Closing the Distance

Geometry

Teacher Edition

region 4®

Closing the Distance: Geometry

Teacher Edition

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Acknowledgments
Region 4 Education Service Center would like to acknowledge the talent and expertise of those who contributed to the development of this book. Their dedication to our core values of excellence in service for children made possible the creation of this resource to assist educators in providing quality, effective instruction for all students.

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2. A resource that integrates related TEKS to provide a review of mathematics concepts and skills, paired with opportunities for rigorous mathematical discourse

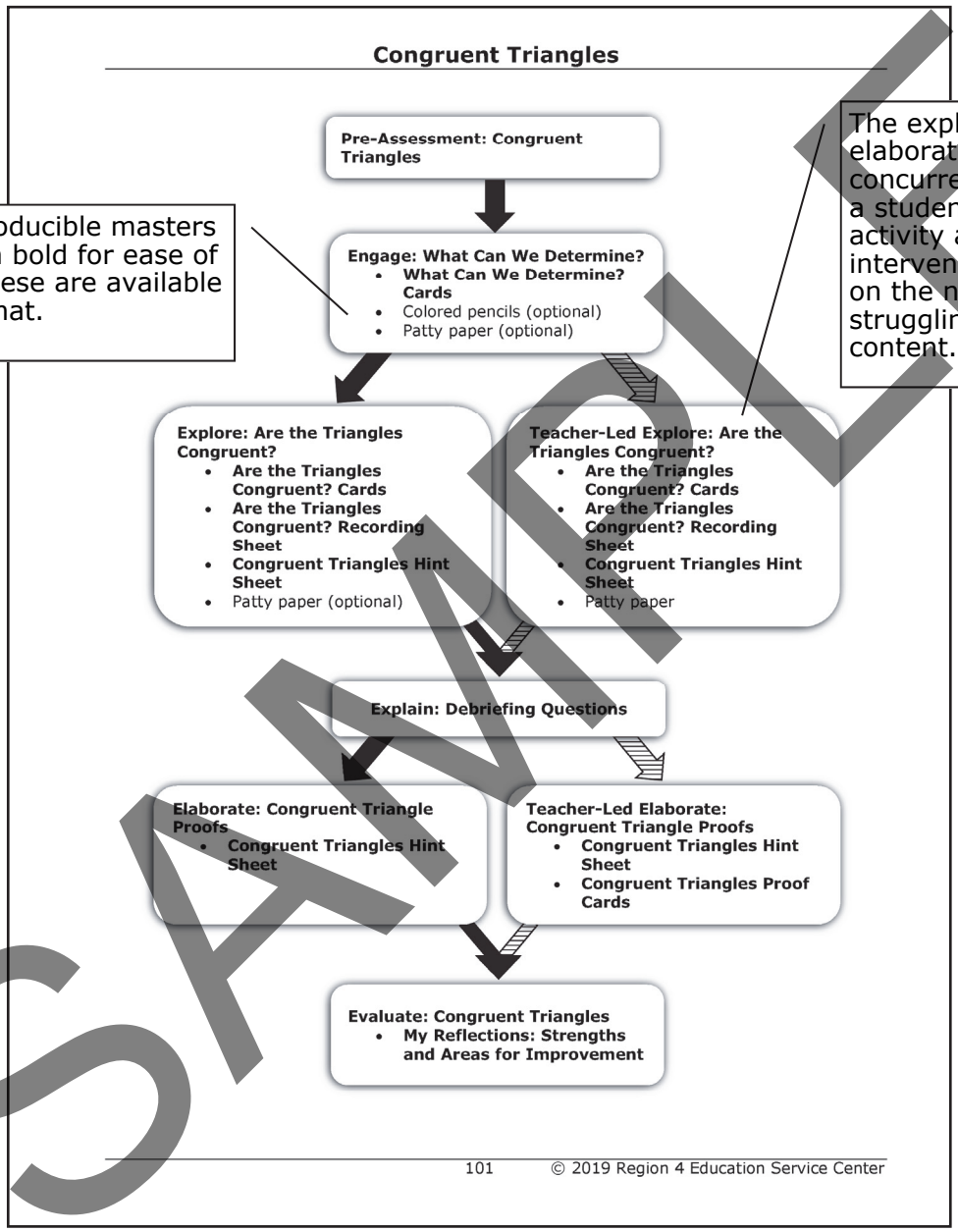
3. A resource of classroom-ready 5E activities that keeps students engaged in a positive, productive manner through strategies, including modeling, card sorts, matching, cooperative learning, and analysis of student work

4. A resource that provides an opportunity for students to track their progress with an analysis of strengths and areas to improve within each lesson

5. A resource that includes a pre-assessment to provide teachers and students quick and timely information on student readiness for the activities in the lesson and identifies students that may benefit from a small-group intervention setting

6. A resource that includes teacher-led interventions for students who may struggle with specific content

What is in a lesson found in *Closing the Distance*?



