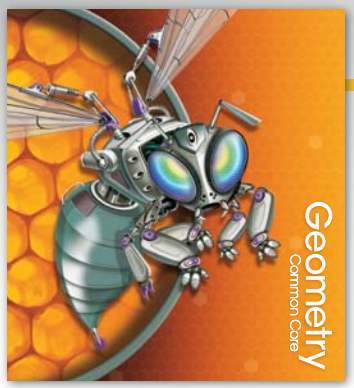
Teacher Resource Sampler

Geometry

Common Core

ALWAYS LEARNING

PEARSON



Go beyond the textbook with Pearson Geometry

Pearson Geometry Common Core Edition © 2015 provides teachers with a wealth of resources uniquely suited for the needs of a diverse classroom. From extra practice to performance tasks, along with activities, games, and puzzles, Pearson is your one-stop shop for flexible Common Core teaching resources.

In this sampler, you will find all the support available for select *Geometry* lessons from Chapter 4, illustrating the scope of resources available for the course. *Pearson Geometry* Teacher Resources help you help your students achieve geometry success!

Contents include:

- rigorous practice worksheets
- extension activities
- intervention and reteaching resources
- support for English Language Learners
- performance tasks
- activities and projects

Contents

4-1 Congruent Figures

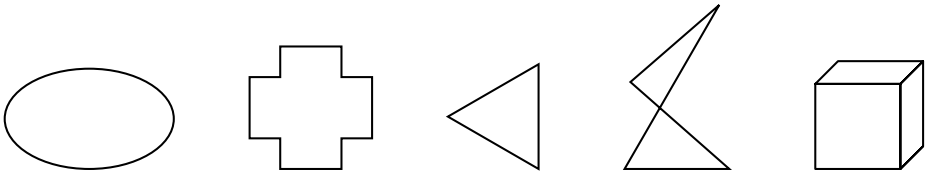
Vocabulary

Review

1. Underline the correct word to complete the sentence.

A *polygon* is a two-dimensional figure with two / three or more segments that meet exactly at their endpoints.

2. Cross out the figure(s) that are NOT *polygons*.



Vocabulary Builder

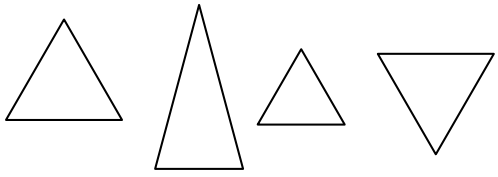
congruent (adjective) **kahng GROO unt**

Main Idea: **Congruent** figures have the same size and shape.

Related Word: congruence (noun)

Use Your Vocabulary

3. Circle the triangles that appear to be *congruent*.



Write T for *true* or F for *false*.

____ **4.** *Congruent* angles have different measures.

____ **5.** A prism and its net are *congruent* figures.

____ **6.** The corresponding sides of *congruent* figures have the same measure.

take note

Key Concept Congruent Figures

Congruent polygons have congruent corresponding parts—their matching sides and angles. When you name congruent polygons, you must list corresponding vertices in the same order.

$ABCD \cong EFGH$

7. Use the figures at the right to complete each congruence statement.

$\overline{AB} \cong$ ____ $\overline{BC} \cong$ ____ $\overline{CD} \cong$ ____ $\overline{DA} \cong$ ____

$\angle A \cong$ ____ $\angle B \cong$ ____ $\angle C \cong$ ____ $\angle D \cong$ ____

Problem 1 Using Congruent Parts

Got It? **If $\triangle WYS \cong \triangle MKV$, what are the congruent corresponding parts?**

8. Use the diagram at the right. Draw an arrow from each vertex of the first triangle to the corresponding vertex of the second triangle.

$\triangle W Y S \cong \triangle M K V$

9. Use the diagram from Exercise 8 to complete each congruence statement.

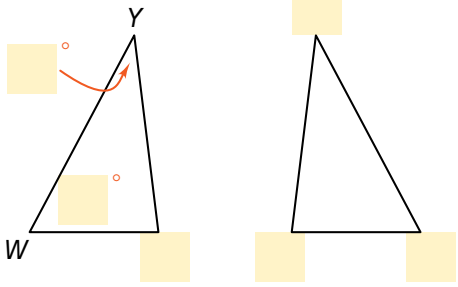
Sides $\overline{WY} \cong$ ____ $\overline{YS} \cong$ ____ $\overline{WS} \cong$ ____

Angles $\angle W \cong$ ____ $\angle Y \cong$ ____ $\angle S \cong$ ____

Problem 2 Finding Congruent Parts

Got It? **Suppose that $\triangle WYS \cong \triangle MKV$. If $m\angle W = 62$ and $m\angle Y = 35$, what is $m\angle V$? Explain.**

Use the congruent triangles at the right.



10. Use the given information to label the triangles. Remember to write corresponding vertices in order.

11. Complete each congruence statement.

$\angle W \cong$ ____

$\angle Y \cong$ ____

$\angle S \cong$ ____

12. Use the Triangle Angle-Sum theorem.

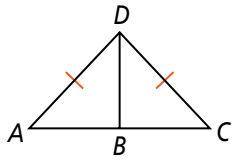
$m\angle S + m$ ____ $+ m$ ____ $= 180$, so $m\angle S = 180 - ($ ____ $+$ ____ $)$, or ____.

13. Complete.

Since $\angle S \cong$ ____ and $m\angle S =$ ____, $m\angle V =$ ____.

Problem 3 Finding Congruent Triangles

Got It? Is $\triangle ABD \cong \triangle CBD$? Justify your answer.



14. Underline the correct word to complete the sentence.

To prove two triangles congruent, show that all adjacent / corresponding parts are congruent.

15. Circle the name(s) for $\triangle ACD$.

acute	isosceles	right	scalene

16. Cross out the congruence statements that are NOT supported by the information in the figure.

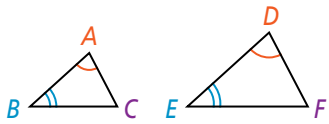
$\overline{AD} \cong \overline{CD}$	$\overline{BD} \cong \overline{BD}$	$\overline{AB} \cong \overline{CB}$
$\angle A \cong \angle C$	$\angle ABD \cong \angle CBD$	$\angle ADB \cong \angle CDB$

17. You need _____ congruence statements to prove two triangles congruent, so you can / cannot prove that $\triangle ABD \cong \triangle CBD$.

take note

Theorem 4–1 Third Angles Theorem

Theorem	If . . .	Then . . .
If two angles of one triangle are congruent to two angles of another triangle, then the third angles are congruent.	$\angle A \cong \angle D$ and $\angle B \cong \angle E$	$\angle C \cong \angle F$



Use $\triangle ABC$ and $\triangle DEF$ above.

18. If $m\angle A = 74$, then $m\angle D =$ _____.

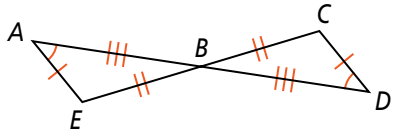
19. If $m\angle B = 44$, then $m\angle E =$ _____.

20. If $m\angle C = 62$, then $m\angle F =$ _____.

Problem 4 Proving Triangles Congruent

Got It? Given: $\angle A \cong \angle D$, $\overline{AE} \cong \overline{DC}$, $\overline{EB} \cong \overline{CB}$, $\overline{BA} \cong \overline{BD}$

Prove: $\triangle AEB \cong \triangle DCB$



21. You are given four pairs of congruent parts. Circle the additional information you need to prove the triangles congruent.

A third pair of congruent sides	A second pair of congruent angles	A third pair of congruent angles

22. Complete the steps of the proof.

1) $\overline{AE} \cong$ ____, $\overline{EB} \cong$ ____, $\overline{BA} \cong$ ____	1) Given
2) $\angle A \cong$ ____	2) Given
3) $\angle ABE \cong$ ____	3) Vertical angles are congruent.
4) $\angle E \cong$ ____	4) Third Angles Theorem
5) $\triangle AEB \cong$ ____	5) Definition of $\cong$ triangles

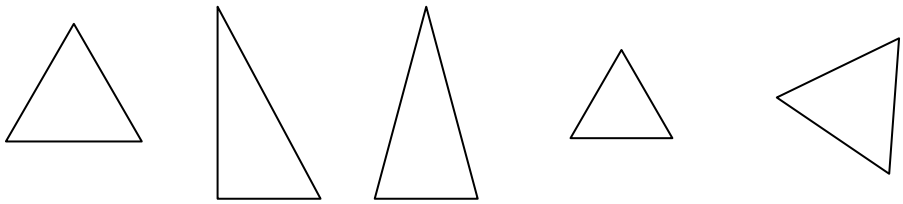
Lesson Check • Do you UNDERSTAND?

If each angle in one triangle is congruent to its corresponding angle in another triangle, are the two triangles congruent? Explain.

23. Underline the correct word to complete the sentence.

To disprove a conjecture, you need one / two / many counterexample(s).

24. An equilateral triangle has three congruent sides and three 60°angles. Circle the equilateral triangles below.



25. Use your answers to Exercise 24 to answer the question.

_____

_____

_____

Math Success

Check off the vocabulary words that you understand.

☐ congruent ☐ polygons

Rate how well you can ***identify congruent polygons.***

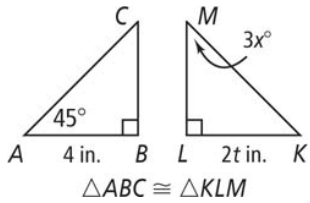
Need to review 0 2 4 6 8 10 Now I get it!

Name _____ Class _____ Date _____

4-1 Think About a Plan

Congruent Figures

Algebra Find the values of the variables.



$\triangle ABC \cong \triangle KLM$

Know

1. What do you know about the measure of each of the non-right angles?

_____

2. What do you know about the length of each of the legs?

_____

3. What types of triangles are shown in the figure?

_____

Need

4. What information do you need to know to find the value of x?

_____

5. What information do you need to know to find the value of t?

_____

Plan

6. How can you find the value of x? What is its value?

_____

7. How do you find the value of t? What is its value?

_____

Name_____ Class_____ Date_____

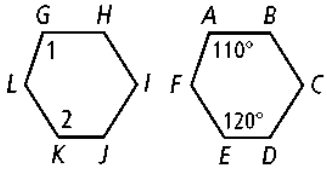
4-1 Practice

Form G

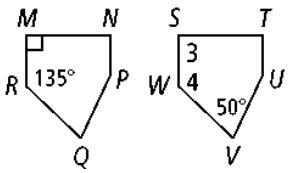
Congruent Figures

Each pair of polygons is congruent. Find the measures of the numbered angles.

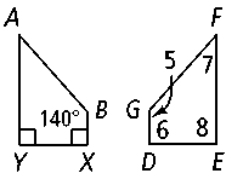
1.



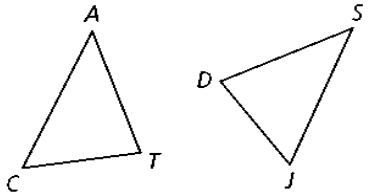
2.



3.



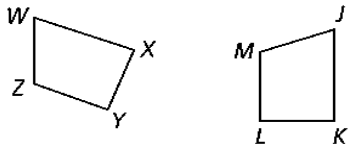
$\Delta CAT \cong \Delta JSD$. List each of the following.



4. three pairs of congruent sides

5. three pairs of congruent angles

***WXYZ* ≅ *JKLM*. List each of the following.**

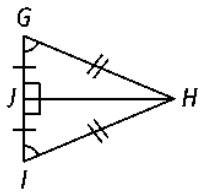


6. four pairs of congruent sides

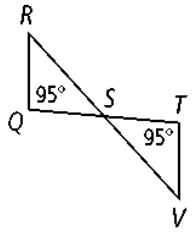
7. four pairs of congruent angles

For Exercises 8 and 9, can you conclude that the triangles are congruent? Justify your answers.

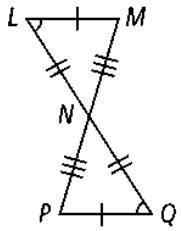
8. ΔGHJ and ΔIHJ



9. ΔQRS and ΔGHJ



10. Developing Proof Use the information given in the diagram. Give a reason that each statement is true.



a. $\angle L \cong \angle Q$

b. $\angle LNM \cong \angle QNP$

c. $\angle M \cong \angle P$

d. $\overline{LM} \cong \overline{QP}, \overline{LN} \cong \overline{QN}, \overline{MN} \cong \overline{PN}$

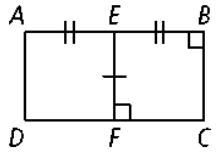
e. $\Delta LNM \cong \Delta QNP$

4-1 Practice (continued) *Form G*

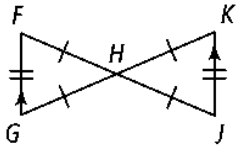
Congruent Figures

For Exercises 11 and 12, can you conclude that the figures are congruent? Justify your answers.

