

# Self-Guided Training

Transition to Algebra (TTA) classrooms are inherently collaborative spaces. As a class and in small groups, TTA students solve problems and puzzles, read and create problem-solving skits, engage in whole-class oral Mental Mathematics, and discuss mathematical questions and concepts.

It's always ideal to have an in-person professional development training with a TTA author or a trained TTA PD provider, but this is not always possible. For these cases and for additional support, TTA author and PD provider, Mary Fries, has created this Self-Guided Training as an alternative to our week-long PD.

You will need:

- 1 Teacher Resources box for Transition to Algebra; this includes:
  - » 1 Series Overview booklet
  - » 12 Teaching Guides-one for each of the 12 units
  - » 12 Answer Keys—one for each of the 12 units
- 1 set of blank Student Worktexts (One copy of each unit should be taken from a Class Pack and written in directly as the "Teacher Copy." Do not use Answer Keys for this Self-Guided Training.)
- Access to a computer with Internet access and speakers (for watching videos and solving TTA-related math puzzles online)
- The Making Sense of Algebra book

Ideally, you will also have colleagues (local or online) who are teaching TTA with whom you can plan regular meetings to work through this training with and to discuss TTA and your successes and struggles with teaching the course.

Every reading and activity in this guide has been carefully chosen to provide a solid introduction to TTA. Teachers with extremely limited time may wish to take note of the green sections indicating a minimal introduction to the curriculum.







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# Introduction to Features and Design

- Read the following sections of the Series Overview booklet included in your Teacher Resources box to learn about the Habits-of-Mind Design approach, the twelve units, the curricular design elements, and how to prepare for an effective year.
  - » "Introducing Transition to Algebra" (pages 5, 7-13, 15-19)
  - » "Student Materials" (pages 21-25)
  - » "Materials for Teachers" (pages 37-45)
  - » "Getting Ready to Teach" (pages 47-49)
- Access the Digital Resources referenced at the bottom of the Table of Contents of your Series Overview booklet. These include printable and projectable resource pages and projectable Answer Keys/Student Books. (Open an Answer Key in Acrobat to access the toggle that turns the answers on and off).
- Read Chapter 1 of Making Sense of Algebra, "Algebraic Habits of Mind."
- Watch this video: "How Habits of Mind organize instruction in Transition to Algebra and align with the CCSS" (third video under the second tab "Author Interviews" on transitiontoalgebra.com).



# Unit 1: Language of Algebra

### Introduction

- In the Unit 1 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » Read the Mental Mathematics introduction, "Distributive Property: Halving and Doubling," and the first page of Mental Mathematics, "Doubling 1- and 2-digit numbers," (pages T32-T33).
- Watch this video: "How the TTA Teaching Guides support teacher professional development" (sixth video under the second tab "Author Interviews" on transitiontoalgebra.com).
- In the Unit 1 Student Worktext, **read the "Dear Student" letter** on the inside cover.

### Lesson 1: Exploring Number Tricks

- Read the entire Teaching Guide for Lesson 1 (page T7-T9).
- Work through problem #1 (page 3) in a blank Unit 1 Student Worktext. Write directly in the student books, and feel free to explore additional problems. If you have a colleague with whom you can work on the problems, solve them together, and discuss the mathematics and possible student thinking as you work.
- Read the Thinking Out Loud dialogue (page 3).
- Work through problem #8 (page 4).
- Watch this video: "A number trick to launch algebra instruction" (seventh video under the first tab "Using TTA" on <u>transitiontoalgebra.com</u>).

#### Lesson 2: Exploring Number Trick Logic

- In the Teaching Guide, read the Purpose statement (page T10).
- In your "Teacher Copy" of the Student Worktext, work through problems #1, 12, 16-19 (pages 7-8).
- Problems #17-19 are designed to encourage small-group discussion. After you write your own responses, look at the examples in the Answer Key for some ideas on what students may say.
- In the Teaching Guide, **read the sidebar remarks** beginning with "Use students' intuition..." (page T11).
- Watch this video: "A mental mathematics exercise prepares students for the distributive property" (first video under the second tab "Author Interviews" on <u>transitiontoalgebra</u>. <u>com</u>).





