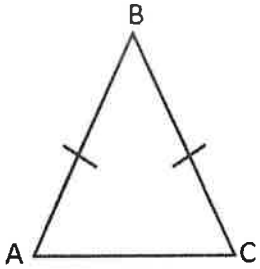
Foundations of Math 2
Unit 4 - Similarity and Congruence
Lesson 1 – Isosceles & Equilateral Triangles
Exterior Angle Theorem

Name: _____
Date: _____ Pd: _____

Triangle Sum Theorem: The sum of the measures of the angles of a triangle is _____.

Remember: An **ISOSCELES TRIANGLE** is a 3-sided polygon with at least 2 congruent sides.



Label the vertex angle, the base angles, the legs and the base of the isosceles triangle.

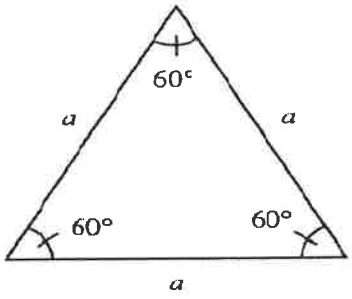
If two sides of a triangle are congruent, then the angles opposite those sides are congruent:

In ΔABC: if _____ $\cong$ _____, **then** _____ $\cong$ _____.

If two angles of a triangle are congruent, then the sides opposite those angles are congruent:

In ΔABC: if _____ $\cong$ _____, **then** _____ $\cong$ _____.

Remember: An **EQUILATERAL TRIANGLE** is a 3-sided polygon with all 3 congruent sides.

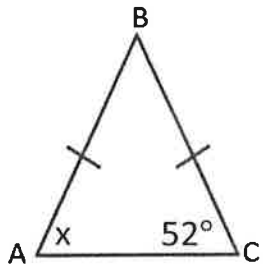


If a triangle is equilateral, then it is _____.

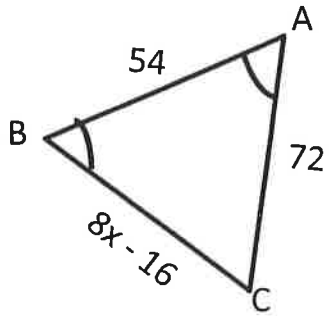
If a triangle is equiangular, then it is _____.

Each angle of an equilateral triangle measures _____.

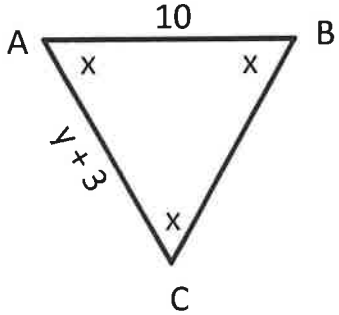
1. Find the value of x:



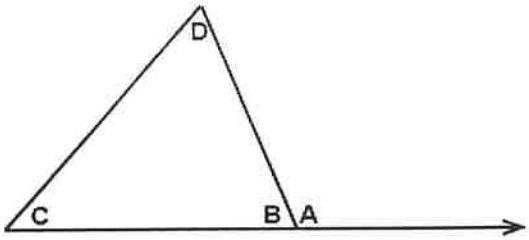
2. Find the value of x:



3. Find the value of x and y:



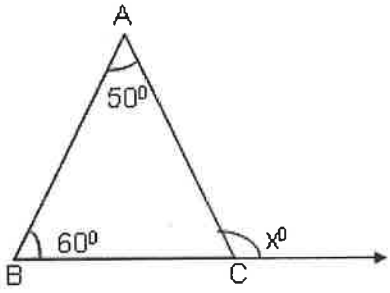
Exterior Angle Theorem: The measure of an exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles.



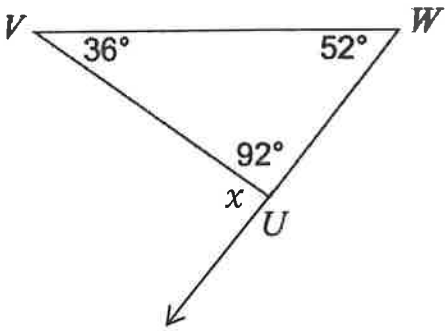
$$m < A = m < C + m < D$$

$$< A \ \& < B \ are \ supplementary$$

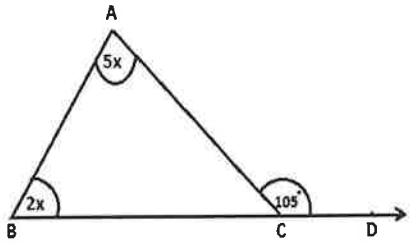
1. Find the measure of x:



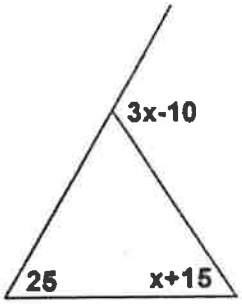
2. Find the measure of x:



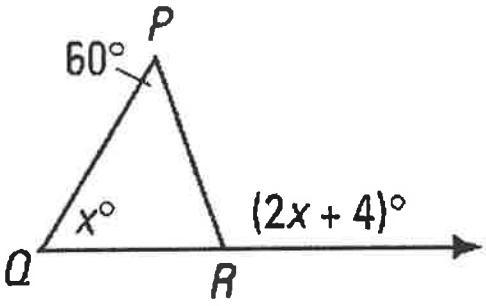
3. Find the value of x:



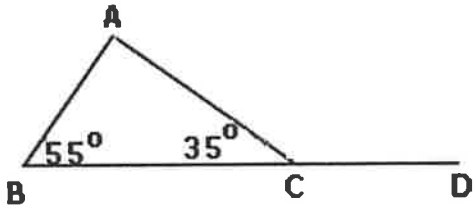
4. Find the value of x:



5. Find the value of x:



6. Find the m<ACD:

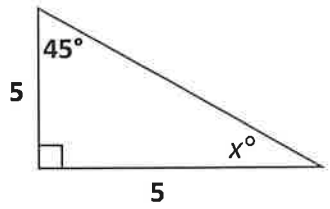


Foundations of Math 2
Unit 4 - Similarity and Congruence
Lesson 1 – Isosceles & Equilateral Triangles
Exterior Angle Theorem **CLASSWORK/HOMEWORK**

Name: _____
Date: _____ Pd: _____

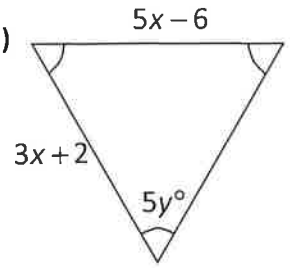
Find the value of x:

1)



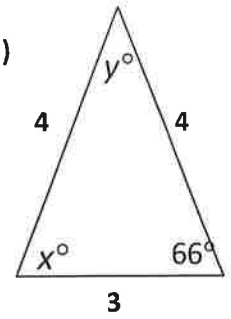
Find the values of x and y:

2)



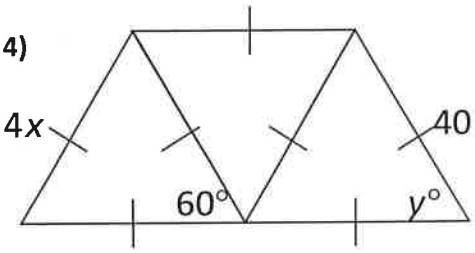
Find the values of x and y:

3)



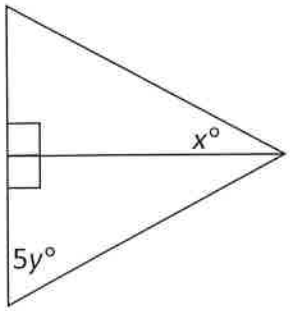
Find the values of x and y:

4)



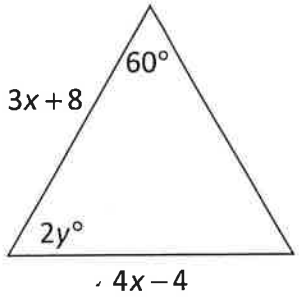
Find the values of x and y:

5) Equilateral Triangle



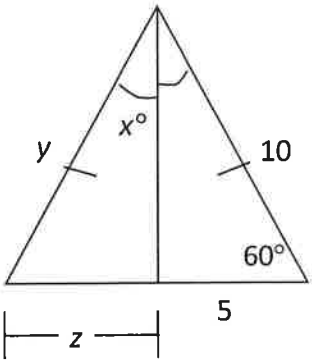
Find the values of x and y:

6) Equilateral Triangle



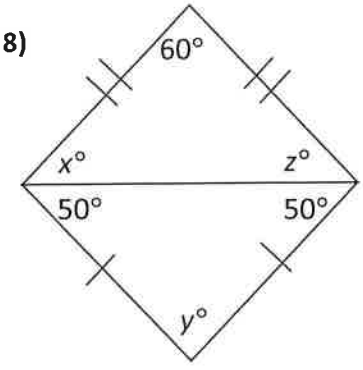
Find x, y and z:

7)



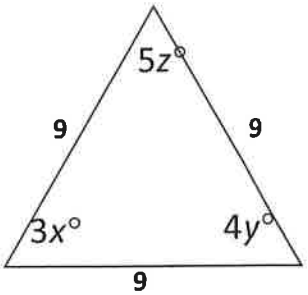
Find x, y and z:

8)



Find x, y and z:

9)



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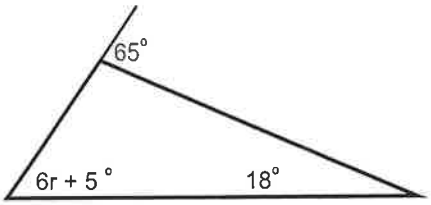
Name : _____ Score : _____

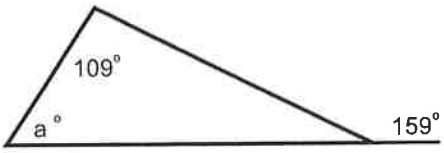
Teacher : _____ Date : _____

Exterior Angle Theorem

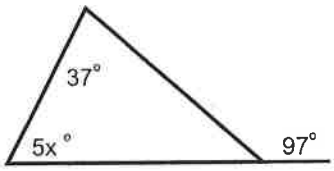
Solve for the given variable.