Titles of reproducible masters are printed in bold for ease of reference. These are available in digital format.

The explore and the elaborate phase have two concurrent components: a student-facilitated activity and a teacher-led intervention that focuses on the needs of students struggling with the content.

Each lesson supports multiple student expectations with a focus on the STAAR® readiness standards. Student expectations are listed at the

Materials for each phase are summarized on one page for ease in preparation.

Congruent Triangles

Phase	Activity Title	TEKS	Additional Materials	Instructional Grouping
Pre-Assessment	**Pre-Assessment: Congruent Triangles**	G(6)(A) G(6)(B) G(6)(D)		Individual
Engage	**What Can We Determine?**	G(6)(D)	• ***What Can We Determine? Cards*** (1 set per group) • Colored pencils (optional) • Patty paper	Groups of 3 Whole-group
Explore Explain	**Are the Triangles Congruent? Recording Sheet**	G(6)(A) G(6)(B) G(6)(D)	• **Congruent Triangles Hint Sheet** • Highlighters • Patty paper (optional)	Pairs of students Whole-group
Elaborate	**Congruent Triangle Proofs**	G(6)(A) G(6)(B)	• **Congruent Triangles Hint Sheet**	Pairs of students
Evaluate	**Evaluate: Congruent Triangles**	G(6)(A) G(6)(B) G(6)(D)	• **My Reflections: Strengths and Areas for Improvement**	Individual

Bold items are reproducible masters.
Italicized items require advanced preparation.

Grouping strategies for each phase are summarized to assist in the arrangement of the classroom.

Pre-Assessment: Congruent Triangles

The purpose of this activity is to formatively assess students' understanding of how to prove tw triangles are congruent.

The identified activities are recommended for small-group, teacher-led interventions for students who may struggle with the specific content in **Pre-Assessment: Congruent Triangles.**

Content	Teacher-Led Intervention
Identify given information about segments, angles, and triangles from given information.	**Are the Triangles Congruent?**
Identify which triangle congruence conditions must be present to prove two triangles are congruent.	**Congruent Triangle Proofs**

A focused pre-assessment is provided for each lesson. Tier I intervention activities are identified for use with students who may struggle with the identified content.

