



How to support your student as they learn about Justifying Line and Angle Relationships

Mathematics is a connected set of ideas, and your student knows a lot. Encourage them to use the mathematics they already know when encountering new concepts in this topic.

Where are we?



In this MATHbook topic, students engage with proofs on several levels: reading and analyzing completed proofs, finishing proofs that have been partially completed, supplying the reasons for given statements, and mirroring a two-column proof from a given flow-chart proof. Students have the opportunity to experience proofs before having to write them entirely on their own.

Where have we been?

Students have investigated triangles and quadrilaterals. They used informal arguments to establish facts about the angle sum and exterior angles of triangles, as well as the angles created when a transversal cuts parallel lines.

Where are we going?

As the theorems proven in this topic are used to prove other theorems in future topics, students are building a system of geometric relationships and seeing how these geometric ideas are connected.



MATHia

Encourage your students to work through the sequence of MATHia assigned to them. These workspaces deepen their understanding and provide practice with the concepts of **Justifying Line and Angle Relationships**.

Forms of Proof

- Introduction to Proofs
- Completing Measure Proofs
- Connecting Steps in Angle Proofs
- Using Angle Theorems

Lines Cut by a Transversal

- Classifying Angles Formed by Transversals
- Calculating Angle Measures Formed by Transversals
- Calculating Angles Formed by Multiple Transversals

Proving Parallel Line Theorems

- Proving Parallel Lines Theorems
- Proving the Converses of Parallel Lines Theorems

Interior and Exterior Angles of Polygons

- Proving Triangle Theorems

Proving Triangles Congruent

- Proving Triangles Congruent Using SAS and SSS
- Proving Triangles Congruent Using AAS and ASA
- Proving Theorems Using Congruent Triangles

Special Right Triangles

- Introduction to Special Right Triangles
- Calculating the Lengths of Sides of Special Right Triangles

Solving Problems with Congruence

- Using Triangle Theorems

Angle Relationships Inside and Outside Circles

- Determining Interior and Exterior Angles in Circles





How to support your student as they learn

MATH MYTH

If I can get the right answer, then I should not have to explain why.

Sometimes you get the right answer for the wrong reasons. Suppose a teacher asks a student, “What is 4 divided by 2?” The student subtracts 2 from 4 and answers, “2!”. She gave the right answer but had an incomplete understanding of division.

However, suppose the teacher asks her to explain her reasoning by drawing a picture, creating a model, or giving a different example. In that case, the teacher has a chance to uncover her flawed understanding.

If teachers don't know their students' reasoning for both right and wrong answers, then they cannot address misconceptions. This is important because new math learning builds upon previous understandings.

Ask your student to explain his or her thinking, when possible, even when you don't know the correct answer. When children (and adults) explain something to someone else, the very process helps them learn.

#mathmythbusted

Talking Points

Discuss With Your Student

Your student is learning about formal proofs. You can further support your student's learning by asking questions about the work they do in class or at home.

Questions to Ask

- 1 *How does this problem look like something you did in class?*
- 2 *Can you show me the strategy you used to solve this problem? Do you know another way to solve it?*
- 3 *Does your answer make sense? How do you know?*
- 4 *Is there anything you don't understand? How can you use today's lesson to help?*



KEY TERMS

auxiliary line

An auxiliary line is a line drawn to help complete a geometric proof.

Angle-Angle-Side Congruence Theorem

The Angle-Angle-Side Congruence Theorem states that if two angles and the non-included side of one triangle are congruent to two angles and the non-included side of another triangle, then the triangles are congruent.

Inscribed Angle Theorem

The Inscribed Angle Theorem states that the measure of an inscribed angle is half the measure of its intercepted arc.





➤ Read and share with your student.

How to support your student as they learn about Using Congruence Theorems

Mathematics is a connected set of ideas, and your student knows a lot. Encourage them to use the mathematics they already know when encountering new concepts in this topic.

Where are we?



In this MATHbook topic, students use the theorems that they have proved to prove new theorems about triangles, quadrilaterals, and angles formed in circles. Students use triangle congruence theorems to verify properties of parallelograms, and they use the congruence theorems they have proved to prove theorems related to the chords of circles.

