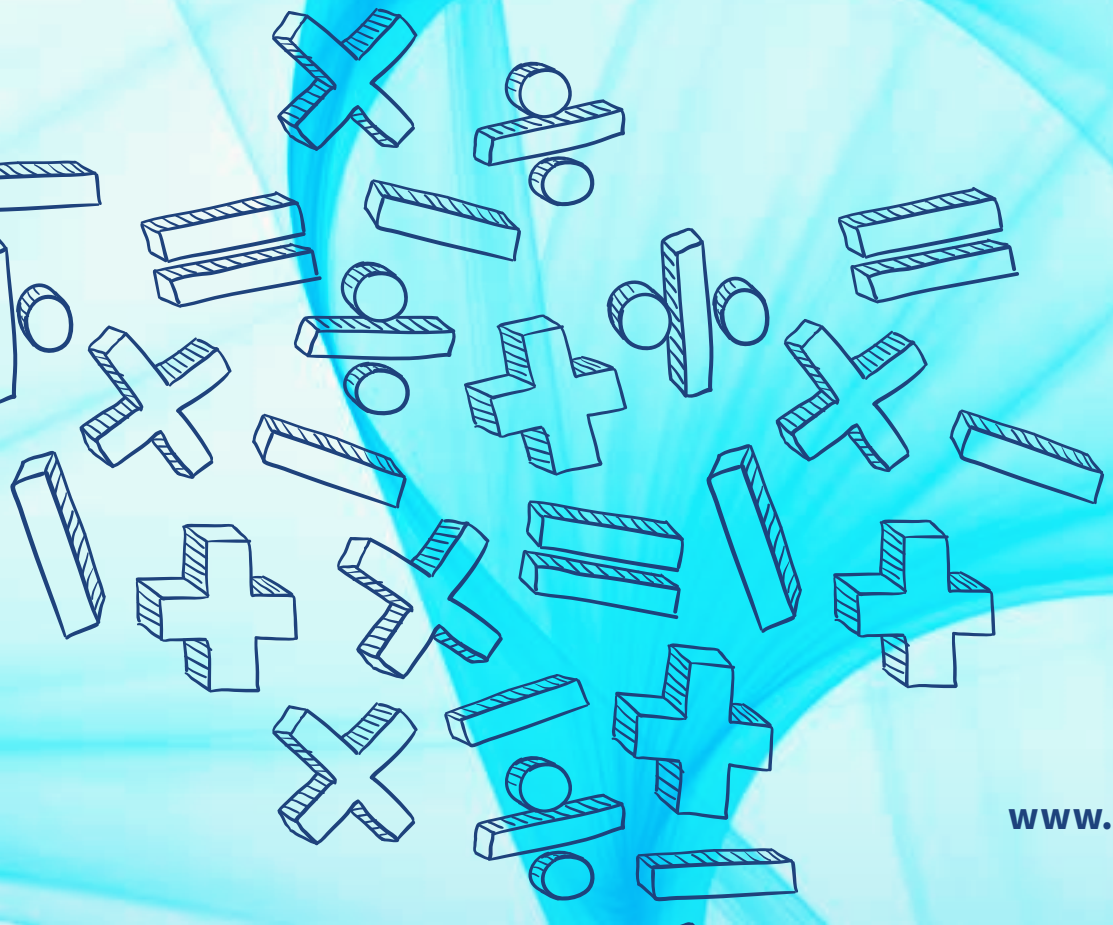
STEMscopes™ MATH

8TH GRADE
TEACHER LESSON SAMPLE

PYTHAGOREAN THEOREM



Discover the wonder of mathematics in our everyday world with STEMscopes Math. Built from the ground up by practicing educators using the flexible 5E lesson model, STEMscopes Math provides you with everything you need to create a meaningful learning experience.

LEARNING WITHIN A REAL-WORLD, RELEVANT CONTEXT

Student learning is rooted in real-world scenarios. Real-world connection provides teachers a way to foster an understanding and appreciation for numbers by focusing on the relationship between mathematical concepts and students' experiences and interests. When real-world connection is incorporated into lessons, students can see how math fits into their daily lives.

STEMscopes Math uses the Hook, Explore Activities, and Problem-Based Tasks to engage students in real-world situations where math skill is needed. Life Connections, Career Connections, Math Today! News, and Math Story incorporate math into the everyday experiences and careers that students may encounter outside of the classroom.

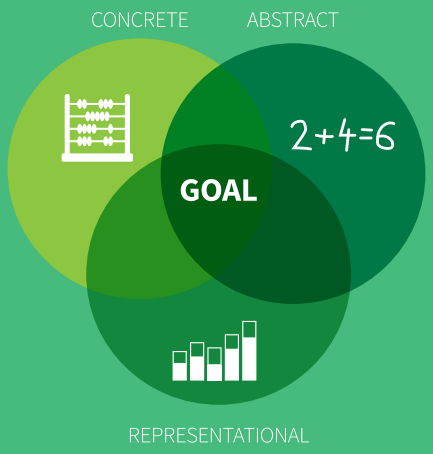
DESIGNED FOR NEW AND VETERAN TEACHERS

Every STEMscopes Math lesson is built to the standards, from the ground up. Chunking information into bite-size pieces, we make our units (called "scopes") digestible and engaging. Whether you're a new or veteran teacher, STEMscopes Math provides everything you need to create a meaningful learning experience.

CONCRETE-REPRESENTATIONAL-ABSTRACT (CRA) APPROACH

The CRA model is a powerful strategy for teaching new math concepts. It is a three-part constructivist process that transitions students from hands-on learning to the math we use as adults. As students progress through the Explore Activities (Lessons), they will transition from hands-on experiences with concrete objects to representational, pictorial models and ultimately arrive at symbolic representations, using only numbers, notations, and mathematical symbols.

Since state assessments often require students to solve problems at all three levels, the CRA model helps students succeed in high-stakes testing. Research-based studies show that students who use concrete materials to learn math develop more precise and comprehensive mental representations, show more motivation and on-task behavior, understand mathematical ideas, and better apply these ideas to life situations.



PROMOTING EQUITY

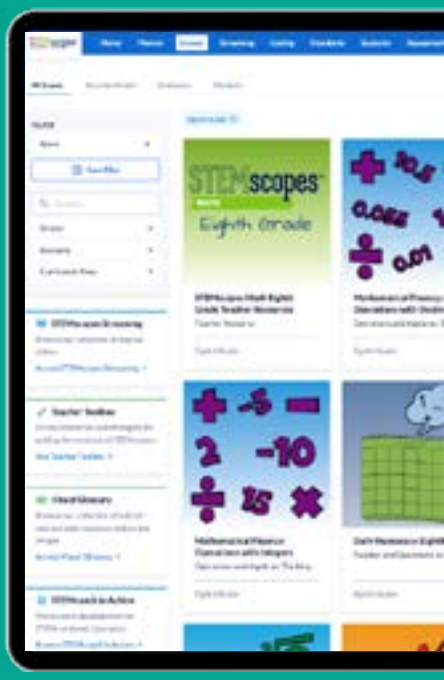
Implementing STEMscopes Math in the classroom provides every student access to high-quality, challenging learning opportunities. The activities within the program are scaffolded and differentiated so that all students find the content accessible, relatable, and challenging. The emphasis on collaborative learning and intentional discourse within the STEMscopes program promotes a sense of community in the classroom where students can learn from each other.

DIGITAL, PRINT, AND KITS

We are committed to delivering flexible, differentiated, student-centered instructional content through our digital platform, and we're all about making life easier for teachers.

DIGITAL CURRICULUM

Our **digital platform** allows you to assign work directly to student accounts, push content to Google Classroom, print materials on demand, and use our lessons in a whole-group or blended learning setting. Find coherent, 5E-based lessons that align with standards and seamlessly flow from one activity to the next.



Print and hands-on kits bring digital learning and real-world instruction together. These supplemental resources establish a concrete connection between school and home, helping teachers make education more equitable.

STUDENT PRINT

HANDS-ON KITS

STANDARDS

Aligning our math program to standards is at the core of what we do. STEMscopes Math fully supports your state standards, no matter where you are.

HOME

This is where you will find your lesson planning materials so you can facilitate fun, purposeful experiences for your students. Build your content knowledge, review the scope's standards, and access parent materials in the Home section.

ENGAGE

The Engage section lays the foundation for learning. You begin by pre-assessing students and filling knowledge gaps. The Hook lays out a storyline narrative to establish a purpose for learning and capture students' attention with real-world connections.

EXPLORE*

This is where students dig into the content. The Explore section includes scaffolded hands-on activities that build toward mastery of the standards. Each Explore prompt encourages rich mathematical discourse and student reasoning, and concludes with an Exit Ticket.

EXPLAIN*

Paired with Explore, the Explain section offers a variety of resources that connect the experiences of the Explore activities to the academic content students need to know. These resources include illustrated vocabulary cards, independent practice, and journal prompts that support the Explore activities and solidify student learning.

ELABORATE*

Workstations are a go! The Elaborate section makes differentiation a cinch with ready-made activities—digital and paper-based games, spiraled review, career connections, literacy connections, and more—perfect for rotations! Students continue learning while you make time for small group interventions and independent projects to support your struggling and advanced learners.

**Instructional elements in STEMscopes Mathematics are intended to work together. The elements in the Explain and Elaborate sections can be used to support student learning and provide opportunities for practice while students explore the concept.*

EVALUATE

Get the data you need from the assessment tools provided in the Evaluate section. From multiple choice-based assessments to an open-ended reasoning prompt, there's an evaluation for every student's learning style. You can also create your own assessments using the assessment builder tool.

INTERVENTION

Useful during Elaborate or as an after-school support, Intervention is a small hands-on activity designed to target students' conceptual misunderstanding while building their math skills. This is also a great re-teach and test prep tool!

ACCELERATION

Are your students ready to go above and beyond with what they've learned? In the Acceleration section, students complete a design challenge and relate learning to current events around the world. The activities prompt them to think more deeply about the content and its applications.

DIGITAL CURRICULUM SAMPLE

To review the lesson resources in the digital Eighth Grade Scope, *Pythagorean Theorem*, access our digital curriculum sample at **www.stemscopes.com/math/national/curriculum-sample** and choose the Eighth Grade level on the left *Grades* menu bar.

Eighth Grade
SAMPLE LESSON

SCOPE (UNIT) **Pythagorean Theorem**

EXPLORE (LESSON) **Modeling the Pythagorean Theorem and the Converse of the Pythagorean Theorem**

The following pages introduce resources to help you get the most out of your STEMscopes Math Grade 8 lesson. You will also notice we've provided supportive unit resources that would allow you to plan lessons throughout the year using STEMscopes Math.