Lesson 3: Balancing Mobile Puzzles

- In the Teaching Guide, read the Purpose statement (page T12).
- In the Student Worktext, read all of the content on page 11.
- In the Teaching Guide, **read the sidebar remarks** under the heading "What if..." (page T13).
- Work through problems #5, 6, 8 (page 12).
- Watch this video: "Mobile Puzzles help students make sense of algebra" (fourth video under the first tab "Using TTA" on <u>transitiontoalgebra.com</u>).

Lesson 4: Describing Tricks and Puzzles

- In the Teaching Guide, read the Purpose statement (page T15).
- Work through problems #1, 5, 6 (pages 15-16).
- In the Teaching Guide, read the Algebraic Habits of Mind: Seeking and Using Structure call-out box (page T15).

Lesson 5: Logic of Tricks and Mobiles

- In the Teaching Guide, read the Purpose statement (page T17).
- Work through problems #1, 2, 6, 7 (pages 19-20).
- After you write your own responses, look at the example responses to problems #2 and #7 in the Answer Key for some ideas on what students may say.
- In the Teaching Guide, read the 7 bold discussion prompts and their commentary (page T18).

### SolveMe Mobiles

- Go to solveme.edc.org and click "Mobiles."
- *Optional*: create an account for yourself by clicking the link in the upper right corner.
- Click the square "Play" button and explore some puzzles.
  - » Explorer puzzles: #20, 31, 54
  - » Puzzler puzzles: #70, 88, 93, 104
  - » Optional: Master puzzles: #145, 158, 154
- Go back to the Main Menu, click the quadrilateral "Information" button (with a question mark), and **read the information under the "Play" tab.**

Please note that these readings and activities are intended as an alternative to in-person PD—not as suggested lesson preparation. When planning each lesson, teachers should review the student materials and read the entire lesson plan and the next Mental Mathematics activity in the Teaching Guide.



# Unit 2: Geography of the Number Line

#### Introduction

- In the Unit 2 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T5).
  - » Read the Mental Mathematics introduction, "Complements and distance: integers," and the first page of Mental Mathematics, "Distance to 10," (pages T49-T50).
- **Read Chapter 5 of Making Sense of Algebra**, "A Geometric Look at Algebra."
- Watch this video: "How Transition to Algebra cultivates meaningful mathematical talk" (fourth video under the second tab "Author Interviews" on transitiontoalgebra.com).
- In the Unit 2 Student Worktext, **read the "Dear Student" letter** on the inside cover .

#### Lesson 1: Placing Integers

- In the Teaching Guide, read the Purpose statement and the Launch: Thinking Out Loud Dialogue and Zooming in on the Number Line (pages T7-T8).
- In a "Teacher Copy" of the Student Worktext, work through problem #1 and read the *Thinking Out Loud* Dialogue (page 3).
- In the Student Worktext, read the yellow box "Using a number line..." and work through problems #13, 17 (page 4).

Lesson 2: Operations with Integers

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #5, 7, 8, 10 (pages 8-9).

Lesson 3: Checkers and Who Am I? Puzzles

- In the Teaching Guide, read the Purpose statement (page T13).
- Work through problems #4, 15, 25, 29 (pages 13-14).
- In the Teaching Guide, read the Algebraic Habits of Mind: Puzzling and Persevering call-out box (page T14).

#### Snapshot Check-ins

- Review the "Assessment Resources" sections of the Series Overview booklet (page 45).
- In the Teaching Guide, **read about this un-graded, formative assessment for Unit 2** (page T16) and **review the actual assessment** (page T43).





Lesson 4: Distance and Inequalities

- In the Teaching Guide, read the Purpose statement (page T17).
- Work through problem #3, read the three yellow boxes, and work through problem #10 (page 18).

Lesson 5: Geography of Addition and Subtraction

- In the Teaching Guide, read the Purpose statement (page T20) and the sidebar remarks under the heading "What if..." (page T21).
- Work through problems #5, 15 (pages 21-22).

