AVID Summer Bridge

Curriculum Sampler

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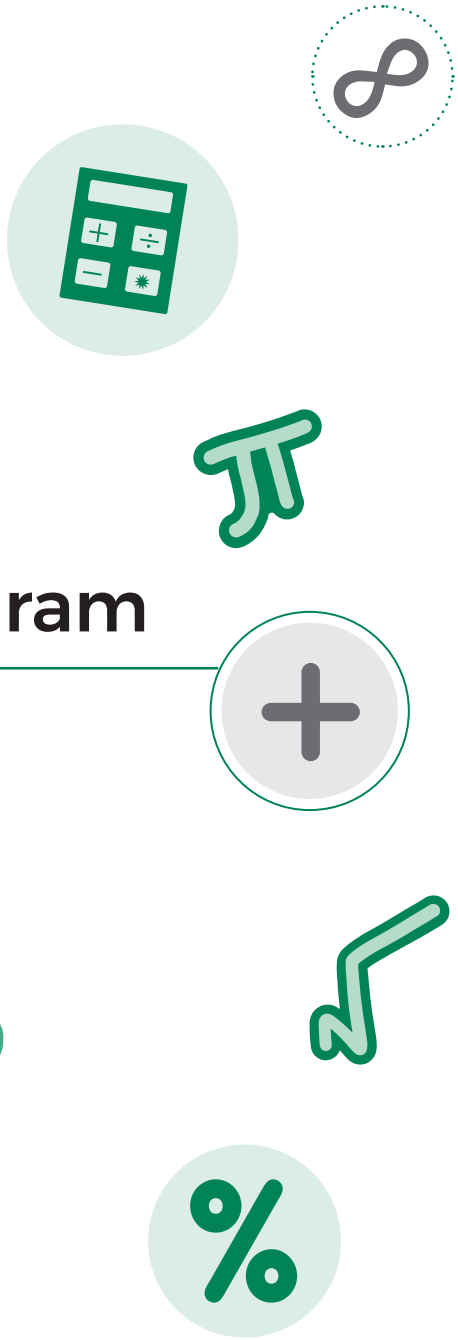
AVID Math
Summer Bridge Program

ALGEBRA READINESS



AVID Algebra Readiness Summer Bridge Program

The *Algebra Readiness Summer Bridge Program* is all about students: students learning math, students growing in problem-solving and critical-thinking abilities, students having fun, students growing in confidence about their math abilities, and students participating in a positive learning environment. *Algebra Readiness* is a three-week program of intensive math content and support activities, which teach eighth-grade and algebraic concepts in order to prepare students for Algebra 1. It can also be used to strengthen students' knowledge and skills prior to, or after, the eighth-grade math classes. The program also incorporates strategies to help English language learner (ELL) students accelerate the development of academic English skills that they need to succeed in math courses.

Math Content and Practices

The curriculum focuses on the fundamental content and practices that must be understood in order to provide a solid foundation for Algebra 1. Some of the math concepts may be quite challenging to students, but they should have been introduced to them in the previous school year. Students will assimilate the concepts at different rates, which requires that the teacher be mindful of the needs of specific classes.

Content

- Ratios and proportional relationships
- Algebraic expressions and equations
- Operations with rational numbers
- Coordinate graphing and transformations
- Multiple representations of functions
- Linear relationships
- Geometrical figures
- Inequalities and irrational numbers

Practices

- Make sense of problems
- Reason abstractly and quantitatively
- Analyze and explain problems and processes
- Discern patterns and structures
- Model with mathematics
- Construct viable arguments
- Apply conceptual understanding
- Attend to precision
- Express regularity in repeated reasoning

While keeping in mind the admonition that "telling is not teaching," the content is taught primarily through inquiry processes. The lessons and activities are collaborative, engaging, and effective in order to promote deep conceptual learning for students. However, the teacher remains the most critical element in a classroom. If the curriculum is taught in an energetic and engaging way, with a positive attitude and with care and concern for the students, it will build students' math skills, as well as their confidence.