11. *AEFD* and *EBCF*

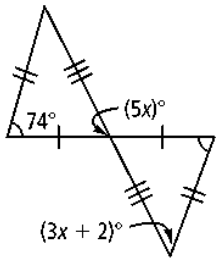


12. ΔFGH and ΔJKH

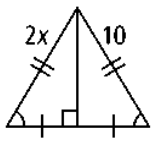


Algebra Find the values of the variables.

13.



14.



Algebra *ABCD* ≅ *FGHJ*. Find the measures of the given angles or lengths of the given sides.

15. $m\angle B = 3y$, $m\angle G = y + 50$

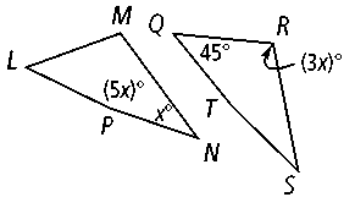
16. $CD = 2x + 3$; $HJ = 3x + 2$

17. $m\angle C = 5z + 20$, $m\angle H = 6z + 10$

18. $AD = 5b + 4$; $FJ = 3b + 8$

19. $LMNP \cong QRST$.

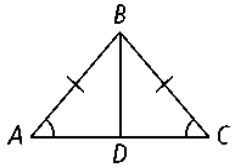
Find the value of x.



20. Given: $\overline{BD}$ is the angle bisector of $\angle ABC$.

$\overline{BD}$ is the perpendicular bisector of $\overline{AC}$.

Prove: $\Delta ADB \cong \Delta CDB$



Name _____ Class _____ Date _____

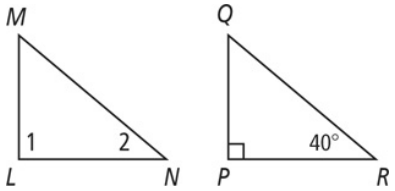
4-1 Practice

Form K

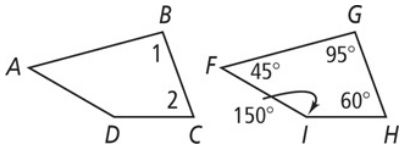
Congruent Figures

Each pair of polygons is congruent. Find the measures of the numbered angles.

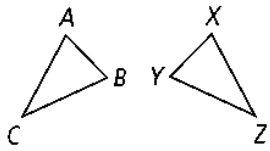
1.



2.



Use the diagram at the right for Exercises 3–7. $\Delta ABC \cong \Delta XYZ$. Complete the congruence statements.



3. $\overline{AB} \cong$ ☐

To start, use the congruence statement to identify the points that correspond to A and B.

A corresponds to ☐. B corresponds to ☐.

4. $\overline{ZY} \cong$ ☐

5. $\angle Z \cong$ ☐

6. $\angle BAC \cong$ ☐

7. $\angle B \cong$ ☐

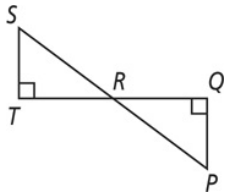
FOUR **≅** ***MANY.*** **List each of the following.**

8. four pairs of congruent angles

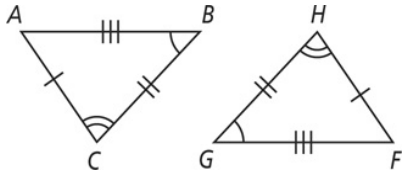
9. four pairs of congruent sides

For Exercises 10 and 11, can you conclude that the figures are congruent? Justify your answers.

10. ΔSRT and ΔPRQ



11. ΔABC and ΔFGH



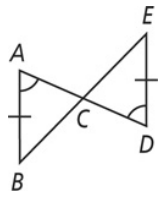
4-1 Practice (continued) *Form K*

Congruent Figures

12. Given: $\overline{AD}$ and $\overline{BE}$ bisect each other.

$\overline{AB} \cong \overline{DE}$; $\angle A \cong \angle D$

Prove: $\Delta ACB \cong \Delta DCE$

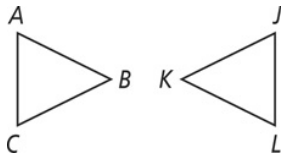


Statements	Reasons
1) $\overline{AD}$ and $\overline{BE}$ bisect each other. $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$	1) Given
2) $\overline{AC} \cong \overline{CD}$, $\overline{BC} \cong \overline{CE}$	2) ?
3) $\angle ACB \cong \angle DCE$	3) ?
4) $\angle B \cong \angle E$	4) ?
5) $\Delta ACB \cong \Delta DCE$	5) ?

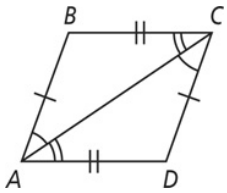
13. If $\Delta ACB \cong \Delta JKL$, which of the following must be a correct congruence statement?

(A) $\angle A \cong \angle L$ (C) $\angle B \cong \angle K$

(B) $\overline{AB} \cong \overline{JL}$ (D) $\Delta BAC \cong \Delta LKJ$

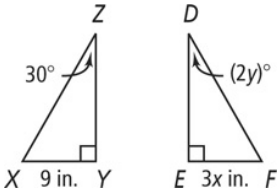


14. Reasoning A student says she can use the information in the figure to prove $\Delta ACB \cong \Delta ACD$. Is she correct? Explain.

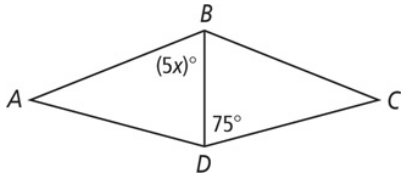


Algebra Find the values of the variables.

15. $\Delta XYZ \cong \Delta FED$



16. $\Delta ABD \cong \Delta CDB$



Algebra $\Delta FGH \cong \Delta QRS$. **Find the measures of the given angles or the lengths of the given sides.**

17. $m\angle F = x + 24$; $m\angle Q = 3x$

18. $\overline{GH} = 3x - 2$; $\overline{RS} = x + 6$

Name _____ Class _____ Date _____

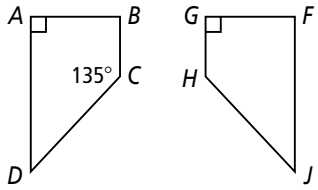
4-1 Standardized Test Prep

Congruent Figures

Multiple Choice

For Exercises 1–6, choose the correct letter.

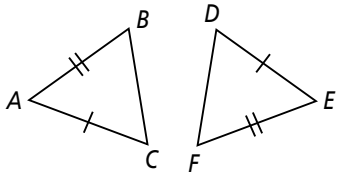
1. The pair of polygons at the right is congruent. What is $m\angle J$?



Ⓐ 45 Ⓒ 135

Ⓑ 90 Ⓓ 145

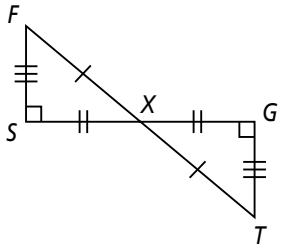
2. The triangles at the right are congruent. Which of the following statements must be true?



Ⓕ $\angle A \cong \angle D$ Ⓗ $\overline{AB} \cong \overline{DE}$

Ⓖ $\angle B \cong \angle E$ Ⓘ $\overline{BC} \cong \overline{DF}$

3. Given the diagram at the right, which of the following must be true?



Ⓐ $\triangle XSF \cong \triangle XTG$ Ⓒ $\triangle FXS \cong \triangle XGT$

Ⓑ $\triangle SXF \cong \triangle GXT$ Ⓓ $\triangle FXS \cong \triangle GXT$

4. If $\triangle RST \cong \triangle XYZ$, which of the following need not be true?

Ⓕ $\angle R \cong \angle X$ Ⓖ $\angle T \cong \angle Z$ Ⓗ $\overline{RT} \cong \overline{XZ}$ Ⓘ $\overline{SR} \cong \overline{YZ}$

5. If $\triangle ABC \cong \triangle DEF$, $m\angle A = 50$, and $m\angle E = 30$, what is $m\angle C$?

Ⓐ 30 Ⓑ 50 Ⓒ 100 Ⓓ 120

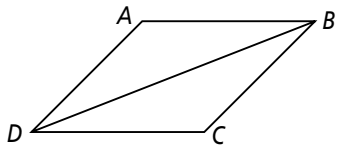
6. If $ABCD \cong QRST$, $m\angle A = x - 10$, and $m\angle Q = 2x - 30$, what is $m\angle A$?

Ⓕ 10 Ⓖ 20 Ⓗ 30 Ⓘ 40

Short Response

7. **Given:** $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$, $\overline{AB} \cong \overline{CD}$, $\overline{AD} \cong \overline{CB}$

Prove: $\triangle ABD \cong \triangle CDB$



Name_____ Class_____ Date_____

4-1 Reteaching

Congruent Figures

Given $ABCD \cong QRST$, find corresponding parts using the names. Order matters.

For example, $\begin{matrix} ABCD \\ QRST \end{matrix}$ This shows that $\angle A$ corresponds to $\angle Q$.

Therefore, $\angle A \cong \angle Q$.

For example, $\begin{matrix} ABCD \\ QRST \end{matrix}$ This shows that $\overline{BC}$ corresponds to $\overline{RS}$.

Therefore, $\overline{BC} \cong \overline{RS}$.

Exercises

Find corresponding parts using the order of the letters in the names.

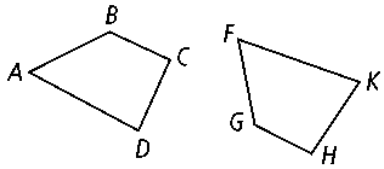
1. Identify the remaining three pairs of corresponding angles and sides between *ABCD* and *QRST* using the circle technique shown above.

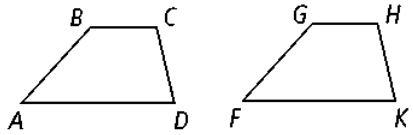
Angles: $\begin{matrix} ABCD \\ QRST \end{matrix}$ $\begin{matrix} ABCD \\ QRST \end{matrix}$ $\begin{matrix} ABCD \\ QRST \end{matrix}$ Sides: $\begin{matrix} ABCD \\ QRST \end{matrix}$ $\begin{matrix} ABCD \\ QRST \end{matrix}$ $\begin{matrix} ABCD \\ QRST \end{matrix}$

2. Which pair of corresponding sides is hardest to identify using this technique?

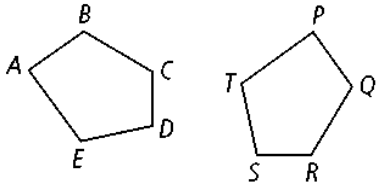
Find corresponding parts by redrawing figures.

3. The two congruent figures below at the left have been redrawn at the right. Why are the corresponding parts easier to identify in the drawing at the right?

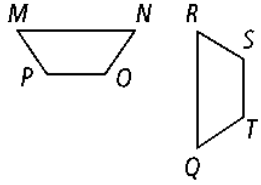




4. Redraw the congruent polygons at the right in the same orientation. Identify all pairs of corresponding sides and angles.



5. $MNOP \cong QRST$. Identify all pairs of congruent sides and angles.



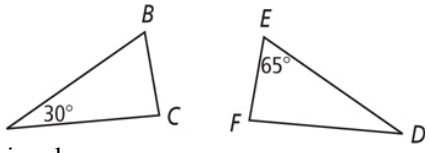
4-1 Reteaching (continued)

Congruent Figures

Problem

Given $\Delta ABC \cong \Delta DEF$, $m\angle A = 30$, and $m\angle E = 65$, what is $m\angle C$?

How might you solve this problem? Sketch both triangles, and put all the information on both diagrams.



$m\angle A = 30$; therefore, $m\angle D = 30$. How do you know?
Because $\angle A$ and $\angle D$ are corresponding parts of congruent triangles.

Exercises

Work through the exercises below to solve the problem above.

6. What angle in $\angle ABC$ has the same measure as $\angle E$? What is the measure of that angle? Add the information to your sketch of $\angle ABC$.

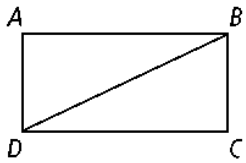
7. You know the measures of two angles in $\angle ABC$. How can you find the measure of the third angle?

8. What is $m\angle C$? How did you find your answer?

Before writing a proof, add the information implied by each given statement to your sketch. Then use your sketch to help you with Exercises 9–12.