Lesson 6: Algebra on the Number Line

- In the Teaching Guide, read the Purpose statement (page T23).
- Work through problem #3, read the *Thinking Out Loud* Dialogue, and work through problems #4, 5 (page 25).

**Exploration: Color Tower 2** 

- Read the "Explorations" section of the Series Overview booklet (pages 26-28).
- In the Student Worktext, read over the Exploration (pages 32-33).
- *Optional:* Work through the Exploration. You will need two colors of blocks or squares to manipulate.
- Read the entire Teaching Guide for the Exploration (pages T28-T29).

You have two piles of blocks, one blue and one green.





(1) How many different ways can you arrange **two** colors to make a tower that is exactly **3** blocks tall?

### Unit Assessments

- In the Teaching Guide, read about this summative assessment for Unit 2 (page T25) and review the actual assessment (pages T45-46).
- In the Student Worktext, review the Unit Additional Practice (pages 35-36) and compare it with the Unit Assessment. Students should be made aware that the Unit Additional Practice is very similar to the Unit Assessment and that they can use it to prepare and to ensure that they fully understand each problem type before the Unit Assessment.

# Unit 3: Micro-Geography of the Number Line

#### Introduction

- In the Unit 3 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » Read the Mental Mathematics introduction, "Complements and distance: fractions and decimals," and the first page of Mental Mathematics, "Comparing to 0.5," (pages T44-T45).
- Read Chapter 3 of <u>Making Sense of Algebra</u>, "Solving and Building Puzzles."
- Watch this video: "Where Am I? Puzzles develop students' algebraic reasoning" (sixth video under the first tab "Using TTA" on transitiontoalgebra.com).
- In the Unit 3 Student Worktext, read the "Dear Student" letter on the inside cover.

#### Lesson 1: Placing Decimals

- In the Teaching Guide, read the Purpose statement and the two sidebar remarks beginning with "When saying decimals out loud..." and "Even among well-educated adults..." (pages T7-T8).
- Work through problems #5, 7-12, 20 (pages 3-4).

Lesson 2: Operations with Decimals

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #9, 20 (pages 8-9).

#### Lesson 3: Decimal Distance

- In the Teaching Guide, read the Purpose statement and the Launch: Comparing Distance between Decimals (page T13).
- Work through problems #1, 13 (pages 12-13).

#### Lesson 4: Placing Fractions

- In the Teaching Guide, read the Purpose statement (page T16) and the sidebar remarks under the heading "What if..." (page T17).
- In the Student Worktext, read the two rounded rectangles on page 18 (at the top and surrounding problem 3) and the two rounded rectangles at the top of page 20.
- Work through problems #4, 22 (pages 18-20).





Lesson 5: Equivalent Fractions

- In the Teaching Guide, read the Purpose statement (page T18).
- Read over problems #4-11 (pages 23-24).
- Work through problems #8f, 8g, 10 (page 24).
- In the Teaching Guide, read Student Problem Solving and Discussion (pages T19-T20).

Lesson 6: Ordering Fractions

- In the Teaching Guide, read the Purpose statement (page T21) and the Algebraic Habits of Mind: Seeking and Using Structure call-out box (page T22).
- Work through problems #8-10 (pages 27-28).

### Lesson 7: Fraction Distances

- In the Teaching Guide, read the Purpose statement (page T24).
- Work through problems #2, 6 (page 31).

### SolveMe Who Am I?

- Go to solveme.edc.org and click "Who Am I?"
- Click the hexagonal "Play" button and explore some puzzles.
  - » Explorer puzzles: #17, 42, 59
  - » Puzzler puzzles: #80, 95, 118, 130
  - » Optional: Master puzzles: #152, 167, 199
- Go back to the Main Menu, click the hexagonal "Information" button (with a question mark), and **read the information under the "Build" tab.**



• Build a Who Am I? puzzle.