Structure of the Program

WICOR® STRATEGIES: The rigorous math content of *Algebra Readiness* is taught with the foundational AVID strategies of Writing, Inquiry, Collaboration, Organization, and Reading (WICOR). Students consistently engage in collaborative learning and frequently teach each other in small-group work and presentations, which engage them actively in the thinking process. Examples of the commonly used WICOR strategies are:

- Focused note-taking
- Collaborative group work and team-building activities
- Learning logs, quickwrites, and Philosophical Chairs discussions
- Interactive Notebooks for organizing notes, data, assignments for processing the content, and reflections on the learning

GUILDS: Students in the *Algebra Readiness Summer Bridge Program* work in "guilds," which compete with each other to earn points. Daily guild challenges review mathematical principles and promote collaborative learning. Students enjoy the competition and love the individual recognition! Although the lessons and activities in the Summer Bridge Program are rigorous, it is important that students have fun while learning in a summer program so that they do not feel that the program is "school as usual." Please make your students feel like superstars during the Summer Bridge Program.

CLASS TIME: Time is a significant factor during the Summer Bridge Program. Please be mindful of the clock as you teach and use your best judgment on extending or shortening lessons or activities. Each of the activities in the units are important for building solid mathematical foundations. It is best to teach the activities in the order presented and omit the last activity of the unit if necessary. However, the last activity is usually a writing reflection, and it is extremely important for students to write and synthesize their thoughts. Include these activities whenever possible.

It is difficult to gauge the appropriate number of example questions to include in activities and notes throughout the Summer Bridge Program. All teachers will have a varying number of students in their classes with various ability levels. For that reason, teacher discretion and judgment must be used in providing initial discussions or review problems before some activities and during some focused note-taking lessons. Additionally, you may find that there are too few examples and that your students need more. Please add example problems and scaffolding opportunities into your lessons, based upon the needs of your students.

END-OF-BRIDGE EXAMS: At the conclusion of the program, students take **district-prepared End-of-Bridge Exams** in order to form a measure of their performance on the course content. *End-of-Bridge Exams are not provided by AVID Center.* Additional measures that districts may use to consider students' entry into Algebra 1 are their math course grades from the previous school year, state exam scores, and district guidelines.

BLENDED LEARNING AND TECHNOLOGY: Since the availability of computers and internet access cannot be ensured at the sites where the Summer Bridge Program is being conducted, technology is not required for the lessons and activities. However, if there is technology access in the Summer Bridge classroom, consider engaging your students using the blended learning enhancements available in the *AVID Summer Bridge Algebra Readiness* eLearning course.

Blended learning is high-quality, efficient instruction comprising a combination of face-to-face and online learning. Educators utilize the benefits and advantages of each option to best support learning objectives. Look for the blended learning icon ( ) within the eLearning course to take advantage of these opportunities.

AVID Digital Teaching and Learning: A Blended Approach to WICOR

AVID's approach to **digital teaching and learning** ignites students' curiosity and develops their self-awareness to build the skills, behaviors, and mindsets needed to engage with technology for inquiry-based problem-solving and rigorous coursework. Educators provide multiple opportunities for students to learn and to discover all aspects of digital learning. These ongoing experiences allow students to build student agency, develop critical thinking skills, practice in a safe environment, learn from mistakes, and create technology routines. Student agency is when students believe in and activate their own potential; build relationships; persist through obstacles; and exercise their academic, social, emotional, and professional knowledge and skills.

Quality digital instruction prioritizes learning first and technology second as it prepares students for ever-changing college and career environments. Students who are proficient with digital literacy skills and practices within every content area will have the advantage of being flexible and adaptive critical thinkers who can engage with new technology in meaningful and productive ways. According to the ISTE Standards for Students, students are literate in all aspects of digital learning when they become *empowered learners, digital citizens, knowledge constructors, innovative designers, computational thinkers, creative communicators,* and *global collaborators.*

WICOR (Writing, Inquiry, Collaboration, Organization, and Reading) is an instructional approach involving both teachers and students, placing students at the center and empowering them to take ownership and agency of their learning. Students build the skills and behaviors to prepare them for mastery of rigorous coursework to ensure college and career success. A blended learning approach to WICOR amplifies and accelerates learning to build student agency by empowering students to approach anything new with curiosity, a growth mindset, and a set of technology and problem-solving skills to engage with content in meaningful ways.

When combining WICOR strategies with technology, it is important to prioritize learning outcomes first. Accordingly, the best digital resource is chosen for the task at hand. This sampling of WICOR strategies through digital resources can be used across a variety of activities, grade levels, and subject areas. Many are modeled throughout AVID professional learning. As students take ownership of their learning, encourage them to create a list of the best tools and resources that will help them choose the appropriate strategies and tools to learn, create, modify, and publish to an authentic audience.

