

# Engaging Mathematics, Volume I: Algebra I

Engaging Mathematics,  
Volume I:  
Algebra I

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SAMPLE

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## What is *Engaging Mathematics, Volume I: Algebra I*?

1 An instructional resource featuring 80 Texas Essential Knowledge and Skills (TEKS)-based, classroom-ready mathematics activities that each take approximately 10 to 15 minutes to complete. We took the best activities of the original series, refreshing and revising them, and then added new activities where needed to create a complement for *Engaging Mathematics, Volume II*.

2 A TEKS-based resource that addresses the majority of the Algebra I TEKS. *Engaging Mathematics, Volume I* complements *Engaging Mathematics, Volume II*. Both volumes provide—

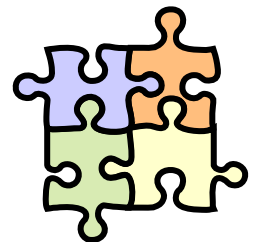
- Rigorous problem-solving tasks;
- Manipulative-based tasks;
- Vocabulary development tasks; and
- Sorting and classifying tasks.

3 A resource that supports high-quality, research-based practices by providing activities that can be used for various purposes, including—

- Engaging warm-ups and opening tasks that draw students into relevant and challenging mathematics;
- Instructional support for all students to help learners articulate, refine, and retain important mathematical concepts, processes, and skills;
- Short-cycle, formative assessments that provide immediate and ongoing feedback to guide instruction for the teacher and learning for the student; and
- Supplemental tasks to support intervention strategies.

4 A resource that incorporates the mathematical process standards by promoting—

- Reasoning, generalizing, and problem-solving in mathematical and real-world contexts;
- Modeling, using tools, and connecting representations;
- Analysis; and
- Communication.



# What is found in an Engaging Mathematics TEKS-based activity?

Each activity addresses a specific student expectation that is reflected in the content objective.

Common classroom materials are used for ease of preparation. Materials are listed 1-per-student unless otherwise noted. Page titles for student handouts are represented with bold font.

Students should have continuous access to graphing technology and STAAR® Reference Materials that will be made available for the assessment.

Facilitation questions are provided for teacher use when supporting student thinking and discourse.

## Writing Linear Equations, Activity 3 A(2)(C)

### Activity Objective

The student will write linear equations in two variables.

### Materials

- Line Up

### Facilitation Questions

- How can you determine the slope of a line?**  
*I can determine the slope of a line by identifying two points on the line and determining the ratio of the change in y to the change in x between the two points.*
- What is standard form of an equation?**  
*The standard form of an equation is  $Ax + By = C$ .*
- How can you determine if two lines are parallel or perpendicular?**  
*If two lines are parallel, their slopes are equivalent. If two lines are perpendicular, their slopes are opposite reciprocals of each other.*

### Answers

Statements	Answers
1. An equation for line c in point-slope form is ____.	false w
2. $y = -x + 8$ represents line b.	$y + 5 = -1.5(x - 2)$ r
3. An equation for line a is $3x - 2y = -2$ .	$x + y = 8$ u
4. An equation for line c in standard form is ____.	$y - 9 = 0.5(x - 2)$ p
5. An equation for line a in point-slope form is ____.	parallel l
6. Line b is ____ to line d.	$x - 2y = -16$ e
7. An equation for line b in standard form is ____.	true o
8. Line b is ____ to line e.	perpendicular f

Mathematics is  p   o   w   e   r   f   u   l  !  
1 2 3 4 5 6 7 8

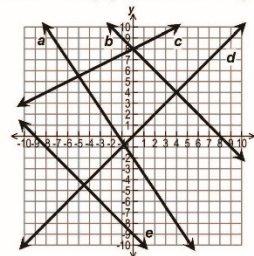
An answer key is included for each activity.

Each activity includes an opportunity for students to articulate and summarize aspects of their learning.

## Line Up

Date: \_\_\_\_\_

Write the correct letter for each statement. Write the letter of the correct answer on the blank at the bottom of the page to reveal a message.