## Optional Puzzle Break





# Unit 4: Area and Multiplication

#### Introduction

- In the Unit 4 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » Read the Mental Mathematics introduction, "Base 10 structure: place value" (page T50).
- **Read Chapter 2 of** <u>Making Sense of Algebra</u>, "Mental Mathematics is More Than Mental Arithmetic."
- Watch this video: "MysteryGrid puzzles foster mathematical perseverance" (third video under the first tab "Using TTA" on transitiontoalgebra.com).
- In the Unit 4 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: MysteryGrid Puzzles

- In the Teaching Guide, read the Purpose statement (page T7).
- In the Student Worktext, **read the MysteryGrid Puzzle** Instructions (page 4).
- Work through problems #6, 13 (pages 3-4).
- While all students should complete the Important Stuff sections, the remaining sections of each lesson are designed for differentiation, including the more challenging Stuff to Make You Think and Tough Stuff sections as well as the Additional Practice, which is at the same level of difficulty as the Important stuff. Review the "Student Problem Solving" section of the Series Overview booklet (page 43).
- Work through problem #25 (page 5).

#### Lesson 2: Multiplication Patterns

- In the Teaching Guide, read the Purpose statement (page T11).
- Work through problems #5, 15 (pages 7-8).
- In the Teaching Guide, read the bold discussion prompts and their commentary (pages T13-T14).

Algebraic Habits of Mind: Seeking and Using Structure				
ach row and column in the multiplication table is like a number line with positive and negative values.				
The patterns continue as you cross zero even if you travel backward. $(6 - 3 - 0 - 3 - 6 - 9)$				
The rules for multiplying positive and negative numbers make sense because they keep these patterns going.				





### Lesson 3: Measuring Area

- In the Teaching Guide, read the Purpose statement (page T15).
- Work through problems #7, 24 (pages 12-13).
- In the Teaching Guide, read the sidebar remarks beginning with "If students aren't sure how to start..." (page T18).



#### Lesson 4: Area Models

- In the Teaching Guide, read the Purpose statement (page T20).
- Work through problems #1, 8 (pages 16-17) and read the Algebraic Habits of Mind: Using Tools Strategically box (page 16).
- In the Teaching Guide, **read the sidebar remarks** beginning with "You may wish to ask a volunteer to..." (page T21).

Lesson 5: Area Models with Algebra

- In the Teaching Guide, read the Purpose statement (page T23).
- Work through problems #4, 8, 9 (pages 21-22).

#### Lesson 6: Signs and Terms

- In the Teaching Guide, read the Purpose statement (page T26).
- Work through problems #6, 7, 15, 16 (pages 25-26).

Lesson 7: Squares and Like Terms

- In the Teaching Guide, read the Purpose statement (page T28).
- Work through problems #2, 9-11 (pages 30-31).

Notice how the like terms are all the same shape with the same area, like the individual little yellow x by 1 rectangles in this image.



Lesson 8: Equivalent Expressions

- In the Teaching Guide, read the Purpose statement (page T30) and the Algebraic Habits of Mind: Communicating with Precision call-out box (page T31).
- Optional: Work through problems #1-7 (pages 34-35). You will need scissors and tape or glue.

Optional Theme: Algebraic Multiplication on the Number Line

- Work through problems in:
  - » Lesson 2 #26-31 (page 10).
  - » Lesson 4 #22-26 (page 18).
  - » Lesson 6 #29-33 (page 28).
  - » Lesson 8 #11-13, 16 (page 36).

## SolveMe MysteryGrid

- Go to solveme.edc.org and click "MysteryGrid."
- Click the "Information" button (with a question mark), and **read the information under the "Play" tab**.
- Go back to the Main Menu and click the "Play" button and explore some puzzles.
  - » Explorer puzzles: #13, 32
  - » Puzzler puzzles: #65, 97, 111
  - » Optional: Master puzzles: #124, 154
- Go back to the Main Menu, click the "Information" button (with a question mark), and **read the information under both the "Build" and "Share" tabs**.
- Build a MysteryGrid puzzle and share it with someone.