Digital resources can often be used beyond their original purpose. For this reason, it is important for educators and students to have a growth mindset when learning and utilizing new tools. Encourage creativity and out-of-the-box thinking to increase rigor through WICOR.

The Curriculum

THE CURRICULUM GUIDE: The curriculum is designed for a 15-day program, as there are 15 consecutive, four-hour units. Units 14 and 15 contain the culminating activities to prepare students for the End-of-Bridge Exam. To allow for flexibility of order, these two units have been combined. If your Summer Bridge Program is shorter or longer than 15 days in length, you will need to adjust the units to fit your specific needs.

The first page of each unit in the curriculum guide is the unit plan, which lists the objectives, activities, handouts, resources and supplies, WICOR strategies, ELL strategies, teacher preparation items, correlation to Common Core State Standards, and vocabulary words for the lessons and activities in that unit. The times listed for each lesson and activity are suggested times. Your students may need more or less time. Common supplies (i.e., markers, pencils, scissors, etc.) are not listed on each lesson or activity, but should be available to students each day. On

the unit plan and individual lessons and activities, the handouts are understood to be distributed as one per student, unless otherwise indicated. **The handouts marked with an asterisk (*) are items that are not pre-printed in the student Interactive Notebooks and must be copied and distributed by teachers as indicated in the lessons and on the handout list in Appendix V. Supplies marked with a star (★) are items that should be readily available and that the teacher can provide without purchasing them.** Each unit begins with a warm-up and ends with a review activity or a written reflection in which students process their learning.

OFFICIAL MATH LANGUAGE: The use of official math language (OML) is emphasized throughout the curriculum and should be a continuous thread during the program. Purposeful vocabulary activities are included in many of the units. Where one has not been built in, one can be added as time allows. The Appendices contain vocabulary cards and additional vocabulary activities that can be used at any time.

ENGLISH LANGUAGE LEARNER (ELL) STRATEGIES: In order to help ELL students acquire the content knowledge within the *Algebra Readiness* program, processing strategies for the lessons provide support through vocabulary activities, student discussions of math concepts, written explanations of concepts and "gallery tours." Throughout the curriculum, you will see additional **ELL Notes**, which offer alternative ways for students to process the information. Keep in mind that ELL students may require additional processing time for the lessons.

OTHER CURRICULUM GUIDE ITEMS: Appendices in the curriculum guide contain team-builders/brain breaks, which can be used as often as needed, and a list of supplies and materials. Access the eLearning course to find electronic copies of all student handouts, a certificate template, SLAP cards, vocabulary cards, and the student Interactive Notebook.

Focused Note-Taking

Focused note-taking is a five-phase process that can be used and adjusted for various note-taking purposes. Throughout Summer Bridge, students will practice note-taking skills through the five phases of focused note-taking: taking notes in a variety of formats, processing content, connecting their thinking, summarizing information, and applying their learning.

The goal of focused note-taking is to empower students to take ownership of their learning and develop skills that will serve them in college, careers, and life. Focused note-taking may be new for students. Effectively taking and using notes takes practice. Scaffolds and suggestions for building these skills are incorporated throughout the Summer Bridge content. Additional information on the phases and formats of focused note-taking is provided in Unit 1.

Interactive Notebooks

The curriculum is written with the intention of students keeping an *Interactive Notebook* (INB) as a means of organizing and keeping track of their work. Typically, the notebooks are a record of the information to be learned ("input": notes, worksheets, and data; typically recorded on the right side) and the processing of the information ("output": explanations, reflections, and non-linguistic representations; typically recorded on the left side). During the short Summer Bridge Program, the pages will frequently be completed consecutively, rather than strictly in a right-page–left-page relationship.

A table of contents in the teacher curriculum guide and the student Interactive Notebook lists the placement of the pre-printed pages and the blank pages on which students will either glue or tape handouts or create the information. (These page entries are shaded in the teacher's guide.) If additional space is needed for a page, a "flip page" can be glued or taped onto the page. The table of contents has columns for writing in the date of each activity.

