Algebra I Station Activities

for Common Core State Standards

WALCH EDUCATION®

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Introduction

This revised edition of the *Algebra I Station Activities for Common Core State Standards* includes a collection of updated and improved station-based activities to provide students with opportunities to practice and apply the mathematical skills and concepts they are learning. It contains sets of activities that are tightly aligned to both the Mathematical Practices and the following Common Core conceptual categories and domains for high school mathematics: Algebra (Seeing Structure in Expressions, Creating Equations, Reasoning with Equations and Inequalities, Arithmetic with Polynomials and Rational Expressions); Functions (Building Functions, Interpreting Functions); and Statistics and Probability. These enhancements have been carried out based on continuing refinement of Common Core implementation. You may use these activities in addition to direct instruction, or instead of direct instruction in areas where students understand the basic concepts but need practice. The Discussion Guide included with each set of activities provides an important opportunity to help students reflect on their experiences and synthesize their thinking. It also provides guidance for ongoing, informal assessment to inform instructional planning.

Implementation Guide

The following guidelines will help you prepare for and use the activity sets in this book.

Setting Up the Stations

Each activity set consists of four or more stations. Set up each station at a desk, or at several desks pushed together, with enough chairs for a small group of students. Place a card with the number of the station on the desk. Each station should also contain the materials specified in the teacher's notes, and a stack of student activity sheets (one copy per student). Place the required materials (as listed) at each station.

When a group of students arrives at a station, each student should take one of the activity sheets to record the group's work. Although students should work together to develop one set of answers for the entire group, each student should record the answers on his or her own activity sheet. This helps keep students engaged in the activity and gives each student a record of the activity for future reference.

Forming Groups of Students

All activity sets consist of four stations. You might divide the class into four groups by having students count off from 1 to 4. If you have a large class and want to have students working in small groups, you might set up two identical sets of stations, labeled A and B. In this way, the class can be divided into eight groups, with each group of students rotating through the "A" stations or "B" stations.

Assigning Roles to Students

Students often work most productively in groups when each student has an assigned role. You may want to assign roles to students when they are assigned to groups and change the roles occasionally. Some possible roles are as follows:

- Reader—reads the steps of the activity aloud
- Facilitator—makes sure that each student in the group has a chance to speak and pose questions; also makes sure that each student agrees on each answer before it is written down
- Materials Manager—handles the materials at the station and makes sure the materials are put back in place at the end of the activity
- Timekeeper—tracks the group's progress to ensure that the activity is completed in the allotted time
- Spokesperson—speaks for the group during the debriefing session after the activities

Timing the Activities

The activities in this book are designed to take approximately 15 minutes per station. Therefore, you might plan on having groups change stations every 15 minutes, with a two-minute interval for moving from one station to the next. It is helpful to give students a "5-minute warning" before it is time to change stations.

Since the activity sets consist of four stations, the above timeframe means that it will take about an hour and 10 minutes for groups to work through all stations. If this is followed by a 20-minute class discussion as described on the next page, an entire activity set can be completed in about 90 minutes.

Guidelines for Students

Before starting the first activity set, you may want to review the following "ground rules" with students. You might also post the rules in the classroom.

- All students in a group should agree on each answer before it is written down. If there is a disagreement within the group, discuss it with one another.
- You can ask your teacher a question only if everyone in the group has the same question.
- If you finish early, work together to write problems of your own that are similar to the ones on the student activity sheet.
- Leave the station exactly as you found it. All materials should be in the same place and in the same condition as when you arrived.

Debriefing the Activities

After each group has rotated through every station, bring students together for a brief class discussion. At this time you might have the groups' spokespersons pose any questions they had about the activities. Before responding, ask if students in other groups encountered the same difficulty or if they have a response to the question. The class discussion is also a good time to reinforce the essential ideas of the activities. The questions that are provided in the teacher's notes for each activity set can serve as a guide to initiating this type of discussion.

You may want to collect the student activity sheets before beginning the class discussion. However, it can be beneficial to collect the sheets afterward so that students can refer to them during the discussion. This also gives students a chance to revisit and refine their work based on the debriefing session.