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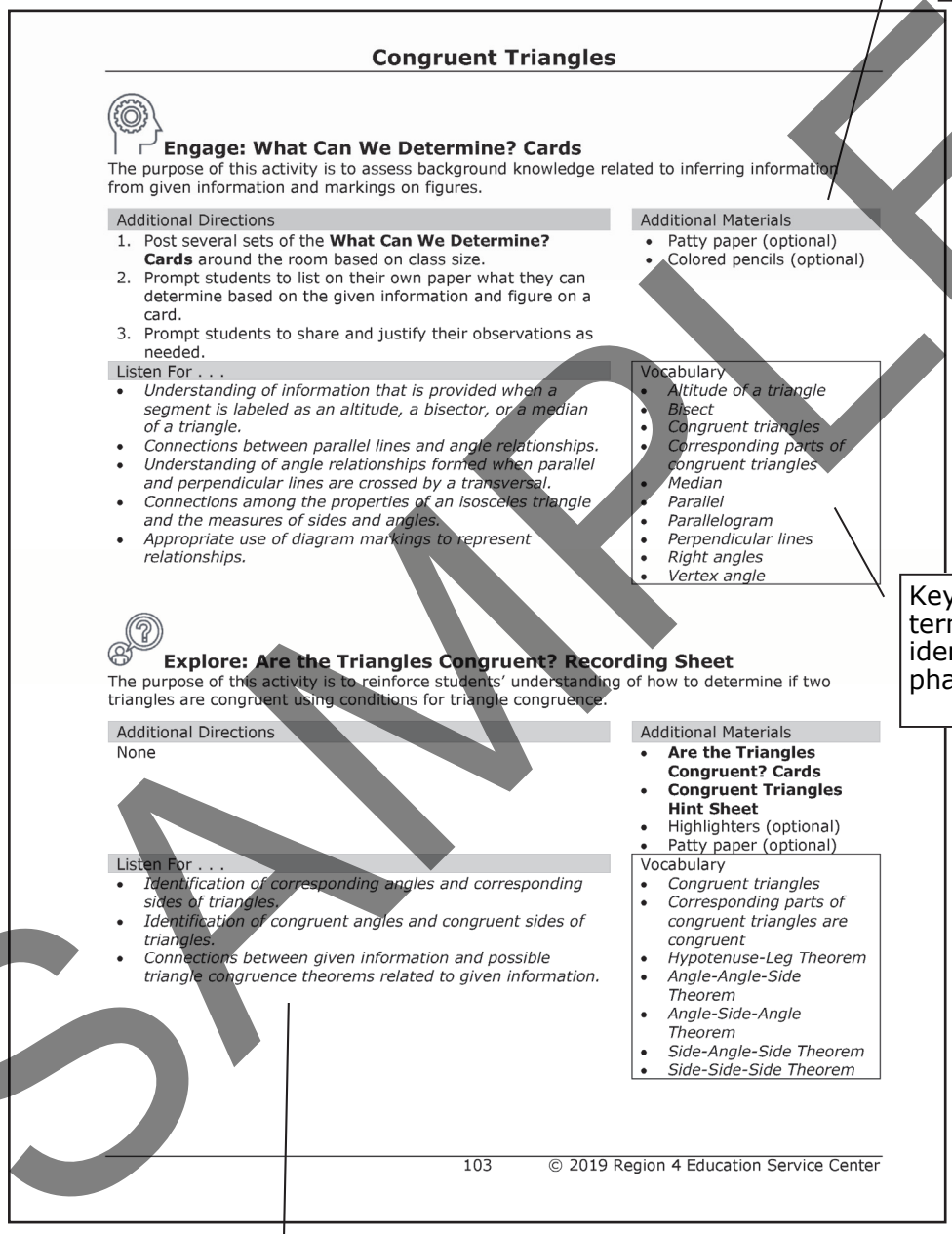
What is in a lesson found in *Closing the Distance*?

Additional materials may be needed to complement the student pages.



Congruent Triangles

Engage: What Can We Determine? Cards

The purpose of this activity is to assess background knowledge related to inferring information from given information and markings on figures.

Additional Directions

1. Post several sets of the **What Can We Determine? Cards** around the room based on class size.
2. Prompt students to list on their own paper what they can determine based on the given information and figure on a card.
3. Prompt students to share and justify their observations as needed.

Additional Materials

- Patty paper (optional)
- Colored pencils (optional)

Listen For . . .

- *Understanding of information that is provided when a segment is labeled as an altitude, a bisector, or a median of a triangle.*
- *Connections between parallel lines and angle relationships.*
- *Understanding of angle relationships formed when parallel and perpendicular lines are crossed by a transversal.*
- *Connections among the properties of an isosceles triangle and the measures of sides and angles.*
- *Appropriate use of diagram markings to represent relationships.*

Vocabulary

- *Altitude of a triangle*
- *Bisect*
- *Congruent triangles*
- *Corresponding parts of congruent triangles*
- *Median*
- *Parallel*
- *Parallelogram*
- *Perpendicular lines*
- *Right angles*
- *Vertex angle*

Key vocabulary terms are identified for each phase.

Explore: Are the Triangles Congruent? Recording Sheet

The purpose of this activity is to reinforce students' understanding of how to determine if two triangles are congruent using conditions for triangle congruence.

Additional Directions

None

Additional Materials

- **Are the Triangles Congruent? Cards**
- **Congruent Triangles Hint Sheet**
- Highlighters (optional)
- Patty paper (optional)

Listen For . . .

- *Identification of corresponding angles and corresponding sides of triangles.*
- *Identification of congruent angles and congruent sides of triangles.*
- *Connections between given information and possible triangle congruence theorems related to given information.*

Vocabulary

- *Congruent triangles*
- *Corresponding parts of congruent triangles are congruent*
- *Hypotenuse-Leg Theorem*
- *Angle-Angle-Side Theorem*
- *Angle-Side-Angle Theorem*
- *Side-Angle-Side Theorem*
- *Side-Side-Side Theorem*

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Key ideas and concepts to listen for as students complete each phase are listed.

The explain phase includes debriefing questions to guide class discussion for key understandings and skills found in the activities.

Congruent Triangles

Explain: Debriefing Questions

The purpose of this activity is to highlight key understandings and skills applied in the Explore phase of this lesson.