Add the information implied by each given statement.

9. Given: $\angle A$ and $\angle C$ are right angles.



10. Given: $\overline{AB} \cong \overline{CD}$ and $\overline{AD} \cong \overline{CB}$.

11. Given: $\angle ADB \cong \angle CBD$.

12. Can you conclude that $\angle ABD \cong \angle CDB$ using the given information above? If so, how?

13. How can you conclude that the third side of both triangles is congruent?

Name _____ Class _____ Date _____

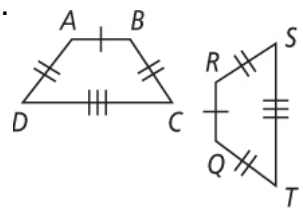
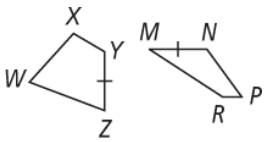
4-1 Additional Vocabulary Support

Congruent Figures

Concept List

algebraic equation	**angle measure**	**congruency statement**
congruent angles	**congruent polygons**	**congruent segments**
congruent triangles	**proof**	**segment measure**

Choose the concept from the list above that best represents the item in each box.

1. $\overline{GH} \cong \overline{ST}$	**2.** $m\angle A = 45$	**3.** 
4. $YZ = MN$ 	**5.** $\Delta ABC \cong \Delta XYZ$	**6. Given:** $\overline{BD}$ is the angle bisector of $\angle ABC$, and $\overline{BD}$ is the perpendicular bisector of $\overline{AC}$. **Prove:** $\Delta ADB \cong \Delta CDB$
7. $m\angle H = 5x$ $m\angle W = x + 28$ Solve $5x = x + 28$ to find the measures of $\angle H$ and $\angle W$.	**8.** $BC = 3$ cm	**9.** $\angle ADB$ and $\angle SDT$ are vertical angles. So, $\angle ADB \cong \angle SDT$.

Name_____ Class_____ Date_____

4-1 Activity: Create Your Own Logo

Congruent Figures

Available Only Online & DVD

Materials

- Graph paper
- Colored pencils or crayons

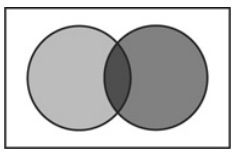
A *logo* is an identifying statement often represented in symbolic form. With exposure from advertising, many corporate logos have become familiar.

Work in a group to identify corporation logos that use these shapes.

1. triangles
2. circles
3. squares

Logos often include congruent figures to help establish symmetric eye-catching forms.

Identify the congruent figure in each logo.

4. 

5. 

6. 

7. 

8. Design a logo of your own, using at least two sets of congruent triangles. Other congruent figures also may be used. Use graph paper, and include color in your design.

Name_____ Class_____ Date_____

4-3 Game: Big Hitters

Triangle Congruence by ASA and AAS

Available Only Online & DVD

Setup

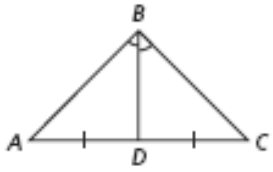
Your teacher will divide the class into teams of 5 students. Cut out the set of diagrams below. As a team, sit in a circle and place the diagrams in the center, face down.

Game Play

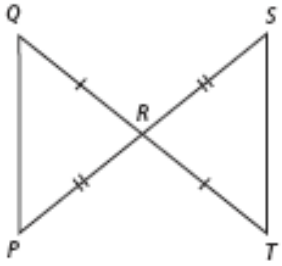
Certain theorems, properties, and definitions are used more frequently than others to find congruent parts when proving that two triangles are congruent. You might call them "big hitters." Being able to recognize when these big hitters may be used is a big advantage when writing proofs. As a team, look for ways to apply the big hitters.

In each round, a different student is to reveal a diagram. Work as a team to write down as many big hitters as you can that could likely apply to the diagram. When your teacher calls time, he or she will reveal the correct answers and your team will earn a point for each correctly identified big hitter. A point is subtracted for incorrect answers. After 9 rounds, the team with the greatest number of points wins.

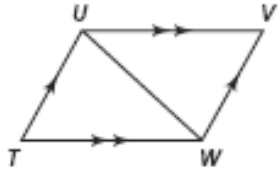
I



II

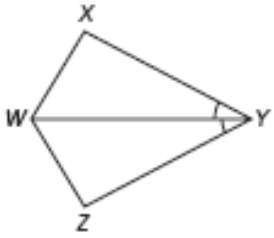


III

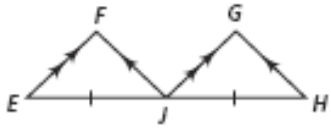


IV

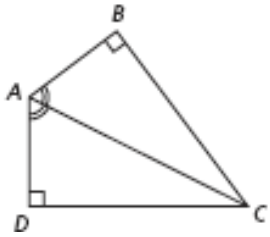
V



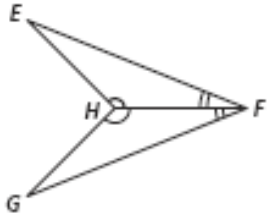
VI



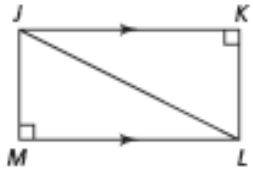
VII



VIII



IX



Name _____ Class _____ Date _____

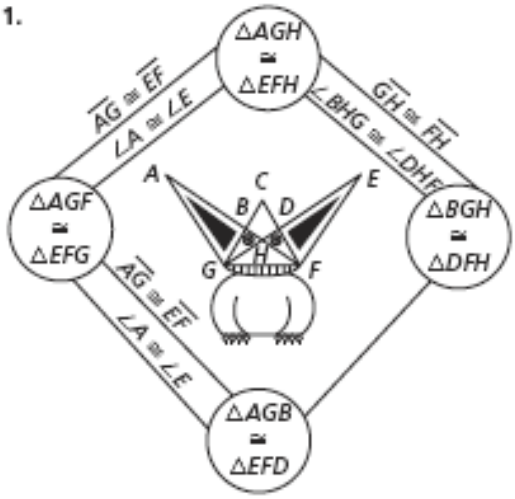
4-4 Puzzle: Cage the Monster

Using Corresponding Parts of Congruent Triangles

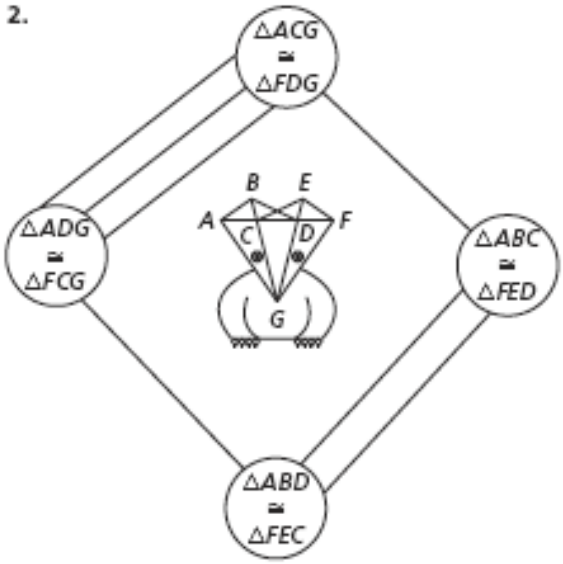
Available Only Online & DVD

A proof with multiple pairs of congruent triangles can seem like a monster. But, you can control the monster if you can master the diagram. Build a fence around each monster by stating the shared congruent parts for the given pairs of congruent triangles. The first problem has been started for you.

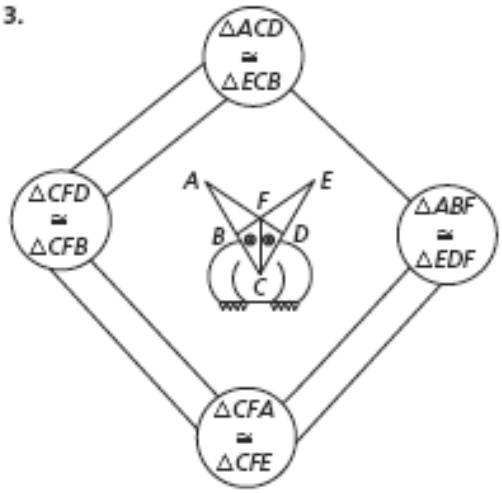
1.



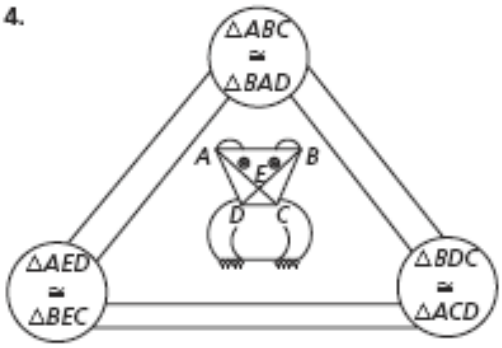
2.



3.



4.



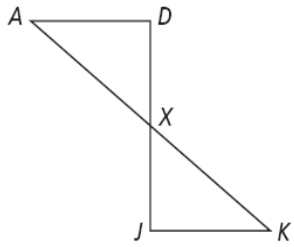
Name _____ Class _____ Date _____

4-1 Enrichment

Congruent Figures

Shared Implications

Sometimes different statements share one or more implications. For example, "$\overline{QR} \perp \overline{ST}$" and "$\overline{QR}$ is the perpendicular bisector of $\overline{ST}$" share the implication that $\overline{QR}$ meets $\overline{ST}$ at a right angle. The statements below refer to the diagram at the right.



1. $\overline{DJ} \perp \overline{JK}$ **;**

2. $\overline{DJ} \perp \overline{AD}$ **;**

3. $\overline{AD} \parallel \overline{JK}$ **;**

4. $\angle A \cong \angle K$**;**

5. $\overline{DX} \cong \overline{JX}$ **;**

6. $\overline{AD} \cong \overline{KJ}$ **;**

7. $\overline{AK}$ bisects $\overline{DJ}$;

8. $\overline{DJ}$ bisects $\overline{AK}$ **;**

9. $m\angle D = m\angle J = 90$

Identify shared implications and reduce the number of given statements.

1. What implication is shared by Statement 5 and Statement 7?

2. What implication is shared by Statement 3 and Statement 4?

3. Which two statements share at least one implication with Statement 9?

4. Can you prove $\Delta ADX \cong \Delta KJX$ using only five of the statements above? If so, identify them, then complete the proof.

5. Can you prove $\Delta ADX \cong \Delta KJX$ using only four of the statements above? If so, identify them, then complete the proof.

6. Can you prove $\Delta ADX \cong \Delta KJX$ using only three of the statements above if the only way to prove triangles congruent is through the definition of congruent triangles? If so, identify them, then complete the proof.

Name _____ Class _____ Date _____

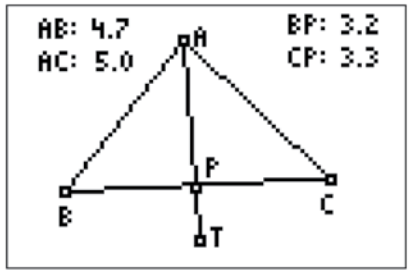
Angle Bisectors in Triangles I

Activity 34

FILES NEEDED: Cabri® Jr.
AppVar: GL45A

Given: In GL45A, $\overline{AT}$ bisects $\angle BAC$.

Explore: angle bisectors in triangles



1. Drag point A, B, or C. Find four different isosceles triangles with $AB = AC$. For each triangle, record the lengths BP and CP in the table below.

BP				
CP				

2. Study the data in the table. Complete this conjecture about how lengths BP and CP are related.

If the bisector of the vertex $\angle A$ of isosceles $\triangle ABC$ intersects the base $\overline{BC}$ in point P, then $BP =$? .

3. Generalize your conjecture from Question 2.

The bisector of the vertex angle of an isosceles triangle ? the base of the triangle.

4. Install screen-angle measures for $\angle BPA$ and $\angle CPA$. Drag point A, B, or C. Find four different isosceles triangles with $AB = AC$. For each triangle, record $m\angle BPA$ and $m\angle CPA$ in the table below.

$m\angle BPA$				
$m\angle CPA$				

5. Study the data in the table. Complete this conjecture about $\angle BPA$ and $\angle CPA$.

If the bisector of the vertex $\angle A$ of isosceles $\triangle ABC$ intersects the base $\overline{BC}$ in point P, then $\angle BPA$ and $\angle CPA$? .

6. Generalize your conjecture from Question 5.

The bisector of the vertex angle of an isosceles triangle ? the base of the triangle.