Printing the INB: Printed and bound Interactive Notebooks are available for purchase from AVID Center. Schools and teachers may also choose to (1) print the INB in its entirety from the eLearning course, (2) provide spiral notebooks in which students glue the handouts, or (3) distribute activity sheets individually and keep them in folders for students.

- **Printed INB:** Most of the handouts are pre-printed in the INB except for those that are to be distributed when they are used (e.g., items for analysis). These are marked with an asterisk (*) in the list of handouts on each unit plan. Pages are left blank for these additional pages. The INB pages are laid out to be printed two-sided. Pre-printing some of the pages in the INB will greatly minimize the use of valuable instruction time to cut handouts and glue them into the notebooks.
- **Spiral notebooks:** Individual handout pages are cut and glued in the notebooks. In regular classrooms, this is the method teachers typically use for Interactive Notebooks. In the short summer programs in which time is limited during the class period, you will have to allow extra time for students to cut and glue pages into the notebooks.
- **Distribute activity sheets individually:** If Interactive Notebooks or spiral notebooks are not used to organize student materials, you can distribute each activity sheet as it is needed and keep the completed sheets in folders for each student.

TABLE OF CONTENTS

UNIT 5:
Algebraic Concepts: Transformations and Expressions

Objectives: The Students Will...

- Use official math language (OML) to describe mathematical concepts and processes.
- Simplify algebraic expressions using the distributive property and like terms.
- Explore congruence and similarity through translations, rotations, reflections, and dilations.

Activities

- *Warm-Up* (15 min)
- *Transformation Exploration, Part 1* (40 min)
- *SLAP* (30 min)
- *Transformation Exploration, Part 2* (30 min)
- *Transformation Exploration: Card Sort and Summary* (20 min)
- *Expression-Problem Match* (15 min)
- *Substitution Crossword* (35 min)
- *See-Run-Do: Introduction to Algebra* (40 min)
- *Exit Ticket* (5 min)

Optimize student success through blended learning! Access the Blended Learning tab in your eLearning course to take advantage of these opportunities.

Handouts

- *Warm-Up, Unit 5*
- *Transformation Exploration: Translations*
- *Transformation Exploration: Rotations*
- *SLAP Cards* (2 copies of 4 sets)*
- *Transformation Exploration: Reflections*
- *Transformation Exploration: Dilation 1*
- *Transformation Exploration: Dilation 2*
- *Transformation Exploration Card Sort* (1 set per pair of students plus 1 set for the board)*
- *Expression-Problem Match*
- *Substitution Crossword*
- *See-Run-Do Equations* (1 set per group)*
- *See-Run-Do Poster* (1 per group and 1 per student)*
- *Exit Tickets* (use handout from Unit 1; 1 ticket per student)*

Resources and Supplies

- Markers, highlighters, pencils, scissors, sticky notes, glue sticks, adhesive tape, colored pencils
- 4" x 4" squares of patty paper or wax paper (5 per group)
- Envelopes (1 per pair of students)
- Cardstock
- Baggies (1 per group)
- Chart paper (optional)

Teacher Preparation

- Prepare the sets of *SLAP Cards* by copying them on cardstock and cutting them apart. The sets can be copied in color or black and white.
- Cut cards for *Transformation Exploration Card Sort* and place each set in an envelope.
- Copy *See-Run-Do Poster* (1 per group and 1 per student) and post the posters in separate locations for the activity.
- Copy and cut *See-Run-Do Equations* sets and place each set in a bag.
- Copy and cut *Exit Tickets* (if using handout from Unit 1 for activity).

WICOR Strategies

W - Reflect on learning
I - Analyze and reproduce algebraic problems
C - Collaborate on activities
O - Plan and organize using note-taking and Interactive Notebooks
R - Read and interpret math word problems

ELL Strategies

- Vocabulary building
- Peer collaboration
- Speaking and listening exercises in math
- Sentence frames
- Visuals and manipulatives

Alignment to Math Common Core State Standards: The Students Will…

- Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). (6.EE.2c)
- Apply the properties of operations to generate equivalent expressions. (6.EE.3)
- Verify experimentally the properties of rotations, reflections, and translations. (8.G.1)
- Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. (8.G.2)
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.3)
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (8.G.4)

Vocabulary

- algebraic expression
- congruent
- constant
- dilation
- reflection
- rotation
- scale factor
- similar figures
- simplify
- translation

