

August 27, 2018

What does triangle congruency mean?

Find an explanation and a picture, using technology.

Aug 24-10:10 AM

Let's look at the triangle sum theorem...


Geogebra, interior triangle sum

Geogebra, triangle sum theorem

What is the triangle sum theorem?

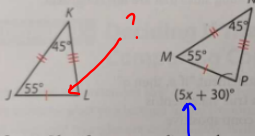
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Now the triangle sum theorem using paper.....



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**Example 2** Find the value of the variable that results in congruent triangles.



**Congruent**  
 $\angle K \approx \angle N \approx 45^\circ$   
 $\angle J \approx \angle M = 55^\circ$   
 $\angle L \approx \angle P$

Step 1 Identify corresponding angles.  
 $\angle M$  corresponds to  $\angle J$ , because they have the same measure and they are formed by congruent corresponding sides. Similarly,  $\angle N$  corresponds to  $\angle K$ . So,  $\angle P$  corresponds to  $\angle L$ .

$$55 + 45 + \angle L = 180$$

$$100 + \angle L = 180$$

$$-100 \quad -100$$

$$\angle L = 80^\circ$$

$$80 = 5x + 30$$

$$-30 \quad -30$$

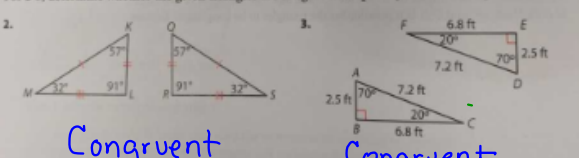
$$50 = 5x$$

$$\frac{50}{5} = \frac{5x}{5}$$

$$10 = x$$

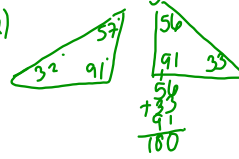
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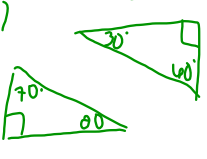
For 2-5, determine whether the given triangles are congruent. Explain your reasoning.



**Congruent** look @ sides →  
 look @ angles →

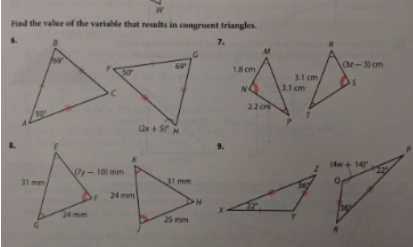
**Not Congruent** Not Congruent

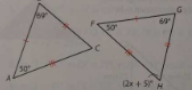
2)   $\frac{57}{91} \neq \frac{32}{91}$

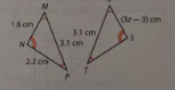
3) 

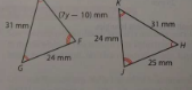
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Find the value of the variable that results in congruent triangles.



6. 

7. 

8. 

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Triangle Sum Theorem  
Practice Problems  
Find the measure of each angle indicated.

1)  $? + 55 + 70 = 180$

2)  $? + 35 + 85 = 180$

3)  $? + 30 + 90 = 180$

4)  $? + 45 + 35 = 180$

Solve for x.

5)  $66 + x + 30 + 90 = 180$

6)  $60 + 30x + 90 = 180$

7)  $? + x + 44 + 55 = 180$

8)  $? + 10x + 24 + 40 = 180$

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Find the measure of angle A.

9)  $\angle A = 20(1) = 20$   
 $71x - 1 + 20x + 90 = 180$   
 $91x + 89 = 180$   
 $91x = 91$   
 $x = 1$

11)  $x + 52 + 67 + x + 75 = 180$   
 $2x + 194 = 180$   
 $-194 - 194$   
 $2x = -14$   
 $x = -7$

12)  $x + 52 + 67 + x + 75 = 180$   
 $2x + 194 = 180$   
 $-194 - 194$   
 $2x = -14$   
 $x = -7$

13)  $x + 52 + 67 + x + 75 = 180$   
 $2x + 194 = 180$   
 $-194 - 194$   
 $2x = -14$   
 $x = -7$

14)  $x + 52 + 67 + x + 75 = 180$   
 $2x + 194 = 180$   
 $-194 - 194$   
 $2x = -14$   
 $x = -7$

15)  $x + 52 + 67 + x + 75 = 180$   
 $2x + 194 = 180$   
 $-194 - 194$   
 $2x = -14$   
 $x = -7$

16)  $x + 52 + 67 + x + 75 = 180$   
 $2x + 194 = 180$   
 $-194 - 194$   
 $2x = -14$   
 $x = -7$

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Choose 2 from #1-4  
Choose 2 from #5-8  
Choose 3 from #10-16

Circle these in red pen, please!