1) 

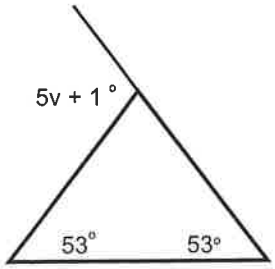
r = ____

2) 

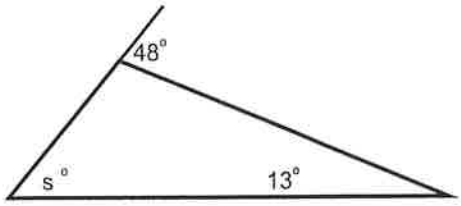
a = ____

3) 

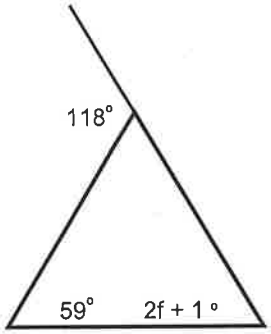
x = ____

4) 

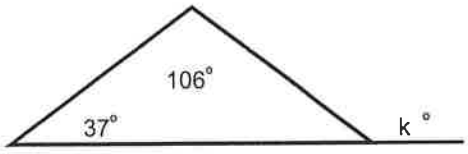
v = ____

5) 

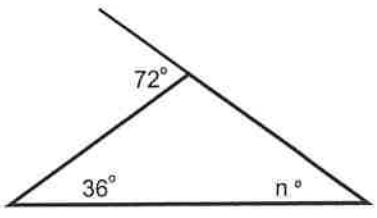
s = ____

6) 

f = ____

7) 

k = ____

8) 

n = ____

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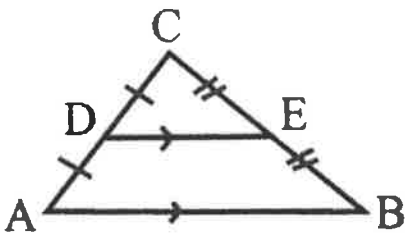
Foundations of Math 2
Unit 4 - Similarity and Congruence
Lesson 2 – Midsegment Theorem

Name: _____
Date: _____ Pd: _____

- The **mid-segment** of a triangle is the segment joining the midpoints of 2 sides of the triangle.
- The **mid-segment** is parallel to the third side and it is half the length of the third side.



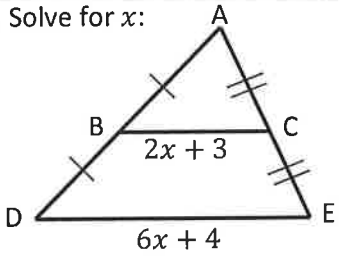
DE is the mid-segment of ΔABC

D is the midpoint of AC and E is the midpoint of BC

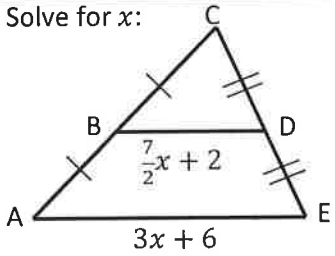
DE is parallel to AB and $DE = \frac{1}{2} AB$ or $AB = 2DE$

➢ Use the mid – segment formula above to solve the following examples:

1. Solve for x:

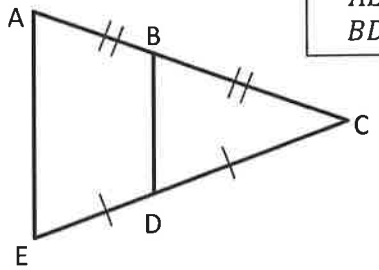


2. Solve for x:



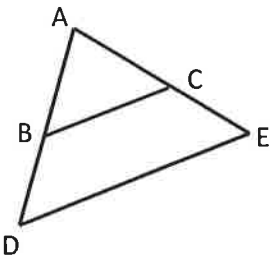
3. Solve for x:

$AE = 6x + 8$
$BD = 4x + 2$



4. Solve for x:

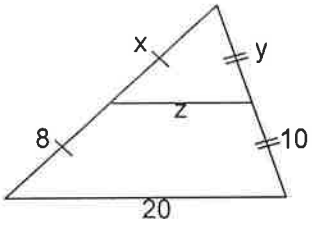
$AB = BD$
$AC = CE$
$BC = 4x - 5$
$DE = -x + 17$
Find the length of DE.
Find the length of BC.



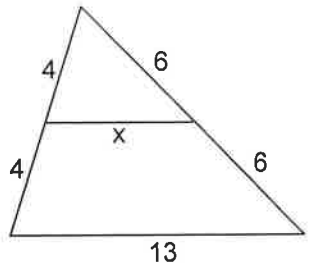
Name _____

Date _____ Period _____

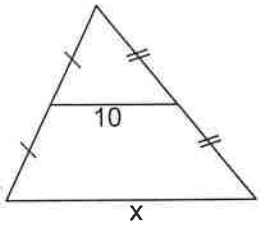
1. x = _____ y = _____ z = _____



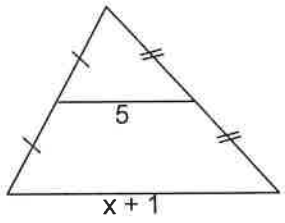
2. x = _____



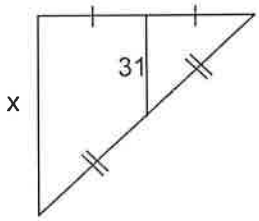
3. x = _____



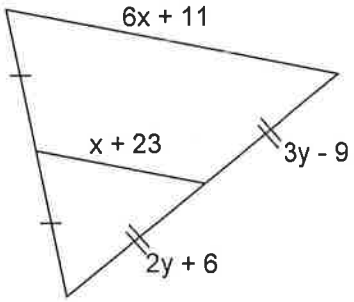
4. x = _____



5. x = _____



6. x = _____ y = _____

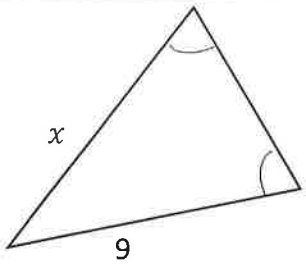


Foundations of Math 2
Unit 4 – Similarity & Congruence
Isosceles, Equilateral, Exterior Angle, Mid-segment

Name_____
Date_____ Pd____

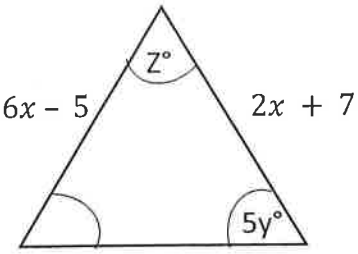
I. Isosceles and Equilateral Triangles

1.



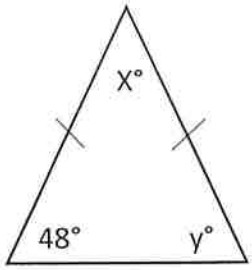
$x =$ _____

2.



$x =$ _____ $y =$ _____ $z =$ _____

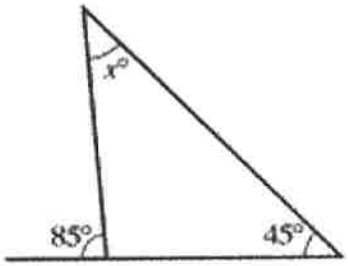
3.



$x =$ _____ $y =$ _____

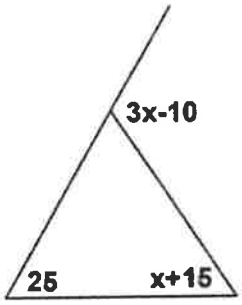
II. Exterior Angles

4.



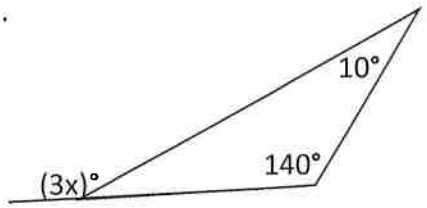
$x =$ _____

5.



$x =$ _____

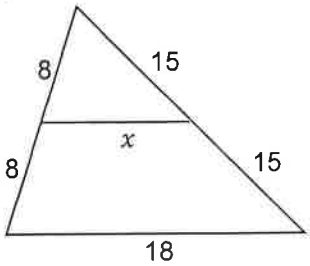
6.



$x =$ _____

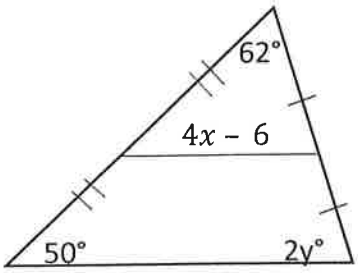
III. Mid-segment

7.



$x =$ _____

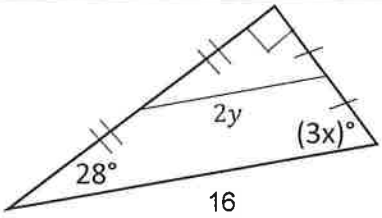
8.



3x – 2

$x =$ _____ $y =$ _____

9.

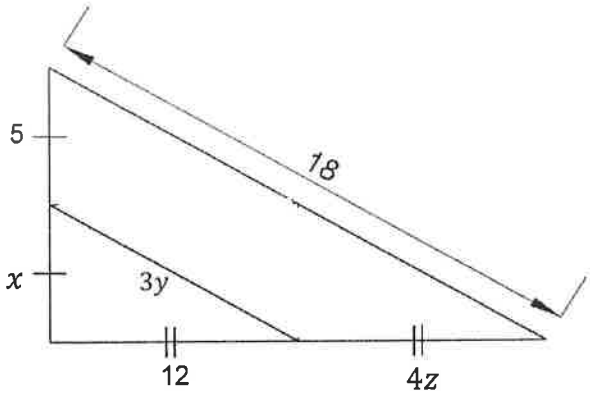


$x =$ _____ $y =$ _____

pg. 7

IV. Practice Problems

10.