This sample lesson ***does not include*** all the elements and features of our digital and print math curriculum.

RESOURCE LIST

The following resources, as well as additional resources not listed, can be found in the digital curriculum *Grade 8 Scope, Pythagorean Theorem.*

HOME

- Student Expectations
- Key Concepts
- Scope Overview
- Parent Letter

TEACHER TOOLBOX

- Scope List
- Scope and Sequence
- Lesson Planning Guide for 1-3 Explores
- Lesson Planning Guide for 3-5 Explores

EXPLORE

- Explore 1: Modeling the Pythagorean Theorem and the Converse of the Pythagorean Theorem*

EXPLAIN

- Vocabulary Cards*

ACCELERATION

- Choice Board
- Would You Rather

DAILY NUMERACY

- Week 1 Activities

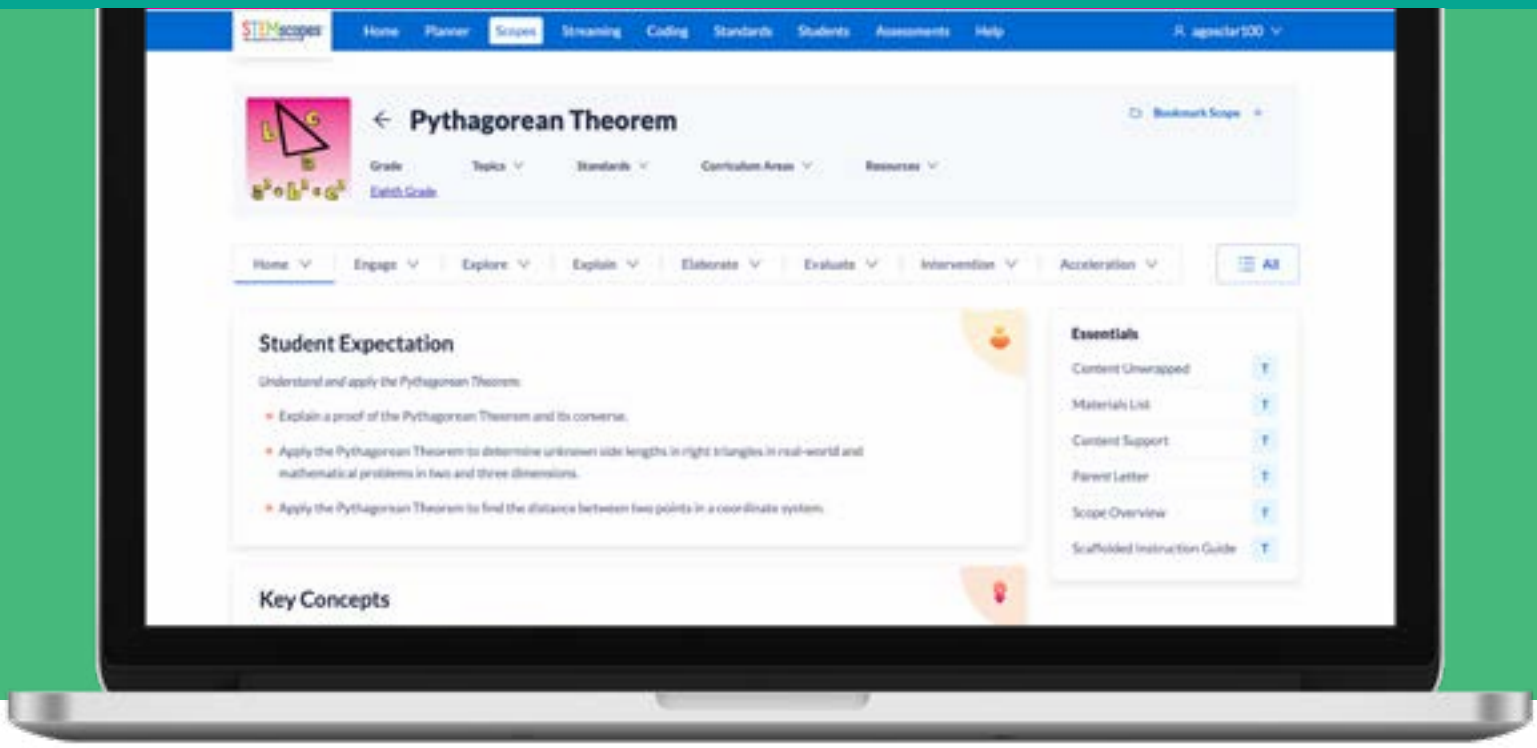
MATHEMATICAL FLUENCY

- "All Operations - Different Signs" Activity*

**These activities are samples and do not represent all the activities and resources within our digital and print curriculum.*

Eighth Grade SAMPLE LESSON

SCOPE (UNIT) **Pythagorean Theorem**



STUDENT EXPECTATIONS

Understand and apply the Pythagorean theorem.

- Explain a proof of the Pythagorean theorem and its converse.
- Apply the Pythagorean theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- Apply the Pythagorean theorem to find the distance between two points in a coordinate system.

KEY CONCEPTS

- I can explain using a model proof of the Pythagorean theorem.
- I can use my reasoning skills to determine that the converse of the Pythagorean theorem must also be true.
- I can apply the Pythagorean theorem to determine the value of an unknown side of a two- or three-dimensional right triangle in real-world or mathematical problems.
- I can use the Pythagorean theorem to calculate the distance between two points on a coordinate plane.

Scope Overview: Pythagorean Theorem

Standards

Understand and apply the Pythagorean Theorem.

- Explain a proof of the Pythagorean Theorem and its converse.
- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

If the APK reveals that students are not ready, move to the Foundation Builder!

Engage

- Accessing Prior Knowledge: Constructing Triangles
- Foundation Builder: Constructing Triangles
- Hook: Mini Golf

Home

- Scope Overview
- Content Support
- Standards Unwrapped
- Parent Letter

Explore

- Explore 1: Modeling Pythagorean Theorem and the Converse of the Pythagorean Theorem
  - Exit Ticket
  - Show What You Know: Part I
- Explore 2: Finding an Unknown Side Length in Right Triangles
  - Exit Ticket
  - Show What You Know: Part II
- Explore 3: The Pythagorean Theorem in Rectangular Prisms
  - Exit Ticket
  - Show What You Know: Part III
- Explore 4: The Pythagorean Theorem on a Coordinate Grid
  - Exit Ticket
  - Show What You Know: Part IV

Explain

- Picture Vocabulary
- Interactive Vocabulary
- Show What You Know
- Anchor Chart
- Interactive Notebook

Elaborate

- Fluency Builder
  - Bam!
- Spiraled Review
- Data Science
- Interactive Practice
  - Drone Delivery

Once all of the Explores have been taught, go back to the Hook for students to apply knowledge learned.

Instructional elements in STEMscopes Mathematics are intended to work together. The elements in the Explain and Elaborate sections can be used to support student learning and provide opportunities to practice while the students are exploring the concept.

Evaluate

- Mathematical Modeling Task
- Standards Based Assessment
- Skills Quiz

Intervention

- Skill Review and Practice
- Supplemental Aids

Acceleration

- Choice Board
- Would You Rather

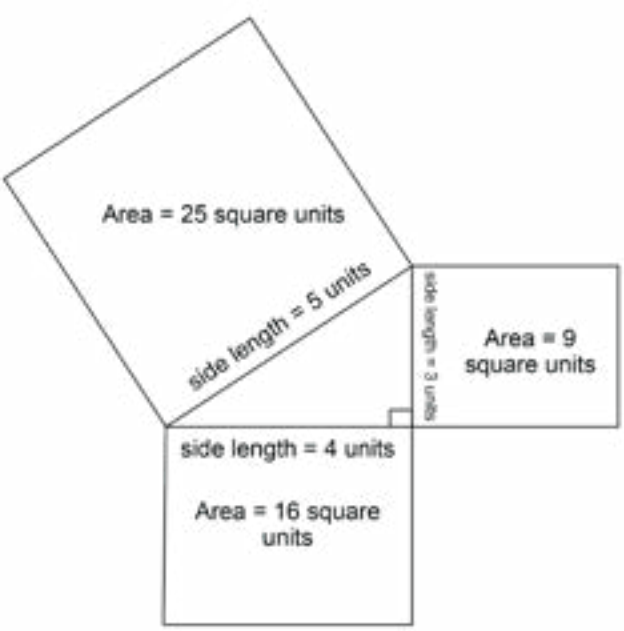
Eighth Grade – Pythagorean Theorem

Dear Parents,

In math class, your student is about to explore the Pythagorean theorem. To master this skill, they will build on their knowledge of properties of triangles. As your student extends their mathematical knowledge, they will learn the following concepts:

- The Pythagorean theorem can be modeled using the area of three squares.

  Example:

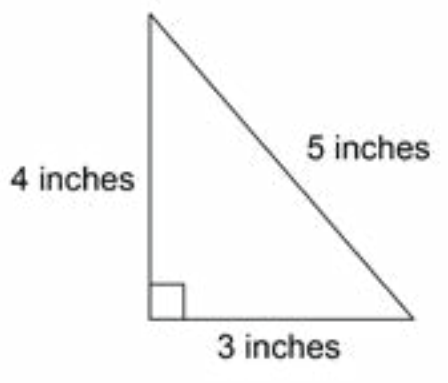


$3^2 + 4^2 = 5^2$

9 square units + 16 square units = 25 square units

- The Pythagorean theorem can be used to solve for the missing side of a right triangle. A right triangle has three sides, two of which form a 90-degree angle called a right angle. These two sides are known as legs. The third side, or side opposite from the right angle, is called the hypotenuse. The hypotenuse is the longest side of a right triangle. The Pythagorean theorem is applied given the length of both legs or one leg and the hypotenuse.