Extension

7. Combine your conjectures from Questions 3 and 6 into one statement.

8. Explain how to use GL45A to demonstrate the Isosceles Triangle Theorem.

Angle Bisectors in Triangles I

Teacher Notes

Activity Objective

Students use Cabri® Jr. to explore angle bisectors of isosceles triangles.

Time

- 15–20 minutes

Materials/Software

- App: Cabri® Jr.
- AppVar: GL45A
- Activity worksheet

Skills Needed

- drag an object
- install a measure

Classroom Management

- Students can work individually or in pairs depending on the number of calculators available.
- Use TI Connect™ software, TI-GRAPH LINK™ software, the TI-Navigator™ system, or unit-to-unit links to transfer GL45A to each calculator.

Notes

- In F1, select Open and then press ENTER to see the AppVar list.
- Students can drag only points A, B, and C. Points P and T are not draggable.
- Depending on the orientation of the triangle, it may not always be possible to match the lengths AB and AC exactly. Students can use values within one tenth of each other, or move B or C to reorient the base.

Answers

1. Check students' work.
2. CP
3. bisects
4. Check students' work.
5. are right angles
6. is perpendicular to
7. The bisector of the vertex angle of an isosceles triangle is the perpendicular bisector of the base of the triangle.
8. Answers may vary. Sample: Install screen-angle measures for $\angle B$ and $\angle C$. Find four different isosceles triangles with $AB = AC$. Record and study $m\angle B$ and $m\angle C$.

Name _____ Class _____ Date _____

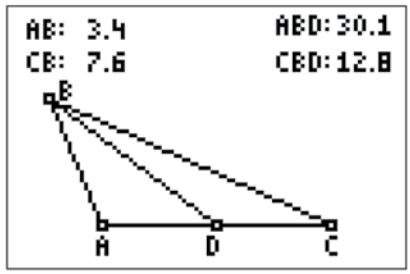
Segment Bisectors in Triangles

Activity 35

FILES NEEDED: Cabri® Jr.
AppVar: GL45B

Given: In GL45B, point D bisects side $\overline{AC}$ of $\triangle ABC$.

Explore: segment bisectors in triangles



1. Drag point A, B, or C. Find four different isosceles triangles with $AB = CB$. For each triangle, record the angle measures indicated in the table below.

$m\angle ABD$				
$m\angle CBFD$				

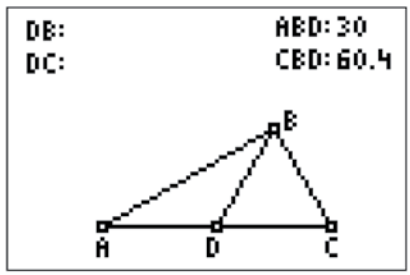
2. Study the data in the table. Complete the following conjecture.

If point D bisects the base $\overline{AC}$ of isosceles $\triangle ABC$, then $\overline{BD}$ ___?___.

3. Drag point A, B, or C to get $AB = CB$ and $m\angle ABD$ as close to 45 as you can make it. What kind of triangle is $\triangle ABC$? Explain.

Extension

Make $\overline{AC}$ horizontal. Replace the screen measures AB and CB with DB and DC as shown at right.



4. Drag point B so that $\angle ABD$ and $\angle CBD$ are complementary. What kind of triangle is $\triangle ABC$? Explain.

5. Drag point B so that $\angle ABD$ and $\angle CBD$ are complementary in four different locations. In each location, what do you observe about DB and DC?

6. Complete the following conjecture.

In right $\triangle ABC$ with right angle B, length $DB =$ ___?___.

7. Generalize your conjecture from Question 6.

In a right triangle, the midpoint of the hypotenuse is ___?___.

Segment Bisectors in Triangles

Teacher Notes

Activity Objective

Students use Cabri® Jr. to explore medians in isosceles triangles.

Time

- 15–20 minutes

Materials/Software

- App: Cabri® Jr.
- AppVar: GL45B
- Activity worksheet

Skills Needed

- drag an object

Classroom Management

- Students can work individually or in pairs depending on the number of calculators available.
- Use TI Connect™ software, TI-GRAPH LINK™ software, the TI-Navigator™ system, or unit-to-unit links to transfer GL45B to each calculator.

Notes

- If students cannot match the lengths AB and CB exactly, suggest that they move point A or C to reorient the base.
- You may wish to introduce the term *median* with this Activity.

Answers

1. Check students' work.

2. bisects $\angle ABC$

3. Right isosceles triangle; Since $AB = CB$, it is isosceles. Since $m\angle ABD = 45, m\angle CBD = 45$ and $m\angle ABC = 90$, so $\triangle ABC$ is a right triangle.

4. Right triangle; $m\angle ABD + m\angle CBD = 90°$, so $\angle ABC$ is a right angle.

5. They are equal.

6. $\frac{1}{2}$ the length of the hypotenuse

7. equidistant from the three vertices

Name _____ Class _____ Date _____

Chapter 4 Quiz 1

Form G

Lessons 4-1 through 4-3

Do you know HOW?

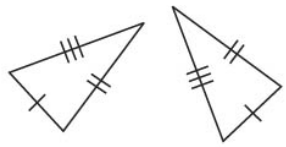
1. Two triangles have the following pairs of congruent sides: $\overline{BD} \cong \overline{FJ}$, $\overline{DG} \cong \overline{JM}$, and $\overline{GB} \cong \overline{MF}$. Write the congruence statement for the two triangles.

$\triangle QRS \cong \triangle TUV$. Name the angle or side that corresponds to the given part.

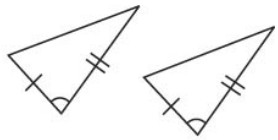
2. $\angle Q$ **3.** $\overline{RS}$ **4.** $\angle S$ **5.** $\overline{QS}$

State the postulate or theorem that can be used to prove the triangles congruent. If you cannot prove the triangles congruent, write *not enough information.*

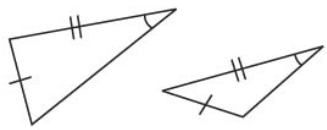
6.



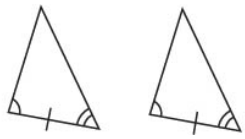
7.



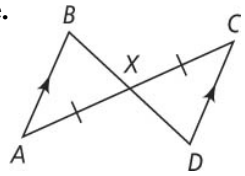
8.



9.



Use the diagram below. Tell why each statement is true.



10. $\angle A \cong \angle C$

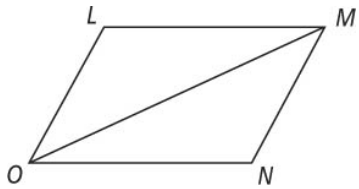
11. $\angle AXB \cong \angle CXD$

12. $\Delta ABX \cong \Delta CDX$

Do you UNDERSTAND?

13. Given: $\overline{LM} \cong \overline{NO}$; $\angle LMO \cong \angle NOM$

Prove: $\Delta LMO \cong \Delta NOM$



14. Reasoning Explain why it is not possible to have a Side-Side-Angle congruence postulate or theorem. Draw a picture if necessary.

Name _____ Class _____ Date _____

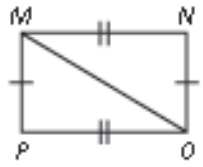
Chapter 4 Quiz 2

Form G

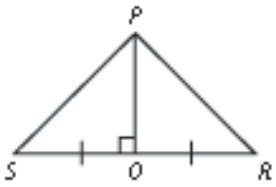
Lessons 4-4 through 4-7

Do you know HOW?

Explain how to use congruent triangles to prove each statement true.

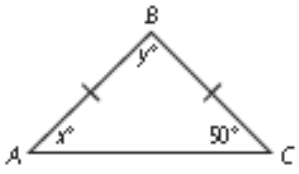


1. $\angle OMN \cong \angle MOP$

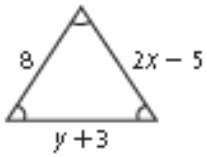


2. $\overline{SP} \cong \overline{RP}$

Find the values of x and y.

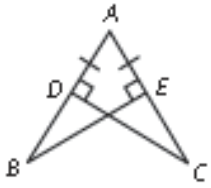


3.

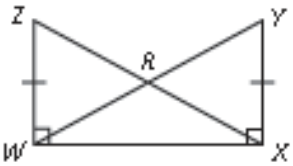


4.

Name a pair of overlapping congruent triangles in each diagram. State whether the triangles are congruent by SSS, SAS, ASA, AAS, or HL.



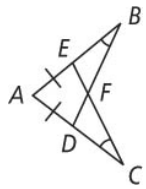
5.



6.

Do you UNDERSTAND?

7. Reasoning Complete the proof by filling in the missing statements and reasons.



Given: $\overline{AE} \cong \overline{AD}, \angle B \cong \angle C$

Prove: $\overline{EB} \cong \overline{DC}$

Statements	Reasons
1) $\overline{AE} \cong \overline{AD}, \angle B \cong \angle C$	1) ?
2) ?	2) Reflexive Property of Congruence
3) $\triangle ABD \cong \triangle ACE$	3) ?
4) $\overline{AB} \cong \overline{AC}$	4) ?
5) ?	5) Segment Addition Postulate

Name_____ Class _____ Date _____

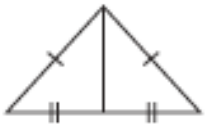
Chapter 4 Test

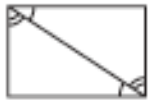
Form G

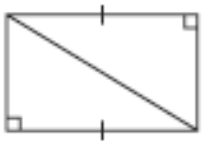
Do you know HOW?

State the postulate or theorem you would use to prove each pair of triangles congruent. If the triangles cannot be proven congruent, write *not enough information.*

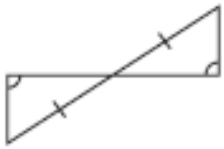
1. 

2. 

3. 

4. 

5. 

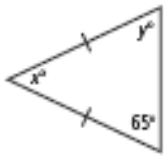
6. 

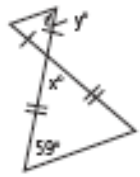
7. 

8. 

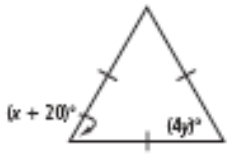
9. 

Find the value of x and y.

10. 

11. 

12. 

13. 

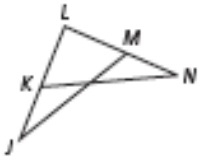
14. $\Delta CGI \cong \Delta MPR$. Name all of the pairs of corresponding congruent parts.

Chapter 4 Test (continued)

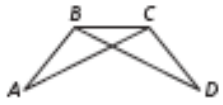
Form G

Name a pair of overlapping congruent triangles in each diagram. State whether the triangles are congruent by SSS, SAS, ASA, AAS, or HL.

15. Given: $\overline{LM} \cong \overline{LK}; \overline{LN} \cong \overline{LJ}$



16. Given: $\angle ABC \cong \angle DCB; \angle DBC \cong \angle ACB$



17. Given: $\angle E \cong \angle D \cong \angle DCF \cong \angle EFC$

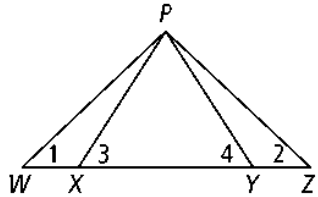
18. Given: $\overline{HI} \cong \overline{JG}$

Do you UNDERSTAND?

19. Reasoning Complete the following proof by providing the reason for each statement.

Given: $\angle 1 \cong \angle 2; \overline{WX} \cong \overline{ZY}$

Prove: $\angle 3 \cong \angle 4$

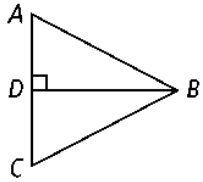


Statements	Reasons
1) $\angle 1 \cong \angle 2; \overline{WX} \cong \overline{ZY}$	1) ?
2) $\overline{WP} \cong \overline{ZP}$	2) ?
3) $\Delta WXP \cong \Delta ZYP$	3) ?
4) $\overline{XP} \cong \overline{YP}$	4) ?
5) $\angle 3 \cong \angle 4$	5) ?

20. Reasoning Write a proof for the following:

Given: $\overline{BD} \perp \overline{AC}$, D is the midpoint of $\overline{AC}$.

Prove: $\overline{BC} \cong \overline{BA}$



Name _____ Class _____ Date _____

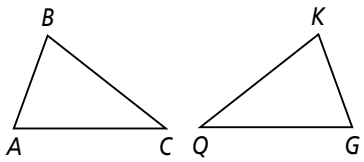
Chapter 4 Find the Errors!

