

# Station Activities

## for Mathematics

Grade 7



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# Introduction

## Instruction

This book includes a collection of station-based activities to provide students with opportunities to practice and apply the mathematical skills and concepts they are learning. It contains five sets of activities for each of the four strands: Number and Operations; Geometry and Measurement; Algebra; and Data Analysis and Probability. You may use these activities in addition to the direct instruction lessons, or, especially if a pre-test or other formative assessment suggests it, instead of direct instruction in areas where students have the basic concepts but need practice. The debriefing discussions after each set of activities provide an important opportunity to help students reflect on their experiences and synthesize their thinking. It also provides an additional opportunity 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 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 below, 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.

### Materials List

#### Class Sets

- calculators
- rulers
- protractors
- scissors

#### Station Sets

- fraction circles
- algebra tiles and equation mats
- counters (50–100 chips, counters, beans, pennies)
- tiles ( +/– 25 of each of several colors)
- integer chips
- rectangular prism
- regular shapes (triangle, square, pentagon, hexagon, heptagon, octagon, nonagon, decagon, dodecagon)
- variety of round objects
- string
- box/container 2 in.  $\times$  4 in.  $\times$  8 in.
- 64 1-inch cubes
- cylinder
- geoboards and rubber bands
- spinners
- Unifix or other connecting cubes
- colored cubes
- bags (fabric or opaque paper)

#### Ongoing Use

- index cards (need to be prepared according to specifications in teacher notes for many of the station activities)
- graph paper
- pencils
- highlighters of several colors
- pencils/markers of several colors
- pennies
- number cubes

#### Other

- bags of fun-size M&Ms®
- boxes of toothpicks

#### Overhead Manipulatives (optional)

- clock
- algebra tiles
- geometric shapes
- protractor
- tiles
- fraction circles
- spinners

# Algebra

## Set 4: Solving Equations

### Instruction

**Goal:** To provide opportunities for students to develop concepts and skills related to solving equations

#### NCTM Standards, Grades 6–8

##### Algebra

Represent and analyze mathematical situations and structures using algebraic symbols; develop an initial conceptual understanding of different uses of variables; recognize and generate equivalent forms for simple algebraic expressions and solve linear equations.

### Student Activities Overview and Answer Key

#### Station 1

Students are given a set of cards with linear equations written on them. They are given another set of cards with values of the variable written on them. Students work together to match each equation to its solution. Once students have paired the cards, they reflect on the strategies they used.

**Answers:** The cards should be paired as follows:  $x + 8 = 3$  and  $x = -5$ ,  $-4x + 28 = 4$  and  $x = -6$ ,  $x - 2 = 1$  and  $x = 3$ ,  $x + 4 = 7$  and  $x = 3$ ,  $x = 1$  and  $x = 1$ ,  $x + 6 = 10$  and  $x = 4$ .

**Possible strategies:** Choose an equation. Check each value of  $x$  in the equation to see if it is a solution. Alternatively, solve the equation and look for its solution among the values of  $x$ .

#### Station 2

Students work together to use algebra tiles to represent linear equations. Then they use the tiles to help them solve the equations. Students explain the strategies they used to manipulate the tiles and solve the equations.

**Answers:** 1.  $x = 4$ , 2.  $x = -6$ , 3.  $x = -2$ , 4.  $x = -6$ , 5.  $x = 4$ , 6.  $x = 3$

**Possible strategies:** Remove the same number of yellow tiles as the same number of red tiles from both sides of the mat. Add the same number of red tiles or yellow tiles to both sides, and then remove zero pairs. Divide the tiles on each side of the mat into the same number of equal groups, and remove all but one of the groups on each side. The remaining group shows the solution.

**Station 3**

In this activity, students use cups and counters to model linear equations. In the given pictures, each cup is holding an unknown number of counters. Students use this idea to write the equation that is modeled by each picture. Then they use actual cups and counters, as well as logical reasoning, to help them find the unknown number of counters in each cup. This is equivalent to solving the corresponding equation.

**Answers:** 1.  $x + 3 = 10$ ,  $x = 7$ ; 2.  $2x = 10$ ,  $x = 5$ ; 3.  $2x + 3 = 7$ ,  $x = 2$ ; 4.  $3x = 6$ ,  $x = 2$

**Station 4**

Students are given a set of equations and a set of real-life situations. They work together to match each situation to an equation. Then they solve the equation. At the end of the activity, students explain the strategies they used to match the equations to the situations.

**Answers:** 1.  $2x + 3 = 10$ ,  $x = 3.5$ ; 2.  $3x - 2 = 4$ ,  $x = 2$ ; 3.  $2x - 3 = 10$ ,  $x = 6.5$ ; 4.  $3x + 2 = 10$ ,  $x = 2.67$

Possible strategies: Use the words in phrases that refer to arithmetic operations as clues to identifying the corresponding equation. For example, gathering equal groups of objects corresponds to multiplication.