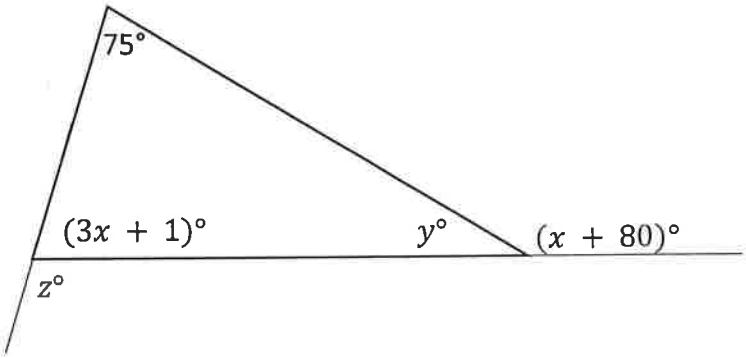


$x =$ _____

$y =$ _____

$z =$ _____

11.

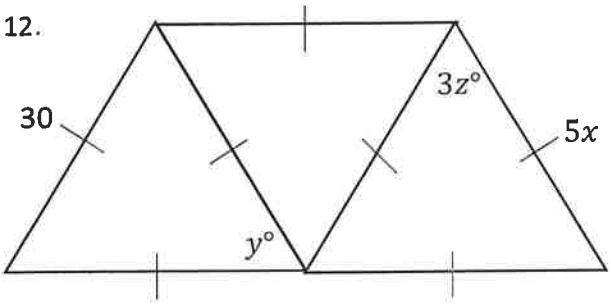


$x =$ _____

$y =$ _____

$z =$ _____

12.



$x =$ _____

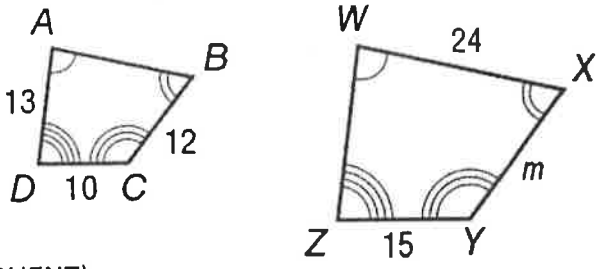
$y =$ _____

$z =$ _____

Foundations of Math 2
Unit 4 - Similarity and Congruence
Lesson 3 – Similar Polygons

Name: _____
Date: _____ Pd: _____

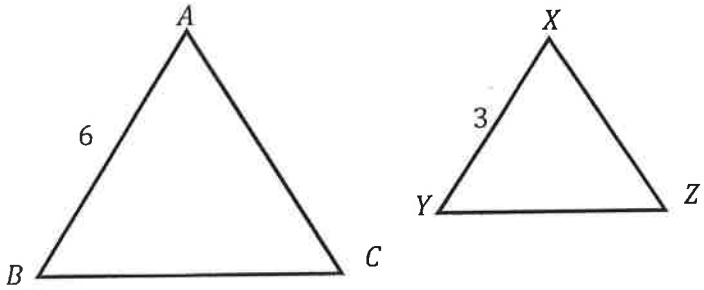
- Similar: figures that have the same SHAPE but not necessarily the same size.
- Similar Polygons have:
  - corresponding angles that are ***congruent***
  - corresponding sides that are ***proportional***
- Similarity Statement...



- Name the Corresponding Angles... (CONGRUENT)
- Name the Corresponding Sides... (PROPORTIONAL)

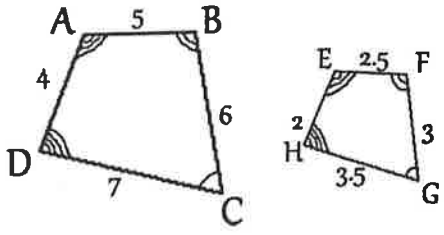
- Remember: A dilation is a transformation in which the pre-image and the image are the same SHAPE but not the same size. In other words, a dilation produces SIMILAR figures. The scale factor of a dilation is the **ratio of the lengths of the corresponding sides of 2 similar polygons.**

Given: $\Delta ABC \sim \Delta XYZ$



- ✓ Name the congruent angles:
- ✓ Name the proportional sides:
- ✓ What is the scale factor?

- **ARE WE SIMILAR??**
  - ✓ Corresponding angles congruent?
  - ✓ Corresponding sides proportional?
  - ✓ If so... What is the scale factor?
  - ✓ Write a similarity statement.



➢ **ARE WE SIMILAR??**

- ✓ Corresponding angles congruent?
- ✓ Corresponding sides proportional?
- ✓ If so... What is the scale factor?
- ✓ Write a similarity statement.

Figure A

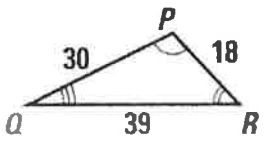
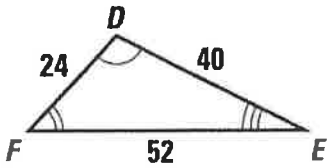


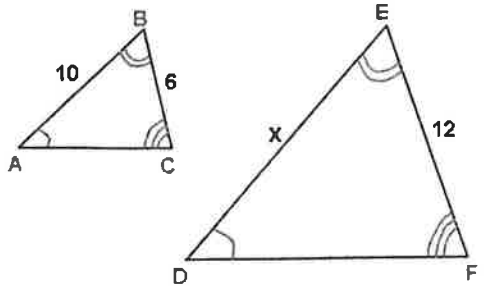
Figure B



➢ When polygons are similar, the scale factor can be used to find the values of variables.

- **Determine the scale factor. Then set up a proportion and solve for the unknown variable.**

1)



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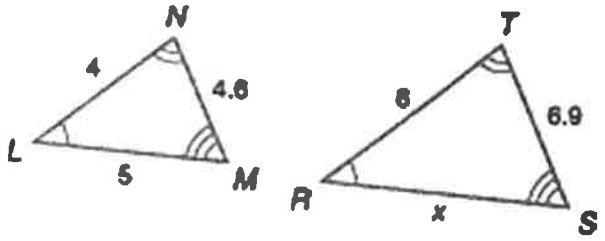

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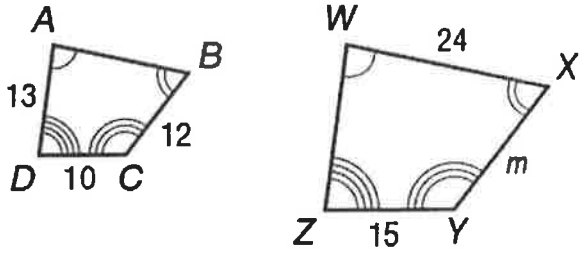

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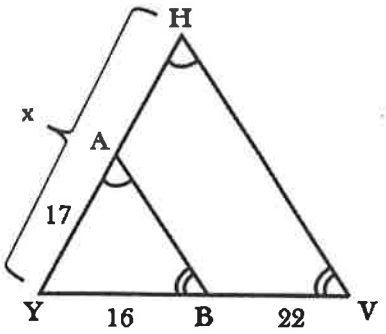

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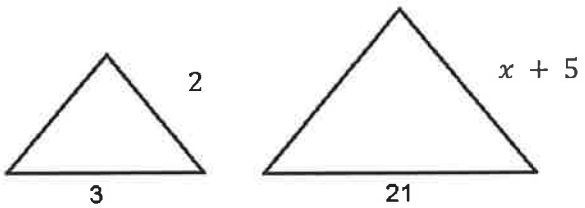
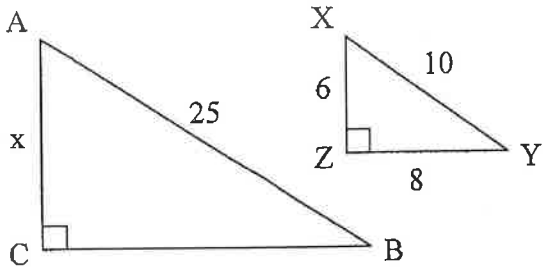


Foundations of Math 2
Unit 4 - Similarity and Congruence
Lesson 3 – Similar Polygons **Practice**

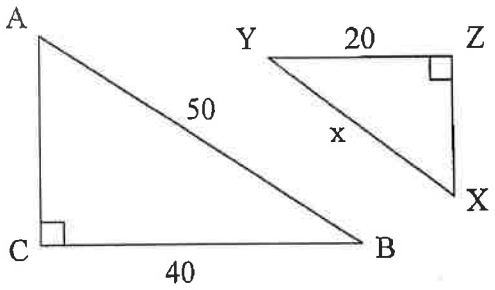
Name: _____
Date: _____ Pd: _____

Find the missing side lengths in each pair of similar figures.

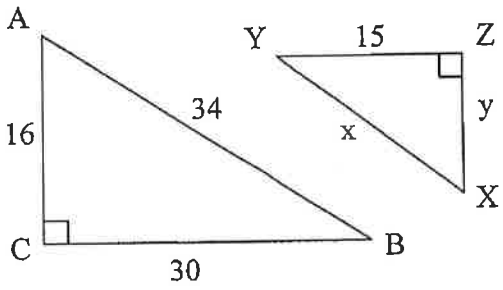
1. $\Delta ABC \sim \Delta XYZ$



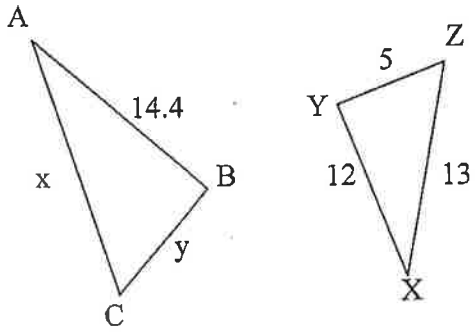
2. $\Delta ABC \sim \Delta XYZ$



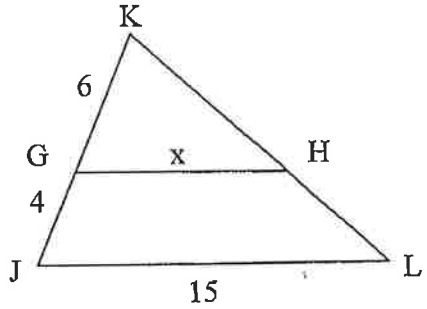
3. $\Delta ABC \sim \Delta XYZ$



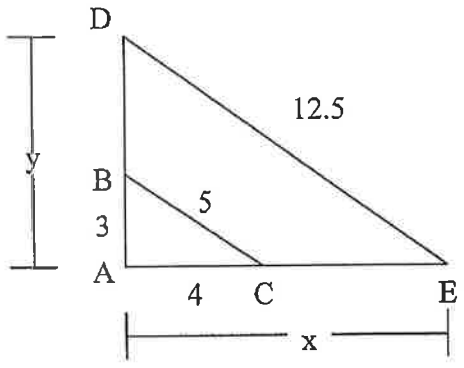
4. $\Delta ABC \sim \Delta XYZ$



5. $\Delta JKL \sim \Delta GKH$



6. $\Delta ABC \sim \Delta ADE$



pg. 11

Use similar triangles to find the missing information.