Transformation Exploration, Part 1

INTRODUCTION

The *Transformation Exploration, Part 1* activity provides students with the opportunity to explore congruence and similarity through translations and rotations of plotted coordinates. Reflections and dilations will be explored in *Part 2*, after a *Brain Break* activity that will allow the students a mental break from the intense activity.

time

40 minutes

handouts

- *Transformation Exploration: Translations*
- *Transformation Exploration: Rotations*

supplies

- Colored pencils
- 4"x 4" squares of patty paper or wax paper (2 per group)
- Sticky notes or scratch paper (1 per group)

Teacher Directions

- Create groups of three students each. Allow them 4 minutes to discuss and write their group's definitions for the following terms on the related INB processing page. This should be done without referring to the vocabulary cards at the back of their INBs. Tell students to leave space between each definition to add the correct definition.

translation	*scale factor* (similar figures)
dilation	*polygon*
rotation	*similar*
reflection	*congruent*

- After the groups' definitions have been written, ask students to record the actual definition of each word from the *Vocabulary Cards* (Appendix I). You may want to ask volunteers to explain each of the terms to the class.
- **ELL Note:** Include the more social language of "turn or spin" (for rotation), "flip" (for reflection), "slide or move" (for translation), "same size, same shape" (congruent or rigid), "same shape, different size," (similar) and "enlarged or shrunk" (for dilation).
- Each student will complete the first two *Transformation Exploration* pages (*Translations* and *Rotations*) during Part 1 of this activity. The next two *Transformation Exploration* pages (*Reflections* and *Dilation 1*) will be completed in Part 2, and the fifth page (*Dilation 2*) is to be used as an extension for early finishers.
- On a sticky note or scrap piece of paper, have each group select and write the coordinates of one point within the region $0 \le x \le 5$ and $0 \le y \le 8$. Collect the papers with the selected points and randomly choose five points for the students to plot.
- Have each group record the points in their tables as you call them out, and plot the points on their graph paper. These five points are to be used for the starting image on all of the *Transformation Exploration* pages.

- After all points have been plotted, instruct students to connect the points using a colored pencil to form a polygon.
- Direct the groups to trace their polygons onto a sheet of patty paper with one corner of the paper at the origin and the two adjoining sides following the *x*-axis and *y*-axis of the first quadrant.
- Before students begin the activity, review the use of the "prime" notation for the transformed values. If your district/state uses the subscript notation, you may want to have students change the prime designations to the subscript notation.
- Allow the groups about 20 minutes to complete the first two *Transformation Exploration* pages *(Translations* and *Rotations)*.
- Students may have difficulty interpreting the algebraic representations of the transformations [e.g., translating from (*x*, *y*) to (*-x*, *-y*)] or answering some of the questions on the page.
- Monitor each group during this process to make sure they are on the right track. Be mindful of the students' math backgrounds and their need for support in completing the activity.
- **Teacher Note:** Maintaining students' accountability during a group activity like this can be difficult, so be sure to communicate to all students that a random member from each group will be selected to present their group's findings at the end of the activity to the class. Encourage each group to make sure everyone in their group feels comfortable talking about what they did and what they learned from the exploration.
- Since the *Transformation Exploration* activity is long and rather intense, a fun activity is inserted between Parts 1 and 2.
- The debrief of the entire activity will take place after Part 2.