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## Optional Puzzle Break





10,+			14,+
10,+		1,-	
35,•	3,-		

# Unit 5: Logic of Algebra

### Introduction

- In the Unit 5 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T7).
  - » Read the Mental Mathematics introduction, "Any order, any grouping (commutative and associative) property of multiplication: combining multiplications and divisions by 2 and 10" (page T52).
- Read Chapter 6 of <u>Making Sense of Algebra</u>, "Thinking Out Loud."
- Watch this video: "Mystery Number Puzzles help students reason through equations" (fifth video under the first tab "Using TTA" on transitiontoalgebra.com).
- In the Unit 5 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: Staying Balanced

- In the Teaching Guide, read the Purpose statement (page T8).
- Work through problems #2, 3 (page 3).

Lesson 2: Mobiles and Equations

- In the Teaching Guide, read the Purpose statement (page T11).
- Work through problems #2, 4 and read the Algebraic Habits of Mind: Using Tools Strategically box (page 8).

Lesson 3: Keeping Track of Your Steps

- In the Teaching Guide, read the Purpose statement (page T15).
- Work through problems #2-6 and read the Thinking Out Loud dialogue (pages 13-14).
- In the Teaching Guide, read the Algebraic Habits of Mind: Seeking and Using Structure call-out box (page T15).

Lesson 4: Arranging Instructions in Order

- In the Teaching Guide, read the Purpose statement (page T17).
- Work through problems #1, 13 (pages 18-19).





Lesson 5: The Language and Logic of Expressions

- In the Teaching Guide, read the Purpose statement (page T21), the Algebraic Habits of Mind: Seeking and Using Structure call-out box (page T21), and the sidebar remarks beginning with "This tricky language..." (page T22).
- Work through problems #1, 4, 26 (pages 23-25) and read the box "Divide the result by" or "divide by the result"? (page 23) and the Algebraic Habits of Mind: Communication with Precision box (page 24).

Lesson 6: Solving Equations One Chunk at a Time

- In the Teaching Guide, read the Purpose statement and the Algebraic Habits of Mind: Seeking and Using Structure call-out box (page T23).
- In the Student Worktext, read the Thinking Out Loud dialogue and the Algebraic Habits of Mind: Seeking and Using Structure box, and work through problems #4, 5 (page 28).

Lesson 7: Solving with Squares

- In the Teaching Guide, read the Purpose statement (page T25).
- Work through problems #1, 7-9 (pages 33-34).
- In the Teaching Guide, read the bold discussion prompts and their commentary (page T26).

Lesson 8: Solving with Systems

- In the Teaching Guide, read the Purpose statement (page T27).
- Work through problems #7, 16 (pages 38-40).

A **system of equations** is a set of equations that all use the same set of variables. Solving a system of equations means finding one value for each of the variables in a way that makes all of the equations true simultaneously. For example, this system has the solution c = 6, t = 3, and q = 9:

$$3t + c + q = 24$$
$$2t + c = 12$$
$$c = 2t$$

Solving a system of equations is a lot like solving a mobile puzzle. In fact, this system of equations matches the mobile in problem 1. Can you see where each equation appears in the mobile?



# Unit 6: Geography of the Coordinate Plane

#### Introduction

- In the Unit 6 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » Read the Mental Mathematics introduction, "Using approximations to make exact calculations" (page T51).
- Read Chapter 4 of <u>Making Sense of Algebra</u>, "Extended Investigations for Students."
- Watch these videos:
  - » "Explorations focus on a single problem in great depth" (second video under the first tab "Using TTA" on <u>transitiontoalgebra.com</u>).
  - » "How the Exploration in Transition to Algebra foster mathematical thinking" (second video under the second tab "Author Interviews" on <u>transitiontoalgebra.com</u>).
- In the Unit 6 Student Worktext, **read the "Dear Student" letter** on the inside cover.

### Lesson 1: Plotting Data

- In the Teaching Guide, read the Purpose statement (page T7).
- In the Student Worktext, read the Algebraic Habits of Mind: Communicating with Precision box (page 3) and work through problems #6, 9 (page 4).

#### Lesson 2: Coordinating Data

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #1-4 (page 7).
- In the Teaching Guide, read the bold discussion prompts and their commentary (pages T12-T13).