Guide to Common Core State Standards Annotation

As you use this book, you will come across annotation symbols included with the standards for several station activities. The following descriptions of these annotation symbols are verbatim from the Common Core State Standards Initiative website, at http://www.walch.com/CCSS/00002.

Symbol: ★

Denotes: Modeling Standards

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

From http://www.walch.com/CCSS/00003

Symbol: (+)

Denotes: College and Career Readiness Standards

The evidence concerning college and career readiness shows clearly that the knowledge, skills, and practices important for readiness include a great deal of mathematics prior to the boundary defined by (+) symbols in these standards.

From http://www.walch.com/CCSS/00004

Standards Correlations

The standards correlations below and on the next page support the implementation of the Common Core State Standards. This book includes station activity sets for the Common Core conceptual categories of Algebra, Functions, and Statistics and Probability. This table provides a listing of the available station activities organized by Common Core standard.

The left column lists the standard codes. The first letter of the code represents the Common Core conceptual category. This letter is followed by a dash and the initials of the domain name, which is then followed by the standard number. The middle column lists the title of the station activity set that corresponds to the standard, and the right column lists the page number where the station activity set can be found.

The table indicates the standards that are heavily addressed in the station sets. If there are other standards that are addressed within the set, they can be found on the first page of each set.

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(*continued*)

Standards Correlations

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Materials List

Class Sets

- calculators
- rulers

Station Sets

- algebra tiles (40 of each color: red, blue, green, and yellow)
- bag to hold marbles
- deck of playing cards that contains only the numbers 2–10
- graphing calculators
- measuring stick
- slips of paper with <, >, ≤, and ≥ written on them
- uncooked spaghetti noodles

Ongoing Use

- graph paper
- highlighters (yellow specifically)
- index cards (prepared according to specifications in teacher notes for many of the station activities)
- number cubes
- pencils

Seeing Structure in Expressions

Set 1: Factoring Polynomials

Instruction

Goal: To provide opportunities for students to develop concepts and skills related to factoring polynomials

Common Core State Standards

A–SSE.2 Use the structure of an expression to identify ways to rewrite it.

A–SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★

a. Factor a quadratic expression to reveal the zeros of the function it defines.

b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

c. Use the properties of exponents to transform expressions for exponential functions.

Student Activities Overview and Answer Key

Station 1

Students will be given a number cube. Students will use the number cube to populate the exponents of terms and expressions. They will find the greatest common factor of terms and expressions. Then they will factor the expression using the greatest common factor.

Answers

1. Answers will vary. Possible answer: x^3, x^6, x^4; x^3
2. 1; x^3; x
3. greatest common factor
4. Answers will vary. Possible answer: $4x^3 - 6x^2 + 4x^4$; 2; x^2; $2x^2$; $2x - 3 + 2x^2$
5. Answers will vary. Possible answer: $-5x^2y + x^3 - 10x^5y^4$; 1; x^2; x^2; $-5y + x - 10x^3y^4$
6. Answers will vary. Possible answer: $6x^3yz + 2s + 4x^2y^5$; 2; no common variables; 2; $3x^3yz + s + 2x^2y^5$
7. No, because there was no variable that all three terms had in common.
8. $4x^2y^4z^3(3x^2y + 14z^3 - 6xy^3z^5)$
9. $3c^2(9a^2b^3 - 4ac - 3b^2c^3)$
10. $-9s^2t(4r^2st + 2rs + 3r^2s^2t^4 + 1)$

Instruction

Station 2

Students will be given eight blank index cards, plus ten index cards with the following written on them:

$3x$; x; +1; +2; +4; +8; –1; –2; –4; –8

Students will work together to arrange the cards to factor a trinomial. Then they will create the possible factors of a trinomial and factor the trinomial. Students factor trinomials with a leading coefficient other than 1.

Answers

1. $(3x + 2)(x + 4)$
2. Answers will vary. Possible answer: We used the distribution method to check factors.
3. The factors are $3x$ and x because 3 is a prime number.
4. x, $2x$, $3x$, and $6x$
5. –5, –1, 1, 5
6. $(2x – 1)(3x + 5)$
7. Use the distribution method to double-check answers.

