proportionality and similarity*

## ***Performance Expectations***

*Students are expected to:*

- 7.2.B Solve single- and multi-step problems involving proportional relationships and verify the solutions.

## ***Explanatory Comments and Examples***

Example:

- Tom wants to buy some candy bars and magazines for a trip. He has decided to buy three times as many candy bars as magazines. Each candy bar costs \$0.70 and each magazine costs \$2.50. The sales tax rate on both types of items is  $6\frac{1}{2}\%$ . How many of each item can he buy if he has \$20.00 to spend?

## ***Explanatory Comments and Examples***

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Problems include those that involve rate, percent increase or decrease, discount, markup, profit, interest, tax, or the conversion of money or measurement (including multiplying or dividing amounts in recipes).

More complex problems, such as dividing 100 into more than two proportional parts (e.g., 4:3:3), allow students to generalize what they know about proportional relationships to a range of situations.

Examples:

- At a certain store, 48 television sets were sold in April. The manager at the store wants to encourage the sales team to sell more TVs and is going to give all the sales team members a bonus if the number of TVs sold increases by 30% in May. How many TVs must the sales team sell in May to receive the bonus? Explain your answer.

## Performance Expectations

Students are expected to:

- 7.2.D Make scale drawings and solve problems related to scale.
- 7.2.E Represent proportional relationships using graphs, tables, and equations, and make connections among the representations.
- 7.2.F Determine the slope of a line corresponding to the graph of a proportional relationship and relate slope to similar triangles.

## Explanatory Comments and Examples

- After eating at a restaurant, you know that the bill before tax is \$52.60 and that the sales tax rate is 8%. You decide to leave a 20% tip for the waiter based on the pre-tax amount. How much should you leave for the waiter? How much will the total bill be, including tax and tip? Show work to support your answers.
- Joe, Sam, and Jim completed different amounts of yard work around the school. They agree to split the \$200 they earned in a ratio of 5:3:2, respectively. How much did each boy receive?

Example:

- On an 80:1 scale drawing of the floor plan of a house, the dimensions of the living room are  $1\frac{7}{8}$ '' by  $2\frac{1}{2}$ '' . What is the actual area of the living room in square feet?

Proportional relationships are linear relationships whose graphs pass through the origin and can be written in the form  $y = kx$ .

Example:

- The relationship between the width and length of similar rectangles is shown in the table below. Write an equation that expresses the length,  $l$ , in terms of the width,  $w$ , and graph the relationship between the two variables.

width	4	12	18	...	$w$
length	10	30	45	...	?

This expectation connects the constant rate of change in a proportional relationship to the concept of slope of a line. Students should know that the slope of a line is the same everywhere on the line and realize that similar triangles can be used to demonstrate this fact. They should recognize how proportionality is reflected in slope as it is with similar triangles. A more complete discussion of slope is developed in high school.

## Performance Expectations

Students are expected to:

7.2.G Determine the unit rate in a proportional relationship and relate it to the slope of the associated line.

7.2.H Determine whether or not a relationship is proportional and explain your reasoning.

7.2.I Solve single- and multi-step problems involving conversions within or between measurement systems and verify the solutions.

## Explanatory Comments and Examples

The associated unit rate, constant rate of change of the function, and slope of the graph all represent the constant of proportionality in a proportional relationship.

Example:

- Coffee costs \$18.96 for 3 pounds. What is the cost per pound of coffee? Draw a graph of the proportional relationship between the number of pounds of coffee and the total cost, and describe how the unit rate is represented on the graph.

A proportional relationship is one in which two quantities are related by a constant scale factor,  $k$ . It can be written in the form  $y = kx$ . A proportional relationship has a constant rate of change and its graph passes through the origin.

Example:

- Determine whether each situation represents a proportional relationship and explain your reasoning.

x	1	2	3	4
y	4.5	9	13.5	18

—  $y = 3x + 2$

- One way to calculate a person's maximum target heart rate during exercise in beats per minute is to subtract the person's age from 200. Is the relationship between the maximum target heart rate and age proportional? Explain your reasoning.

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Students should be given the conversion factor when converting between measurement systems.

## Performance Expectations

*Students are expected to:*

## Explanatory Comments and Examples

Examples:

- The lot that Dana is buying for her new one-story house is 35 yards by 50 yards. Dana's house plans show that her house will cover 1,600 square feet of land. What percent of Dana's lot will not be covered by the house? Explain your work.
- Joe was planning a business trip to Canada, so he went to the bank to exchange \$200 U.S. dollars for Canadian dollars (at a rate of \$1.02 CDN per \$1 US). On the way home from the bank, Joe's boss called to say that the destination of the trip had changed to Mexico City. Joe went back to the bank to exchange his Canadian dollars for Mexican pesos (at a rate of 10.8 pesos per \$1 CDN). How many Mexican pesos did Joe get?