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What is the interior triangle sum theorem?  
The 3 angle of any triangle = 180.

4) Solve for ?  
7) Solve for x  
14) Solve for A

4)  $? + 85 + 35 = 180$   
 $? + 120 = 180$   
 $-120 - 120$   
 $? = 60$

7)  $x + 44 + 55 + 90 = 180$   
 $x + 189 = 180$   
 $-189 - 189$   
 $x = -9$

14)  $5x + 2 + 6x + 134 = 180$   
 $11x + 136 = 180$   
 $-136 - 136$   
 $11x = 44$   
 $11 11$   
 $x = 4$   
 $A = 5(4) + 2$   
 $A = 22$

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Quiz review

12)  $m\angle 1 = 60$ ,  $m\angle 2 = 2x$  Linear Pair  
 $\angle 1 + \angle 2 = 180$   
 $x + 2x = 180$   
 $3x = 180$   
 $3 3$   
 $x = 60$   
 $2 \cdot x = 2 \cdot 60$   
 $m\angle 1 = 60$ ,  $m\angle 2 = 120$

Bonus Solve for all angles.  
 $80 + 2x = 180$   
 $-100 - 100$   
 $2x = 80$   
 $2 2$   
 $x = 40$

because vertical angle!  
vertical angle!

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3)

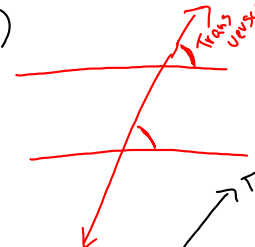

$2x = 80$   
 $x = 40$

$4y = 60$   
 $4 4$   
 $y = 15$

$4y + A = 180$   
 $4(15) + A = 180$   
 $-60 - 60$   
 $A = 120$

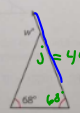
$x = 40$ ,  $y = 15$ ,  $A = 120$

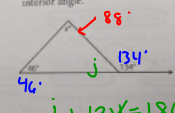
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2)  Corresponding  $\angle$ s.  
 1)  alternate interior  
 7 complementary  $\angle = 90^\circ$   
 8 supplementary or linear pair  $\angle = 180^\circ$   
 9 vertical angles

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p278-279 #11-15

11. Find  $w$  to find the measure of the exterior angle.  
  $j=44$

12. Find  $x$  to find the measure of the remote interior angle.  
  $88^\circ$   
 $j + 134 = 180$   
 $-134 \quad -134$   
 $j = 46$

$68 + 68 + j = 180$   
 $136 + j = 180$   
 $-136 \quad -136$   
 $j = 44$   
 $j$  &  $w$  are a linear pair  
 $44 + w = 180$   
 $-44 \quad -44$   
 $w = 136$

$46 + 46 + x = 180$   
 $92 + x = 180$   
 $-92 \quad -92$   
 $x = 88$

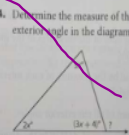
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14. Determine the measure of the indicated exterior angle in the diagram.

Find  $m\angle H$ .  
 $6x - 1 + 5x + 17 + L = 180$   
 $6x - 1 + 5x + 17 + 54 = 180$   
 $11x + 70 = 180$   
 $-70 \quad -70$   
 $11x = 110$   
 $\frac{11x}{11} = \frac{110}{11}$   
 $x = 10$   
 $\angle H = 6x - 1$   
 $\angle H = 6(10) - 1$   
 $\angle H = 59$

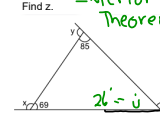
Match each angle with its corresponding measure, given  $m\angle 1 = 130^\circ$  and  $m\angle 7 = 70^\circ$ .

a. $\angle A$	50°
b. $m\angle 3$	60°
c. $m\angle 4$	70°
d. $m\angle 2$	110°
e. $m\angle 6$	120°

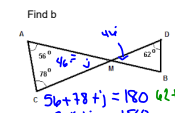
  $60^\circ$ ,  $70^\circ$ ,  $130^\circ$

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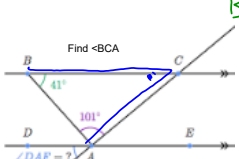
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Find  $z$ . Interior  $\Delta$  Sum Theorem  
  $26^\circ = z$