Statements	Answers
1. An equation for line c in point-slope form is ____.	false w
2. $y = -x + 8$ represents line b.	$y + 5 = -1.5(x - 2)$ r
3. An equation for line a is $3x - 2y = -2$ .	$x + y = 8$ u
4. An equation for line c in standard form is ____.	$y - 9 = 0.5(x - 2)$ p
5. An equation for line a in point-slope form is ____.	parallel l
6. Line b is ____ to line d.	$x - 2y = -16$ e
7. An equation for line b in standard form is ____.	true o
8. Line b is ____ to line e.	perpendicular f

Mathematics is  p   o   w   e   r   f   u   l  !  
1 2 3 4 5 6 7 8

### Communicating about Mathematics

How did you determine the standard forms of line b and c?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





## Writing Linear Equations, Activity 2

### A(2)(B)

#### Activity Objective

The student will write linear equations in two variables.

#### Materials

- **Linear Land Game**
- **Game Cards & Answer Card**—1 set per 2 students
- **Game Board**—1 per 2 students
- Scissors
- Game pieces—paperclips, pennies, centimeter cubes

#### Facilitation Questions

- **How can you determine the  $y$ -intercept when given a point and the slope of a line?**

*I can substitute the coordinates of the point and the slope into the equation  $y = mx + b$  and then solve for  $b$ .*

- **What does it mean for a point to be a  $y$ -intercept?**

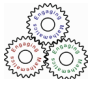
*A point is a  $y$ -intercept if its  $x$ -coordinate is zero.*

#### Answers

*Answers may vary.*

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_



## Linear Land Game

- Shuffle the **Game Cards** and place them in a pile face down.
- Place the **Answer Card** face up so that it is visible to each player.
- Each player places a game piece on the *Start Here* square.
- Player 1 picks a **Game Card** from the pile. Player 1 writes a linear equation for the selected card. When Player 1 is finished, cross out the selected point or slope so that it cannot be used again. Place the card at the bottom of the pile.
- Player 1 locates the linear equation on the **Answer Card** and moves as indicated.
- Player 2 repeats these steps.
- Players continue alternating turns.
- The winner is the player closest to the finish when time runs out or when all the cards have been used twice.

**My Workspace:**

### Communicating about Mathematics

Describe how you determined the  $y$ -intercept when given a point and the slope of a line.



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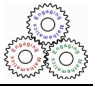


## Game Cards & Answer Card

























Cut along the dashed lines.

Given: $m = \frac{1}{2}$ Choose a point: (2,1), (2,4), or (0,5)	Given: $m = -3$ Choose a point: (-2,5), (3,0), or (-2,9)	Given: (2,-5) Choose a slope: $m = 0$ , $m = 1$ , or $m = -1$
Given: (-1,3) Choose a slope: $m = 3$ , $m = 2$ , or $m = -1$	Given: $m = \frac{1}{4}$ Choose a point: (8,1), (4,6), or (-4,0)	Given: $m$ is undefined Choose a point: (-4,-9), (0,1), or (6,-7)
Given: (-3,7) Choose a slope: $m = -\frac{7}{3}$ , $m = -4$ , or $m = -1$	Given: $m = \frac{5}{2}$ Choose a point: (4,-1), (3,2), or (-6,3)	Given: $m = 8$ Choose a point: (0,-4), (0,4), or (0,8)

Answer Card		
<b>Move 1</b> $y = -5$ $x = -4$ $y = \frac{1}{2}x$ $y = -4x - 5$ $y = -\frac{7}{3}x$	<b>Move 2</b> $y = \frac{5}{2}x + 18$ $y = -3x - 1$ $y = -x + 4$ $y = \frac{1}{4}x + 1$ $x = 0$	<b>Move 3</b> $y = x - 7$ $y = 3x + 6$ $y = \frac{1}{2}x + 5$ $y = 8x + 8$ $y = \frac{1}{4}x - 1$
<b>Move 4</b> $y = \frac{1}{4}x + 5$ $y = -3x + 9$ $y = \frac{5}{2}x - 11$ $y = -x + 2$	<b>Move 5</b> $y = \frac{1}{2}x + 3$ $y = -x - 3$ $y = 8x + 4$ $y = 2x + 5$	<b>Move 6</b> $y = -3x + 3$ $y = \frac{5}{2}x - \frac{11}{2}$ $y = 8x - 4$ $x = 6$