Where have we been?

Students build from the fundamentals of proof they learned in the previous topic. Students have explained how the criteria for the SSS, SAS, and ASA theorems follow from the definition of congruence.

Where are we going?

Students will use logical reasoning not just in geometry but as they progress through advanced mathematics. Mathematics is about understanding and providing valid reasons why numeric, algebraic, and geometric relationships exist and whether or not they exist in all cases.



MATHia

Encourage your students to work through the sequence of MATHia assigned to them. These workspaces deepen their understanding and provide practice with the concepts of **Using Congruence Theorems**.

Extending Triangle Congruence Theorems

- Proving Triangles Congruent Using HL and HA

Properties of Quadrilaterals

- Understanding Parallelograms
- Determining Parts of Quadrilaterals and Parallelograms

Parallelogram Proofs

- Proofs about Parallelograms





How to support your student as they learn

MATH MYTH

Asking questions means you don't understand.

It is universally true that, for any given body of knowledge, there are levels to understanding. For example, you might understand the rules of baseball and follow a game without trouble. But there is probably more to the game that you can learn. For example, do you know the 23 ways to get on first base, including the one where the batter strikes out?

Questions don't always indicate a lack of understanding. Instead, they might allow you to learn even more on a subject that you already understand. Asking questions may also give you an opportunity to ensure that you understand a topic correctly. Finally, questions are extremely important to ask yourself. For example, everyone should be in the habit of asking themselves, "Does that make sense? How would I explain it to a friend?"

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Talking Points

Discuss With Your Student

Your student is learning about proving the congruence of figures. You can further support your student's learning by asking questions about the work they do in class or at home.

Questions to Ask

- 1 *How does this problem look like something you did in class?*

- 2 *Can you show me the strategy you used to solve this problem? Do you know another way to solve it?*

- 3 *Does your answer make sense? How do you know?*

- 4 *Is there anything you don't understand? How can you use today's lesson to help?*



KEY TERMS

tangent segment

A tangent segment is a line segment formed by connecting a point outside of the circle to a point of tangency.

Trapezoid Midsegment Theorem

The Trapezoid Midsegment Theorem states that the midsegment of a trapezoid is parallel to each of the bases and its length is one half the sum of the lengths of the bases.

Diameter-Chord Theorem

The Diameter-Chord Theorem states that the perpendicular bisector of a chord bisects the chord's intercepted arc.





How to support your student as they learn about Similarity

Mathematics is a connected set of ideas, and your student knows a lot. Encourage them to use the mathematics they already know when encountering new concepts in this topic.

Where are we?



In this MATHbook topic, students learn that dilations are non-rigid motion transformations that preserve shape but not necessarily size, and you can prove triangle similarity using as few as two or three pairs of corresponding parts. With a repertoire of triangle proportionality theorems to use, students solve indirect measurement problems using similarity and right triangles.

Where have we been?

Students have developed an understanding of proportional reasoning by exploring multiplicative relationships and having used scale factors to solve problems. They have learned that two figures are similar they can map one onto the other by a sequence of transformations.

Where are we going?

Understanding similarity further develops proportional reasoning. It provides the opportunity for students to connect spatial and numeric reasoning and lays the groundwork for understanding trigonometric ratios, which students will explore in the next topic.



Encourage your students to work through the sequence of MATHia assigned to them. These workspaces deepen their understanding and provide practice with the concepts of **Similarity**.

Dilating Figures to Create Similar Figures

- Understanding Similarity
- Describing a Dilation
- Specifying a Sequence of Transformations

Establishing Triangle Similarity Criteria

- Understanding the Triangle Similarity Theorems
- Identifying Similar Triangles Using Theorems

Theorems About Proportionality

- Proofs Using Similar Triangles

Application of Similar Triangles

- Calculating Corresponding Parts of Similar Triangles

Partitioning Segments in Given Ratios

- Partitioning Segments in Given Ratios
- Partitioning Segments Proportionally



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MARK YOUR CALENDAR
End of Topic Test:



How to support your student as they learn

MATH MYTH

There is one right way to do math problems.