Station 3

Students will be given five index cards with the following expressions written on them:

$x^2 + 8x + 12$; $x^2 - 8x + 15$; $x^2 + 2x - 80$; $x^2 + x - 12$; $x^2 - x - 12$

They will also receive five index cards with the following factors written on them:

$(x - 3)(x + 4)$; $(x + 10)(x - 8)$; $(x + 2)(x + 6)$; $(x + 3)(x - 4)$; $(x - 3)(x - 5)$

Students will work together to match each expression with the appropriate factors. Then students will factor trinomials with a leading coefficient of 1. They will explain how to double-check their answers and why factoring out the greatest common factor first is important.

Answers

1. $x^2 + 8x + 12$ and $(x + 2)(x + 6)$
2. $x^2 - 8x + 15$ and $(x - 3)(x - 5)$
3. $x^2 + 2x - 80$ and $(x + 10)(x - 8)$
4. $x^2 + x - 12$ and $(x - 3)(x + 4)$
5. $x^2 - x - 12$ and $(x + 3)(x - 4)$

6. Answers will vary.
7. Use the distribution method to multiply the binomials. This should yield the original trinomial.
8. 1
9. x and x
10. 6 and –2; ($\boxed{x}$ + $\boxed{6}$)($\boxed{x}$ + ($\boxed{-2}$)); $(x + 6)(x - 2)$
11. 2
12. $x^2 + 4x - 5$
13. x and x
14. –5; 4; 5 and –1; ($\boxed{x}$ + $\boxed{5}$)($\boxed{x}$ – $\boxed{1}$); $2(x + 5)(x - 1)$
15. Answers will vary. Possible answer: It is easier to factor smaller numbers.

Station 4

Students will be given a number cube. Students will use the number cube to populate binomial expressions. They will multiply the binomial expressions using the distribution method. Then they will factor the polynomial they created. They will relate the distribution method to factoring. They will factor the difference of squares and perfect square trinomials.

Answers

1. Answers will vary. Possible answer: $(x + 2)(x - 2) = x^2 - 4$
2. 2
3. It cancels out.
4. $(2x + 3)(2x - 3)$; Find the square root of the first term and the second terms. Write the factors in $(a + b)(a - b)$ form.
5. $(7x^3 + 6)(7x^3 - 6)$
6. Answers will vary. Possible answer: $(2x + 3)(2x + 3) = 4x^2 + 12x + 9$
7. 3
8. $(4x + 3)(4x + 3)$; Find the square root of the first term and the third term. Write the factors in $(a + b)(a + b)$ form.
9. $(2x^4 + 5)(2x^4 + 5)$
10. Answers will vary. Possible answer: $(x - 3)(x - 3) = x^2 - 6x + 9$
11. 3

12. $(5x - 3)(5x - 3)$; Find the square root of the first term and the third term. Write the factors in $(a - b)(a - b)$ form.
13. $(6x^2 - 1)(6x^2 - 1)$

Materials List/Setup

Station 1 number cube

Station 2 eight blank index cards; ten index cards with the following written on them:

$3x$; x; +1; +2; +4; +8; –1; –2; –4; –8

Station 3 five index cards with the following expressions written on them:

$x^2 + 8x + 12$; $x^2 - 8x + 15$; $x^2 + 2x - 80$; $x^2 + x - 12$; $x^2 - x - 12$

five index cards with the following factors written on them:

$(x - 3)(x + 4)$; $(x + 10)(x - 8)$; $(x + 2)(x + 6)$; $(x + 3)(x - 4)$; $(x - 3)(x - 5)$

Station 4 number cube

Discussion Guide

To support students in reflecting on the activities and to gather some formative information about student learning, use the following prompts to facilitate a class discussion to "debrief" the station activities.

Prompts/Questions

1. How do you find the greatest common factor of terms with variables?
2. How do you factor a trinomial with a leading coefficient not equal to 1?
3. How do you factor a trinomial with a leading coefficient equal to 1?
4. How do you factor the difference of two squares?
5. How do you factor the perfect square trinomial $a^2 + 2ab + b^2$?
6. How do you factor the perfect square trinomial $a^2 - 2ab + b^2$?

Think, Pair, Share

Have students jot down their own responses to questions, then discuss with a partner (who was not in their station group), and then discuss as a whole class.