Available Only Online

For use with Lessons 4-1 through 4-2

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. **If $\triangle ABC \cong \triangle GKQ$, what are the congruent corresponding parts?**

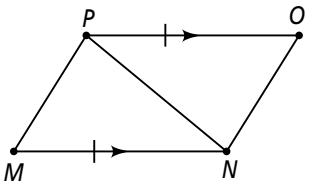


Sides: $\overline{AC} \cong \overline{QG}$; $\overline{AB} \cong \overline{QK}$; $\overline{BC} \cong \overline{KG}$

Angles: $\angle A \cong \angle Q$; $\angle B \cong \angle K$; $\angle C \cong \angle G$

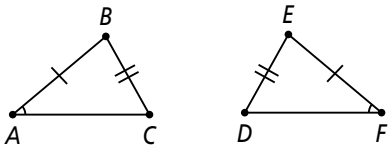
2. **Given: $\overline{PO} \parallel \overline{MN}$, $\overline{PO} \cong \overline{MN}$**

Prove: $\triangle MPN \cong \triangle ONP$



Statements	Reasons
1) $\overline{PO} \parallel \overline{MN}$	1) Given
2) $\overline{PO} \cong \overline{MN}$	2) Given
3) $\overline{PN} \cong \overline{PN}$	3) Reflexive Property of $\cong$
4) $\triangle MPN \cong \triangle ONP$	4) SS Postulate

3. **What other information do you need to prove the triangles congruent by SAS? Explain.**



None. The triangles have two pairs of congruent sides ($\overline{AB} \cong \overline{DE}$, and $\overline{BC} \cong \overline{EF}$) and one pair of congruent angles ($\angle BAC \cong \angle EFD$). So, the triangles are congruent by SAS.

Name _____ Class _____ Date _____

Chapter 4 Find the Errors!

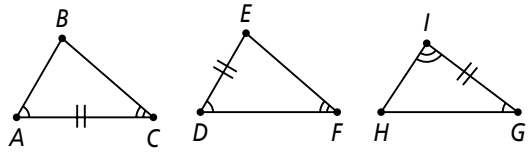
Available Only Online

For use with Lessons 4-3 through 4-5

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

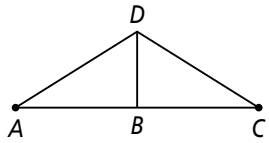
1. Which two triangles are congruent by ASA? Explain.

$\triangle ABC \cong \triangle DEF$ are congruent by ASA. They each have two pairs of congruent angles and one pair of congruent sides.



2. Given: $\angle A \cong \angle C$
$\overline{BD}$ **bisects** $\angle ADC$

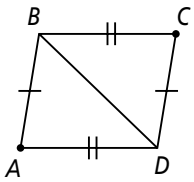
Prove: $\triangle ADB \cong \triangle CDB$



Statements	Reasons
1) $\angle A \cong \angle C$	1) Given
2) $\overline{BD}$ bisects $\angle ADC$	2) Given
3) $\overline{BD} \cong \overline{BD}$	3) Reflexive Property of $\cong$
4) $\triangle ADB \cong \triangle CDB$	4) AAS Theorem

3. Given: $\overline{AB} \cong \overline{CD}$
$\overline{AD} \cong \overline{BC}$

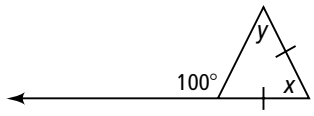
Prove: $\angle A \cong \angle C$



Statements	Reasons
1) $\overline{AB} \cong \overline{CD}$	1) Given
2) $\overline{AD} \cong \overline{BC}$	2) Given
3) $\overline{BD} \cong \overline{BD}$	3) Reflexive Property of $\cong$
4) $\angle A \cong \angle C$	4) Corresponding parts of $\cong$ triangles are $\cong$.

4. What are the values of x and y?

$x = 80°, y = 20°$



Name _____ Class _____ Date _____

Chapter 4 Find the Errors!

Available Only Online

For use with Lessons 4-6 through 4-7

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

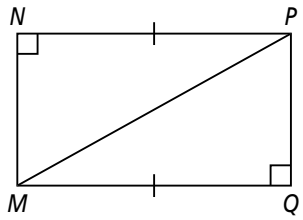
1. **On the diagram shown, $\angle N$ and $\angle Q$ are right angles and $\overline{NP} \cong \overline{MQ}$.**

   Are $\triangle NPM$ and $\triangle QMP$ congruent? Write a paragraph proof.

   $\angle N$ and $\angle Q$ are right angles.

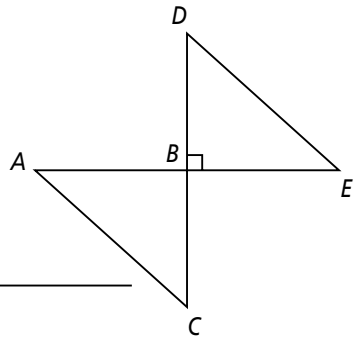
   So, $\triangle NPM$ and $\triangle QMP$ are right triangles.

   Also, $\overline{NP} \cong \overline{MQ}$. Therefore, $\triangle NPM \cong \triangle QMP$ by the Hypotenuse Leg Theorem.



2. **Given: $\overline{DC} \perp \overline{AE}$, $\overline{DE} \cong \overline{AC}$**
   B is the midpoint of $\overline{AE}$

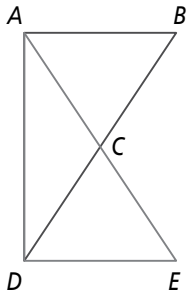
   Prove: $\triangle BDE \cong \triangle BCA$



Statements	Reasons
1) $\overline{DC} \perp \overline{AE}$	1) Given
2) $\overline{DE} \cong \overline{AC}$	2) Given
3) B is the midpoint of $\overline{AE}$	3) Given
4) $\overline{AB} \cong \overline{BE}$	4) Definition of midpoint
5) $\triangle BDE$ and $\triangle BCA$ are right $\triangle$s	5) Definition of right triangle
6) $\triangle BDE \cong \triangle BCA$	6) Hypotenuse Leg Theorem

3. **In the diagram, $\triangle ADE \cong \triangle DAB$. What is their common side or angle?**

   $\angle C$



Name _____ Class _____ Date _____

Performance Tasks

Chapter 4

Task 1

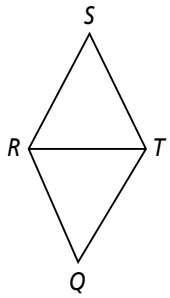
Draw and label three pairs of triangles to illustrate the Side-Side-Side, Angle-Side-Angle, and Side-Angle-Side Postulates. One pair of triangles should share a common side. The figures should provide enough information to prove that they are congruent. Write the congruence statements for each pair.

Task 2

A rhombus is a quadrilateral with four congruent sides.

Given: $RSTQ$ is a quadrilateral, $\angle SRT \cong \angle STR \cong \angle RTQ \cong \angle TRQ$.

Prove: $RSTQ$ is a rhombus.



Performance Tasks (continued)

Chapter 4

Task 3

You need to design a company logo. The requirements for the logo are as listed:

- The logo must include at least six triangles.
- Some of the triangles should overlap.
- Some of the triangles should share sides.
- One triangle needs to be isosceles.
- One triangle needs to be equilateral.
- At least two pairs of triangles should be congruent pairs.

Use a straightedge, compass, and protractor to aid in your design.

Label the vertices of the triangles and describe as many congruencies as you can (sides and angles).

Describe two pairs of congruent triangles in your design and justify how you know they are congruent. Include references to geometric theorems and postulates.

Name_____ Class _____ Date_____

Extra Practice

Available Only Online

Chapter 4

Lesson 4-1

$\triangle SAT \cong \triangle GRE$. Complete each congruence statement.

1. $\angle S \cong$?

2. $\overline{GR} \cong$?

3. $\angle E \cong$?

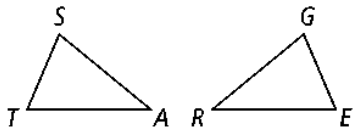
4. $\overline{AT} \cong$?

5. $\triangle ERG \cong$?

6. $\overline{EG} \cong$?

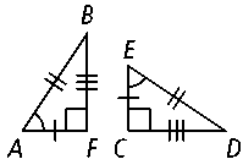
7. $\triangle REG \cong$?

8. $\angle R \cong$?

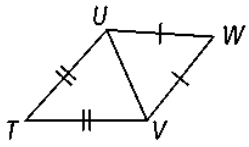


State whether the figures are congruent. Justify your answers.

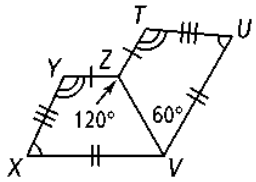
9. $\triangle ABF$; $\triangle EDC$



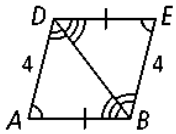
10. $\triangle TUV$; $\triangle UVW$



11. $\triangle XYZV$; $\triangle UTZV$



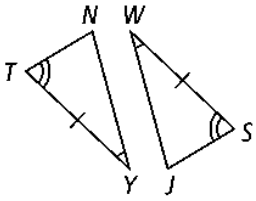
12. $\triangle ABD$; $\triangle EDB$



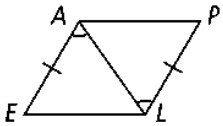
Lessons 4-2 and 4-3

Can you prove the two triangles congruent? If so, write the congruence statement and name the postulate you would use. If not, write *not possible* and tell what other information you would need.

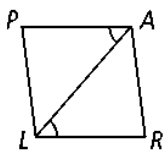
13.



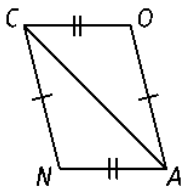
14.



15.



16.



Name_____ Class _____ Date_____

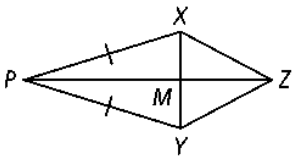
Extra Practice (continued)

Available Only Online

Chapter 4

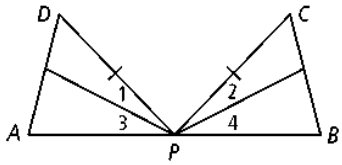
17. Given: $\overline{PX} \cong \overline{PY}$, $\overline{ZP}$ bisects $\overline{XY}$.

Prove: $\triangle PXZ \cong \triangle PYZ$



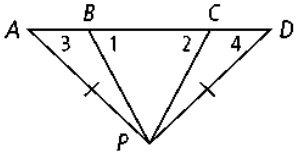
18. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$, $\overline{PD} \cong \overline{PC}$, P is the midpoint of $\overline{AB}$.

Prove: $\triangle ADP \cong \triangle BCP$



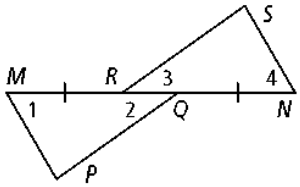
19. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$, $\overline{AP} \cong \overline{DP}$

Prove: $\triangle ABP > \triangle DCP$



20. Given: $\overline{MP} \| \overline{NS}, \overline{RS} \| \overline{PQ}, \overline{MR} \cong \overline{NQ}$

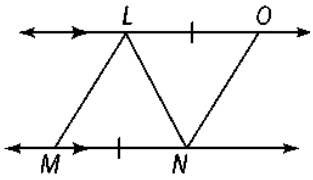
Prove: $\triangle MQP \cong \triangle NRS$



Lesson 4-4

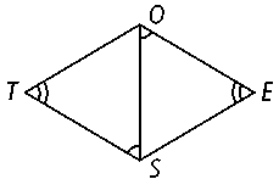
21. Given: $\overline{LO} \cong \overline{MN}, \overleftrightarrow{LO} \| \overleftrightarrow{MN}$

Prove: $\angle MLN \cong \angle ONL$



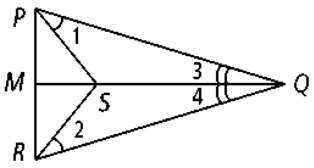
22. Given: $\angle OTS \cong \angle OES, \angle EOS \cong \angle OST$

Prove: $\overline{TO} \cong \overline{ES}$



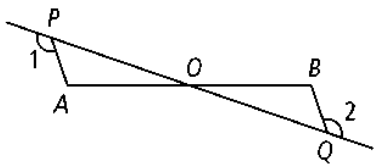
23. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$, M is the midpoint of $\overline{PR}$

Prove: $\triangle PMQ \cong \triangle RMQ$



24. Given: $PO = QO$, $\angle 1 \cong \angle 2$,

Prove: $\angle A \cong \angle B$



Name_____ Class _____ Date_____

Extra Practice (continued)

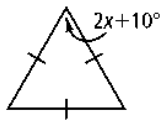
Available Only Online

Chapter 4

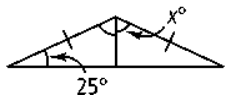
Lesson 4-5

Find the value of each variable.