Lesson 3: Geometric Transformations

- In the Teaching Guide, read the Purpose statement (page T14).
- Work through problems #1, 6 and read the Algebraic Habits of Mind: Describing Repeated Reasoning box (pages 12-13).







Lesson 4: Transformations with Algebra

- In the Teaching Guide, read the Purpose statement (page T17).
- Work through problems #1, 3 (page 17).
- In the Teaching Guide, read the Algebraic Habits of Mind: Seeking and Using Structure call-out box (page T18).

Lesson 5: Intuitive Graphing

- In the Teaching Guide, read the Purpose statement (page T20).
- Optional: work through problems #1-6 (page 22). You will need scissors and tape or glue.
- Work through problems #11, 12 (page 23).

Lesson 6: Solutions and Point Testing

- In the Teaching Guide, read the Purpose statement (page T23).
- Work through problems **#1**, **4**, **5**, **8**, **9** (pages 27-28).

Lesson 7: Graphing Relationships

- In the Teaching Guide, read the Purpose statement (page T27) and the Algebraic Habits of Mind: Using Tools Strategically call-out box (page T28).
- Work through problems #1-4 (page 32).

Life is hard enough! When you are looking for solution points, you might as well choose "easy" values. A lot of times, using 0 for x is easy. Sometimes, using 0 for y is easy, too. Using 1 and -1 for x also makes calculations simpler. Or, if you see the graph is following a pattern, guess a solution point and test it.

#### Exploration: Boxes of Chocolates

- Work through problems **#1-6** (pages 37-38).
- Read the entire Teaching Guide for the Exploration (pages 31-34).



# Unit 7: Thinking Things Through Thoroughly

#### Introduction

- In the Unit 7 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T8).
  - » **Read the Mental Mathematics introduction**, "Distributive property and distance" (page T40).
- Watch these videos:
  - » "The power of head-less and tail-less word problems" (first video under the first tab "Using TTA" on <u>transitiontoalgebra</u>. <u>com</u>).
  - » "How to leverage the instructional value of logic puzzles" (fifth video under the second tab "Author Interviews" on <u>transitiontoalgebra.com</u>).
- In the Unit 7 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: What Can You Say for Sure?

- In the Teaching Guide, read the Purpose statement (page T9).
- Work through problems #1, 2 (page 3).

Lesson 2: Asking Good Questions

- In the Teaching Guide, read the Purpose statement (page T11).
- Work through problems #1, 3 (pages 8-9).

Lesson 3: Repeating and Generalizing

- In the Teaching Guide, read the Purpose statement (page T14).
- Work through problems #1, 2 (page 13) and read the Thinking Out Loud dialogue.

<b>Plan A:</b> Pay a monthly fee of \$20 plus \$5 for each visit.	Algebraic Habits of Mind: Describing Repeated Reasoning
<ul> <li>Find Malika's total cost (c) for the month if she makes v visits.</li> <li>Try some numbers first.</li> <li>What is the total cost if Malika makes 7 visits?</li> </ul>	The goal here is to get a sense of the <i>rhythm</i> of the calculations so you can repeat that pattern with a variable instead of a number. Record each step you take; you will look back to the patterns in your calculations to describe
<b>b</b> What is the total cost if Malika makes 30 visits?	the situation with algebra soon.





Lesson 4: Mapping It Out

- In the Teaching Guide, read the Purpose statement (page T18).
- Work through problem #1 (page 18).
- In the Teaching Guide, read the Algebraic Habits of Mind: Using Tools Strategically call-out box and the bold discussion prompts and their commentary (page T19).



## Lesson 5: Logic Games

- In the Teaching Guide, read the Purpose statement (page T20).
- Work through problems #1, 3 (page 23).
- Optional: try these Stuff to Make You Think MysteryGrids with algebra (page 25):



Lesson 6: Liars and Truthtellers

- In the Teaching Guide, read the Purpose statement (page T23).
- Work through problems #1, 3 (pages 28-29).

# Unit 8: Logic of Fractions

### Introduction

- In the Unit 8 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » **Read the Mental Mathematics introduction**, "Fractions, approximation, and factors" (page T51).
- In the Unit 8 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: Rational Relationships

- In the Teaching Guide, read the Purpose statement (page T7).
- Work through problems #1, 7, 9, 14 (pages 3-5).