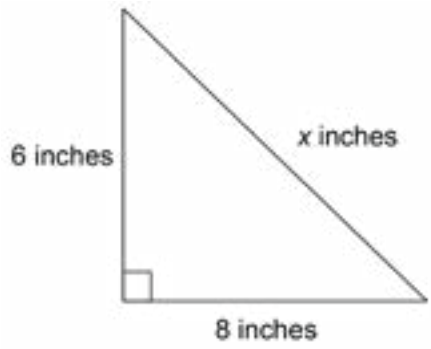
  Pythagorean theorem: $a^2 + b^2 = c^2$, where a and b are legs and c is the hypotenuse



$3^2 + 4^2 = 5^2$

$9 + 16 = 25$

Example: Determine the missing side length, *x*, of each right triangle below:



$a^2 + b^2 = c^2$

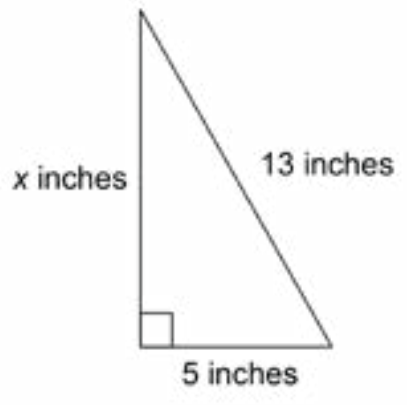
$6^2 + 8^2 = c^2$

$36 + 64 = c^2$

$100 = c^2$

$\sqrt{100} = c$

$c = 10$



$a^2 + b^2 = c^2$

$5^2 + x^2 = 13^2$

$25 + x^2 = 169$

$x^2 = 169 - 25$

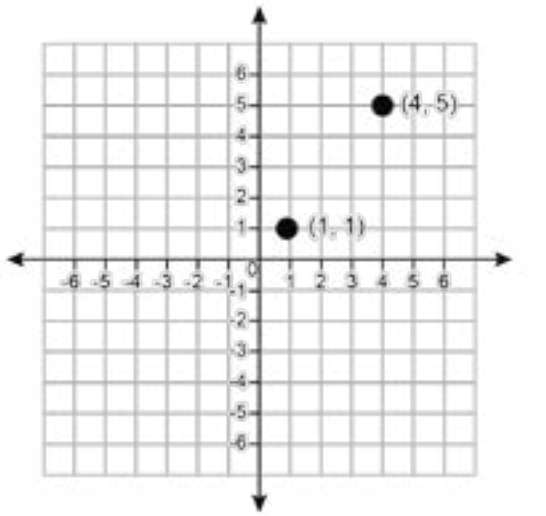
$x^2 = 144$

$x = \sqrt{144}$

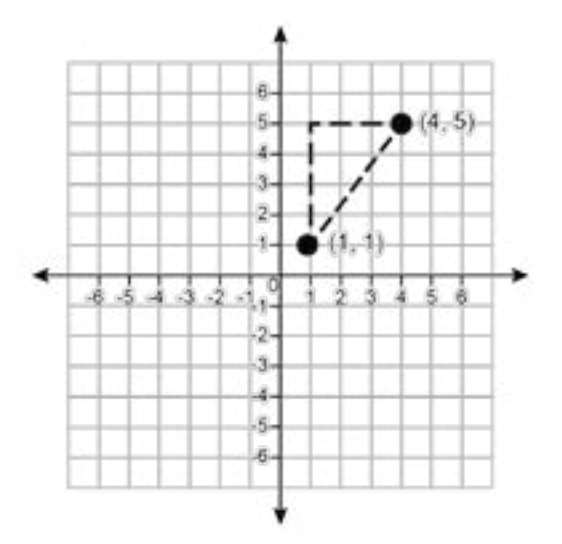
$x = 12$

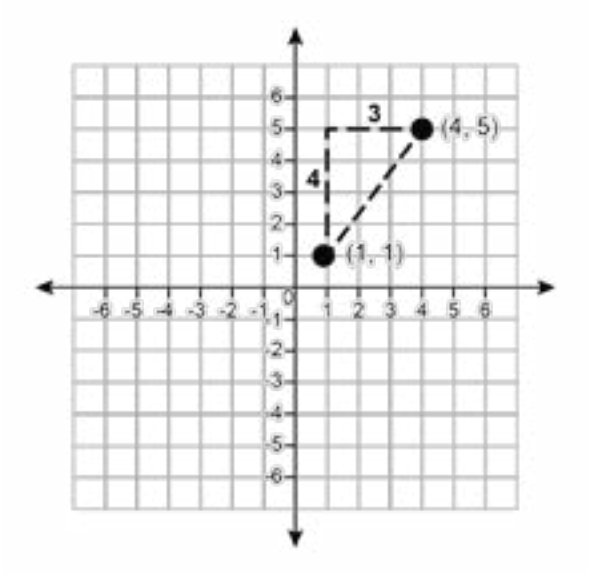
- The Pythagorean theorem can be used to determine the distance between two points on a coordinate grid.

  Example: Determine the distance between the two points.



  Using our knowledge of the Pythagorean theorem, we can create a right triangle connecting these points.





$3^2 + 4^2 = c^2$

$9 + 16 = c^2$

$25 = c^2$

$\sqrt{25} = c$

$c = 5$

The distance between both points is 5 units.

While working with your student at home, the following vocabulary terms may be helpful in your communication about the Pythagorean theorem. These are terms your student will be encouraged to use throughout our explorations and during our Math Chats, which are short, whole-group discussions at the conclusion of each activity.

- **Terms to Know**
  - **converse of the Pythagorean theorem:** theorem which states that if the square of the length of the longest side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle; if $c^2 = a^2 + b^2$, then it is a right triangle
  - **coordinate plane:** two perpendicular number lines called the *x*-axis and the *y*-axis, that intersect at the point (0, 0) and create four quadrants; also called a graph, coordinate grid, or Cartesian plane
  - **distance:** a measurement of the length between two points
  - **hypotenuse:** the longest side of the right triangle, the side opposite of the right angle
  - **leg:** either of the two sides in a right triangle that form the right angle and are opposite of acute angles
  - **point:** a dot that represents a specific spot on a number line or coordinate plane; a geometric object with no dimension used to indicate a location
  - **Pythagorean theorem:** a theorem that states that the square of the hypotenuse is equal to the sum of the squares of the other two sides of a right triangle; $a^2 + b^2 = c^2$
  - **right angle**: an angle that measures 90°
  - **right triangle:** a triangle with one 90º angle
  - **square root:** a number, that when multiplied by itself, produces the given number
  - ***x*-coordinate:** the first term in an ordered pair, provides the location along the *x*-axis within the coordinate plane
  - ***y*-coordinate:** the second term in an ordered pair, provides the location along the *y*-axis within the coordinate plane

We will do many explorations in class to help your student learn these concepts from firsthand experiences. Encourage your student to share these experiences with you and to teach you what he or she has learned. Ask your student to identify examples of what he or she is learning in everyday life, or use the examples on the attached page as a starting point.

Thank you for your support as your student begins this new learning adventure.

Sincerely,

Math outside the Classroom!

The Pythagorean theorem is used all around in our everyday lives. Chat about where you use the Pythagorean theorem in your everyday life. Below are a few examples:

- ★ Look at a map of your home state. Using the Pythagorean theorem and the grid lines on the map, how can you determine the distance between two cities? Practice applying the Pythagorean theorem by calculating the distance between two cities.

- ★ The sizes of TVs are traditionally measured using the diagonal length from one corner of the TV screen to the opposite. By measuring only the length and height, calculate the size of each TV in your home. Use the Pythagorean theorem to determine each TV's diagonal length.

- ★ Carpenters, interior designers, and construction workers use right triangles daily. How might right triangles and the Pythagorean theorem be used when building furniture or a house? What tools might incorporate right triangles in their use? Ask a friend or family member who works in any of these industries to see how they apply right triangles and the Pythagorean theorem at work.

Eighth Grade Scope List

Scope Name	Explores	Suggested Pacing
Integer Exponents	3 Explores	2 Weeks
Square Roots and Cube Roots	3 Explores	1 Week
Irrational Numbers	4 Explores	2 Weeks
Scientific Notation	3 Explores	1 Week
Operations with Scientific Notation	5 Explores	2 Weeks
Solving Linear Equations	3 Explores	2 Weeks
Proportional Relationships	4 Explores	2 Weeks
Solving Pairs of Linear Equations	4 Explores	2 Weeks
Functions	2 Explores	1 Week
Compare Functions	3 Explores	1 Week
Rate of Change	3 Explores	1 Week
Model Function Relationships	2 Explores	1 Week
Transformations	3 Explores	2 Weeks
Congruence and Similarity	4 Explores	1 Week
Angles	4 Explores	2 Weeks
Pythagorean Theorem	4 Explores	2 Weeks
Volume	4 Explores	2 Weeks
Patterns in Bivariate Data	4 Explores	2 Weeks

STEMscopes Math Suggested Scope and Sequence

The STEMscopes Math program is flexible, and there are variations in implementation within the guidelines provided here. This Scope and Sequence is meant to serve as a tool for you to lean on as you find how STEMscopes Math best meets the needs of the students in your classroom.

EIGHTH GRADE

Week	Scope	Cluster
1	• Establish classroom procedures • **Pre-Assessment Benchmark**	Major
2	• Integer Exponents	Major
3	• Integer Exponents	Major
4	• Square Roots and Cube Roots	Major
5	• Irrational Numbers	Supporting
6	• Irrational Numbers	Supporting
7	• Scientific Notation	Major
8	• Operations with Scientific Notation	Major
9	• Operations with Scientific Notation	Major
10	• Solving Linear Equations	Major
11	• Solving Linear Equations	Major
12	• Proportional Relationships	Major
13	• Proportional Relationships	Major
14	• Solving Pairs of Linear Equations	Major
15	• Solving Pairs of Linear Equations	Major
16	• Functions	Major
17	• **Mid-Assessment Benchmark**	Major
18	• Compare Functions	Major
19	• Rate of Change	Major
20	• Model Function Relationships	Major
21	• Transformations	Major
22	• Transformations	Major
23	• Congruence and Similarity	Major
24	• Angles	Major

Week	Scope	Cluster
25	• Angles	Major
26	• Pythagorean Theorem	Major
27	• Pythagorean Theorem	Major
28	• Volume	Additional
29	• Volume	Additional
30	• Patterns in Bivariate Data	Supporting
31	• Patterns in Bivariate Data	Supporting
32	• **Post-Assessment Benchmark**	
33	• **Review Week**	Major
34	• **STANDARDIZED TEST (Approximate)**	Major
35	Review: • Integer Exponents • Square Roots and Cube Roots • Scientific Notation • Operations with Scientific Notation • Solving Linear Equations • Proportional Relationships • Solving Pairs of Linear Equations	Major
36	Review: • Functions • Compare Functions • Rate of Change • Model Function Relationships • Transformations • Congruence and Similarity • Angles • Pythagorean Theorem	Major

Week	Daily Numeracy
All	Additional or repeated standards are addressed in Daily Numeracy. These activities should be rotated through daily. To see the full list of what standards are addressed in these activities, please see the Daily Numeracy: Standards by Activity section in the Daily Numeracy Teacher Toolbox.