Suggested Appropriate Responses

1. Find the greatest common factors of the coefficients. Find the variable with the lowest exponent that can be divided into each term of the polynomial.
2. Find the factors of the leading coefficient. Find the factors of the last term that add up to the middle term taking into account the factors of the leading coefficient.
3. Find the factors of the last term that add up to the middle term taking into account x and x as the first terms. (Assuming the first term is x^2.)
4. Take the square root of the first term and the second term. Put in the form $(a - b)(a + b)$.
5. Take the square root of the first term and the third term. Put in the form $(a + b)(a + b)$.
6. Take the square root of the first term and the third term. Put in the form $(a - b)(a - b)$.

Possible Misunderstandings/Mistakes

- Not factoring out the greatest common factor first
- Not using the law of exponents correctly when factoring
- Not finding the factors of the third term that add up to the middle term when factoring trinomials
- Not canceling out the middle term when factoring the difference of two squares

NAME:

Seeing Structure in Expressions

Set 1: Factoring Polynomials

Station 1

At this station, you will find a number cube. As a group, roll the number cube. Write this number in the first box below. Repeat this process until each box contains a number. Then complete problems 1–3.

$x^{\square}, x^{\square}, x^{\square}$

1. Of the three terms above, which term has the lowest exponent?

2. Divide your answer from problem 1 into each of the three terms above. Write your answers below.

3. You found the largest monomial that could be divided into all the terms. What is the name for this factor?

For problems 4–6, roll the number cube and write the number in the first box. Repeat this process until each box contains a number. Then answer the questions to complete each problem.

4. $4x^{\square} - 6x^{\square} + 4x^{\square}$

   What is the greatest common factor of the coefficients?

   What is the greatest common factor of the variables?

   What is the greatest common factor of the three terms?

   Factor out the greatest common factor of each term. Show your work.

continued

Seeing Structure in Expressions

Set 1: Factoring Polynomials

5. $-5x\square y + x\square - 10x\square y\square$

   What is the greatest common factor of the coefficients?

   What is the greatest common factor of the variables?

   What is the greatest common factor of the three terms?

   Factor out the greatest common factor of each term. Show your work.

6. $6x\square yz + 2s\square + 4x\square y\square$

   What is the greatest common factor of the coefficients?

   What is the greatest common factor of the variables?

   What is the greatest common factor of the three terms?

   Factor out the greatest common factor of each term. Show your work.

7. Did you factor out any variables in problem 6? Why or why not?

8. What is the greatest common factor of the following expression?

   $12x^4y^5z^3 + 56x^2y^4z^6 - 24x^3y^7z^8$

continued

Seeing Structure in Expressions

Set 1: Factoring Polynomials

9. What is the greatest common factor of the following expression?

   $27a^2b^3c^2 - 12ac^3 - 9b^2c^5$

10. What is the greatest common factor of the following expression?

    $-36r^2s^3t^2 - 18rs^3t - 27r^2s^4t^5 - 9s^2t$

NAME:

Seeing Structure in Expressions

Set 1: Factoring Polynomials

Station 2

At this station, you will find eight blank index cards, plus ten index cards with the following written on them:

$3x$; x; +1; +2; +4; +8; –1; –2; –4; –8

As a group, determine which index cards to use to factor:

$3x^2 + 14x + 8$

1. What are the factors of $3x^2 + 14x + 8$?

2. How did you determine which index cards to use in problem 1?

3. Why were $3x$ and x the only factors of $3x^2$?

Given: $6x^2 + 7x - 5$

4. What are the factors of $6x^2$?

   Write each factor on separate index cards.

5. What are the factors of –5?

   Write each factor on separate index cards.

continued

6. As group, arrange the index cards you created to help you factor $6x^2 + 7x - 5$. Show your work.

7. How can you double-check to see if you factored the trinomial correctly?

NAME:

Seeing Structure in Expressions

Set 1: Factoring Polynomials

Station 3

At this station, you will find five index cards with the following expressions written on them:

$$x^2 + 8x + 12\,;\ x^2 - 8x + 15\,;\ x^2 + 2x - 80\,;\ x^2 + x - 12\,;\ x^2 - x - 12$$

You will also find five index cards with the following factors written on them:

$$(x - 3)(x + 4)\,;\ (x + 10)(x - 8)\,;\ (x + 2)(x + 6)\,;\ (x + 3)(x - 4)\,;\ (x - 3)(x - 5)$$

Shuffle the cards. As a group, match the expressions with their factors. Write the matches on the lines below.