7. A giraffe is 18 feet tall and casts a shadow of 12 feet. Corry casts a shadow of 4 feet. How tall is Corry?

8. When a Ferris wheel casts a 20-meter shadow, a man 1.8 meters tall casts a 2.4-meter shadow. How tall is the Ferris wheel?

9. A flagpole casts a shadow 28 feet long. A person standing nearby casts a shadow eight feet long. If the person is six feet tall, how tall is the flagpole?

10. A photograph measuring four inches wide and five inches long is enlarged to make a wall mural. If the mural is 120 inches wide, how long is the mural?

11. A 9-foot ladder leans against a building six feet above the ground. At what height would a 15-foot ladder touch the building if both ladders form the same angle with the ground?

12. Chris wants to reduce a triangular pattern with sides 16, 16 and 20 centimeters. If the longest side of the new pattern is to be 15 cm, how long should the other two sides be?

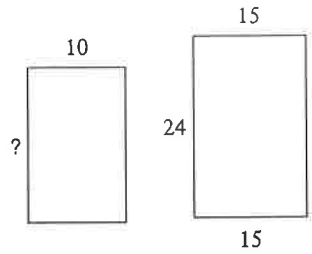
Kuta Software - Infinite Geometry Name_____

Using Similar Polygons

Date_____ Period____

The polygons in each pair are similar. Find the missing side length.

1)



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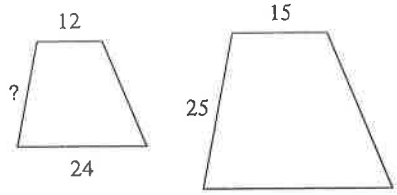

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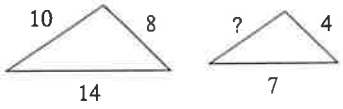

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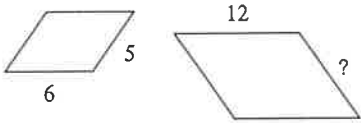

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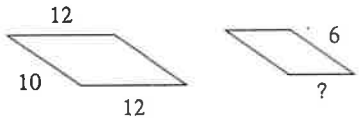

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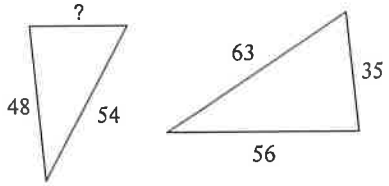

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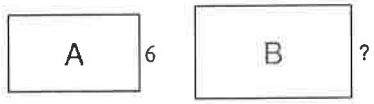
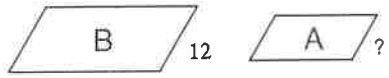


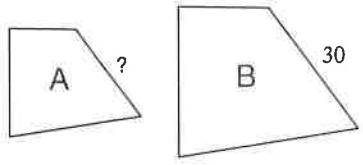
scale factor from A to B = 2 : 7

8)



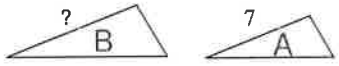
scale factor from A to B = 2 : 3

9)



scale factor from A to B = 5 : 6

10)

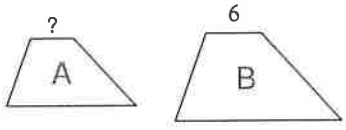


scale factor from A to B = 1 : 7

11)

scale factor from A to B = 2 : 3

12)



scale factor from A to B = 1 : 2

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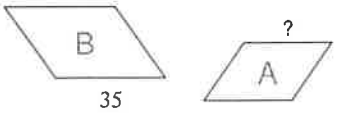
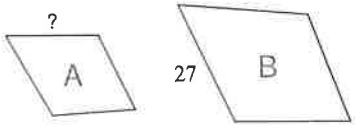
13)



scale factor from A to B = 6 : 7

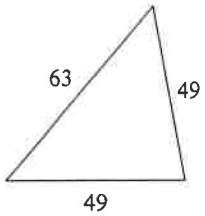
14)

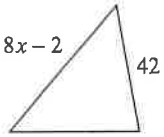


scale factor from A to B = 1 : 3

Solve for x. The polygons in each pair are similar.

15)





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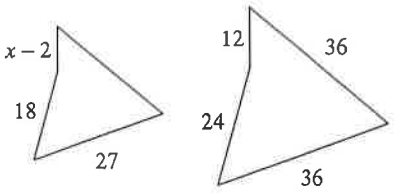

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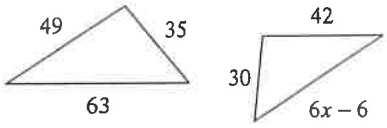

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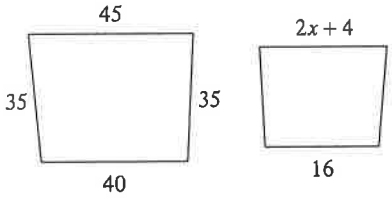

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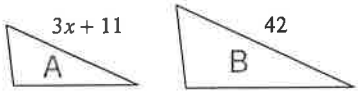
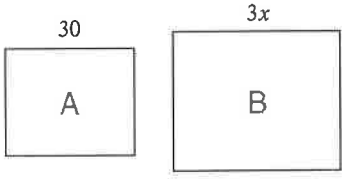


scale factor from A to B = 5 : 6

20)



scale factor from A to B = 5 : 6

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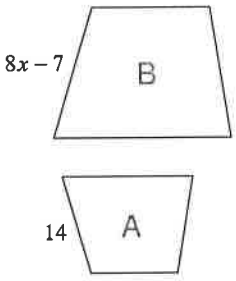
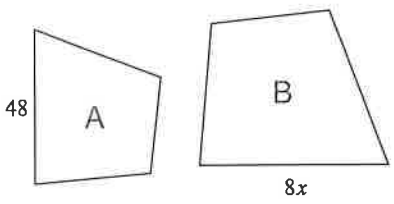


scale factor from A to B = 2 : 7

22)



scale factor from A to B = 6 : 7

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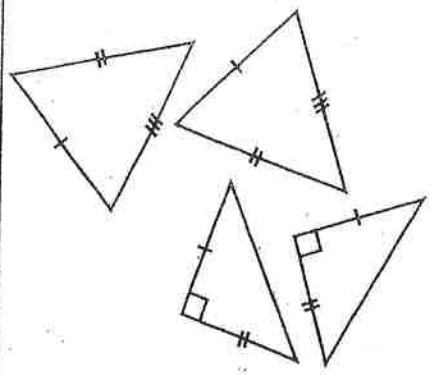
Foundations of Math 2
Unit 4 – Similarity & Congruence
L4 – Congruent Triangles HOMEWORK

Name: _____
Date: _____ Pd: ____

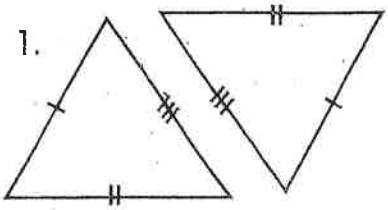
Congruent Triangles: SSS and SAS

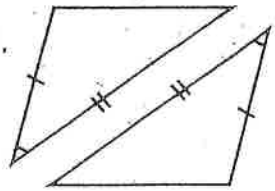


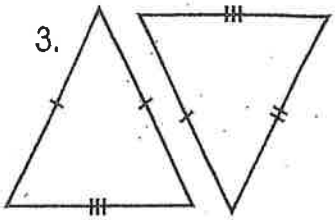
SSS — Side, Side, Side
three sides of one triangle are congruent to the corresponding sides of another triangle → ≅ △s

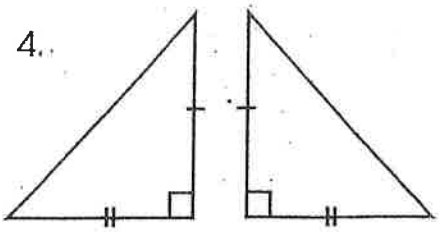
SAS — Side, Angle, Side
two sides and the included angle of one triangle are congruent to the corresponding parts of another triangle → ≅ △s

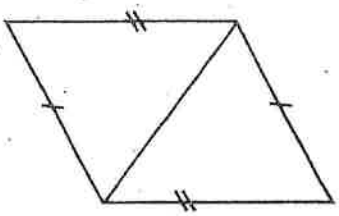
State whether these pairs of triangles are congruent by SSS or SAS. If neither method works, write N.

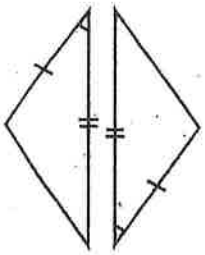
1. 

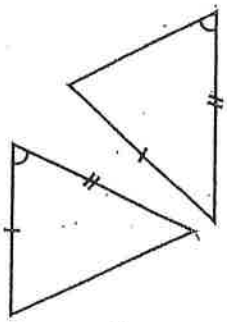
2. 

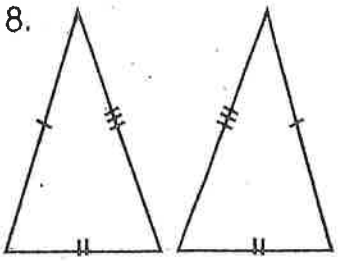
3. 

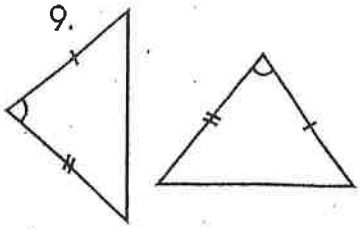
4. 