Lesson 2: Multiplying with Fractions

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #1, 3 (page 9).

Lesson 3: Fractions and Area Models

- In the Teaching Guide, read the Purpose statement (page T14).
- Work through problems #1, 4, 7, 12 (pages 14-15).
- In the Teaching Guide, read the Algebraic Habit of Mind: Using Tools Strategically call-out box and the bold discussion prompts and their commentary (pages T14-T15).

Lesson 4: Rewriting Rational Expressions

• In the Teaching Guide, read the Purpose statement (page T17).



• Work through problems #10, 13 (page 20).





Lesson 5: Scaling to Solve

- In the Teaching Guide, read the Purpose statement (page T21).
- Work through problems **#5, 9** (page 26).

#### Lesson 6: Scaling to Add

- In the Teaching Guide, read the Purpose statement (page T23).
- Read the Thinking Out Loud dialogue and work through problem #9 (pages 30-32).

Discuss & Write What You Think
(9) You may have been taught a method for adding fractions by considering equivalent fractions. How does this model show that $\frac{1}{2} + \frac{1}{5} = \frac{7}{10}$ ? 1 half 1 half 7 tenths

Lesson 7: Proportional Reasoning

- In the Teaching Guide, read the Purpose statement (page T25).
- Work through problems #1, 10 (page 35).
- In the Teaching Guide, read the Algebraic Habits of Mind: Describing Repeated Reasoning call-out box and the bold discussion prompts and their commentary (page T26).

Lesson 8: Fractions and Graphs (Rates of Change)

- In the Teaching Guide, read the Purpose statement (page T27).
- Work through problem #1 (page 40).

**Optional** Puzzle Break



# Unit 9: Points, Slopes, and Lines

### Introduction

- In the Unit 9 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » **Read the Mental Mathematics introduction**, "Sight-reading algebraic expressions" (page T48).
- In the Unit 9 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: Comparing Points

- In the Teaching Guide, read the Purpose statement (page T7).
- Work through problems #3, 7 (pages 3-4).

#### Lesson 2: Distance

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #1, 2 (pages 9-10).

#### Lesson 3: Slope

- In the Teaching Guide, read the Purpose statement (page T13).
- Work through problems #1, 2 (pages 15-16).





In a science lab, tubs of water are filled and emptied at different rates. Tubs A-F are shown in the graphs below.



Lesson 4: Slopes and Lines

- In the Teaching Guide, read the Purpose statement (page T16).
- Work through problems #4-7, 14 (pages 20-21).

Lesson 5: Collinearity

- In the Teaching Guide, read the Purpose statement (page T20).
- Work through problems #1-3, 6 (pages 25-26).
- In the Teaching Guide, read the bold discussion prompts and their commentary (page T22).

Lesson 6: Generalizing the Equation of a Line

- In the Teaching Guide, read the Purpose statement and the Algebraic Habits of Mind: Describing Repeated Reasoning call-out box (page T23).
- Work through problem #1 (page 29).

Lesson 7: Linear Equations and Graphs

- In the Teaching Guide, read the Purpose statement (page T25).
- Work through problems #1, 4 (page 33).

Exploration: Seeing the Pythagorean Theorem

- In the Teaching Guide, read the purpose for Exploration (page T29).
- In the Student Worktext, read over the steps in problem #3 (page 39).
- Optional: Work through problems #1-4 (pages 38-40). You will need scissors and tape or glue.





Your cutout should look like this.



**f** Now cut the cutout into 3 pieces.



**(g)** Glue or tape the biggest piece back down.



# Unit 10: Area Model Factoring

### Introduction

- In the Unit 10 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » **Read the Mental Mathematics introduction**, "Factors, products & sums and percentage calculations" (page T37).
- In the Unit 10 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: Division Undoes Multiplication

- In the Teaching Guide, read the Purpose statement (page T7).
- Work through problems #7, 20 (pages 3-4).