1. _____
2. _____
3. _____
4. _____
5. _____
6. What strategy did you use to match the cards?

7. How can you double-check your matches?

continued

Seeing Structure in Expressions

Set 1: Factoring Polynomials

Given: $x^2 + 4x - 12$

8. What is the greatest common factor of all three terms?

Use your answers for problems 9 and 10 to fill in the boxes below.

(□ + ⬚)(□ + ⬚)

9. What are the factors of x^2?

   Write these factors in the solid boxes.

10. What are the factors of –12 that add up to 4?

    Write these factors in the dashed boxes.

What are the factors of $x^2 + 4x - 12$?

Given: $2x^2 + 8x - 10$

11. What is the greatest common factor of all three terms?

12. Factor out the greatest common factor. What is the new expression?

Use your answers for problems 13 and 14 to fill in the boxes below.

(□ + ⬚)(□ + ⬚)

13. What are the factors of x^2?

    Write these factors in the solid boxes.

continued

14. What are the factors of _____that add up to _____?

    Write these factors in the dashed boxes.

    What are the three factors of $2x^2 + 8x - 10$?

15. Why should you factor out the greatest common factor first before factoring the expression?

Seeing Structure in Expressions

Set 1: Factoring Polynomials

Station 4

At this station, you will find a number cube. As a group, roll the number cube once. Write this number in *both* boxes below.

$(x + \square)(x - \square)$

1. Use the distribution method to multiply the two binomials. Show your work.

2. How many terms does the polynomial you created in problem 1 contain?

3. Why is there no x term in the polynomial you created in problem 1?

4. How can you factor $4x^2 - 9$ using the observations you made in problems 1–3? Show your work.

5. Factor $49x^6 - 36$. Show your work.

continued

NAME:

Seeing Structure in Expressions

Set 1: Factoring Polynomials

As a group, roll the number cube once. Write this number in *both* boxes below.

($\square x + 3$)($\square x + 3$)

6. Use the distribution method to multiply the two binomials. Show your work.

7. How many terms does the polynomial you created in problem 6 contain?

8. How can you factor $16x^2 + 24x + 9$ using the observations you made in problems 6 and 7? Show your work.

9. Factor $4x^8 + 20x^4 + 25$. Show your work.

continued

NAME:

Seeing Structure in Expressions

Set 1: Factoring Polynomials

As a group, roll the number cube once. Write this number in *both* boxes below.

$(x - \square)(x - \square)$

10. Use the distribution method to multiply the two binomials. Show your work.

11. How many terms does the polynomial you created in problem 10 contain?

12. How can you factor $25x^2 - 30x + 9$ using the observations you made in problems 10 and 11? Show your work and answer.

13. Factor $36x^4 - 12x^2 + 1$. Show your work.

Creating Equations

Set 1: Literal Equations

Instruction

Goal: To provide opportunities for students to develop concepts and skills related to solving literal equations for a specified variable

Common Core State Standards

A–CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.★

A–REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Student Activities Overview and Answer Key

Station 1

Students will be given five index cards with the following formulas and equations written on them:

$$y = mx + b \qquad d = rt \qquad A = lw \qquad V = lwh \qquad A = \frac{1}{2}bh$$

Students work as a group to match the formula or equation with the appropriate "Solve for" variable card and solve for the variable.

Answers

1.

Original problem	Steps	Final answer
$y = mx + b$	$y = mx + b$ $y - b = mx$ $\frac{y - b}{m} = x$	$x = \frac{y - b}{m}$
$d = rt$	$d = rt$ $\frac{d}{t} = r$	$r = \frac{d}{t}$
$A = lw$	$A = lw$ $\frac{A}{l} = w$	$w = \frac{A}{l}$

(continued)

Original problem	Steps	Final answer
$V = lwh$	$V = lwh$ $\frac{V}{wh} = l$	$\frac{V}{wh} = l$
$A = \frac{1}{2}bh$	$A = \frac{1}{2}bh$ $\frac{2}{1}A = bh$ $\frac{2A}{b} = h$	$h = \frac{2A}{b}$