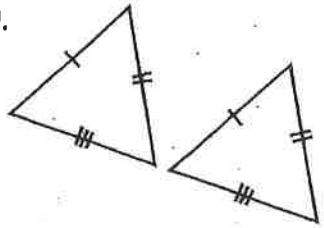
5. 

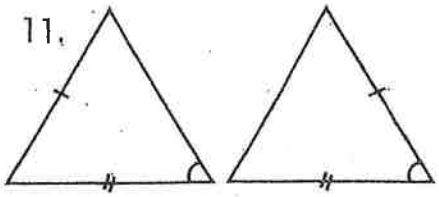
6. 

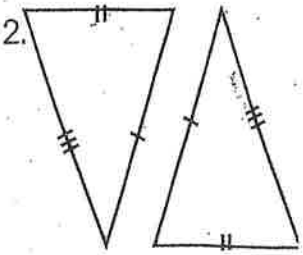
7. 

8. 

9. 

10. 

11. 

12. 

pg. 15

Kuta Software - Infinite Geometry

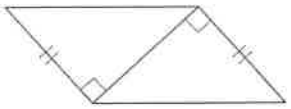
Name_____

SSS and SAS Congruence

Date_____ Period____

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

1)



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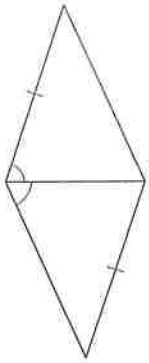

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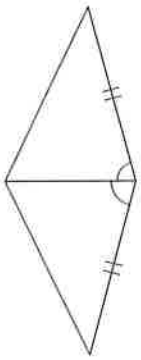

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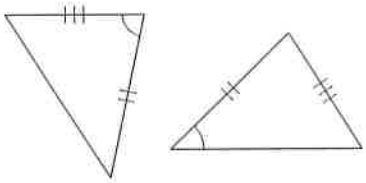

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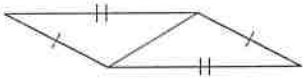

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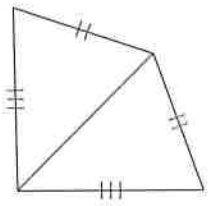

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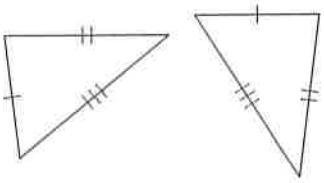

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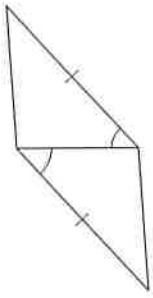

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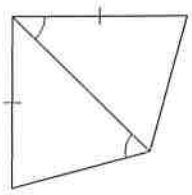

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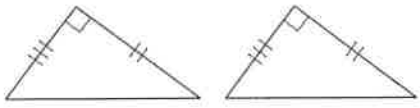
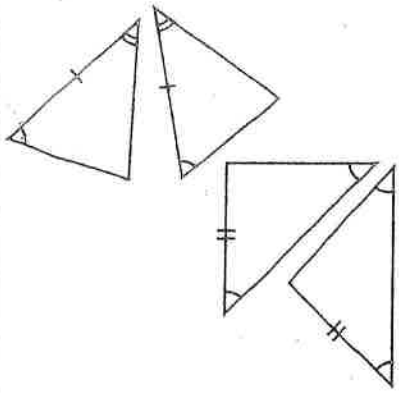


pg. 16

Congruent Triangles: ASA and AAS

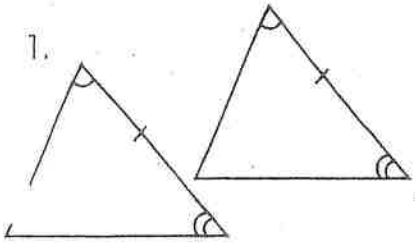


ASA — Angle, Side, Angle
two angles and the included side of one triangle are congruent to the corresponding parts of another triangle → $\cong \triangle s$

AAS — Angle, Angle, Side
two angles and the non-included side of one triangle are congruent to the corresponding parts of another triangle → $\cong \triangle s$

State whether these pairs of triangles are congruent by ASA or AAS. If neither method works, write N.

1.



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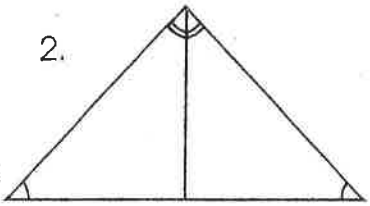

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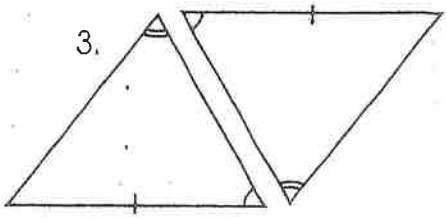

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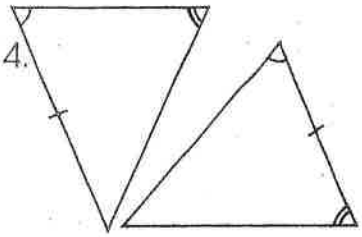

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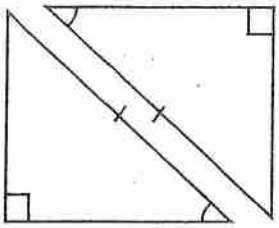

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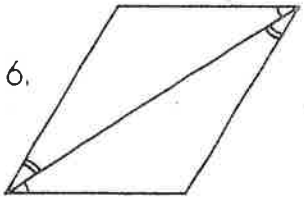

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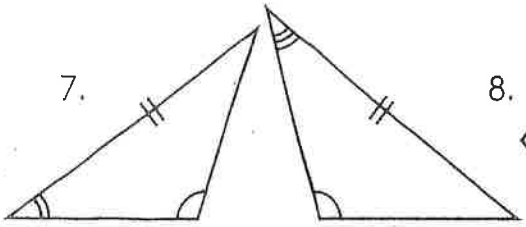

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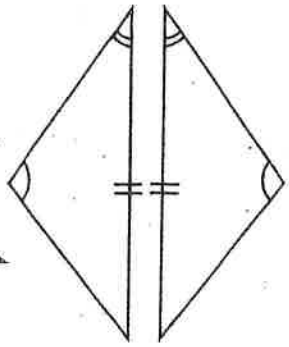

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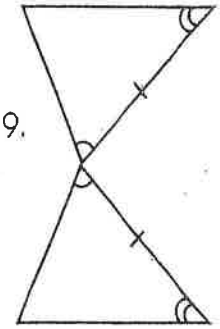

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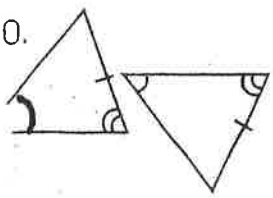

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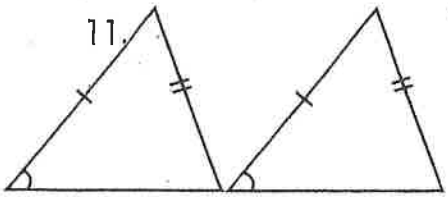

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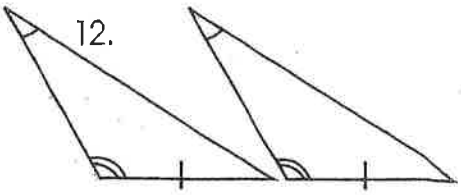

Kuta Software - Infinite Geometry

Name_____

ASA and AAS Congruence

Date_____ Period____

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

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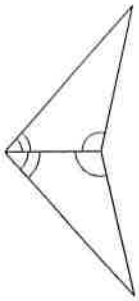

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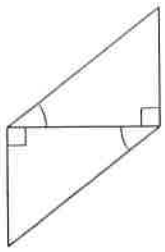

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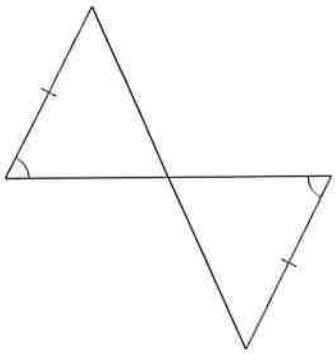

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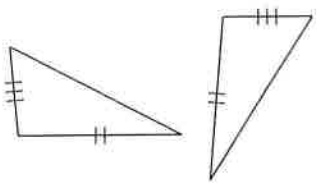

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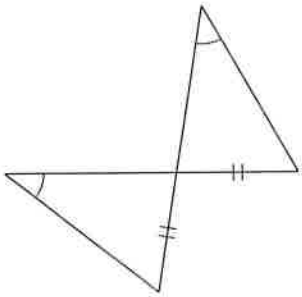

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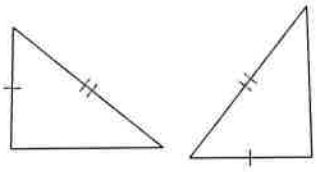

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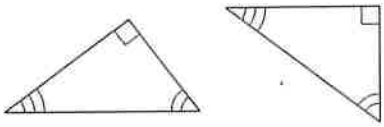

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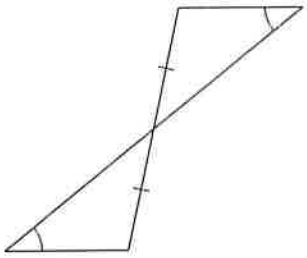

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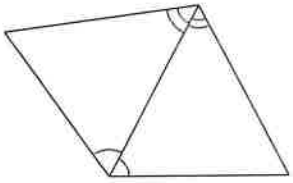

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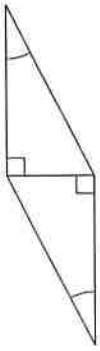


pg. 18

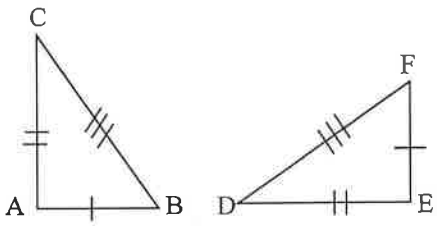
Foundations of Math 2 **Name:** _____

Unit 4 Similar & Congruent Triangles

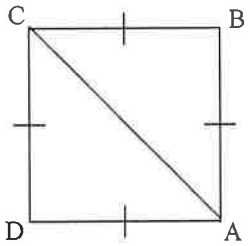
Lesson 4 - CLASSWORK

For each pair of triangles, name the congruent triangle.