Transformation Exploration: Translations

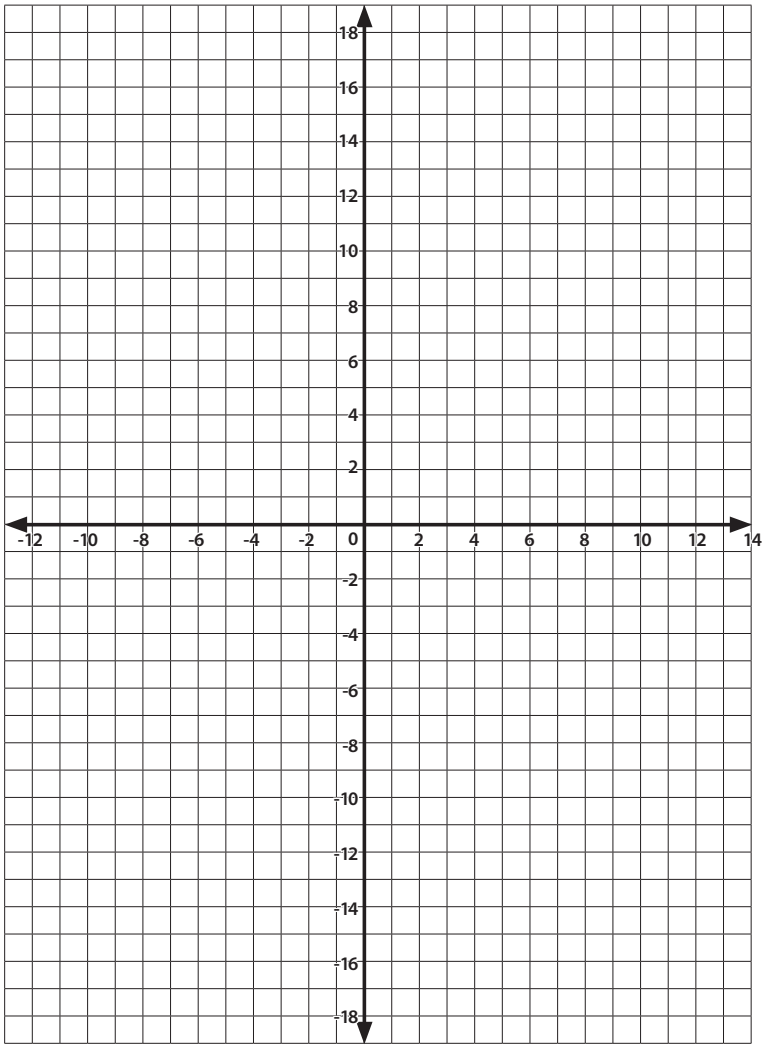
- Record the coordinates of your original polygon in the table.
- Graph the polygon on the coordinate plane.
- Translate the polygon by (-6, 4) in the table.
- Graph the translation in a different color on the coordinate plane.

Point	Original (x, y)	New Point	Translation $(x - 6, y + 4)$
A		*A'*	
B		*B'*	
C		*C'*	
D		*D'*	
E		*E'*	

Processing Notes:
- Highlight important vocabulary.
- Star important concepts.

Connecting Thinking:
Identify points of confusion.

Answer the following questions by using your table, graph, and patty paper.



Does the translation change the size? Does it change the shape? In your own words, how does a translation affect the graph of a polygon?

How do the coordinates change? How does this change show up on the graph?

Would you describe the translated polygon as similar or congruent? How do you know? (Hint: use your definitions and patty paper to check.)

SUMMARY: Summarize how translations affect a polygon.

Transformation Exploration: Rotations

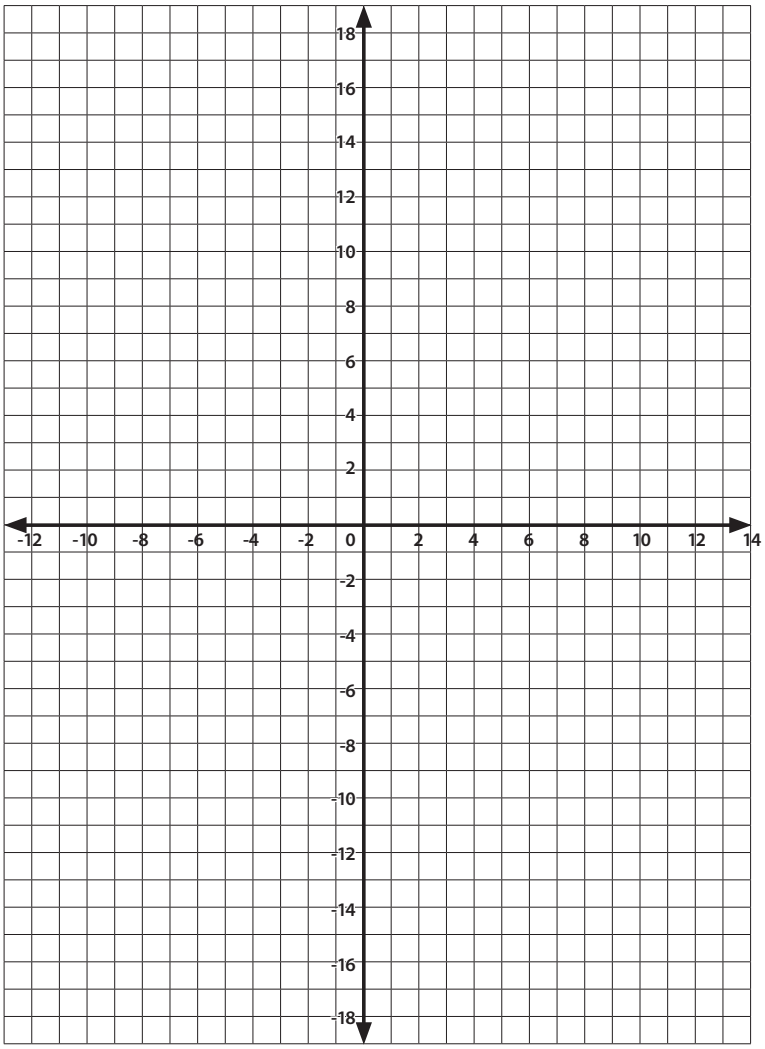
- Record the coordinates of your original polygon in the table.
- Graph the polygon on the coordinate plane.
- Translate the polygon by (*-x, -y*) in the table.
- Graph the rotation in a different color on the coordinate plane.