Whole-Group Plan

1–3 Explores

*Based on a 90-minute class period	Day 1	Day 2	Day 3	Day 4	Day 5
Whole Group	Mathematical Fluency/Daily Numeracy Accessing Prior Knowledge Foundation Builder[1] Hook Begin Explores if time allows. Anchor Chart	Mathematical Fluency/Daily Numeracy Explores[2] Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)	Mathematical Fluency/Daily Numeracy Explores (continued) Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)	Mathematical Fluency/Daily Numeracy Hook (Post-Explore) Teacher Choice[3] All students: • Picture Vocabulary • Interactive Vocabulary • Interactive Notebook Mastery level: • Would You Rather • Choice Board Meets level: • Data Science • Mathematical Modeling Task Approaching level: • Interactive Practice • Skills Quiz	Mathematical Fluency/Daily Numeracy Skill Review and Practice (for students who need it) Fluency Builder (Choose one.) (for students who don't need intervention)
Assessment and Closure	Accessing Prior Knowledge to determine readiness Formative assessment based on APK and student performance on Explore Allow students to share what they felt successful with and what they struggled with today.	Administer the Exit Ticket to assess student learning after the Explore. Allow students to work on Show What You Know – Part I as independent practice after first Explores.	Administer the Exit Ticket to assess student learning after the final Explores. Allow students to work on Show What You Know – Part 2 as independent practice after Explore 2.	Assess how students perform based on individual assignments chosen.	Standards-Based Assessment

The essential elements are highlighted. If time is limited, teach these elements to fully cover the standards.

[1]Use as intervention if APK shows foundational gaps.

[2]Set your pace according to the number of Explores included in this scope. Use Exit Tickets as well as Show What You Knows for each Explore completed.

[3]Teachers can choose from the following elements. We have suggested activities for students, including recommended tasks for students at each skill level.

Small-Group Plan

1–3 Explores

*Based on a 90-minute class period	Day 1	Day 2	Day 3	Day 4	Day 5
Whole Group ***20 Minutes**	Daily Numeracy Accessing Prior Knowledge[1] Hook Introduce stations.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart Add Picture Vocabulary words to word wall based on terms introduced in the lessons.	Daily Numeracy Hook (Post-Explore) Review any Explore or Show What You Know problems that gave students trouble. Anchor Chart	Daily Numeracy Spiraled Review Standards-Based Assessment
Small-Group Instruction *Small Group/ Stations 70 Minutes	Pull small groups of students to do the following: 1. The Foundation Builder (if they need previous grade level content) 2. Explores 1–2[2]	Pull students to work with you to finish Explores 1–2.	Pull students to work with you on Explores 2–3.	Pull students to do the Skill Review and Practice based on needs.	None
Stations ***Options are flexible.**	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder 4. Interactive Vocabulary 5. Spiraled Review 6. Show What You Know	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder 4. Choice Board 5. Spiraled Review 6. Show What You Know	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder 4. Data Science 5. Spiraled Review 6. Show What You Know	Have students work in groups on the Mathematical Modeling Task.	Have the following materials available for students who finish early: 1. Mathematical Fluency 2. Would You Rather 3. Skills Quiz 4. Choice Board 5. Spiraled Review
Assessment and Closure	Accessing Prior Knowledge to determine readiness Formative assessment based on APK and student performance to determine who needs to be pulled to small group Allow students to share what they felt successful with and what they struggled with today.	Administer the Exit Tickets to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.	Administer the Exit Tickets to assess student learning.	Student success with intervention can be assessed by using the Checkup. Other students can be assessed by their performance on the Mathematical Modeling Task.	Standards-Based Assessment

The essential elements are highlighted. If time is limited, teach these elements to fully cover the standards.
[1]Use as intervention if APK shows foundational gaps.
[2]Set your pace according to the number of Explores included in this scope. Use Exit Tickets as well as Show What You Knows for each Explore completed.

Whole-Group Plan

3–6 Explores

Week 1 *Based on 90-minute class period	Day 1	Day 2	Day 3	Day 4	Day 5
Whole Group	Mathematical Fluency/Daily Numeracy Accessing Prior Knowledge Foundation Builder[1] Hook (Pre-Explore)	Mathematical Fluency/Daily Numeracy Explores[2] Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)	Mathematical Fluency/Daily Numeracy Explores (continued) Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)	Mathematical Fluency/Daily Numeracy Explores (continued) Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)	Mathematical Fluency/Daily Numeracy Explores (continued) Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)
Assessment and Closure	Accessing prior knowledge to determine readiness Formative assessment based on APK and student performance on Explore Allow students to share what they felt successful with and what they struggled with today.	Administer the Exit Ticket to assess student learning after the Explore. Allow students to work on Show What You Know as independent practice after Explores.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Know as independent practice after Explores.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Know as independent practice after Explores.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Know as independent practice after Explores.

The essential elements are highlighted. If time is limited, teach these elements to fully cover the standards.
[1]Use as intervention if APK shows foundational gaps.
[2]Set your pace according to the number of Explores included in this scope. Use Exit Tickets as well as Show What You Knows for each Explore completed.

Whole-Group Plan

3–6 Explores

Week 2 *Based on 90-minute class period	Day 6	Day 7	Day 8	Day 9	Day 10
Whole Group	Mathematical Fluency/Daily Numeracy Explores (continued) Anchor Chart Exit Tickets Show What You Know (Assist and reteach as needed.)	Mathematical Fluency/Daily Numeracy Hook (Post-Explore) Picture Vocabulary Interactive Vocabulary Would You Rather Choice Board	Mathematical Fluency/Daily Numeracy Interactive Practice Mathematical Modeling Task	Mathematical Fluency/Daily Numeracy Teacher Choice[3] Meets Level: • Would You Rather • Choice Board Approaching Level: • Interactive Practice • Skills Quiz	Mathematical Fluency/Daily Numeracy Skill Review and Practice (for students who need it) Fluency Builder (choose one.) (for students who do not need intervention)
Assessment and Closure	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Know as independent practice after Explores.	Allow students to share what they felt successful with and what they struggled with today.	Assess how students perform on the Mathematical Modeling Task.	Assess how students perform based on individual assessment chosen.	Standards-Based Assessment

The essential elements are highlighted. If time is limited, teach these elements to fully cover the standards.
[3]Choose from the following elements. We have suggested activities for students, including recommended tasks for students at each skill level.

Small-Group Plan

3–6 Explores

Week 1 *Based on 90-minute class period	Day 1	Day 2	Day 3	Day 4	Day 5
Whole Group *20 Minutes	Daily Numeracy Accessing Prior Knowledge[1] Hook (Pre-Explore) Introduce stations.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart Add Picture Vocabulary words to word wall based on terms introduced in the lessons.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart Review any Explore or Show What You Know problems that gave students trouble.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart Review any Explore or Show What You Know problems that gave students trouble.
Small-Group Instruction *Small Group/ Stations 70 Minutes	Pull small groups of students to the Foundation Builder (if they need previous grade-level content). Begin Explores.[2]	Pull students to work with you on Explore 1.	Pull students to work with you on Explore 2.	Pull students to work with you on Explore 3.	None
Stations	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder (from previous scope)	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder (from previous scope)	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder (from previous scope)	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder (from previous scope)	1. Mathematical Fluency 2. Interactive Practice 3. Fluency Builder (from previous scope)
Assessment and Closure	Accessing prior knowledge to determine readiness Formative assessment based on APK and student performance to determine who needs to be pulled to small group Allow students to share what they felt successful with and what they struggled with today.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.

The essential elements are highlighted. If time is limited, teach these elements to fully cover the standards.

[1]Use as intervention if APK shows foundational gaps.

[2]Set your pace according to the number of Explores included in this scope. Use Exit Tickets as well as Show What You Knows for each Explore completed.

STEMscopes MATH

Small-Group Plan

3–6 Explores

Week 2 *Based on 90-minute class period	Day 6	Day 7	Day 8	Day 9	Day 10
Whole Group *20 Minutes	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart Review any Explore or Show What You Know problems that gave students trouble.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Anchor Chart Review any Explore or Show What You Know problems that gave students trouble.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Add Picture Vocabulary words to word wall based on terms introduced in the lessons.	Daily Numeracy Allow students to share what they learned yesterday, and discuss what students worked on. Review any Explore or Show What You Know problems that gave students trouble.	Daily Numeracy Spiraled Review Standards-Based Assessment
Small-Group Instruction *Small Group/ Stations 70 Minutes	Pull students to work with you on Explore 4.	Pull students to work with you on Explore 5.	Hook (Post-Explore)	Skill Review and Practice	None
Stations	1. Choice Board 2. Spiraled Review 3. Show What You Know	1. Interactive Vocabulary 2. Spiraled Review 3. Show What You Know	1. Interactive Notebook 2. Spiraled Review 3. Show What You Know	Have students work in groups on the Mathematical Modeling Task.	Have the following materials available for students who finish early: 1. Would You Rather 2. Choice Board 3. Spiraled Review
Assessment and Closure	Administer the Exit Ticket to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.	Administer the Exit Tickets to assess student learning after the Explores. Allow students to work on Show What You Knows as independent practice after Explores.	Administer the Exit Tickets to assess student learning. Skills Quiz	Student success with intervention can be assessed by using the Checkup. Other students can be assessed by their performance on the Mathematical Modeling Task.	Standards-Based Assessment

The essential elements are highlighted. If time is limited, teach these elements to fully cover the standards.

[1]Use as intervention if APK shows foundational gaps.

[2]Set your pace according to the number of Explores included in this scope. Use Exit Tickets as well as Show What You Knows for each Explore completed.

Pythagorean Theorem

Explore 1 - Modeling the Pythagorean Theorem and the Converse of the Pythagorean Theorem

Description

Students will demonstrate the Pythagorean theorem by using models and will find the area of three connected squares. Students will also identify right triangles with the converse of the Pythagorean theorem.

Standards of Mathematical Practice

- **MP.1 Make sense of problems and persevere in solving them:** Students will be able to identify the two legs and hypotenuse, given the side lengths of a right triangle.
- **MP.4 Model with mathematics:** Students will model the Pythagorean theorem using manipulatives and the area of three connected squares.
- **MP.6 Attend to precision:** Students will apply the Pythagorean theorem in order to determine whether a triangle is a right triangle. Students will square numbers with pencil and paper and a calculator, if needed.
- **MP.7 Look for and make use of structure:** Students will be able to identify the two legs and hypotenuse of a right triangle based on the measurements of the three sides.