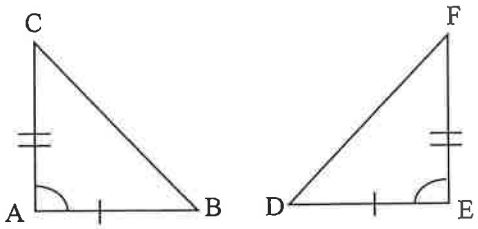
1. $\triangle ABC \cong \triangle$_____



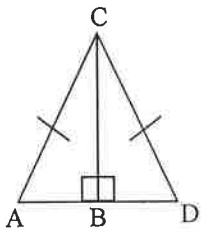
2. $\triangle ABC \cong \triangle$_____



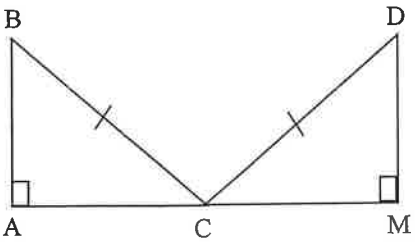
3. $\triangle ABC \cong \triangle$_____



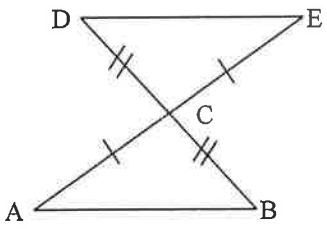
4. $\triangle ABC \cong \triangle$_____



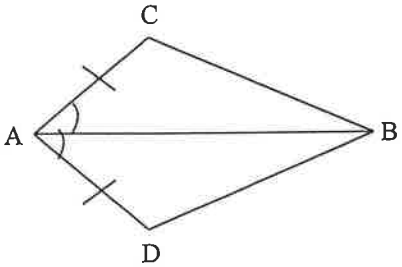
5. $\triangle ABC \cong \triangle$_____



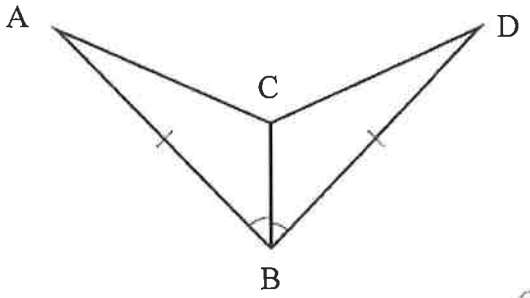
6. $\triangle ABC \cong \triangle$_____



7. $\triangle ABC \cong \triangle$_____



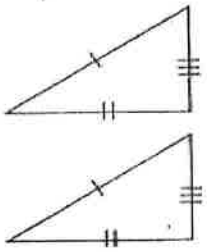
8. $\triangle ABC \cong \triangle$_____

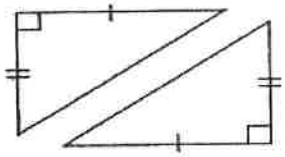


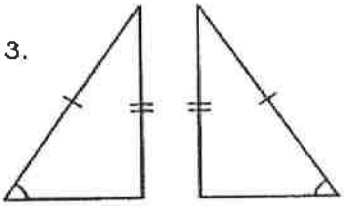
Congruent Triangles Worksheet

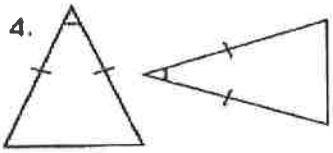
Name _____ Period ____

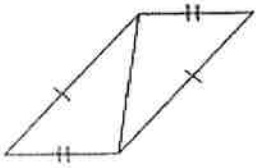
I. State whether these triangles are congruent by SSS, SAS, or none.

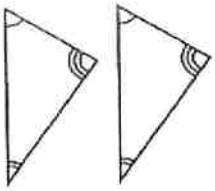
1. 

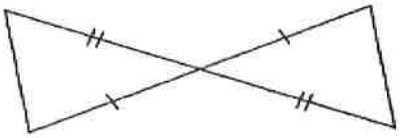
2. 

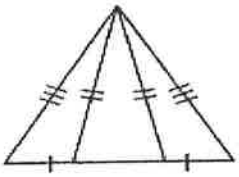
3. 

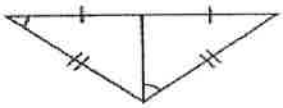
4. 

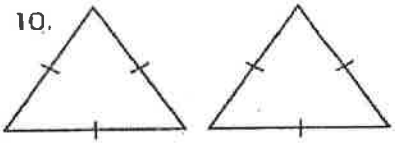
5. 

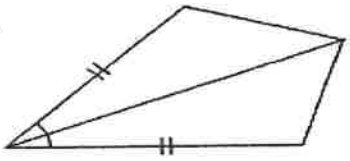
6. 

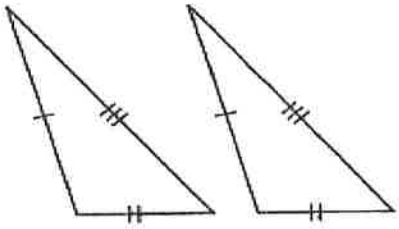
7. 

8. 

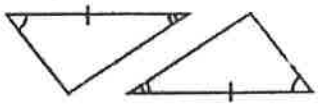
9. 

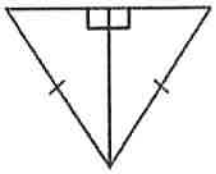
10. 

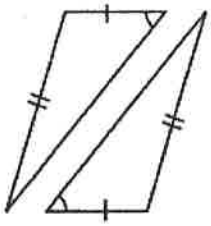
11. 

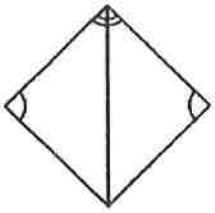
12. 

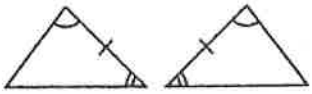
II. State whether these triangles are congruent by ASA, AAS or none.

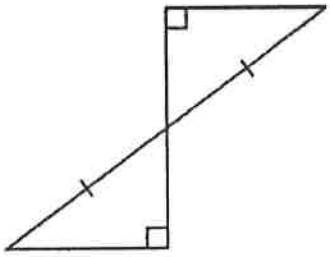
1. 

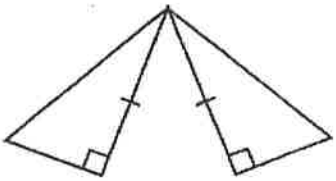
2. 

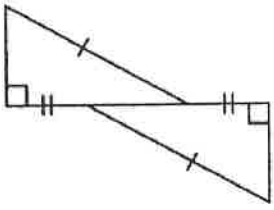
3. 

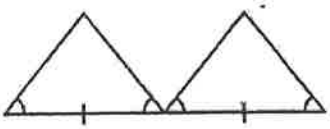
4. 

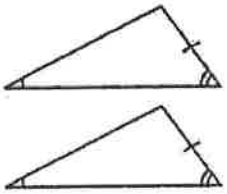
5. 

6. 

7. 

8. 

9. 

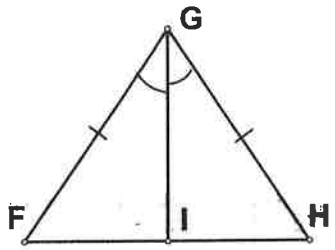
10. 

pg. 20

Triangle Congruence Worksheet

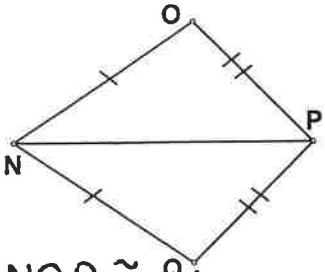
For each pair to triangles, state the postulate or theorem that can be used to conclude that the triangles are congruent.