- Did you focus on angles or segments when trying to determine if two triangles were congruent? Why?
- How did you determine if you had enough information to prove two triangles are congruent?
- Was the needed information always in the list of given information? What did you do if it was not?

Elaborate: Congruent Triangle Proofs

The purpose of this activity is to reinforce students' understanding of how to prove two triangles are congruent using congruency theorems.

Additional Directions

Prompt students to compare their proof with someone who has written the same type of proof.

Listen For . . .

- *Identification of corresponding angles and corresponding sides of triangles.*
- *Identification of congruent angles and congruent sides of triangles.*
- *Connections between given information and possible triangle congruence theorems related to given information.*
- *Understanding of how to determine what additional information is needed when there is not enough information to prove two triangles are congruent.*
- *Understanding of how to justify a sequenced set of mathematical statements to prove a geometric relationship using proof methods, such as a two-column proof, a flow proof, and a paragraph proof.*

Additional Materials

- **Congruent Triangles Hint Sheet**

Vocabulary

- *Congruent triangles*
- *Corresponding parts of congruent triangles*
- *Hypotenuse-Leg Theorem*
- *Angle-Angle-Side Theorem*
- *Angle-Side-Angle Theorem*
- *Side-Angle-Side Theorem*
- *Side-Side-Side Theorem*

Complete directions are included on each student page. Additional directions are provided for teacher-facilitated aspects of an activity.