Materials

Printed
1 Student Journal (per student)
1 Exit Ticket (per student)
1 Converse of the Pythagorean Theorem Cards (per partnership)
1 Modeling the Pythagorean Theorem Work Mat (per partnership)
1 Demonstrating the Pythagorean Theorem Triangles (per partnership)

Reusable
1 Pair of scissors (per partnership)
1 Glue stick (per partnership)
1 Calculator (per partnership)

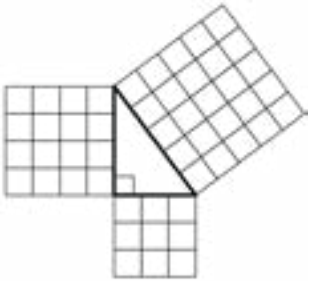
Preparation

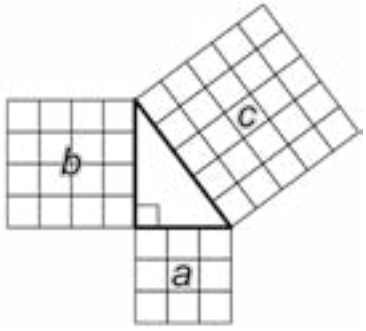
- Plan to divide the class into groups of two to complete this activity.
- Print a Student Journal and an Exit Ticket for each student.
- Print a Modeling the Pythagorean Theorem Work Mat and a Demonstrating the Pythagorean Theorem Triangles per partnership.
- Print a set of the Converse of the Pythagorean Theorem Cards per partnership.
- Gather enough pairs of scissors, glue sticks, and calculators for each pair of students to use one of each for Part II.

Procedure and Facilitation Points

Part I: Modeling the Pythagorean Theorem

1. Read the following scenario to students: *Mason plans on opening a mini-golf course in a few months. He begins planning his new course by researching several designs online. Mason notices that a majority of each course's 18 holes are shaped like right triangles. Mason notices a small border is placed along the perimeter of each of these right triangle-shaped holes. After looking at the border along each right triangle-shaped hole, Mason is curious whether there is a relationship between the three sides of a right triangle. Let's help Mason determine the relationship between the 3 sides of a right triangle as he begins planning his mini-golf course.*
2. Give a Student Journal to each student.
3. Give a Modeling the Pythagorean Theorem Work Mat and Demonstrating Pythagorean Triangles to each pair of students.
4. Have students use the Modeling the Pythagorean Theorem Work Mat and Demonstrating the Pythagorean Theorem Triangles to represent the Pythagorean theorem. Students should cut out the triangles from the Demonstrating the Pythagorean Theorem Triangles handout and use those triangles to place on the Modeling the Pythagorean Theorem Work Mat.
5. Instruct students to use triangles from Demonstrating the Pythagorean Theorem Triangles to demonstrate the Pythagorean theorem. They will place those triangles on the Modeling the Pythagorean Theorem WorkMat. After placing the triangles on the Modeling the Pythagorean Theorem Work Mat, students can draw a square for each side length, using the side lengths of each triangle squared, and cut out each square to represent the side^2. Monitor and assess student understanding as each group collaborates by asking the following guiding questions:
   a. **DOK-1** What is the Pythagorean theorem? Responses may vary. The Pythagorean theorem describes a special relationship between the sides of a right triangle. When applying the Pythagorean theorem, each side of the right triangles is also a side of a square that's attached to the triangle.
   b. **DOK-1**: How can you determine the area of a square? Responses may vary. The area of a square is any side multiplied by itself. (For example, $a \times a = a^2$).
   c. **DOK-1:** How can you use triangles abc, def, and mno to demonstrate the Pythagorean theorem? Responses may vary. Make three squares with sides that are equal to each side of the triangle. Cut out each square to place on each side of the triangle.





   d. **DOK-1:** Given the area of square a, what operation allows you to determine the side length of square *a*? Responses may vary. The square root allows us to find the side length of a square given the area of the square.
   e. **DOK-2:** Is $a^2 + b^2 = c^2$, the same as $b^2 + a^2 = c^2$? Why or why not? Responses may vary. Yes, because of the commutative property of addition, 2 + 4 yields the same answer as 4 + 2.
6. Allow students enough time to record all of their work for Part I of the Explore on the Student Journal.
7. After Part I of the Explore, invite the class to a Math Chat to share their observations and learning.

Math Chat	
Questions	**Sample Student Response**
DOK-1 Using the area of each square, describe the Pythagorean theorem.	The area of squares *a* and *b* together equal the area of square *c*.

Math Chat	
DOK-1 How can you determine the side length of a square given its area?	We would need to find the square root ($\sqrt{}$) of the area in order to determine the length of one of the square's side.
DOK-2 What did you notice about the sum of square a and square b when compared to square ?	The sum of the number of tiles it takes to fill square *a* and square *b* is the same amount of tiles it takes to fill square *c*.
DOK-2 Do you think the Pythagorean theorem only applies to right triangles? What about non-right triangles?	I think the Pythagorean theorem applies to all triangles, including non-right triangles.

Part II: The Converse of the Pythagorean Theorem

1. Read the following scenario to students: *When researching online, Mason notices that many of the golf courses contain right-triangle-shaped holes, but he's not 100% confident that each of these holes is a right triangle. Without a protractor, he's unsure of how to prove which holes are right triangles and which are not. Let's help Mason decide whether a triangle is a right triangle by applying the Pythagorean theorem!*
2. Give the Converse of the Pythagorean Theorem Cards, a pair of scissors and a glue stick to each partnership. A calculator can also be provided to students when evaluating the square of larger numbers.
3. Instruct students to begin by identifying whether Hole 7 and Hole 12 are right triangles by applying the Pythagorean theorem. Have students fill in the blanks with the legs and assumed hypotenuse of each triangle. Have students solve the equation by simplifying the squares. Instruct students to circle *Yes* if the equation is true, and to circle *No* If the equation is not true.
4. Have students divide the Converse of the Pythagorean Theorem Cards page into two, so that each student receives one set of cards. Instruct the class that each student will cut out their own set of 6 cards. Then, have students work together and apply the Pythagorean theorem to each triangle and determine whether the triangle is an example of a right triangle. When the students reach a consensus on each triangle, students will glue each card in the appropriate column.
5. Monitor and assess student understanding as each group collaborates by asking the following guiding questions:
    a. **DOK-1:** How do you know which measurements to use when applying the Pythagorean theorem? Responses may vary. We need to know the side lengths of both legs in order to substitute the values for variables, *a* and *b*. We will then substitute the length of the hypotenuse for variable *c*.
    b. **DOK-2:** What happens when the Pythagorean theorem creates a true statement? Responses may vary. When the equation created using the Pythagorean theorem generates a true statement, then the three side lengths form a right triangle.
    c. **DOK-2:** What happens when the Pythagorean theorem creates a false statement? Responses may vary. When the equation created using the Pythagorean theorem does not generate a true statement, then the three side lengths do not form a right triangle. The three side lengths could, however, create another type of triangle.
6. Allow time for students to complete Part II of the Student Journal including the reflection questions.
7. After Part II of the Explore, invite the class to a Math Chat to share their observations and learning.

Math Chat	
Questions	**Sample Student Response**
DOK-2 How can you determine whether a triangle is a right triangle, given only the lengths of each side?	We can apply the Pythagorean theorem using the triangle's side lengths. If the Pythagorean theorem forms a true statement, the triangle is a right triangle.

Math Chat	
DOK-2 In your own words, describe the Converse of the Pythagorean theorem.	A true statement is generated when using the Pythagorean theorem and the lengths of a right triangle's three sides. If a false statement is created, then the triangle is not a right angle.
DOK-2 A triangle has side lengths of 7, 9, and 10. Is this a right triangle?	$a^2 + b^2 = c^2$ $7^2 + 9^2 = 10^2$ $49 + 81 = 100$ $130 \neq 100$ These side lengths do not form a right triangle.

8. When students are done, have them complete the Exit Ticket to formatively assess their understanding of the concept.

Anchor Chart and Interactive Notebook

Be sure to complete the Anchor Chart as a class. Once the class has completed the Anchor Chart, have students individually complete their Interactive Notebook.

Instructional Supports

1. Struggling students may have difficulty understanding the relationships between the Pythagorean theorem and the areas of squares *a*, *b*, and *c*. Provide a diagram like the one displayed in the markdown to help them grasp the concept. Ask questions such as the following: What is the area of square *a*? What is the area of square *b*? What is the area of square *c*? If I want to find the length of this side of the triangle, how can I use the area of square *a* to help me?
2. Struggling students may have difficulty identifying the hypotenuse of the triangle. Let them know for Part 1, the hypotenuse or longest side is always opposite the right angle, and have them indicate on triangles *abc*, *def*, and *mno*, the right angle, and consequently the hypotenuse.

Language Acquisition Strategy

The following Language Acquisition Strategy is supported in this Explore activity. See the strategies below for ways to support a student's language development.

Students will enhance language attainment as they acquire knowledge from a variety of multimedia instructional formats.

Beginner: Before the lesson, project on the board images of different sports, including golf, and have students repeat after you the sport's name.

Intermediate: Before the lesson, show students a clip from a golf game to help them visualize the context for this and upcoming Explores in the scope.

Advanced: Before the lesson, allow students to play a virtual golf game to help them understand the sport mentioned in this and upcoming Explores in the scope.

Explore

Pythagorean Theorem
Explore 1

Name:_____ Date:_____

Designing a Mini-Golf Course

Part I: The Pythagorean Theorem

Use the Modeling the Pythagorean Theorem Work Mat and the Demonstrating Pythagorean Theorem Triangles handout to complete the table. Write the formula that applies the Pythagorean theorem to each triangle and proves that a triangle is a right triangle.

Side Length		Area		Pythagorean Theorem Formula
a		a^2		
b		b^2		
c		c^2		
d		d^2		
e		e^2		
f		f^2		
m		m^2		
n		n^2		
o		o^2		

Explore

Reflect

1. How were models used to demonstrate the Pythagorean theorem?

2. How can you determine the area of a square given one of its side lengths?

3. How can you determine the side length of a square given its area?

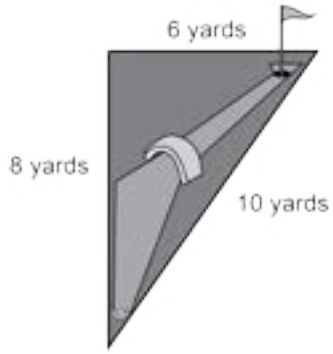
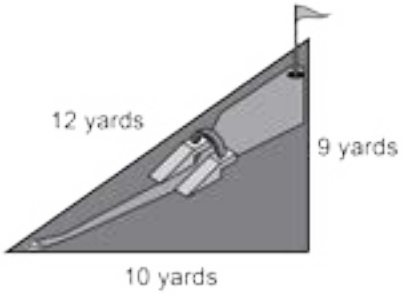
4. The hypotenuse is the longest side of a right triangle. How can you identify the hypotenuse when given an image of a right triangle?