$69 + 85 + z = 180$   
 $154 + z = 180$   
 $-154 \quad -154$   
 $z = 26$

Find  $b$ .  
  $108$

$56 + 78 + b = 180$   
 $134 + b = 180$   
 $-134 \quad -134$   
 $b = 46$

Find  $\angle BCA$ .  
  $154$


$j + z = 180$   
 $26 + z = 180$   
 $-26 \quad -26$   
 $z = 154$

$41 + 101 + C = 180$   
 $142 + C = 180$   
 $-142 \quad -142$   
 $C = 38$

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Unit 2 - Similarity Congruence & Proofs Name \_\_\_\_\_

Isosceles triangle - label all parts

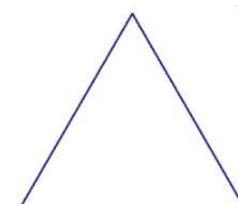


Isosceles vocabulary, please define.  
 Isosceles triangle:  
 Leg -  
 vertex angle -  
 base -  
 base angle -

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Unit 2 - Similarity Congruence & Proofs Name \_\_\_\_\_

Equilateral Triangle



Find a minimum of three facts about equilateral triangles.

- 1)
- 2)
- 3)

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Triangle Congruency Manipulative

Are congruent if...	Side Side Side SSS	Angle Angle Side AAS	Side Angle Side SAS	Angle Side Angle ASA	Hypotenuse Leg HL
SSS SAS AAS ASA HL					

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Geometry \_\_\_\_\_ Name \_\_\_\_\_ ID: 1  
 What congruency statement is used (if any)? Date \_\_\_\_\_ Period \_\_\_\_\_  
 Determine if the two triangles are congruent. If they are, state how you know.

1) SAS

2) AAS

3) AAS

4) NOT congruent

5) SSS

6) NOT congruent

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7) SSS  
 Reflexive Property

8) NOT congruent

9) NOT congruent

10) HL

11) SSS

12) HL

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13-18 then let me see!

13) SAS

14) AAS

15) SAS

16) ASA

17) NOT congruent

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18) ASA

State what additional information is required in order to know that the triangles are congruent for the reason given.

19) HL

20) SAS

21) HL

22) SSS

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Determine if the two triangles are congruent. If they are, state how you know.

1) SAS  
 AAS

2) SAS

3) ASA  
 $\overline{AD}_1 = \overline{AD}_2$

4) SAS

5) SAS

6) NOT congruent

7) SAS

8) NOT congruent

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### PROOFS SSS, ASA, AAS, SAS, HL

For these fill in any missing statements or reasons.

1.  $\angle B \cong \angle E$ ,  $\angle C \cong \angle F$ , and  $\angle A \cong \angle D$

Prove:  $\triangle ABC \cong \triangle DEF$

Statements	Reasons
1. $\angle B \cong \angle E$	1. Given
2. $\angle C \cong \angle F$	2. Given
3. $\angle A \cong \angle D$	3. Given
4. $\triangle ABC \cong \triangle DEF$	4. ASA

2. Given:  $PQ \cong RS$ , and  $\angle PQS \cong \angle RSQ$

Prove:  $\triangle ABC \cong \triangle DBC$

Statements	Reasons
1. $\angle PQS \cong \angle RSQ$	1. Given
2. $QS \cong QS$	2. Reflexive Property
3. $PQ \cong RS$	3. Given
4. $\triangle PQS \cong \triangle RSQ$	4. SAS

3.  $GI \cong GZ$ ,  $GI \cong GZ$ , and  $BC \cong EF$

Prove:  $\triangle ABD \cong \triangle DEF$

Statements	Reasons
1. $AB \cong DE$	1. Given
2. $BC \cong EF$	2. Given
3. $\angle B \cong \angle E$	3. Given
4. $\triangle ABC \cong \triangle DEF$	4. SAS

4. Given:  $\angle L \cong \angle N$ ,  $\angle LOM \cong \angle NMO$

Prove:  $\triangle LMO \cong \triangle NMO$

Statements	Reasons
1. $\angle L \cong \angle N$	1. Given
2. $\angle LOM \cong \angle NMO$	2. Given
3. $MO \cong MO$	3. Reflexive Property
4. $\triangle LMO \cong \triangle NMO$	4. ASA

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5. Given:  $\overline{AE}$  bisects  $\overline{BD}$ ,  $\angle A \cong \angle E$