# Game Board

<b>START HERE</b>	<i>Move forward 2 spaces.</i> 			<i>Move back 1 space.</i> 	<i>Move ahead! Take the slide.</i>	<i>Move forward 3 spaces.</i> 
						
	<i>Move back 2 spaces.</i> 	<i>Lose a turn.</i>				
						
<i>Move back 2 spaces.</i> 		<i>Move forward 2 spaces.</i> 				
				<i>Go back! Follow the arrows.</i>		
						
<b>Finish</b>		<i>Go back! Follow the arrows.</i>				<i>Move back 2 spaces.</i> 



## Solving Quadratic Equations, Activity 3

A(8)(A)

### Activity Objective

The student will solve quadratic equations having real solutions.

### Materials

- Solving Quadratic Equations: Round Robin

### Facilitation Question

- **How can factoring out the greatest common factor help you factor the trinomial?**  
*Factoring out the greatest common factor may simplify factoring the trinomial by making the leading coefficient 1 or a prime number.*

### Answers

<p>1. <math>3x^2 - 27 = 0</math></p> $\boxed{3}(x^2 - \boxed{9}) = 0$ $\boxed{3}(x + \boxed{3})(x - \boxed{3}) = 0$ $x + \boxed{3} = 0 \quad \text{or} \quad x - \boxed{3} = 0$ $x = \boxed{-3} \qquad \qquad \qquad x = \boxed{3}$	<p>2. <math>2x^2 + x - 10 = 0</math></p> $(\boxed{2x} + \boxed{5})(x - \boxed{2}) = 0$ $\boxed{2x} + \boxed{5} = 0 \quad \text{or} \quad x - \boxed{2} = 0$ $x = \boxed{-\frac{5}{2}} \qquad \qquad \qquad x = \boxed{2}$
<p>3. <math>2x^2 - 14x - 16 = 0</math></p> $\boxed{2}(x^2 - \boxed{7x} - \boxed{8}) = 0$ $\boxed{2}(\boxed{x} + \boxed{1})(\boxed{x} - \boxed{8}) = 0$ $\boxed{x} + \boxed{1} = 0 \quad \text{or} \quad \boxed{x} - \boxed{8} = 0$ $x = \boxed{-1} \qquad \qquad \qquad x = \boxed{8}$	



Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Solving Quadratic Equations: Round Robin

- Pass your paper to the person seated to your right and solve the first problem on the paper you have received. You may work with your group to solve the problem.
- Upon completion, pass the papers to the right and solve the second problem. You may work together to solve the problem.
- Pass the papers to the right again and solve the third problem. You may work together to solve the problem.

<p>1. Complete the solution for x.</p> $3x^2 - 27 = 0$ $\square(x^2 - \square) = 0$ $\square(x + \square)(x - \square) = 0$ $x + \square = 0 \quad \text{or} \quad x - \square = 0$  $x = \square \qquad x = \square$	<p>2. Complete the solution for x.</p> $2x^2 + x - 10 = 0$ $(\square + \square)(x - \square) = 0$ $\square + \square = 0 \quad \text{or} \quad x - \square = 0$  $x = \square \qquad x = \square$
<p>3. Complete the solution for x.</p> $2x^2 - 14x - 16 = 0$ $\square(x^2 - \square - \square) = 0$ $\square(\square + \square)(\square - \square) = 0$ $\square + \square = 0 \quad \text{or} \quad \square - \square = 0$  $x = \square \qquad x = \square$	

### Communicating about Mathematics

Describe how you can verify your solutions for x.




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