**Materials List/Set Up**

**Station 1** set of 6 index cards with the following equations written on them:  
 $x + 8 = 5$ ,  $-4x = 24$ ,  $x/2 = -2$ ,  $x - 7 = -4$ ,  $3 = x/2$ ,  $-24 = -6x$   
set of 6 index cards with the following values of  $x$  written on them:  
 $x = -6$ ,  $x = -4$ ,  $x = -3$ ,  $x = 3$ ,  $x = 4$ ,  $x = 6$

**Station 2** algebra tile; equation mat

**Station 3** 3 paper cups; 12 counters or other small objects, such as pennies or beans

**Station 4** none

**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. What are some different tools, objects, or drawings that you can use to help you solve equations?
2. How do you solve an equation using inverse operations?
3. How do you know which operation to use first when you solve a two-step equation?
4. How can you check your solution to an equation?

**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. Algebra tiles, cups and counters, drawings of balance scales, etc.
2. Isolate the variable by applying inverse operations to both sides of the equation.
3. You usually add or subtract on both sides of the equation before you multiply or divide on both sides of the equation. (This reverses the order of operations to “undo” the operations on the variable.)
4. Substitute the value for the variable in the equation and simplify. If the solution is correct, the two sides of the equation should be equal.

**Possible Misunderstandings/Mistakes**

- Using an incorrect operation to solve an equation (e.g., solving  $x + 3 = 12$  by adding 3 to both sides)
- Attempting to solve an equation such as  $x + 4 = 9$  by subtracting  $x$  from both sides
- Applying an operation that does not isolate the variable (e.g., solving  $9 = 3x$  by dividing both sides by 9)

NAME: \_\_\_\_\_

## Algebra

### Set 4: Solving Equations

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#### Station 1

At this station, you will find a set of cards with the following equations written on them:

$x + 8 = 5$

$-4x = 24$

$\frac{x}{2} = -2$

$x - 7 = -4$

$3 = \frac{x}{2}$

$-24 = -6x$

You will also find a set of cards with the following values of  $x$  written on them:

$x = -6$

$x = -4$

$x = -3$

$x = 3$

$x = 4$

$x = 6$

Work with other students to match each equation with its solution.

Work together to check that each equation is paired with its correct solution. Write the pairs below.

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Explain the strategies you used to match up the cards. \_\_\_\_\_

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NAME: \_\_\_\_\_

## Algebra

### Set 4: Solving Equations

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#### Station 2

You can use algebra tiles to help you solve equations.

Each square yellow tile shows  $+1$ . Each square red tile shows  $-1$ . Each rectangular yellow tile shows  $x$ . Use the equation mat to show the two sides of an equation.

Work together using algebra tiles to show each equation.

Then work together using the tiles to solve the equation. Write the answers below.

1.  $x + 4 = 10$  \_\_\_\_\_

2.  $x + 7 = 2$  \_\_\_\_\_

3.  $x - 5 = -7$  \_\_\_\_\_

4.  $2x = -10$  \_\_\_\_\_

5.  $2x + 1 = 9$  \_\_\_\_\_

6.  $8 = 4x - 4$  \_\_\_\_\_

Explain at least two strategies you used to solve the equations using algebra tiles.

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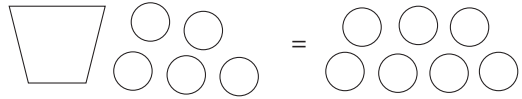
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**Algebra****Set 4: Solving Equations****Station 3**

In each picture, the cup is holding an unknown number of counters,  $x$ . If there is more than one cup, every cup is holding the same number of counters.

Each picture shows an equation. This picture shows  $x + 5 = 7$ . To make the two sides equal, there must be 2 counters in the cup.

This means  $x = 2$ .



Work with other students to write an equation for each picture. Then find the number of counters in each cup. You can use the cups and counters at the station to help you.

1. Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

2. Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

3. Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

4. Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

**Algebra****Set 4: Solving Equations****Station 4**

At this station, you will match equations to real-life situations and then solve the equations.

Work with other students to match each situation to one of the following equations. When everyone agrees on the correct equation, write it on the line. Then work together to solve it.

$2x - 3 = 25$

$2x + 3 = 25$

$3x + 2 = 25$

$3x - 25 = 2$

1. Rosa bought some notebooks that cost \$2 each. She also bought a compass that cost \$3. She spent a total of \$25. How many notebooks did she buy?

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

2. Ms. Chen brought 3 packages of pencils for her class. Each package contained the same number of pencils. The 25 students in her class each took one pencil. There were 2 pencils left over. How many pencils were in each package?

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

3. Tyler bought two copies of a DVD to give as gifts. He had a coupon for \$3 off his total purchase. The final cost of the DVDs was \$25. How much did each DVD cost?

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

4. A bowl can hold 25 fluid ounces of liquid. Omar empties a full teacup of water into the bowl 3 times. Then he adds another 2 fluid ounces of water to fill the bowl. How many fluid ounces of liquid does the teacup hold?

Equation: \_\_\_\_\_

Solution: \_\_\_\_\_

Explain the strategies you used to match the equations to the situations. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_