1. _____



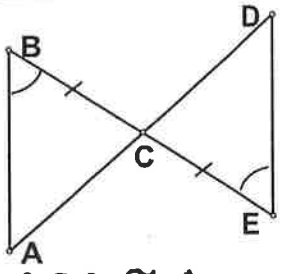
$\triangle FIG \cong \triangle$ ____

2. _____



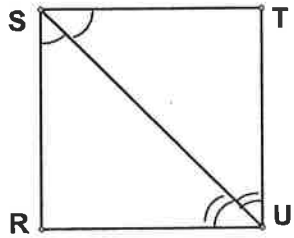
$\triangle NOP \cong \triangle$ ____

3. _____



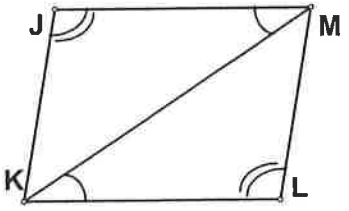
$\triangle ABC \cong \triangle$ ____

4. _____



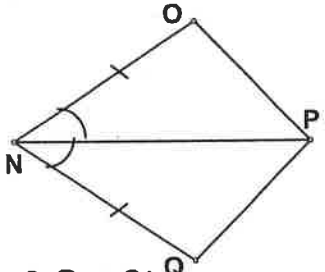
$\triangle STU \cong \triangle$ ____

5. _____



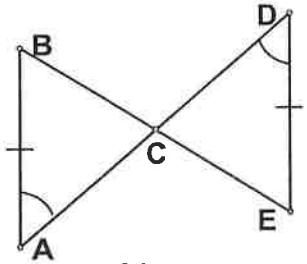
$\triangle JKM \cong \triangle$ ____

6. _____



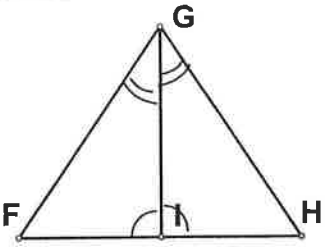
$\triangle OPN \cong \triangle$ ____

7. _____



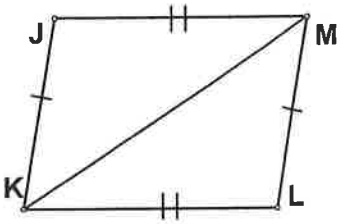
$\triangle ACB \cong \triangle$ ____

8. _____



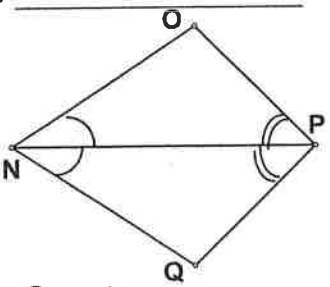
$\triangle GFI \cong \triangle$ ____

9. _____



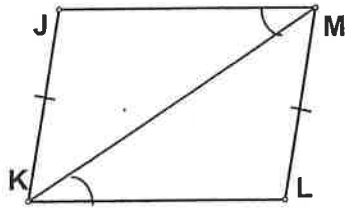
$\triangle KLM \cong \triangle$ ____

10. _____



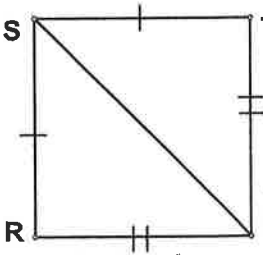
$\triangle PON \cong \triangle$ ____

11. _____



$\triangle KJM \cong \triangle$ ____

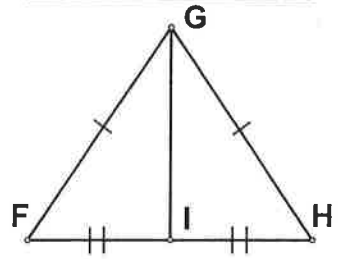
12. _____



$\triangle SUR \cong \triangle$ ____

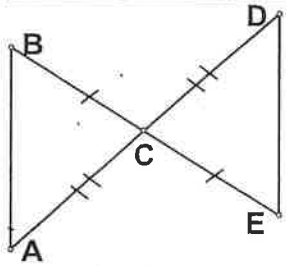
Name - _____ Period - _____

13. _____



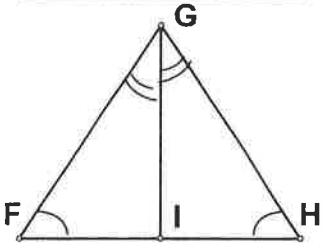
$\triangle FIG \cong \triangle$ ___

14. _____



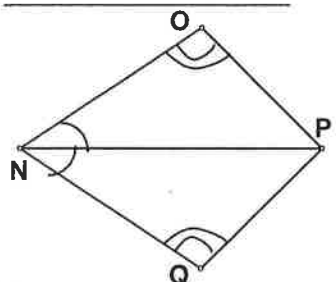
$\triangle CAB \cong \triangle$ ___

15. _____



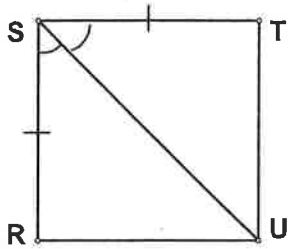
$\triangle FGI \cong \triangle$ ___

16. _____



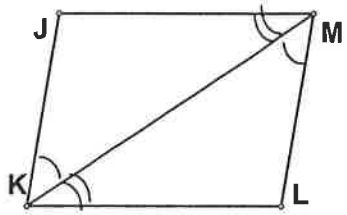
$\triangle NOP \cong \triangle$ ___

17. _____



$\triangle RUS \cong \triangle$ ___

18. _____



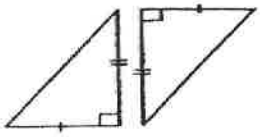
$\triangle JKM \cong \triangle$ ___

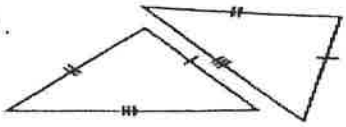
pg. 22

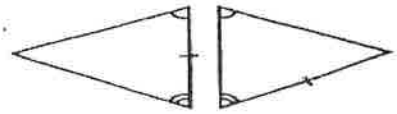
Foundations of Math 2 Name: _____

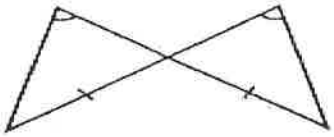
Unit 4 Lesson 4 - HOMEWORK

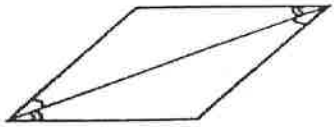
III. State whether each pair of triangles is congruent by SSS, SAS, ASA, AAS, or none.

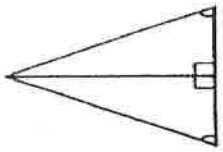
1. 

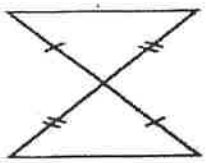
2. 

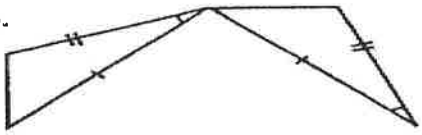
3. 

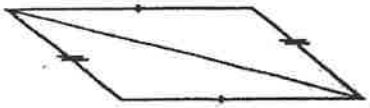
4. 

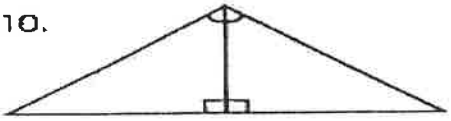
5. 

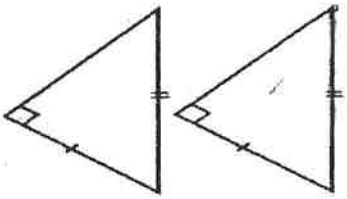
6. 

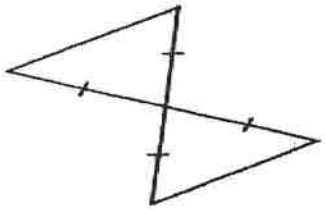
7. 

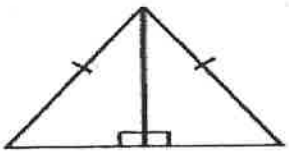
8. 

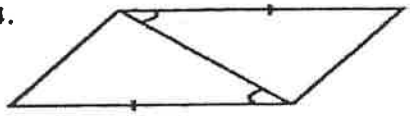
9. 

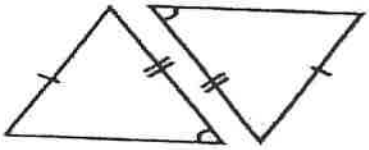
10. 

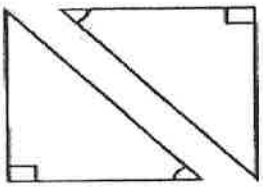
11. 

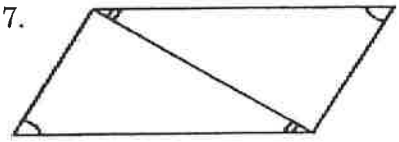
12. 

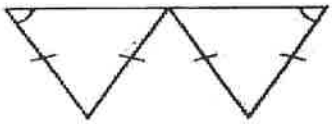
13. 

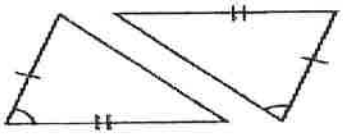
14. 

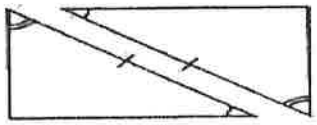
15. 

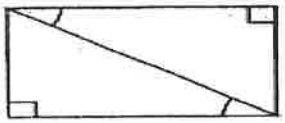
16. 

17. 

18. 

19. 

20. 

21. 

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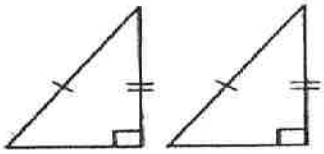
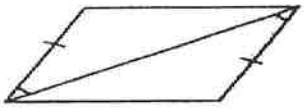
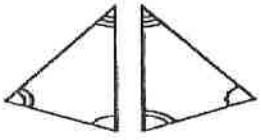
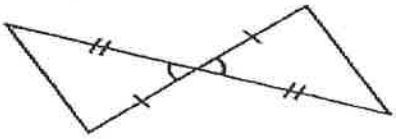
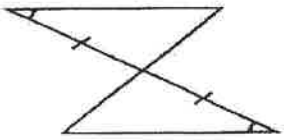
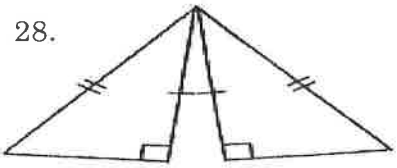
23. 

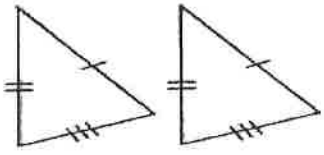
24. 

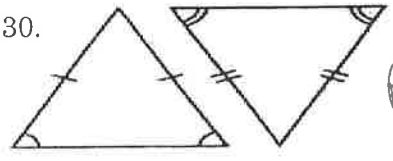
25. 

26. 

27. 

28. 

29. 

30. 

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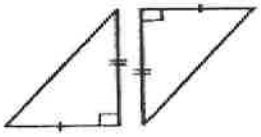
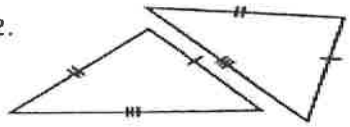
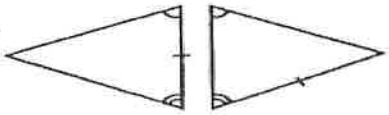
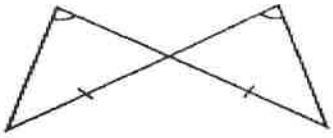
Unit 4 Lesson 4 - HOMEWORK

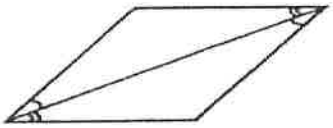
III. State whether each pair of triangles is congruent by SSS, SAS, ASA, AAS, or none.

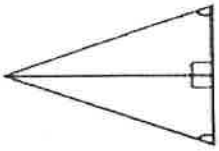
1. 