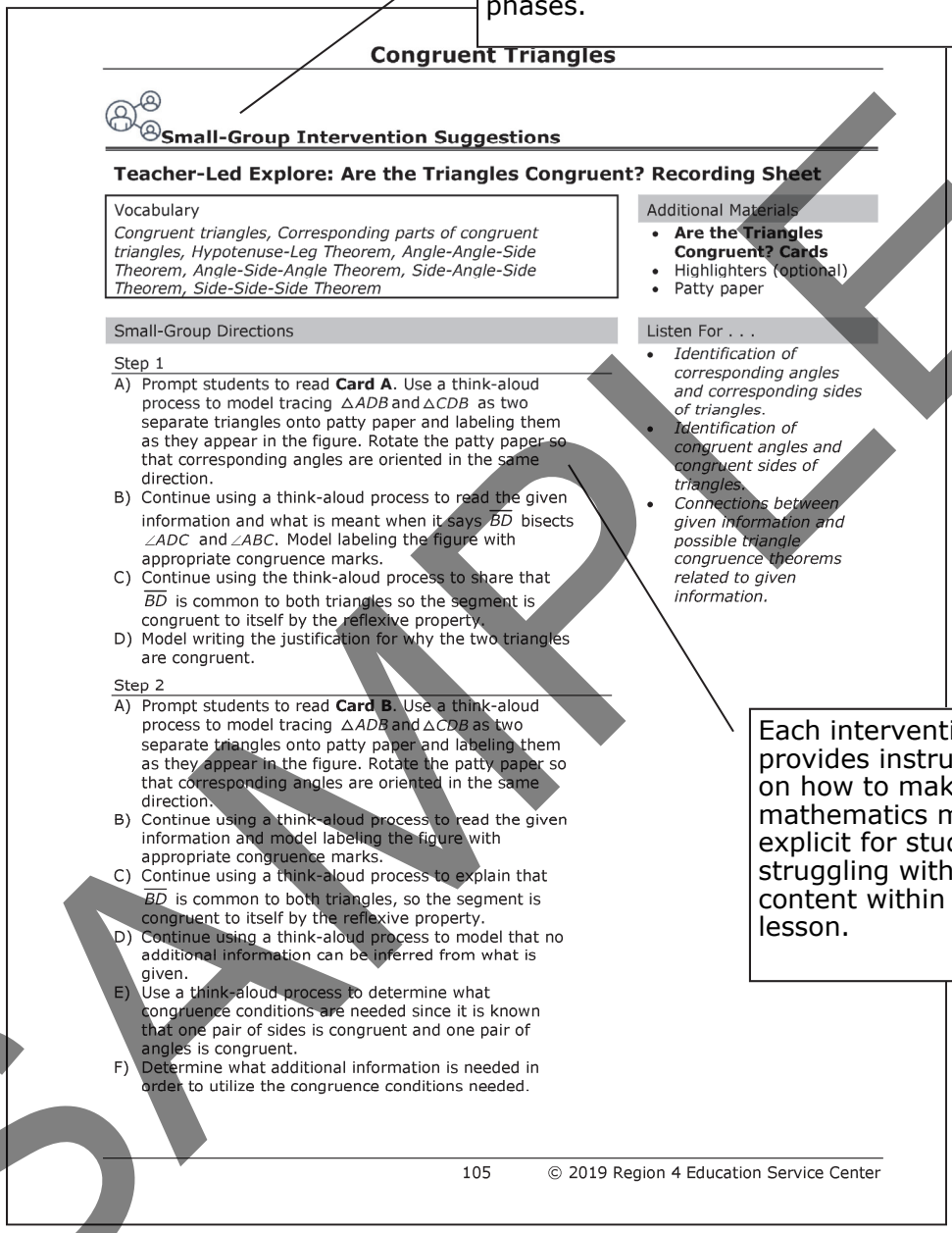
Evaluate: Congruent Triangles

The purpose of this activity is to assess students' understanding of how to justify triangles are congruent.

Question	TEKS	Correct Answer
1	G(6)(B)	C
2	G(6)(B)	D
3	G(6)(B)	C
4	G(6)(B)	A

Each selected-response item is labeled with the content student expectation.

Small-group intervention suggestions are provided for the Explore and the Elaborate phases.



Congruent Triangles

Small-Group Intervention Suggestions

Teacher-Led Explore: Are the Triangles Congruent? Recording Sheet

Vocabulary

Congruent triangles, Corresponding parts of congruent triangles, Hypotenuse-Leg Theorem, Angle-Angle-Side Theorem, Angle-Side-Angle Theorem, Side-Angle-Side Theorem, Side-Side-Side Theorem

Additional Materials

- **Are the Triangles Congruent? Cards**
- Highlighters (optional)
- Patty paper

Small-Group Directions

Step 1

A) Prompt students to read **Card A**. Use a think-aloud process to model tracing $\triangle ADB$ and $\triangle CDB$ as two separate triangles onto patty paper and labeling them as they appear in the figure. Rotate the patty paper so that corresponding angles are oriented in the same direction.
B) Continue using a think-aloud process to read the given information and what is meant when it says $\overline{BD}$ bisects $\angle ADC$ and $\angle ABC$. Model labeling the figure with appropriate congruence marks.
C) Continue using the think-aloud process to share that $\overline{BD}$ is common to both triangles so the segment is congruent to itself by the reflexive property.
D) Model writing the justification for why the two triangles are congruent.

Step 2

A) Prompt students to read **Card B**. Use a think-aloud process to model tracing $\triangle ADB$ and $\triangle CDB$ as two separate triangles onto patty paper and labeling them as they appear in the figure. Rotate the patty paper so that corresponding angles are oriented in the same direction.
B) Continue using a think-aloud process to read the given information and model labeling the figure with appropriate congruence marks.
C) Continue using a think-aloud process to explain that $\overline{BD}$ is common to both triangles, so the segment is congruent to itself by the reflexive property.
D) Continue using a think-aloud process to model that no additional information can be inferred from what is given.
E) Use a think-aloud process to determine what congruence conditions are needed since it is known that one pair of sides is congruent and one pair of angles is congruent.
F) Determine what additional information is needed in order to utilize the congruence conditions needed.

Listen For . . .

- *Identification of corresponding angles and corresponding sides of triangles.*
- *Identification of congruent angles and congruent sides of triangles.*
- *Connections between given information and possible triangle congruence theorems related to given information.*

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Each intervention provides instructions on how to make the mathematics more explicit for students struggling with the content within the lesson.

What is in a lesson found in *Closing the Distance*?

Each lesson provides an opportunity for student reflection as the student self-assesses strengths for each phase of the lesson. Following this self-assessment, students are prompted to note what they are most proud of and to set a goal to improve understanding.

Name: _____ Date:_____

My Reflections: Strengths and Areas for Improvement

Place a plus sign for each statement you feel is a strength after completing each lesson activity.

Lesson Activity	I can identify additional information needed to prove that two triangles are congruent.	I can determine if a pair of triangles are congruent using the congruency theorems.	I can write a proof to show that two triangles are congruent.	I can justify my reasoning that two triangles are congruent.
Pre-Assessment: Congruent Triangles				
What Can We Determine? Cards				
Are the Triangles Congruent?				
Congruent Triangle Proofs				
Evaluate: Congruent Triangles				

I am most proud . . .

_____

_____

_____

To improve my understanding, I . . .

_____

_____

_____