Prove:  $\triangle ABC \cong \triangle EDC$

Statements	Reasons
1. $\angle A \cong \angle E$	1. Given
2. $AE$ bisects $BD$	2. Given
3. $\angle ACB \cong \angle ECD$	3. Definition of Bisect
4. $BC \cong DC$	4. Vertical angle
5. $\triangle ABC \cong \triangle EDC$	5. ASA

6. Given:  $PQ \parallel ST$ ,  $PR \cong TR$

Prove:  $\triangle PQR \cong \triangle TSR$

Statements	Reasons
1. $PQ \parallel ST$	1. Given
2. $\angle P \cong \angle T$	2. Alternate interior angles
3. $PR \cong TR$	3. Given
4. $\angle R \cong \angle R$	4. Reflexive Property
5. $\triangle PQR \cong \triangle TSR$	5. ASA

7. Given:  $\overline{LM} \cong \overline{NO}$ , and  $\angle M \cong \angle O$

Prove:  $\triangle MPL \cong \triangle NPO$

Statements	Reasons
1. $\overline{LM} \cong \overline{NO}$	1. Given
2. $\angle M \cong \angle O$	2. Given
3. $\angle LMP \cong \angle ONP$	3. Vertical angle
4. $\triangle MPL \cong \triangle NPO$	4. ASA

8. Given:  $\overline{AB} \parallel \overline{DC}$

Prove:  $\triangle ABC \cong \triangle CDA$

Statements	Reasons
1. $\overline{AB} \parallel \overline{DC}$	1. Given
2. $\angle ACB \cong \angle CAD$	2. Alternate interior angles
3. $\triangle ABC \cong \triangle CDA$	3. ASA

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9. Given:  $PQ \cong SU$ ,  $QR \cong ST$ , and  $PR \cong TU$

Prove:  $\triangle PQR \cong \triangle STU$

Statements	Reasons
1. $PQ \cong SU$	1. Given
2. $QR \cong ST$	2. Given
3. $PR \cong TU$	3. Given
4. $\triangle PQR \cong \triangle STU$	4. SSS

10. Given: N is the midpoint of  $\overline{MO}$ ,  $\overline{LN} \cong \overline{PN}$ , and  $\overline{LN} \cong \overline{PN}$

Prove:  $\triangle LMN \cong \triangle PON$

Statements	Reasons
1. $\overline{LN} \cong \overline{PN}$	1. Given
2. $\overline{LN} \cong \overline{PN}$	2. Given
3. N is the Midpoint of $\overline{MO}$	3. Given
4. $\angle LNM \cong \angle ONP$	4. Vertical angle
5. $\triangle LMN \cong \triangle PON$	5. SAS

11. Given: C is the midpoint of  $\overline{BE}$ ,  $\angle B \cong \angle E$ , and  $\overline{AB} \cong \overline{DE}$

Prove:  $\triangle ABC \cong \triangle DEC$

Statements	Reasons
1. $\angle B \cong \angle E$	1. Given
2. $\overline{AB} \cong \overline{DE}$	2. Given
3. $\overline{BC} \cong \overline{EC}$	3. C is the midpoint
4. $\triangle ABC \cong \triangle DEC$	4. SAS

12. Given:  $\overline{QT}$  bisects  $\overline{SP}$ ,  $\overline{SP}$  bisects  $\overline{QT}$

Prove:  $\triangle QRP \cong \triangle SRT$

Statements	Reasons
1. $\overline{QT}$ bisects $\overline{SP}$	1. Given
2. $\overline{SP}$ bisects $\overline{QT}$	2. Given
3. $\overline{QR} \cong \overline{SR}$	3. Definition of Bisector
4. $\angle QRP \cong \angle SRT$	4. Vertical Angles
5. $\triangle QRP \cong \triangle SRT$	5. SAS

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### STUDY GUIDE

Geometry Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

#### Triangle Congruence

State if the two triangles are congruent. If they are, state how you know.

- ASA
- SSS
- NOT Congruent
- NOT Congruent
- AAS
- HL
- ASA
- AAS
- HL
- SSS

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9) HL

Write the congruence Statement \_\_\_\_\_

10) SSS

Write the congruence Statement \_\_\_\_\_

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Geometry, Unit 5 - Congruent Triangles Proof Activity - Part 1 Name \_\_\_\_\_

For each problem, do the following:

- Show the given information in the diagram (using tick marks to show congruent sides and arcs to show congruent angles).
- Show any other congruent parts you notice (from vertical angles, sides shared in common, or alternate interior angles with parallel lines).
- Give the postulate or theorem that proves the triangles congruent (SSS, SAS, ASA, AAS, HL).
- Finally, fill in the blanks to complete the proof.