2. $x = \frac{25 - y}{3}$
   $y = -3x + 25$

3. $a = \frac{7 - 28c}{14}$ or $a = \frac{1}{2} - 2c$
   $c = \frac{7 - 14a}{28}$ or $c = \frac{1}{4} - \frac{1}{2}a$

4. $g = 12f - \frac{3}{2}h + 20$
   $f = \frac{1}{12}g + \frac{1}{8}h - \frac{5}{3}$
   $h = \frac{-2}{3}g + 8f + \frac{40}{3}$

Station 2

Students are given a number cube. Students roll the number cube to populate the coefficients of variables in equations. Then they solve for each variable in the equation.

Answers

1. Answers will vary. Possible answers include: $6x - 4y = 6z$; $x = \frac{2}{3}y + z$; $y = \frac{3}{2}x - \frac{3}{2}z$; $z = x - \frac{2}{3}y$

2. Answers will vary. Possible answers include: $\frac{2}{3}A + B = 6C$; $A = \frac{-3}{2}B + 9C$; $B = \frac{-2}{3}A + 6C$; $C = \frac{1}{9}A + \frac{1}{6}B$
3. Answers will vary. Possible answers include: $f^2 - 2d = \frac{3}{4}g$; $f = \pm\sqrt{2d + \frac{3}{4}g}$; $d = \frac{1}{2}f^2 - \frac{3}{8}g$; $g = \frac{4}{3}f^2 - \frac{8}{3}d$

Station 3

Students will solve four real-world applications of literal equations. They will be given six formulas to choose from. They will be given a word problem and asked to solve for a specified variable.

Answers

1. $d = rt$; $750 = 60t$; $t = 12.5$ hours; $d = rt$; we solved for t because we wanted to know how long it took him to drive to the college.
2. $V = lwh$; $1280 = 16 \bullet w \bullet 10$; $w = 8$ inches; $V = lwh$; we are given the volume of the aquarium.
3. $A = \frac{1}{2}bh$; $6 = \frac{1}{2}b(4)$; $b = 3$ inches; $A = \frac{1}{2}bh$; we know it is a triangular sail.
4. $A = \pi r^2$; $36\pi = \pi r^2$; $r = 6$ inches; $A = \pi r^2$; we know it is a circular piece of wood.

Station 4

Students will be given 37 index cards with variables and operations written on them. Students work together to move the cards on the table to create each equation and solve for each variable indicated.

Answers

1. $X = D - Y$
2. $A = TS - B$
3. $R = \frac{-A}{F - Z}$
4. $T = X + \frac{Z}{S} + \frac{A}{S}$ or $T = \frac{Z + A}{S} + X$

Instruction

Materials List/Setup

Station 1 five index cards with the following formulas and equations written on them:

$y = mx + b$, $d = rt$, $A = lw$, $V = lwh$, $A = \frac{1}{2}bh$

five index cards with the following written on them:

"Solve for *x*," "Solve for *r*," "Solve for *w*," "Solve for *l*," "Solve for *h*"

Station 2 number cube

Station 3 none

Station 4 37 index cards with the following written on them:

$X, Y, D, F, A, B, S, T, Z, R, -Y, -Y, (S), (S), -B, -B, -Z, -Z, (R), (R), \left(\frac{1}{F-Z}\right), \left(\frac{1}{F-Z}\right), \left(\frac{1}{S}\right), \left(\frac{1}{S}\right), +X, +X, (D), (D), -T, -T, (, (,),), +, -, =$

Instruction

Discussion Guide

To support students in reflecting on the activities and to gather some formative information about student learning, use the following prompts to facilitate a class discussion to "debrief" the station activities.

Prompts/Questions

1. How do you solve literal equations for a specific variable?
2. How many variables can you solve for in the formula $V = lwh$?
3. Name three formulas in geometry that are literal equations.
4. Name four real-world applications of literal equations.

Think, Pair, Share

Have students jot down their own responses to questions, then discuss with a partner (who was not in their station group), and then discuss as a whole class.