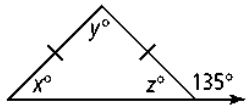
25.



26.

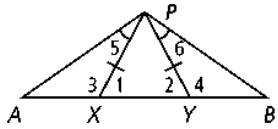


27.



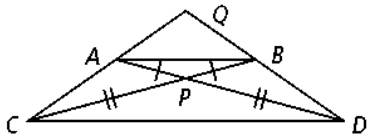
28. Given: $\angle 5 \cong \angle 6, \overline{PX} \cong \overline{PY}$

Prove: $\triangle PAB$ is isosceles.



29. Given: $\overline{AP} \cong \overline{BP}, \overline{PC} \cong \overline{PD}$

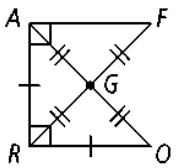
Prove: $\triangle QCD$ is isosceles.



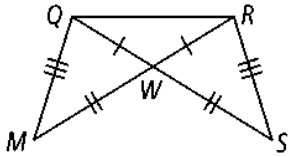
Lessons 4-6 and 4-7

Name a pair of overlapping congruent triangles in each diagram. State whether the triangles are congruent by SSS, SAS, ASA, AAS, or HL.

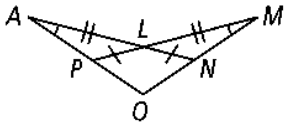
30.



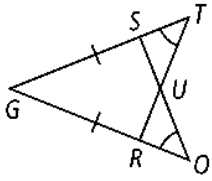
31.



32.

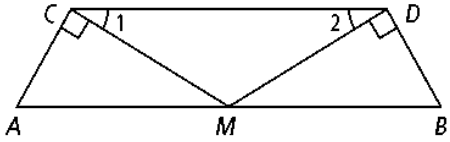


33.



34. Given: M is the midpoint of $\overline{AB}$, $\overline{MC} \perp \overline{AC}, \overline{MD} \perp \overline{BD}, \angle 1 \cong \angle 2$

Prove: $\triangle ACM \cong \triangle BDM$



35. The longest leg of $\triangle ABC$, $\overline{AC}$, measures 10 centimeters. $\overline{BC}$ measures 8 centimeters. You measure two of the legs of $\triangle XYZ$ and find that $\overline{AC} \cong \overline{XZ}$ and $\overline{BC} \cong \overline{YZ}$. Can you conclude that two triangles to be congruent by the HL Theorem? Explain why or why not.

Name _____ Class _____ Date _____

Chapter 4 Project: Tri, Tri Again

Beginning the Chapter Project

Have you ever wondered how bridges stay up? How do such frail-looking frameworks stretch through the air without falling? How can they withstand the twisting forces of hurricane winds and the rumbling weight of trucks and trains? Part of the answer lies in the natural strength of triangles.

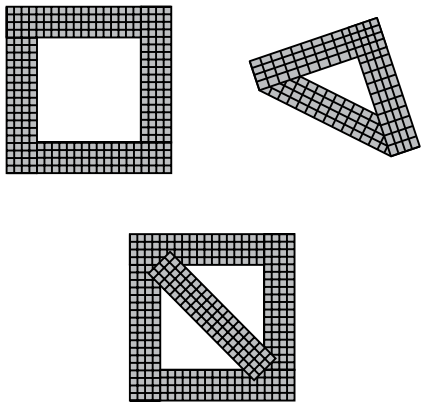
In your project for this chapter, you will explore how engineers use triangles to construct safe, strong, stable structures. You then will have a chance to apply these ideas as you design and build your own bridge with toothpicks or craft sticks. You will see how a simple shape often can be the strongest one.

Activities

Activity 1: Modeling

Many structures have straight beams that meet at joints. You can use models to explore ways to strengthen joints.

- Cut seven cardboard strips approximately 6 in. by $\frac{1}{2}$ in. Make a square frame and a triangular frame. Staple across the joints as shown.



- With your fingertips, hold each model flat on a desk or table, and try to Change its shape. Which shape is more stable?
- Cut another cardboard strip, and use it to form a brace for the square frame. Is it more rigid? Why does the brace work?

Activity 2: Observing

Visit local bridges, towers, or other structures that have exposed frameworks. Examine these structures for ideas you can use when you design and build a bridge later in this project. Record your ideas. Sketch or take pictures of the structures. On the sketches or photos, show where triangles are used for stability.

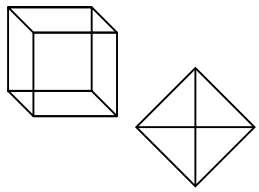
Chapter 4 Project: Tri, Tri Again (continued)

Activity 3: Investigating

In the first activity, you tested the strength of two-dimensional models. Now investigate the strength of three-dimensional models.

Use toothpicks or craft sticks and glue to construct a cube and a tetrahedron (a triangular pyramid).

- Which model is stronger?
- Describe how you could strengthen the weaker model.



Use toothpicks or craft sticks and glue to construct a structure that can support the weight of your geometry book.

Finishing the Project

Design and construct a bridge made entirely of glue and toothpicks or craft sticks. Your bridge must be at least 8 in. long and contain no more than 100 toothpicks or 30 craft sticks. With your classmates, decide how to test the strength of the bridge. Record the dimensions of your bridge, the number of toothpicks or craft sticks used, and the weight the bridge could support. Experiment with as many designs and models as you like—the more the better. Include a summary of your experiments with notes about how each one helped you improve your design.

Reflect and Revise

Ask a classmate to review your project with you. Together, check to be sure that your bridge meets all the requirements and that your diagrams and explanations are clear. Have you tried several designs and kept a record of what you learned from each? Can your bridge be stronger or more pleasing to the eye? Can it be built using a more efficient design? Revise your work as needed.

Extending the Project

Research architect R. Buckminster Fuller and geodesic domes. Design and build a geodesic structure, using toothpicks or other materials.

Name _____ Class _____ Date _____

Chapter 4 Project Manager: Tri, Tri Again

Getting Started

As you work on the project, you will need a sheet of cardboard, a stapler, 100 toothpicks or 30 craft sticks, and glue. Keep this Project Manager and all your work for the project in a folder or an envelope.

Checklist

- ☐ Activity 1: cardboard frames
- ☐ Activity 2: observing bridges
- ☐ Activity 3: three-dimensional models
- ☐ toothpick bridge

Suggestions

- ☐ Push or pull the models only along the plane of the frame.
- ☐ Look for small design features that are used repeatedly.
- ☐ Use glue that is strong but quick-drying.
- ☐ Test small parts of the bridge before building the entire structure. Also, decide in advance in what order you will assemble and glue the different sections.

Scoring Rubric

4 The toothpick bridge meets all specifications. The diagrams and explanations are clear. Geometric language was used appropriately and correctly. A complete account of the experiments was given, including how they led to improved designs.

3 The toothpick bridge meets or comes close to meeting all specifications. The diagrams and explanations are understandable but may contain a few minor errors. Most of the geometric language is used appropriately and correctly. Evidence was shown of at least one experimental model prior to the finished model.

2 The toothpick bridge does not meet specifications. Diagrams and explanations are misleading or hard to follow. Geometric terms are completely lacking, used sparsely, or often misused. The model shows little effort and no evidence of testing of preliminary designs.

1 Major elements of the project are incomplete or missing.

0 Project is not handed in or shows no effort.

Your Evaluation of Project Evaluate your work, based on the *Scoring Rubric.*

Teacher's Evaluation of Project

Chapter 4 Project Teacher Notes: Tri, Tri Again

About the Project

Students will explore how engineers use triangles to construct safe, strong, stable structures. Then they will apply these ideas to build their own bridges, using toothpicks or craft sticks.

Introducing the Project

- Ask students whether they have ever built towers using playing cards. Ask them how they placed the first cards and why.
- Have students make towers using playing cards.

Activity 1: Modeling

Students will discover that triangles are more stable or rigid than quadrilaterals. Discuss with students real-world examples in which triangles are used for stability, such as ironing boards, scaffolding, and frames of roofs.

Activity 2: Observing

If students cannot find any local structures with exposed frameworks, suggest that they look in books or on the Internet for pictures of architecture or construction.

Activity 3: Investigating

Have students work in groups, keeping a log of the different models they make in their attempt to find one that supports the weight of the geometry book. Have groups compare the successful models and discuss their similarities and differences.

Finishing the Project

You may wish to plan a project day on which students share their completed projects. Encourage students to explain their processes as well as their products. Ask students to share how they selected their final bridge design. Ask students to submit their best models for a bridge-breaking competition, an event to which you could invite parents and the community.

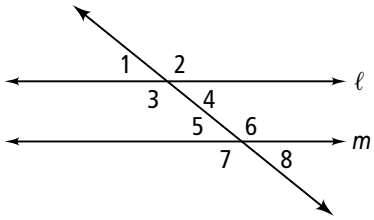
Name _____ Class _____ Date _____

Cumulative Review

Chapters 1–4

Multiple Choice

Use the diagram for Exercises 1 and 2. Line ℓ is parallel to line *m*.



1. Which best describes $\angle 1$ and $\angle 5$?

Ⓐ alternate interior angles

Ⓑ alternate exterior angles

Ⓒ corresponding angles

Ⓓ same-side exterior angles

2. Which best describes $\angle 6$ and $\angle 7$?

Ⓕ vertical angles

Ⓖ corresponding angles

Ⓗ alternate exterior angles

Ⓘ linear pair

3. If an animal is a mammal, then it has fur. What is the conclusion of this conditional?

Ⓐ An animal is a mammal.

Ⓑ The animal has fur.

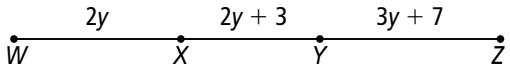
Ⓒ Mammals have fur.

Ⓓ Not all animals have fur.

4. Two of what geometric figure are joined at a vertex to form an angle?

Ⓕ points Ⓖ planes Ⓗ rays Ⓘ lines

5. If $WZ = 80$, what is the value of y?



Ⓐ 8 Ⓑ 9 Ⓒ 10 Ⓓ 11

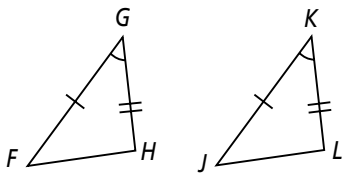
6. If $\triangle ABC \cong \triangle DEF$, which is a correct congruence statement?

Ⓕ $\angle B \cong \angle D$ Ⓖ $\overline{AB} \cong \overline{EF}$ Ⓗ $\overline{CA} \cong \overline{FD}$ Ⓘ $\angle A \cong \angle C$

7. Which can be used to justify stating that $\triangle FGH \cong \triangle JKL$?

Ⓐ ASA Ⓒ SSS

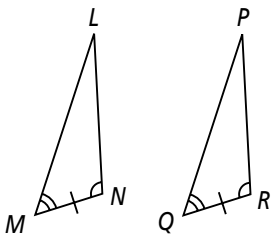
Ⓑ SAS Ⓓ AAS



8. Which postulate can be used to justify stating that $\triangle LMN \cong \triangle PQR$?

Ⓕ ASA Ⓗ SSS

Ⓖ SAS Ⓘ AAS



Name _____ Class _____ Date _____

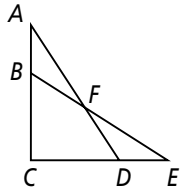
Cumulative Review (continued)

Chapters 1–4

Short Response

9. What is the midpoint of a segment with endpoints at $(-2, 2)$ and $(5, 10)$?

Use the figure at the right for Exercises 10–12.



Given: $\overline{AB} \cong \overline{ED}$, $\overline{BC} \cong \overline{DC}$

10. Which reason could you use to prove $\overline{AC} \cong \overline{EC}$?

11. Which reason could you use to prove $\angle C \cong \angle C$?

12. Which reason could you use to prove $\triangle ACD \cong \triangle ECB$?

13. What is the slope of a line that passes through $(-3, 5)$ and $(4, 3)$?

14. What is the slope of a line that is perpendicular to the line that passes through $(-2, -2)$ and $(1, 3)$?

Extended Response

15. Draw $\triangle ABC \cong \triangle EFG$. Write all six congruence statements.

16. The coordinates of rectangle $HIJK$ are $H(-4, 1)$, $I(1, 1)$, $J(1, -2)$, and $K(-4, -2)$. The coordinates of rectangle $LMNO$ are $L(-1, 3)$, $M(2, 3)$, $N(2, -3)$, and $O(-1, -3)$. Are these two rectangles congruent? Explain. If not, how could you change the coordinates of one of the rectangles to make them congruent?