## Grade 7

### 7.3. Core Content: Surface area and volume

## Performance Expectations

*Students are expected to:*

- 7.3.D Solve single- and multi-step word problems involving surface area or volume and verify the solutions.

## Explanatory Comments and Examples

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Examples:

Alexis needs to paint the four exterior walls of a large rectangular barn. The length of the barn is 80 feet, the width is 50 feet, and the height is 30 feet. The paint costs \$28 per gallon, and each gallon covers 420 square feet. How much will it cost Alexis to paint the barn? Explain your work.

Tyesha has decided to build a solid concrete pyramid on her empty lot. The base will be a square that is forty feet by forty feet and the height will be thirty feet. The concrete that she will use to construct the pyramid costs \$70 per cubic yard. How much will the

concrete for the pyramid cost Tyesha? Justify your answer.

## Grade 7

### 7.5. Additional Key Content

#### Performance Expectations

*Students are expected to:*

- 7.5.A Graph ordered pairs of rational numbers and determine the coordinates of a given point in the coordinate plane.

#### Explanatory Comments and Examples

Example:

- Graph and label the points A(1, 2), B(-1, 5), C(-3, 2), and D(-1, -5). Connect the points in the order listed and identify the figure formed by the four points.
- Graph and label the points A(1, -2), B(-4, -2), and C(-4, 3). Determine the coordinates of the fourth point (D) that will complete the figure to form a square. Graph and label point D on the coordinate plane and draw the resulting square.

## Grade 8

### 8.1. Core Content: Linear functions and equations

#### Performance Expectations

*Students are expected to:*

- 8.1.A Solve one-variable linear equations.

#### Explanatory Comments and Examples

Examples:

Solve each equation for  $x$ .

- $91 - 2.5x = 26$
- $\frac{7}{8}(x - 2) = 119$
- $-3x + 34 = 5x$
- $114 = -2x - 8 + 5x$
- $3(x - 2) - 4x = 2(x + 22) - 5$

- 8.1.B Solve one- and two-step linear inequalities and graph the solutions on the number line.

The emphasis at this grade level is on gaining experience with inequalities, rather than on becoming proficient at solving inequalities in which multiplying or dividing by a negative is necessary.

Example:

- Graph the solution of  $4x - 21 > 57$  on the number line.

8.1.C Represent a linear function with a verbal description, table, graph, or symbolic expression, and make connections among these representations.

Translating among these various representations of functions is an important way to demonstrate a conceptual understanding of functions.

## Performance Expectations

Students are expected to:

- 8.1.D Determine the slope and y-intercept of a linear function described by a symbolic expression, table, or graph.

- 8.1.E Interpret the slope and y-intercept of the graph of a linear function representing a contextual situation.

- 8.1.F Solve single- and multi-step word problems involving linear functions and verify the solutions.

## Explanatory Comments and Examples

Examples:

- Determine the slope and y-intercept for the function described by

$$y = \frac{2}{3}x - 5$$

- The following table represents a linear function. Determine the slope and y-intercept.

x	2	3	5	8	12
y	5	8	14	23	35

Example:

- A car is traveling down a long, steep hill. The elevation,  $E$ , above sea level (in feet) of the car when it is  $d$  miles from the top of the hill is given by  $E = 7500 - 250d$ , where  $d$  can be any number from 0 to 6. Find the slope and y-intercept of the graph of this function and explain what they mean in the context of the moving car.

The intent of this expectation is for students to show their work, explain their thinking, and verify that the answer to the problem is reasonable in terms of the original context and the mathematics used to solve the problem. Verifications can include the use of numbers, words, pictures, or equations.

Example:

- Mike and Tim leave their houses at the same time to walk to school. Mike's walk can be represented by  $d_1 = 4000 - 400t$ , and Tim's walk can be represented by  $d_2 = 3400 - 250t$ , where  $d$  is the distance from the school in feet and  $t$  is the walking time in minutes. Who arrives at school first? By how many minutes? Is there a time when Mike and Tim are the same distance away from the school? Explain your reasoning.

### Performance Expectations

*Students are expected to:*

- 8.1.G Determine and justify whether a given verbal description, table, graph, or symbolic expression represents a linear relationship.

### Explanatory Comments and Examples

Examples:

- Could the data presented in the table represent a linear function? Explain your reasoning.

x	-1	0	1	2	3	4	5
y	0	-1	0	3	8	15	24

- Does  $y = \frac{1}{4}x - 5$  represent a linear function? Explain your reasoning.