Suggested Appropriate Responses

1. Isolate the variable and make sure it has a coefficient of 1.
2. four variables which include V, l, w, and h
3. Answers will vary. Possible answers include: $P = 2L + 2W$, $a^2 + b^2 = c^2$, $A = lw$, $P = 4S$
4. Answers will vary. Possible answers include: distance formula, $d = rt$; slope of a hill, $y = mx + b$; interest formula, $I = prt$; force and acceleration formula, $F = ma$

Possible Misunderstandings/Mistakes

- Not solving for the specified variable
- Not following the properties of equality when moving terms from each side of the equal sign
- Not keeping track of the appropriate sign of the term
- Using the wrong formula for real-world applications

NAME:

Creating Equations

Set 1: Literal Equations

Station 1

You will be given five index cards with the following formulas and equations written on them: $y = mx + b$, $d = rt$, $A = lw$, $V = lwh$, $A = \frac{1}{2}bh$. You will also get five index cards with the following written on them: "Solve for *x*," "Solve for *r*," "Solve for *w*," "Solve for *l*," "Solve for *h*."

Shuffle the cards and deal a card to each student in your group until all the cards have been dealt. Work as a group to match the formula or equation with the appropriate "Solve for" variable card.

1. For all five formulas/equations, write the original problem, your steps to solving for the appropriate variable, and your final answer.

Original problem	Steps	Final answer

continued

NAME:

Creating Equations

Set 1: Literal Equations

Solve for each variable in the equations that follow.

2. $3x + y = 25$

3. $14a + 28c = 7$

4. $\frac{1}{2}g - 6f + \frac{3}{4}h = 10$

NAME:

Creating Equations

Set 1: Literal Equations

Station 2

You will be given a number cube. For each problem, roll the number cube and write the result in the box below. Repeat this process until all the boxes contain a number.

1. Solve for each variable. Write your answers in the space below.

$$\square X - \square Y = \square Z$$

2. Solve for each variable. Write your answers in the space below.

$$\frac{\square}{\square} A + \square B = \square C$$

3. Solve for each variable. Write your answers in the space below.

$$\square f^2 - \square d = \frac{\square}{\square} g$$

NAME:

Creating Equations

Set 1: Literal Equations

Station 3

At this station, you will read four real-world applications of literal equations. You will use some of the following formulas to solve the problems:

$$A = \pi r^2 \quad y = mx + b \quad C = 2\pi r \quad d = rt \quad V = lwh \quad A = lw \quad A = \frac{1}{2}bh$$

Work together to read and solve each problem. Write your answers in the space provided.

1. Jesse is going on a road trip to visit a college. The college is 750 miles away.

   How long will it take Jesse to drive to the college if his average speed is 60 miles per hour?

   Which formula did you use to solve this problem and why?

   Which variable did you solve for and why?

2. Amanda has a rectangular fish aquarium that holds 1,280 in^3 of water. The length of the aquarium is 16 inches and the height is 10 inches. What is the width of the aquarium?

   Which formula did you use to solve this problem and why?

continued

Creating Equations

Set 1: Literal Equations

3. Matt is building a model sailboat. He wants to construct a triangular sail that has an area of 6 square inches. If the height of the sail is 4 inches, then what is the base of the sail?

   Which formula did you use to solve this problem and why?

4. Sara is going to paint a circular piece of wood for the set of her school play. If the area of the wood is 36π, then what is its radius?

   Which formula did you use to solve this problem and why?

NAME:

Creating Equations

Set 1: Literal Equations

Station 4

You will be given 37 index cards with the following written on them:

$$X, Y, D, F, A, B, S, T, Z, R, -Y, -Y, (S), (S), -B, -B, -Z, -Z, (R), (R), \left(\frac{1}{F-Z}\right), \left(\frac{1}{F-Z}\right), \left(\frac{1}{S}\right), \left(\frac{1}{S}\right), +X, +X, (D), (D), -T, -T, (, (,),), +, -, =$$

Work together to place the cards on the table to create each equation below. Move the cards on the table to solve for each variable indicated. Once you agree on a final answer, write it in the space provided.

1. Solve for X: $X + Y = D$

2. Solve for A: $\frac{A+B}{S} = T$

3. Solve for R: $Z - \frac{A}{R} = F$

4. Solve for T: $S(T - X) = Z + A$