Lesson 2: Area Model Inside Out

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #3, 15 (pages 7-8).

#### Lesson 3: Factoring

- In the Teaching Guide, read the Purpose statement (page T13).
- Work through problems #10, 11 (page 12).

Lesson 4: Products, Sums, and Signs

- In the Teaching Guide, read the Purpose statement (page T17).
- Work through problems #2, 8, 9 (pages 18-19).

#### Lesson 5: Zero Product Property

- In the Teaching Guide, read the Purpose statement (page T20).
- Work through problems #8, 9, 16, 21 (pages 25-26).

#### Lesson 6: Solving by Factoring

- In the Teaching Guide, read the Purpose statement (page T22).
- Work through problems #1, 9 (pages 29-30).

Factoring can help solve equations. If we know  $x^2 - 8x - 33 = 0$  and we factor:  $x^2 - 8x - 33 = (x - 11)(x + 3)$ , we can write (x - 11)(x + 3) = 0 instead. Since either x - 11 = 0 or x + 3 = 0, we know x = 11 and x = -3 are solutions.





# Unit 11: Exponents

### Introduction

- In the Unit 11 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » **Read the Mental Mathematics introduction**, "Making sense of exponents" (page T43).
- In the Unit 11 Student Worktext, read the "Dear Student" letter on the inside cover.

Lesson 1: Multiplication World

- In the Teaching Guide, read the Purpose statement (page T7).
- Work through problems #5-8 (page 4).

#### Lesson 2: Exponents

- In the Teaching Guide, read the Purpose statement (page T10).
- Work through problems #1-3, 10 (pages 8-9).

Lesson 3: Extending Exponents

- In the Teaching Guide, read the Purpose statement (page T13).
- Work through problem #7 (page 12).

Lesson 4: Equivalent Expressions

- In the Teaching Guide, read the Purpose statement (page T16).
- Work through problems #2, 4 (page 17).

#### Lesson 5: Area Models

- In the Teaching Guide, read the Purpose statement (page T19).
- Work through problems #1, 10 (pages 20-21).

Lesson 6: Simplifying Expressions

- In the Teaching Guide, read the Purpose statement (page T22).
- Work through problems #4, 8, 12 (pages 24-25).

#### Lesson 7: Fractions in Exponents

- In the Teaching Guide, read the Purpose statement (page T24).
- Work through problem #11, 16 (page 28-29).







A rumor spreads by multiplication. Each person in this picture tells a secret to just two new people. Black spreads the rumor to the reds, who tell the blues, who tell the purples...

# Unit 12: Algebraic Habits of Mind

### Introduction

- In the Unit 12 Teaching Guide,
  - » Read the Unit Introduction (pages T4-T6).
  - » Read the Mental Mathematics introduction, "Review" (page T55).
- In the Unit 12 Student Worktext, **read the "Dear Student" letter** on the inside cover.

Lesson 1: Language and Logic of Algebra

- In the Teaching Guide, read the Purpose statement (page T7).
- Work through problems #4-6, 24, 27 (pages 3-5), and read the Algebraic Habits of Mind: Puzzling and Persevering box (page 5).
- In the Teaching Guide, read the bold discussion prompts and their commentary (page T8).

Lesson 2: Reasoning about Points on a Line

- In the Teaching Guide, read the Purpose statement (page T9).
- Work through problems #6-7 (page 9).

Lesson 3: Multiplying and Un-multiplying

- In the Teaching Guide, read the Purpose statement (page T12).
- Work through problems #8, 14, 19 (pages 15-17).

Lesson 4: Reasoning about Points and Lines on a Plane

- In the Teaching Guide, read the Purpose statement (page T14).
- In the Student worktext, read the boxes titled "Distance" and "Slope" (pages 20-21).
- Work through problems #2, 10 (pages 20-21).

#### Lesson 5: Solving Strategically

- In the Teaching Guide, read the Purpose statement (page T16).
- Work through problems #6, 14, 18, 27 (pages 25-27).

For questions about the TTA curriculum, please contact <u>ttalgebra@edc.org</u>.

Best of luck to you and your students!