Name _____ Class _____ Date _____

Common Core Standards Practice — Week 7

Selected Response

1. If $\triangle ABC \cong \triangle DEF$, which of the following statements is true?

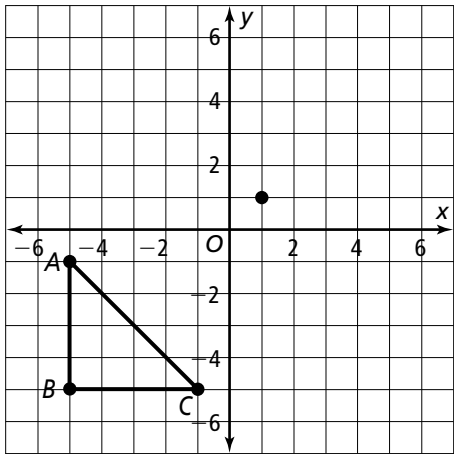
A $\overline{CB} \cong \overline{FE}$
B $\overline{AC} \cong \overline{DE}$
C $\overline{AC} \cong \overline{EF}$
D $\overline{BC} \cong \overline{DE}$

Constructed Response

2. Consider the points $J(2, 3)$, $K(5, 7)$, $L(8, 3)$, $M(-2, 1)$, $N(1, 5)$, $O(4, 1)$. Is $\triangle JKL \cong \triangle MNO$? Justify your answer.

Extended Response

3. a. Construct a triangle that is congruent to the triangle shown below. The entire triangle must be in the first quadrant, $m\angle B = 90$, and one vertex must be at (1, 1).



b. Which postulate proves that the triangles are congruent? Explain.

OVERVIEW

Looking Back	Mathematics of the Week	Looking Ahead
In previous grades students have worked with similar triangles in a variety of ways (8.G.A.4, 8.G.A.5).	Students should understand the properties of congruent triangles, how to determine whether triangles are congruent, and how to use congruent triangles to solve problems.	In Chapter 9, students will revisit congruent triangles when working with congruence transformations (G.CO.B.7).

COMMON CORE CONTENT STANDARDS

G.CO.C.10 Prove theorems about triangles.

G.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Mathematical Practice Standards: 1, 2, 3, 6

TEACHING NOTES

Selected Response

1. *Error Analysis*: Students show understanding of the definition of congruent triangles. If a student answers B, C, or D, he or she is confusing the order of the vertices and is not matching corresponding parts of congruent triangles.

Constructed Response

2. Students use the Distance Formula to compare triangles. Discuss with students triangle congruence by the SSS Postulate. Using the two given triangles, have volunteers describe corresponding angles and sides. Ask students how they will know which postulate to use in this exercise. Then ask them to describe a plan of how they will solve the exercise. As students work, make sure they compare the correct corresponding sides as they find the lengths of the sides.

Extended Response

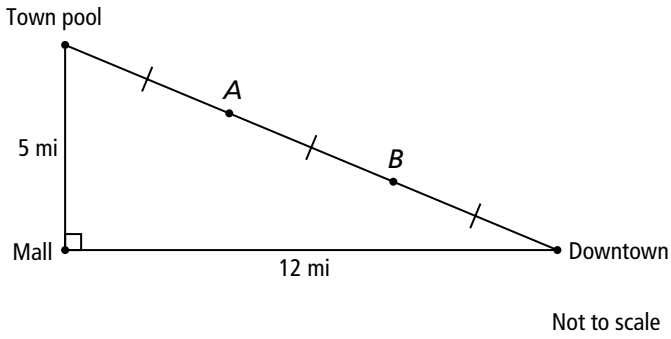
3. Students show understanding of the triangle congruence postulates. Remind students that congruent figures have the same size and shape. If time permits, work through an example of constructing a congruent triangle to a shape you create, similar to the exercise. When you present your example, make sure to include two to three restrictions similar to those in the exercise. As you complete the example for students, note the steps you take to make sure all restrictions are met. As students begin the exercise, ask them to consider a plan when constructing the congruent triangle. When students explain the postulate that proves the triangles are congruent, make sure the postulate corresponds to the reasoning they present.

Name _____ Class _____ Date _____

Performance Task: Urban Planning

Complete this performance task in the space provided. Fully answer all parts of the performance task with detailed responses. You should provide sound mathematical reasoning to support your work.

Students are designing a new town as part of a social studies project on urban planning. They want to place the town's high school at point *A* and the middle school at point *B*. They also plan to build roads that run directly from point *A* to the mall and from point *B* to the mall. The average cost to build a road in this area is $550,000 per mile.



Task Description

What is the difference in the cost of the roads built to the mall from the two schools?

a. Find the measure of each acute angle of the right triangle shown.

b. Find the length of the hypotenuse. Also find the length of each of the three congruent segments forming the hypotenuse.

Name _____ Class _____ Date _____

Performance Task: Urban Planning (continued)

c. Draw the road from point *A* to the mall and find its length.

d. Draw the road from point *B* to the mall and find its length.

e. How much farther from the mall is point *B* than point *A*? How much more will it cost to build the longer road?

Name _____ Class _____ Date _____

Performance Task 2 Scoring Rubric

Urban Planning

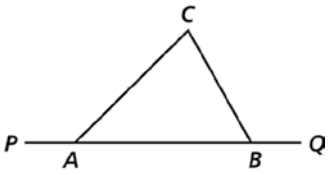
The Scoring Rubric proposes a maximum number of points for each of the parts that make up the Performance Task. The maximum number of points is based on the complexity and difficulty level of the sub-task. For some parts, you may decide to award partial credit to students who may have shown some understanding of the concepts assessed, but may not have responded fully or correctly to the question posed.

Task Parts	Maximum Points
a. Downtown angle: $\tan^{-1}\left(\frac{5}{12}\right) = 22.6°$. Town Pool angle: $\tan^{-1}\left(\frac{12}{5}\right) = 67.4°$.	2
b. Hypotenuse h: $h^2 = 5^2 + 12^2 = 25 + 144 = 169$, so $h = 13$. Length of each of the three congruent segments $= \frac{13}{3}$ mi, or about 4.3 mi.	4
c. Let a = length of the road from point A to the mall. Use the Law of Cosines: $a^2 = 5^2 + \left(\frac{13}{3}\right)^2 - 2(5)\left(\frac{13}{3}\right)\cos 67.4°$, so $a \approx 5.2$ mi.	4
d. Let b = length of the road from point B to the mall. Use the Law of Cosines: $b^2 = 12^2 + \left(\frac{13}{3}\right)^2 - 2(12)\left(\frac{13}{3}\right)\cos 22.6°$, so $b \approx 8.2$ mi.	4
e. Since $8.2 - 5.2 = 3$, point B is about 3 miles further from the mall than point A is. At \$550,000 per mile, the cost to build the longer road is $3(\$550{,}000) = \$1{,}650{,}000$ more.	4
Total Points	**18**

Name _____ Class _____ Date _____

Common Core Readiness Assessment 2

1. Use the diagram and the information given to complete the missing element of the two-column proof.

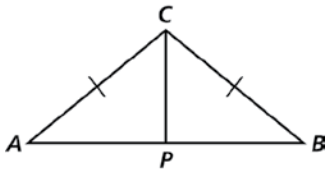


Given: $\angle CAP$ is an exterior angle of ΔCAB.
Prove: $m\angle CAP = m\angle ABC + m\angle BCA$

Statements	Reasons
1. $\angle CAP$ is an exterior angle of ΔCAB.	**1.** Given
2. $\angle CAP$ and $\angle CAB$ are supplementary.	**2.** Angles that form a straight angle are supplementary.
3. $m\angle CAP + m\angle CAB = 180$	**3.** Definition of supplementary angles
4. $m\angle ABC + m\angle BCA + m\angle CAB = 180$	**4.** Triangle Angle Sum Theorem
5. ?	**5.** Transitive Property of Equality
6. $m\angle CAP = m\angle ABC + m\angle BCA$	**6.** Subtraction Property of Equality

A $m\angle CBQ = 180 - m\angle ABC$
B $m\angle CAB = 180 - m\angle CAP$
C $m\angle CAP = 180 - m\angle CBQ$
D $m\angle CAP + m\angle CAB = m\angle ABC + m\angle BCA + m\angle CAB$

2. Use the diagram and the information given to complete the missing element of the two-column proof.



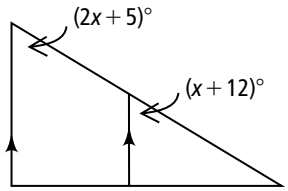
Given: Triangle ABC with $\overline{AC} \cong \overline{BC}$, $\overline{CP}$ bisects $\angle ACB$.
Prove: $\overline{CP} \perp \overline{AB}$

Statements	Reasons
1. $\overline{AC} \cong \overline{BC}$, $\overline{CP}$ bisects $\angle ACB$.	**1.** Given
2. $\angle ACP \cong \angle BCP$	**2.** Definition of angle bisector
3. $\overline{CP} \cong \overline{CP}$	**3.** Reflexive Property of congruent
4. $\Delta ACP \cong \Delta BCP$	**4.** SAS
5. $\angle CPA \cong \angle CPB$	**5.** Corresponding Parts of congruent Triangles are congruent
6. $\angle CPA$ and $\angle CPB$ are supplementary.	**6.** Angles that form a straight angle are supplementary.
7. $\angle CPA$ and $\angle CPB$ are right angles.	**7.** ?
8. $\overline{CP} \perp \overline{AB}$	**8.** Definition of perpendicular lines

F Angles opposite congruent sides of a triangle are congruent.
G Congruent supplementary angles are right angles.
H $\overline{CP} \perp \overline{PB}$
J Triangle Angle Sum Theorem

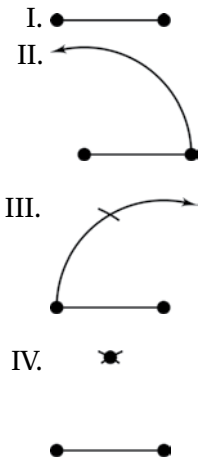
Name _____ Class _____ Date _____

3. Find the value of x.



A $x = 3.5$
B $x = 7$
C $x = 8.5$
D $x = 17$

4. Classify the triangle produced by the following construction. Note that the final step is not shown.



F equilateral
G right
H right and isosceles
J obtuse and isosceles

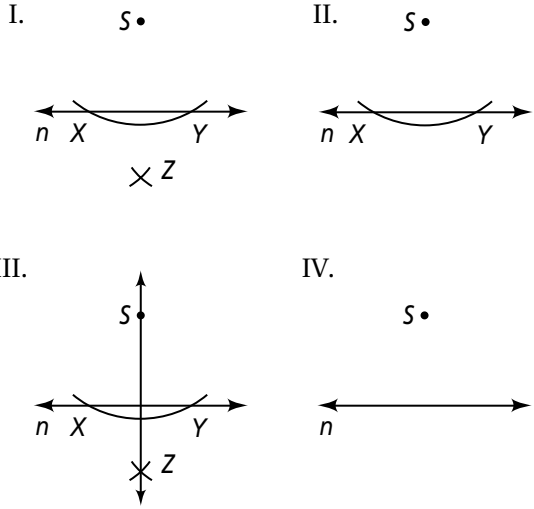
5. Which line is perpendicular to the line $2x - 3y = 12$?

A $y = -\frac{2}{3}x + 12$
B $y = \frac{2}{3}x + 12$
C $y = -\frac{3}{2}x - 12$
D $y = \frac{3}{2}x - 12$

6. Which line is perpendicular to the line $x = \frac{1}{2}$?

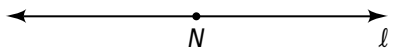
F $x = -2y$
G $y = -2x$
H $x = -2$
J $y = 2$

7. The diagrams below show steps for a perpendicular line construction. Which of the following lists the construction steps in the correct order?



A IV, II, I, III
B IV, II, III, I
C III, I, II, IV
D IV, I, II, III

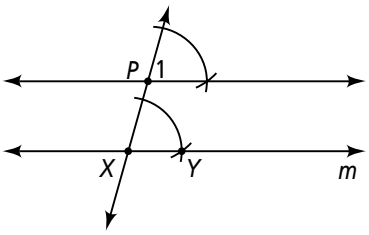
8. What is the first step in constructing the perpendicular to line ℓ at point N?



F Draw an arc above point N.
G Construct a 90° angle with vertex at point N.
H Mark two points on line l that are equidistant from N.
J With the compass at point N, draw a circle.

Name _____ Class _____ Date _____

9. In the construction of a line parallel to line m though point P, what must be true about the construction of $\angle 1$ and $\angle PXY$?