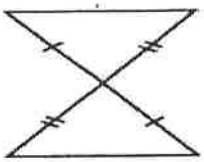
2. 

3. 

4. 

5. 

6. 

7. 

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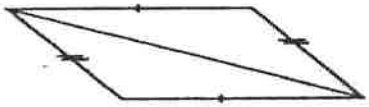
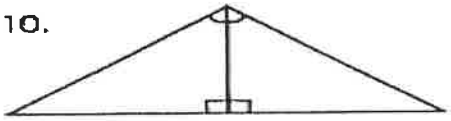
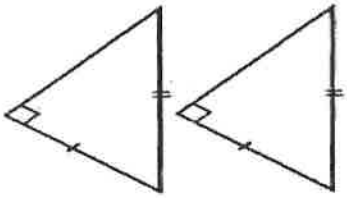
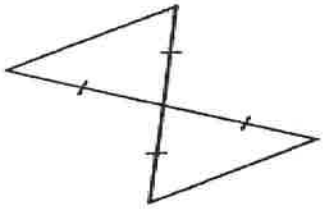
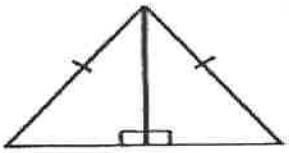
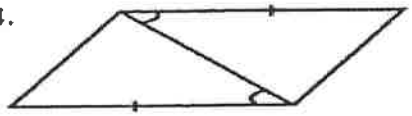
9. 

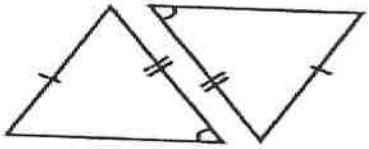
10. 

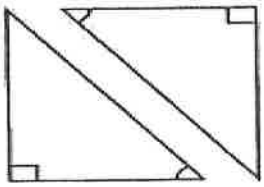
11. 

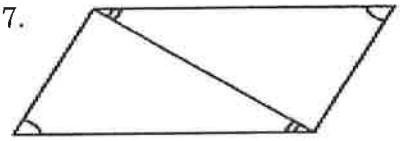
12. 

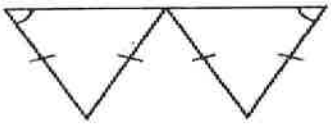
13. 

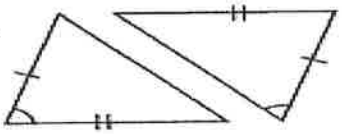
14. 

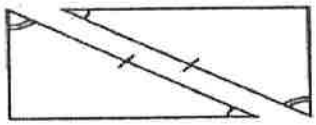
15. 

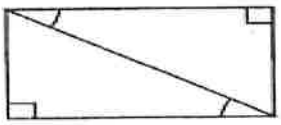
16. 

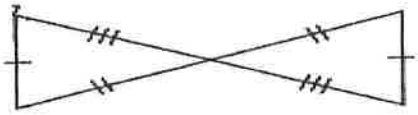
17. 

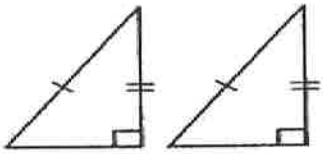
18. 

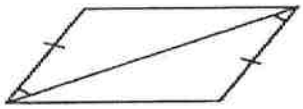
19. 

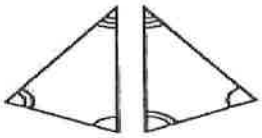
20. 

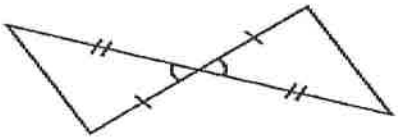
21. 

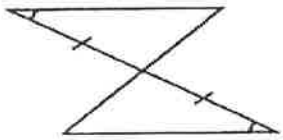
22. 

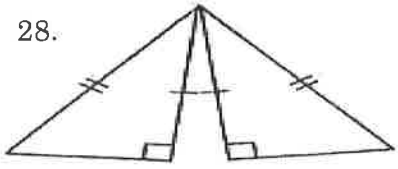
23. 

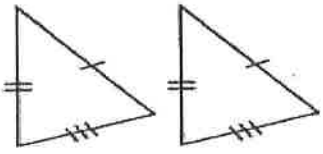
24. 

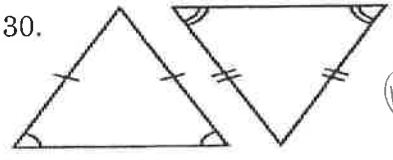
25. 

26. 

27. 

28. 

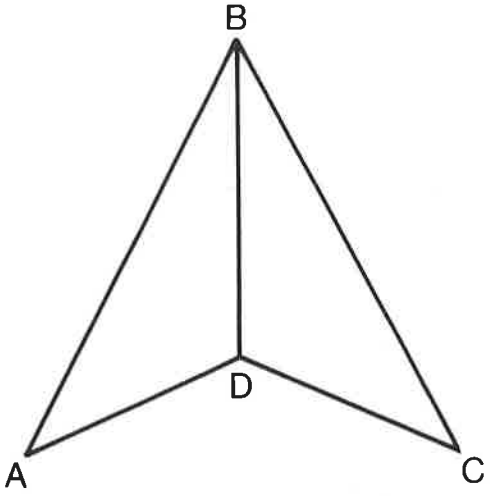
29. 

30. 

pg. 24

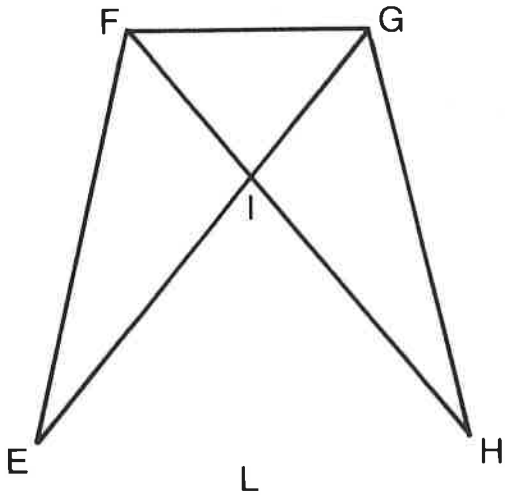
Triangle Treat

All the sides and angles are listed for each triangle. Find a pair of CORRESPONDING PARTS. One will have a number, and the other will have a letter. Write the letter in the box at the bottom of the page that contains the number of the corresponding part.



$\triangle ABD \cong \triangle CBD$

① $\angle A$	Ⓢ $\overline{BD}$
② $\angle ABD$	Ⓘ $\angle CDB$
③ $\angle BDA$	Ⓔ $\angle C$
④ $\overline{AB}$	Ⓐ $\overline{CD}$
⑤ $\overline{BD}$	Ⓔ $\overline{BC}$
⑥ $\overline{AD}$	Ⓞ $\angle DBC$

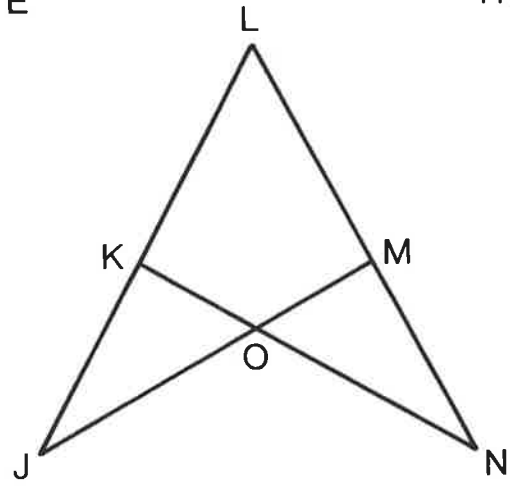


$\triangle EFG \cong \triangle HGF$

⑦ $\angle E$	Ⓡ $\overline{FH}$
⑧ $\angle EFG$	Ⓞ $\angle H$
⑨ $\angle FGE$	Ⓔ $\angle FGH$
⑩ $\overline{EF}$	Ⓔ $\overline{FG}$
⑪ $\overline{FG}$	Ⓘ $\angle GFH$
⑫ $\overline{GE}$	Ⓢ $\overline{GH}$

$\triangle EFI \cong \triangle HGI$

⑬ $\angle E$	Ⓢ $\angle HGI$
⑭ $\angle EFI$	Ⓒ $\overline{IH}$
⑮ $\angle FIE$	Ⓤ $\angle GIH$
⑯ $\overline{FE}$	Ⓔ $\overline{GH}$
⑰ $\overline{FI}$	Ⓔ $\angle H$
⑱ $\overline{IE}$	Ⓡ $\overline{GI}$



$\triangle JLM \cong \triangle NLK$

⑲ $\angle J$	Ⓣ $\angle LKN$
⑳ $\angle L$	Ⓡ $\angle L$
㉑ $\angle LMJ$	Ⓣ $\overline{KN}$
㉒ $\overline{LJ}$	Ⓥ $\overline{LN}$
㉓ $\overline{LM}$	Ⓓ $\overline{LK}$
㉔ $\overline{MJ}$	Ⓔ $\angle N$

$\triangle JKO \cong \triangle NMO$

㉕ $\angle J$	Ⓒ $\overline{ON}$
㉖ $\angle JKO$	Ⓟ $\overline{MO}$
㉗ $\angle KOJ$	Ⓢ $\angle NMO$
㉘ $\overline{KJ}$	Ⓝ $\angle MON$
㉙ $\overline{KO}$	Ⓣ $\angle N$
㉚ $\overline{OJ}$	Ⓣ $\overline{MN}$

5	25	7	17	8	23	13	28	1	18	24	3	22	11	14	6	20	16	30	2	15	27	21	4	12	26	29	9	19	10

Pg. 25

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1. An angle with a measure of $90°$.
2. A triangle with 3 different side lengths.
3. Two angles with equal measures.
4. A triangle with 2 congruent sides.
5. An angle greater than $90°$.
6. An equiangular triangle must also be

   _____.
7. Vertical angles are always _____.
8. Double the length of the _____

   to find the length of the 3rd side of a triangle.
9. Name two reasons for triangles NOT to be congruent.
10. To solve a similar triangle problem, we should set up an equation in the form of a

    _____.