5. How might applying the Pythagorean theorem be useful?

Explore

Part II: The Converse of the Pythagorean Theorem

Determine which triangles form a right triangle.

Is it a right triangle?	
Use the Pythagorean theorem to help Mason decide which of the following two holes' side lengths form a right triangle.	
Hole 7  Pythagorean theorem: ___ + ___ = ___ Right triangle? *Yes* or *No*	
Hole 12  Pythagorean theorem: ___ + ___ = ___ Right triangle? *Yes* or *No*	

Explore

Use the space provided below to sort the Converse of the Pythagorean Theorem cards into two categories: right triangle and not a right triangle.

Right Triangle	
Not a Right Triangle	

Explore

Reflect

1. How can you use the Pythagorean theorem to prove whether a triangle is a right triangle?

2. Given the three side lengths of a triangle, how can you identify the hypotenuse?

3. When applying the Pythagorean theorem to verify whether a triangle is a right triangle, does it matter which of the triangle's two legs is *a* and which is *b*? Why or why not?

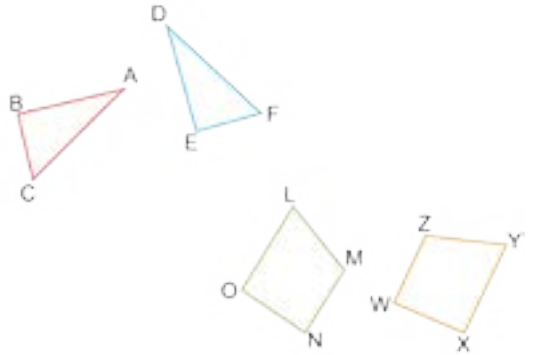
4. When might it be helpful to use the Pythagorean theorem in identifying right triangles?

5. Side lengths, 3, 4, and 5 can be substituted into the Pythagorean theorem to form a true equation. This set of positive integers is also known as a Pythagorean triple. What are some other examples of Pythagorean triples?

Pythagorean Theorem

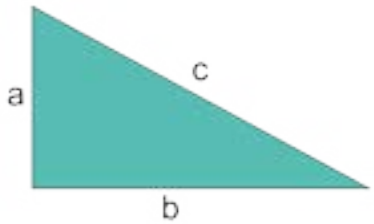
Picture Vocabulary

Congruent Figures



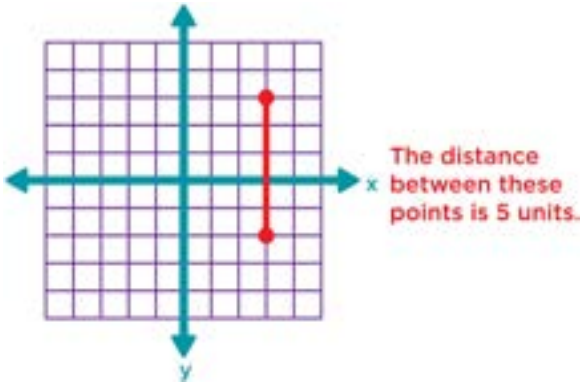
Figures with the same size and shape

Converse of the Pythagorean Theorem



The theorem which states that if the square of the length of the longest side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle; if $c^2 = a^2 + b^2$, then it is a right triangle.

Distance



A measurement of the length between two points

WHAT IS ACCELERATION?

Are your students ready to go above and beyond what they've just learned? In Acceleration, students can engage in a design challenge or relate what they're learning to current events around the world—activities that prompt them to think more deeply about the content and its applications.

Choice Board Activity

DESCRIPTION

Students will explore real-world connections and applications of math content through interactions with engaging activities.

MATERIALS

PRINTED

- 1 Choice Board (per student)
- 1 Set of Activity Handouts (per student)
- 1 Choice Board Self-Assessment (per student)

REUSABLE

- Technology (if applicable)

PREPARATION

- Print a Choice Board and a set of Activity Handouts for each student.
- Print a Choice Board Self-Assessment for each student.
- Plan ahead for technology use. Research may be required for some activities on the Choice Board.

PROCEDURE AND FACILITATION POINTS

1. Distribute a Choice Board to each student.
2. Allow students time to examine the Choice Board and select the activities they would like to explore.
3. Encourage students to attempt at least three activities.
4. Distribute the appropriate Activity Handouts according to students' choices.
5. Upon completion of each Choice Board activity, have students complete a Choice Board Self-Assessment to evaluate their own mathematical thinking and efforts on their project.

Choice Board

Name:_____ Date:_____

Pythagorean Theorem

Choose one or more extension activities from the table below.

Career Connection Architect Research the career field of architecture. Your research must answer the provided questions. Create a presentation to relay your research to the class.	**Mathematician Spotlight** Pythagoras Research Pythagoras's work. Create an informational poster, diorama, or speech to convey this mathematician's work as it relates to the Pythagorean theorem.
Science Connection Ocean Voyage Using the Pythagorean theorem to determine measurement is a skill that is very useful in science. Complete the activity to apply your understanding of using the Pythagorean theorem.	**Create Your Own** Pythagorean Art Create your own work of art using right triangles to demonstrate the Pythagorean theorem.
Arts Connection Art Review Many artists have used their artwork to demonstrate the Pythagorean theorem. Complete this activity to understand the influence Pythagoras had on art.	**Analogies** Challenging Analogy An analogy is a type of comparison. Complete the analogies activity using your knowledge of the Pythagorean theorem.

Pythagorean Theorem

Choice Board

Name:_____ Date:_____

Career Connection

Research the career field listed on the Choice Board. Your research must answer the following questions:

1. List the career you are researching.
2. Describe the career listed above.
3. What materials does someone with this career work with?
4. Where would a person in this field do most of their work?
5. What training/education is required to enter this field?
6. What does the average day on the job look like for someone with this career?
7. How does this career connect to the math you are currently studying?
8. List several other career fields that someone doing this job interacts with on a daily basis.
9. Is this a career you are interested in? Find out more by interviewing someone with this career in your area and researching on the internet.
10. What 21st-century skills listed below could be used with this career? Identify at least one skill that people in this career field use, and explain why the skill is important, according to your research.

    - Collaboration
    - Creativity and innovation
    - Critical thinking and problem solving
    - Communication
    - Technology literacy
    - Flexibility
    - Leadership

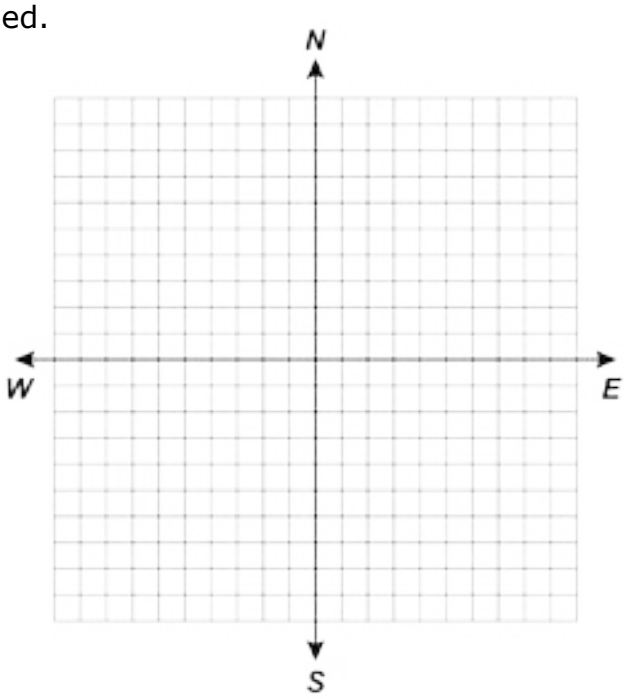
Choice Board

Name:_____ Date:_____

Science Connection

Experts in the field of navigation frequently use the Pythagorean theorem to measure distance on maps. Apply your understanding of right triangles and the Pythagorean theorem to calculate the distances described.

Point of Interest	Location
Lighthouse	(0, 10)
Passenger ship	(3, 2)
Cargo ship	(−7, 7)
Fishing boat	(4, 7)
Coast Guard	(−4, −3)



Description	Vertical Distance	Horizontal Distance	Shortest Distance
From the passenger ship to the lighthouse			
Between the Coast Guard and the fishing boat			
From the cargo ship to the lighthouse			
Between the lighthouse and the Coast Guard			

Choice Board

Name:_____ Date:_____

Create Your Own

Create your own work of art in the space below. Use right triangles to demonstrate the use of the Pythagorean theorem. Be sure to give your artwork a title. Provide a brief description of your work.

Title:

Description:

Choice Board

Name:_____ Date:_____

Arts Connection

Many artists have used the Pythagorean theorem to create a design or patterns for their artwork. Evidence of the Pythagorean theorem can be seen in quilts, paintings, and even sculptures.

Instructions: Research online to find artwork that incorporates right triangles. Select two pieces of art. Write a paragraph that compares and contrasts the artwork. Be sure to describe how each piece of art models the Pythagorean theorem.

Choice Board

Name:_____ Date:_____

Analogies

Complete each math analogy using your knowledge of the Pythagorean theorem.

Example: Puppy is to dog as kitten is to cat.

1. An obtuse angle is to an obtuse triangle as a right angle is to a _____.
2. A leg is to an acute angle as the hypotenuse is to a _____.
3. The Theory of Relativity is to $E = mc^2$ as the Pythagorean theorem is to _____.
4. $a^2 + b^2$ is to c^2 as $18^2 + 24^2$ is to _____.
5. $3^2 + 4^2$ is to 5^2 as $5^2 + 12^2$ is to _____.
6. c^2 is to $a^2 + b^2$ as 17^2 is to 8^2 + _____.
7. Legs of 9 cm and 12 cm are to a hypotenuse of 15 cm as legs of 10 ft. and 24 ft. are to a hypotenuse of _____.
8. $c = 25$ is to $a = 24$ and $b = 7$ as $c = 85$ is to $a = 77$ and _____.

Create two analogies of your own.

Ask a classmate to solve your analogies.

Choice Board

Name:_____ Date:_____

Choice Board Self-Assessment

Rank yourself on the statements below.

1. I successfully completed the task(s).

2. The work taught me more about the content.

3. This work represents my best effort.

4. Identify at least one struggle you encountered during your extension activity.

5. What part of your project are you most proud of?

6. If given the opportunity to complete a similar task in the future, what would you do the same, and what would you do differently?