A $\angle 1$ and $\angle PXY$ must be acute.

B $\angle 1$ and $\angle PXY$ must be obtuse.

C $\angle 1$ and $\angle PXY$ must be congruent.

D $\angle 1$ and $\angle PXY$ must be supplementary.

10. Which of the following pairs of lines are not parallel?

F $y = -2, y = 4$

G $x + y = 3, x - y = 3$

H $y = \frac{1}{2}x + 5, y = \frac{1}{2}x - 4$

J $2x + y = -5, 6x + 3y = 9$

11. Which of the following lines is parallel to the line that passes through $(-1, -3)$ and $(5, 0)$?

A $y = \frac{1}{2}x + 9$

B $y = -\frac{1}{2}x - 3$

C $y = 2x + 5$

D $6x - 3y = -1$

12. What is the y-intercept of the line that is perpendicular to $y = -3x - 5$ and passes through the point $(-3, 7)$?

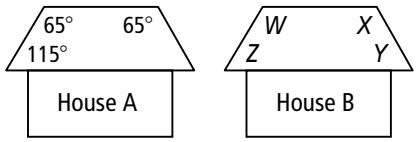
F 23

G $\frac{1}{3}$

H 8

J 10

13. Builders are replacing the congruent roofs on House A and House B. What is the measure of $\angle Z$ on House B?



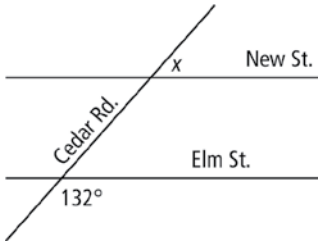
A 25°

B 65°

C 115°

D 180°

14. Engineers are planning a new cross street parallel to Elm St. What angle x should the new street make with Cedar Rd. so that it is parallel to Elm St?



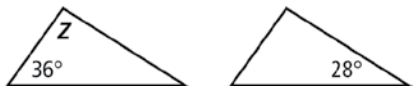
F 84°

G 132°

H 48°

J 42°

15. If these two triangular puzzle pieces are to be made congruent, what must be the measure of angle z?



A 64°

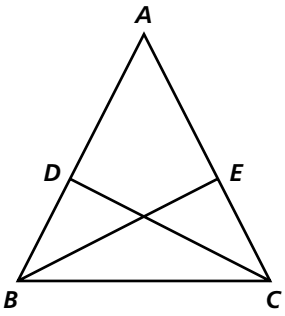
B 116°

C 136°

D 26°

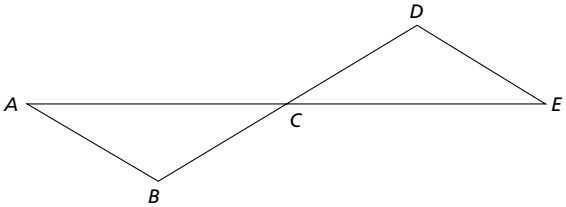
Name _____ Class _____ Date _____

16. In the figure below, it is given that $\overline{BD} \cong \overline{CE}$. To prove $\triangle BCD \cong \triangle CBE$ by the SSS Congruence Theorem, what additional information is sufficient?



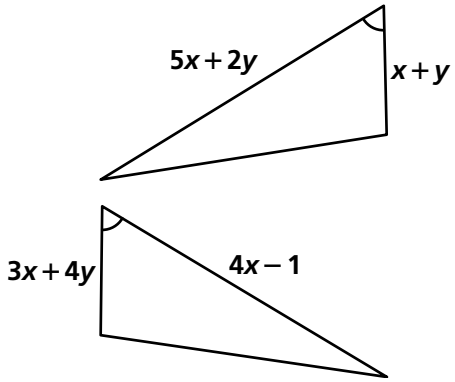
F $\angle A \cong \angle A$ **H** $\overline{AB} \cong \overline{AC}$
G $\overline{DC} \cong \overline{EB}$ **J** $\angle ADC \cong \angle AEB$

17. Given $\overline{AE}$ and $\overline{BD}$ bisect each other at point C, which congruence theorem would you use to prove $\triangle ABC \cong \triangle EDC$?



A HL **C** SAS
B ASA **D** SSS

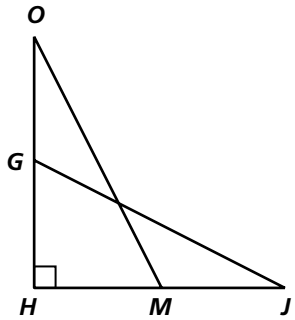
18. For what values of x and y are the triangles congruent?



F $x = 2, y = -3$ **H** $x = 3, y = -2$
G $x = -2, y = 3$ **J** $x = -3, y = 2$

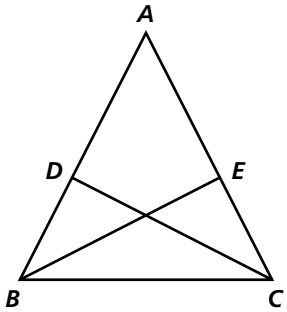
19. Under the conditions stated below, what postulate implies that $\triangle GHJ$ and $\triangle MHO$ are congruent?

$\overline{OH} \cong \overline{JH}$, $\angle O \cong \angle J$



A ASA
B SAS
C SSS
D AAS

20. In the figure below, it is given that $\overline{AD} \cong \overline{AE}$. To prove $\triangle ADC \cong \triangle AEB$ by the ASA Congruence Theorem, what additional information is sufficient?

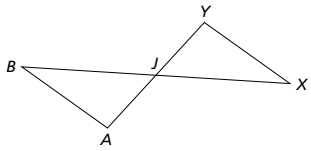


F $\overline{DC} \cong \overline{EB}$
G $\overline{AB} \cong \overline{AC}$
H $\angle ADC \cong \angle AEB$
J $\angle A \cong \angle A$

Name _____ Class _____ Date _____

21. Use the diagram and the information given to complete the missing element of the two-column proof.

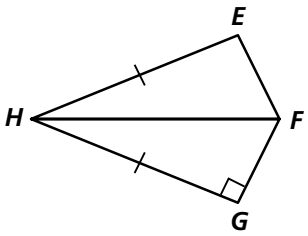
Given: $\overline{AB} \parallel \overline{XY}$
$\overline{AY}$ bisects $\overline{XB}$.
Prove: $\triangle AJB \cong \triangle YJX$.



Statements	Reasons
1. $\overline{AB} \parallel \overline{XY}$	**1.** Given
2. $\angle B \cong \angle X$ $\angle A \cong \angle Y$	**2.** Converse of the Alternate Interior Angles Theorem then alt. int. $\angle$s are $\cong$.
3. $\overline{AY}$ bisects $\overline{XB}$.	**3.** Given
4. $\overline{JB} \cong \overline{JX}$	**4.** Definition of segment bisector
5. $\triangle AJB \cong \triangle YJX$	**5.** ?

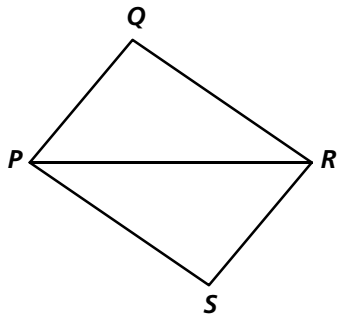
A ASA
B AAS
C SAS
D SSS

22. Given that $\overline{HF}$ is the bisector of $\angle EHG$ and $HE = HG$, which congruence statement can be used to prove that $\Delta EFH \cong \Delta GFH$?



F ASA
G SAS
H HL
J SSS

23. In the figure, $\triangle PQR \cong \triangle RSP$ by SAS. What pair(s) of sides can you conclude are congruent by CPCTC?



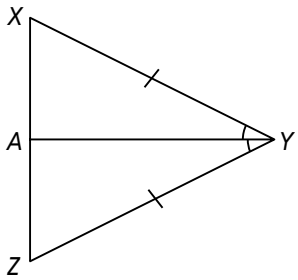
I. $\overline{QR} \cong \overline{SR}$
II. $\overline{QR} \cong \overline{SP}$
III. $\overline{QR} \cong \overline{PR}$

A I only
B I and II
C II only
D II and III

24. If $\triangle ABC \cong \triangle XYZ$ and $AB = 3$, $BC = 6$ and $AC = 4$, what is the length of $\overline{ZX}$?

F 3
G 4
H 5
J 60

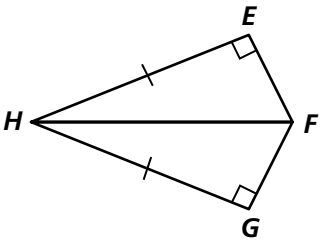
25. Given $\triangle XYZ$ below, what is $m\angle XAY$?



A 30°
B 60°
C 90°
D cannot be determined

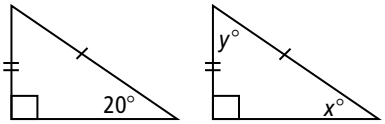
Name _____ Class _____ Date _____

26. Which congruence statement can be used to prove that $\triangle EFH \cong \triangle GFH$?



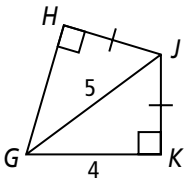
F HL
G SAS
H SSS
J ASA

27. The sails of two boats are pictured below. What is the value of y?



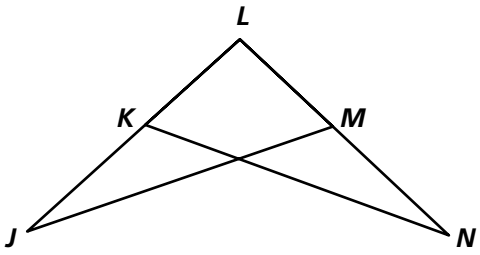
A 20
B 60
C 70
D 90

28. In the figure below, what is the measure of $\overline{GH}$?



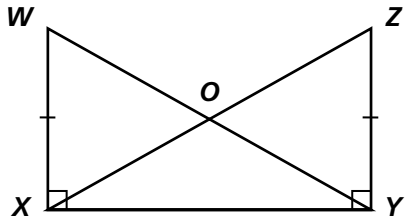
F 3
G 5
H 4
J 9

29. Under the conditions $\overline{JL} \cong \overline{NL}$ and $\overline{KL} \cong \overline{ML}$, what theorem or postulate implies $\triangle MJL \cong \triangle KNL$?



A SSS
B SAS
C ASA
D AAS

30. If $m\angle WYX = 35°$, what is $m\angle XZY$?



F 35°
G 145°
H 65°
J 55°

Name _____ Class _____ Date _____

Common Core Readiness Assessment 2 Report

Common Core State Standards	Test Items	Number Correct	Proficient? Yes or No	Geometry Student Edition Lesson(s)
Geometry				
G.CO.C.9 Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	1			3-2
G.CO.C.10 Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*	2			3-5, 4-5
G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*	7, 8, 9			3-6, 4-4, CB 3-2, CB 4-5
G.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	4			3-6, 4-5
G.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	3, 16–33			4-2, 4-3, 4-4, 4-5, 4-6, 4-7
G.GPE.B.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	5, 6, 10, 11, 12			3-8
G.MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	13, 14, 15			3-4

Student Comments:

Parent Comments:

Teacher Comments:

Pearson Algebra 1, Geometry, Algebra 2 Common Core Edition ©2015

Teacher Resources: Print, DVD, and Online

	Print	CD-ROM/DVD	ONLINE
Student Edition	x		x
Teacher's Edition	x		x
Student Companion	x	x	x
Think About a Plan (Editable)	x	x	x
Practice Form G (Editable)	x	x	x
Practice Form K (Editable)	x	x	x
Standardized Test Prep	x	x	x
Extra Practice (Editable)		x	x
Find the Errors!		x	x
Enrichment (Editable)	x	x	x
Additional Vocabulary Support (Editable)	x	x	x
Activities, Games, and Puzzles (Editable)		x	x
Homework Video Tutors		x	x
Reteaching (Editable)	x	x	x
Chapter Project	x	x	x
Performance Tasks	x	x	x
Cumulative Review	x	x	x
Quizzes and Tests Form G (Editable)	x	x	x
Quizzes and Tests Form K (Editable)	x	x	x
Answers	x	x	x
Common Core Standards Practice and Review	x		x
Multilingual Handbook		x	x
Common Core Overview and Implementation Guide	x		
Teaching with TI Technology	x	x	x
Answers and Solutions CD-ROM		x	
ExamView® Assessment Suite CD-ROM		x	
TI-Nspire™ Lesson Support CD-ROM		x	
Virtual Nerd™ SmartPhone Application			x

PearsonSchool.com
800-848-9500

International customers: visit PearsonGlobalSchools.com

SAM: 978-0-1332-9032-5