Employing multiple strategies to arrive at a single, correct solution is important in life. Suppose you are driving in a crowded downtown area. If one road is backed up, then you can always take a different route. If you know only one route, then you're out of luck.

Learning mathematics is no different. There may only be one right answer, but there are often multiple strategies to arrive at that solution. Everyone should get in the habit of saying: *Well, that's one way to do it. Is there another way? What are the pros and cons?* That way, you avoid falling into the trap of thinking there is only one right way because that strategy might not always work, or there might be a more efficient strategy.

Teaching students multiple strategies is important. This helps students understand the benefits of the more efficient method. In addition, everyone has different experiences and preferences. What works for you might not work for someone else.

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Talking Points

Discuss With Your Student

Your student is learning about similarity and proportional relationships. You can further support your student's learning by asking questions about the work they do in class or at home.

Questions to Ask

- 1 *How does this problem look like something you did in class?*
- 2 *Can you show me the strategy you used to solve this problem? Do you know another way to solve it?*
- 3 *Does your answer make sense? How do you know?*
- 4 *Is there anything you don't understand? How can you use today's lesson to help?*



KEY TERMS

Triangle Proportionality Theorem

The Triangle Proportionality Theorem states that if a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally.

Triangle Midsegment Theorem

The Triangle Midsegment Theorem states that the midsegment of a triangle is parallel to the third side of the triangle and is half the measure of the third side of the triangle.

indirect measurement

Indirect measurement is a technique that uses proportions to determine measurements.



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MARK YOUR CALENDAR
End of Topic Test:



How to support your student as they learn about Trigonometry

Mathematics is a connected set of ideas, and your student knows a lot. Encourage them to use the mathematics they already know when encountering new concepts in this topic.

Where are we?



In this MATHbook topic, students investigate right triangles to understand trigonometric ratios. They discover and analyze these ratios and use them to solve application problems. Students explore the reciprocals of sine, cosine, and tangent, along with their inverses. They explore complement angle relationships in right triangles and then solve real-world problems.

Where have we been?

Students understand that slope is the steepness and direction of a line. They used similar triangles to explain why the slope between any two points on a line is the same. This understanding lays the groundwork for developing tangent as the ratio of the opposite side to the adjacent side.

Where are we going?

Trigonometry provides a crucial bridge between geometry and algebra. Understanding the trigonometric ratios in terms of side length ratios prepares students to study trigonometric functions. Students experience a concrete representation of the trigonometric ratios using triangles.



MATHia

Encourage your students to work through the sequence of MATHia assigned to them. These workspaces deepen their understanding and provide practice with the concepts of **Trigonometry**.

Trigonometric Ratios

- Introduction to Trigonometric Ratios
- Relating Sines and Cosines of Complementary Angles
- Using One Trigonometric Ratio to Solve Problems
- Using Multiple Trigonometric Ratios to Solve Problems





How to support your student as they learn

MATH MYTH

Cramming for a test is just as good as spaced practice for long-term retention.

Everyone has been there. You have a big test tomorrow, but you've been so busy that you haven't had time to study. So you had to learn it all in one night. You may have received a decent grade on the test. However, did you remember the material a week, month, or a year later?

The honest answer is, "probably not." That's because long-term memory is designed to retain useful information.

How does your brain know whether a memory is useful or not? One way is the frequency in which you encounter a piece of information. If you see something only once (like during cramming), then your brain doesn't deem those memories as important. However, if you sporadically come across the same information over time, then it's probably important. To optimize retention, encourage your student to periodically study the same information over expanding intervals of time.

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Talking Points

Discuss With Your Student

Your student is learning about trigonometric ratios. You can further support your student's learning by asking questions about the work they do in class or at home.

Questions to Ask

- 1 *How does this problem look like something you did in class?*
- 2 *Can you show me the strategy you used to solve this problem? Do you know another way to solve it?*
- 3 *Does your answer make sense? How do you know?*
- 4 *Is there anything you don't understand? How can you use today's lesson to help?*



KEY TERMS

tangent (tan)

The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side.

sine (sin)

The sine of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the hypotenuse.

cosine (cos)

The cosine of an acute angle in a right triangle is the ratio of the length of the adjacent side to the length of the hypotenuse.