Teacher Feedback

Would You Rather Activity

DESCRIPTION

Would You Rather is an enriching activity in which students use mathematical reasoning and creativity to justify their answers.

MATERIALS

PRINTED

- 1 Student Handout (per student)
- 1 Rubric (for the teacher)

PREPARATION

- Print one copy of the Student Handout per student
- Plan to put students in pairs if desired

PROCEDURE AND FACILITATION POINTS

1. Distribute a Student Handout to each student.
2. Encourage students to look back at the Student Journals from the Explore activities if they need to review the skills they have learned.
3. Invite students to share their answers and justification with partners.

Pythagorean Theorem SAMPLE

Would You Rather - Skateboard Ramp

Description

Would You Rather is an enriching activity in which students use mathematical reasoning and creativity to justify their answers.

Materials

Printed
1 Student Handout (per student)
1 Rubric (for the teacher)

Preparation

- Print one copy of the Student Handout per student.
- Plan to put students in pairs if desired.

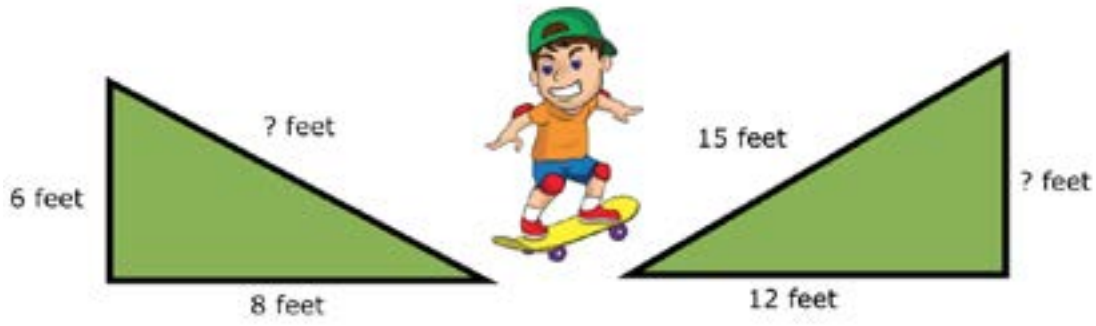
Procedure and Facilitation Points

1. Distribute a Student Handout to each student.
2. Encourage students to look back at the Student Journals from the Explore activities if they need to review the skills they have learned.
3. Invite students to share their answers and justification with partners.

Use mathematical reasoning and creativity to justify your answer to the Would You Rather question.

Anya is building a new skateboard ramp in her backyard. There are two options for the design of the ramp, and both are in the shape of a right triangle. Option 1 has one piece that measures 6 feet in length, and the other piece measures 8 feet in length. Option 2 has one piece that measures 12

feet in length, and the other piece measures 15 feet in length. **Would you rather** build Option 1 or Option 2? Justify your reasoning with mathematics. Solve using the Pythagorean theorem.



ANSWER

Sample answers may include the following: I would rather build Option 1. The hypotenuse measures 10 feet. ($6^2 + 82 = c^2$); $c^2 = 100$; $c = 10$ feet. The height of the ramp is shorter than the second option, which is less intimidating for a less experienced skateboarder like me.

I would rather build Option 2. The height of the ramp would measure 9 feet. ($a^2 + 12^2 = 15^2$); $a^2 = 81$; $a = 9$ feet. The height is greater than the other design, which makes the ramp more challenging for a more skilled skateboarder like me.

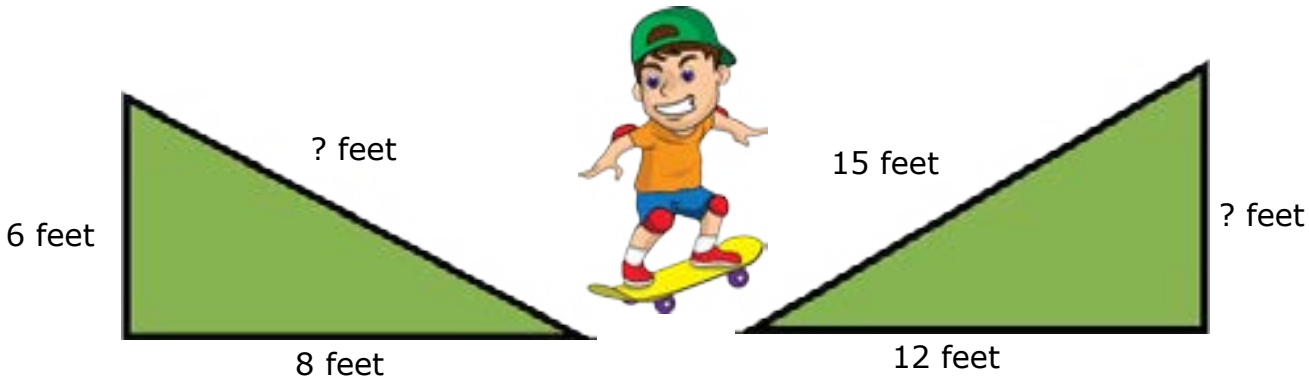
Would You Rather

Name:_____ Date:_____

Skateboard Ramp

Use mathematical reasoning and creativity to justify your answer to the Would You Rather question.

Anya is building a new skateboard ramp in her backyard. There are two options for the design of the ramp, and both are in the shape of a right triangle. Option 1 has one piece that measures 6 feet in length, and the other piece measures 8 feet in length. Option 2 has one piece that measures 12 feet in length, and the other piece measures 15 feet in length. **Would you rather** build Option 1 or Option 2? Justify your reasoning with mathematics. Solve using the Pythagorean theorem.



Would You Rather

Rubric

	Understanding	Computation	Reasoning
1	The student does not understand what the problem is asking them to do. They do not address the problem, and the strategies are not appropriate for the problem.	The student does not solve the problem correctly. They do not support their answer with work.	The student does not support their reasoning. They do not use mathematical language.
2	The student understands what some of the problem is asking them to do. They address most parts of the problem. Strategies used to solve the problem are somewhat appropriate.	The student solves some parts of the problem but may make some mistakes. They support some of their answer with work.	The student somewhat supports their reasoning with some mistakes. They use some mathematical language, with a few mistakes.
3	The student fully understands what the problem is asking them to do. They address all parts of the problem and are able to employ strategies to resolve the problem.	The student solves all parts of the problem correctly and is able to support their answer with work.	The student clearly and accurately supports the reasoning behind their answer. They use accurate mathematical language consistently.

WHAT IS DAILY NUMERACY?

The goal of Daily Numeracy is to empower students to reason with numbers in an accurate, efficient, and flexible way. We have included a carefully crafted, purposeful activity sample designed to help students build their thinking and reasoning around relationships and connections. Each grade level has numerous Daily Numeracy activities.

Week 1 Mini-Lesson

DESCRIPTION

Students reason with numbers in an accurate, efficient, and flexible way through purposeful activities designed to help students build their thinking and reasoning around relationships and connections.

MATERIALS

PRINTED

- 1 Weekly Slideshow (per class)
- 1 Set of Number Cards (per class) *for Blank Number Line activity

REUSABLE

- 1 Projector or document camera (per class)
- 1 Marker (per class)* for Solve It!activity
- 1 Blank number line (per class) for Blank Number Line activity

CONSUMABLE

- 1 Piece of chart paper (per class)* for Solve It! activity

PREPARATION

- Prepare to project the slideshow prompt of the day to each class.

Solve It! Activity:

- Gather a piece of chart paper and a marker to document student responses.

Blank Number Line Activity:

- Prepare a blank number line to be reused throughout the year. Examples include painters tape on a board, string that is hung by using magnets, or duct tape on laminated poster board.
- Print and cut the Number Cards according to the slide being used in class.

PROCEDURE AND FACILITATION POINTS

1. Project the slideshow prompt of the day. Students should not have anything with them for this activity.
2. Give students a minute of silent time as they look at the prompt. Ask students relevant guiding questions. Sample questions are shown in the table below by activity.
3. Accept multiple student responses if their reasoning is accurate. *For the Solve It! activity, call on students to give out answers only. Record student answers on chart paper.
4. As students discuss their responses, ask the class if they agree or disagree, and provide sentence stems for responses.
    a. I agree because . . .
    b. I disagree because . . .
    c. Can you explain why you . . . ?

Solve It! Activity:

5. Students solve equations or word problems by using mental math and other number-sense strategies. Guiding Questions:
    a. Explain the strategy used to get your answer.
    b. Is there a different strategy we could use?
    c. How are these strategies similar? How are they different?

Blank Number Line Activity:

6. Students place rational numbers on an open number line, and they discuss the relationships between the placements. Guiding Questions:
    a. Why did you place your number on that spot?
    b. What is the distance between those two numbers?
    c. Is your number closer to _____ or _____?
    d. Do you need to move any other numbers to place your number?
    e. What do you know about those numbers?
    f. What if I placed these two benchmark numbers on the number line? How would the distance or order of the numbers change?

Not Like the Others Activity:

7. Students describe the characteristics of an object in a set of four or more, and they discuss how it is different from the others. Guiding Questions:
    a. What do you notice?
    b. Which one is not like the others?
    c. What characteristic makes it different?
    d. How are these objects similar?
    e. Do you see another object that is not like the others?

Math Mystery Activity:

8. Guiding Questions:
    a. What do you notice?
    b. How does each clue help you determine the mystery number?
    c. Which clue helped you narrow down your options?
    d. How does a number range help you determine the mystery number?

Same and Different Activity:

9. Students describe how two objects are the same but different, and they discuss the reasoning behind their responses. Guiding Questions:
    a. What do you notice?
    b. How are these two _____ the same, but different?
    c. What characteristics helped you decide that they were the same and different?
    d. Can you think of another way in which they are the same and different?

$$-7 - (-9)$$

Daily Numeracy

−2	2	−3
0	1	Opposite of −3

Daily Numeracy

Day 3
Not Like the Others

-1	1
$\lvert -1 \rvert$	0

Daily Numeracy

Clue 1

Clue 2

Clue 3

Clue 4

Clue 1
The number is divisible by 5.

Clue 2

Clue 3

Clue 4

Daily Numeracy

Clue 1
The number is divisible by 5.

Clue 2
The number is greater than 25.

Clue 3

Clue 4

Clue 1
The number is divisible by 5.

Clue 2
The number is greater than 25.

Clue 3
The number is divisible by 2.

Clue 4

Clue 1
The number is divisible by 5.

Clue 2
The number is greater than 25.

Clue 3
The number is divisible by 2.

Clue 4
The sum of this number and 8 is 58.