Point	Original (*x, y*)	New Point	Translation (*-x, -y*)
A		*A'*	
B		*B'*	
C		*C'*	
D		*D'*	
E		*E'*	

Processing Notes:
- Highlight important vocabulary.
- Star important concepts.

Connecting Thinking:
Identify points of confusion.

Answer the following questions by using your table, graph, and patty paper.



In your own words, how does a rotation affect the graph of a polygon?

How do the coordinates change? How does this change show up on the graph?

Would you describe the rotated polygon as similar or congruent? How do you know? (Hint: use your definitions and patty paper to check.)

SUMMARY: Summarize how rotations affect a polygon.

What's Your Fav?

INTRODUCTION

The *What's Your Fav?* activity requires that students develop an algebraic equation from a multi-step word problem and use the process of substitution to solve the equation. Students may need support in working through the steps of these processes.

time

35 minutes

handout

- *What's Your Fav?*

supplies

- None

Teacher Directions

- Depending on the skill of the students in using substitution in an algebraic equation, you may want to provide a few practice problems, such as the ones below, on defining a variable and translating a verbal expression to an algebraic expression. Students can write the examples on the related processing page in their INBs.
    - Team A scored one-third as many points as Team B.
    - Keisha has eight more than three times as many books as Patrick.
    - Ava received two fewer than half as many points as Nahal.
- Ask students turn to *What's Your Fav?* in their INBs and have a student volunteer read the problem aloud.
- Identify the key words or amounts as a whole class. Ask students to highlight or underline the key words or amounts.
- Guide students in a discussion of defining the variable in the problem and identifying what algebraic expressions they will need to solve the problem.
- Allow students about 10 minutes to work in groups of two or three on writing the equation for Part 1. Monitor and, as necessary, redirect students' work on writing the equation.
- Once the equations are written, have students determine the number of votes that each food choice received.
- About 5 minutes before the time for the activity is over, ask for a volunteer to work the Part 2 problem on the board and explain the steps in the solution. Remind all students to check their work and correct it, if needed, as the problem is discussed.
- Instruct students to list in their INBs the steps they took to solve the problem. Remind them to use official math language. You may need to review with them the OML they might use in their explanation (e.g., variable, like terms, distributive property, simplify).
- If desired, award guild points for correct calculations.
- Close the activity with one of the energizers from Appendix III (e.g., Standing "O," Power Whoosh, or AVID Clap) as recognition of a job well done.

What's Your Fav?

Students at Happy Times Middle School held a vote on their favorite lunch item. There were three options: pizza, spaghetti, and cheeseburgers. There were 750 students at Happy Times Middle School, and each student voted only once.

Pizza received five fewer than four times as many votes as cheeseburgers.

Spaghetti received 15 fewer than twice as many votes as cheeseburgers.

Part 1: Write an equation that could be used to find out how many votes each food received.
Let ***x*** represent the number of votes that were received for cheeseburgers.

Part 2: Using the process of substitution, calculate the number of votes that each food choice received.

Applying Learning:
Apply your learning from the *Cups and Counters* activity.