1. Given:  $\overline{BC} \cong \overline{DC}$ ,  $\overline{AC} \cong \overline{EC}$

Prove:  $\triangle ABC \cong \triangle DCE$

Statements	Reasons
1.	1. Given
2.	2. Vertical $\angle$ s Theorem
3. $\triangle ABC \cong \triangle DCE$	3.

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2. Given:  $\overline{JK} = \overline{IK}$ ;  $\overline{JM} = \overline{IM}$   
 Prove:  $\triangle KJM \cong \triangle KIM$

Statements	Reasons
1.	1.
2.	2. Reflexive Prop.
3.	3.

3. Given:  $\angle G = \angle I$ ;  $\overline{FH}$  bisects  $\angle GFI$   
 Prove:  $\triangle GFH \cong \triangle IFH$

Statements	Reasons
1. $\angle G = \angle I$ ; $\overline{FH}$ bisects $\angle GFI$	1.
2. $\angle GFH \cong \angle IFH$	2. Def. of _____
3.	3. Reflexive Prop.
4.	4.

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p 286

Copy Equilateral Triangle Theorem & Converse of the Equilateral Triangle Theorem.

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p289 #4-9

Find the measure of the indicated angle.

4.  $m\angle A$

5.  $m\angle B$

6.  $m\angle O$

7.  $m\angle E$

For 8-11, find the length of the indicated side.

8.  $\overline{DE}$

9.  $\overline{KL}$

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Geometry Name: \_\_\_\_\_ ID: 1

Finding side & angles of isosceles and equilateral triangles

Find the value of x.

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

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11)

12)

13)

14)

15)

16)

17)

18)

19)

20)

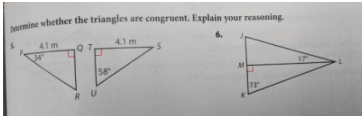
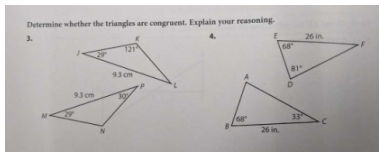
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p203

copy ASA triangle congruence theorem

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p206 #3-6

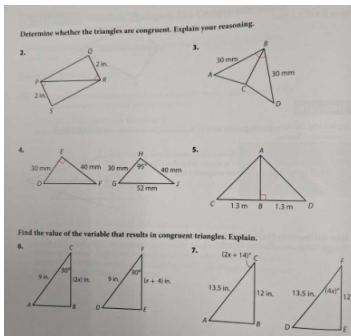


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p213 copy the SAS triangle congruence theorem

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p216 #2-7



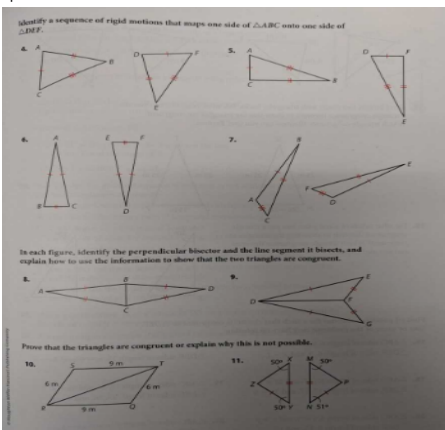
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p222

copy SSS triangle congruence

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p227 #4-11



Aug 24-12:07 PM

p246 copy the AAS congruence statement

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p 250 #1-6

For 1-6, decide whether you have enough information to determine that the triangles are congruent. If they are congruent, explain why.

1.

2.

3.

4.

5.

6.

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p256 copy HL congruence theorem

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p258 2-5, 10-13

Determine whether enough information is given to prove that the triangles are congruent. Explain your answer.

2.  $\triangle ABC$  and  $\triangle DCB$

3.  $\triangle PQR$  and  $\triangle STU$

4.  $\triangle GKI$  and  $\triangle FHJ$

5.  $\triangle EFG$  and  $\triangle SQR$

11.  $\triangle ABC$  and  $\triangle ABD$

13.  $\triangle MPQ$  and  $\triangle PMN$

Algebra: What value of  $x$  will make the given triangles congruent? Explain.

10.  $\triangle KLI$  and  $\triangle JKM$

12.  $\triangle STV$  and  $\triangle UVT$

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Study Guide

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Test

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