The number is ...

50

$y = 12x$	The cost for 20 students to attend the museum was $240.

WHAT IS MATHEMATICAL FLUENCY?

In order for students to be successful as they progress into upper grades, they need to have a solid understanding of the concepts of addition and subtraction, and they also need to be fluent in the thinking strategies necessary for solving such facts. As you use the STEMscopes Math program, you will come to see how your students are starting to rely on their thinking skills and strategies as opposed to their fingers or skip-counting methods. Each grade level has numerous Mathematical Fluency activities.

Operations with Integers: All Operations - Different Signs Lesson Instructions

DESCRIPTION

In this maze activity, students use their understanding of integer operations to successfully navigate a maze using accurate integer calculations.

MATERIALS

PRINTED

- 1 Maze Instruction Sheet (per student)
- 1 Maze (per student)

CONSUMABLE

- Scrap paper

PREPARATION

Print a Maze Instruction Sheet and Maze for each student.

PROCEDURE AND FACILITATION POINTS

1. Explain to students that each problem has at least one possible solution. Correct solutions lead to the finish line. Incorrect solutions lead to dead ends.
2. Have students start in the upper left-hand corner of the maze.
3. Have students work out solutions, using scrap paper as needed.
4. Tell students that when they have found and chosen a solution, they should trace that path on their handout.
5. Explain that if a problem does not show an accurate solution, students must go back and rework the previous problem.
6. Have students continue solving problems until they reach the finish line.
7. If time allows, have each student compare their solution pathway with a classmate's and decide whether they found the most efficient solution pathway.
8. Monitor students as they work to ensure that they are following instructions, and assist with computation as needed.
9. Refer to the answer key, and prompt students in discovering pathways as needed.

Mathematical Fluency

Maze Instruction Sheet

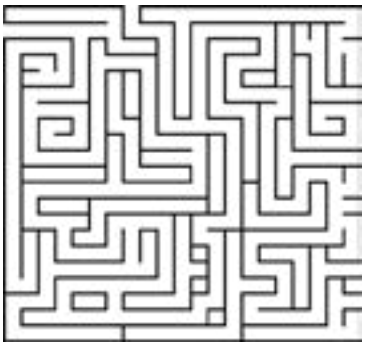
Complete the maze individually, and then compare your solution with a partner.

You Will Need

1 Maze

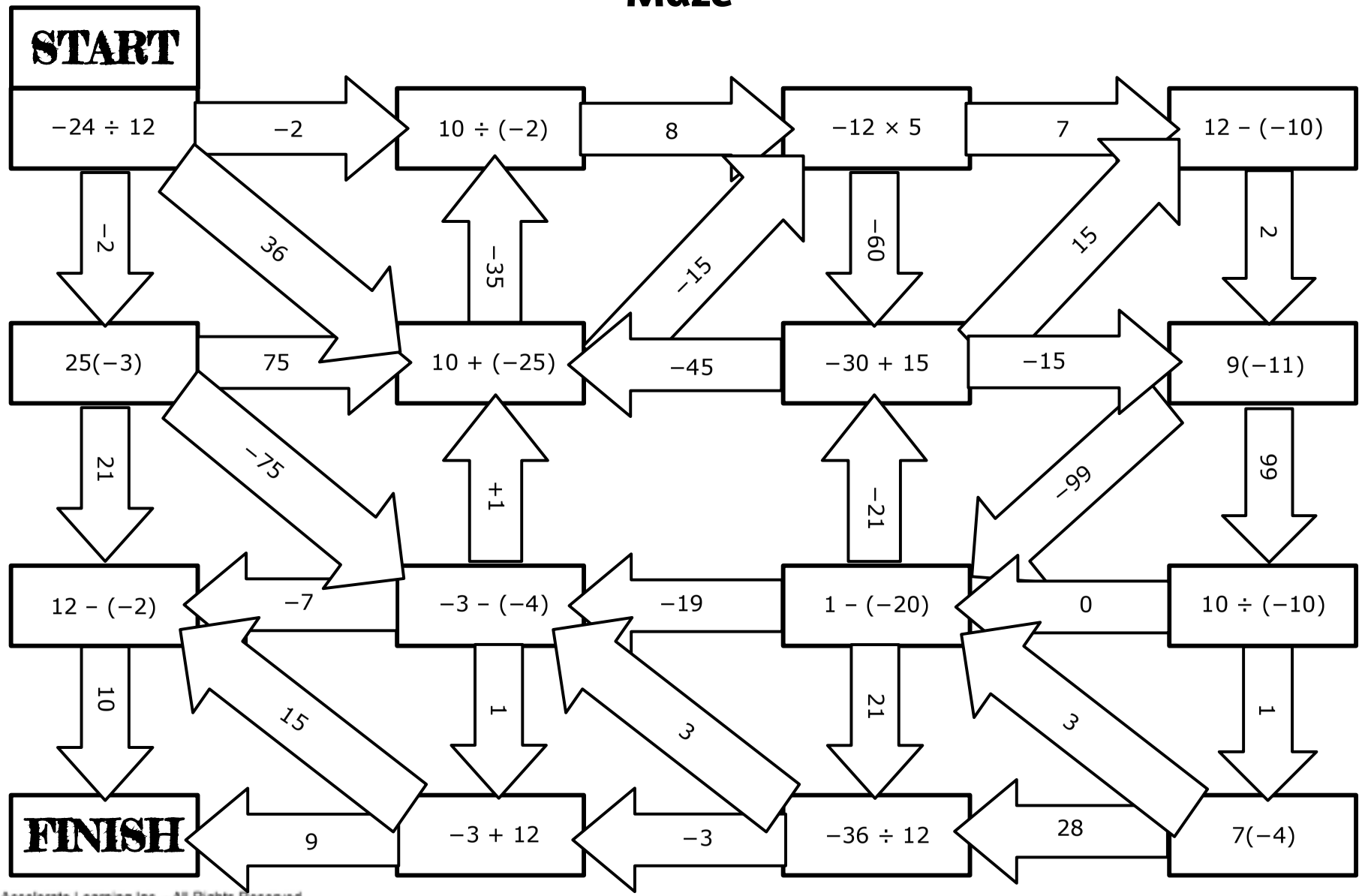
How to Play

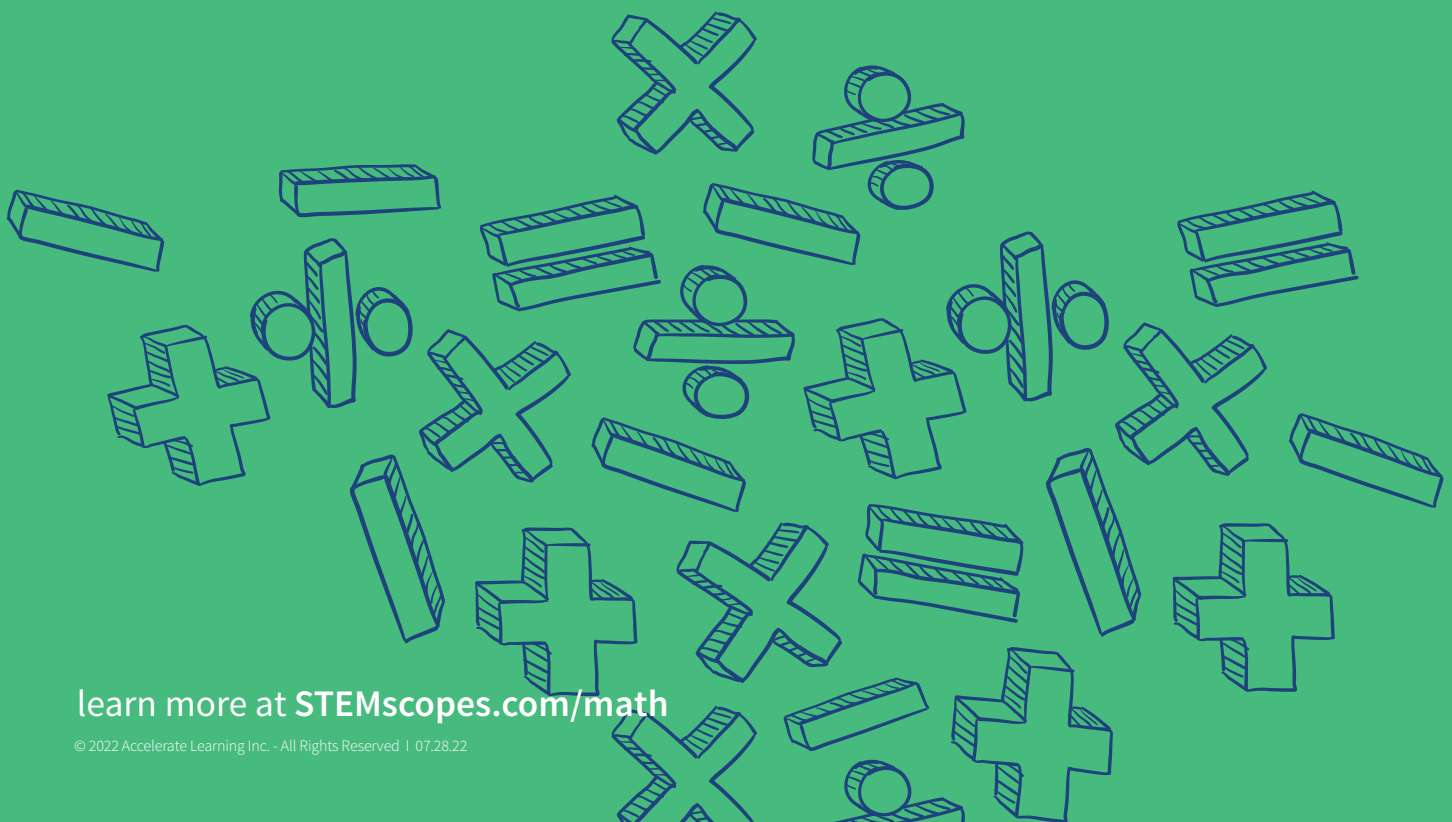
1. Each problem has at least one possible solution. Correct solutions lead to the finish line. Incorrect solutions lead to problems without correct solutions.
2. Start in the upper left-hand corner of the maze.
3. Work out problems, using paper as needed.
4. When you have found and chosen a solution, trace the path on your handout.
5. If a problem does not show an accurate solution, go back and rework the previous problem.
6. Continue solving problems until you reach the finish line.
7. Compare your solution pathway with a classmate's, and decide whether you have found the most efficient solution pathway.



Mathematical Fluency

Maze





learn more at **STEMscopes.com/math**