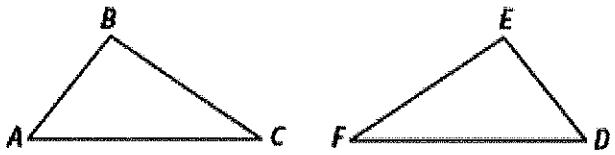
Geometry Unit 4 Day 1 Triangle Congruence

Students will use the fact that congruent triangles have congruent corresponding parts to determine unknown angle measures and side lengths.

Congruent triangles are triangles that have the same size and shape.



Two line segments are congruent if and only if they have the same length. Two angles are congruent if and only if they have the same measure.

1. How could you "map" ΔABC onto ΔDEF?
2. What would be the image of each of the following after the mapping?

$\overline{AB} \rightarrow \overline{DE}$ $\overline{BC} \rightarrow \overline{EF}$ $\overline{AC} \rightarrow \overline{DF}$

$\angle A \rightarrow \angle D$ $\angle B \rightarrow \angle E$ $\angle C \rightarrow \angle F$

3. **Make use of structure.** What is the relationship between $\overline{AB}$ and $\overline{DE}$? What is the relationship between $\angle B$ and $\angle E$? How do you know? they are congruent b/c they are corresponding parts of $\cong \Delta$'s

In congruent triangles, corresponding pairs of sides are congruent and corresponding pairs of angles are congruent. These are called *corresponding parts*.

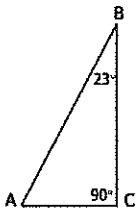
When you write a congruence statement like $\Delta ABC \cong \Delta DEF$, you write the vertices so that corresponding parts are in the same order. So, you can conclude from this statement that $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, $\overline{AC} \cong \overline{DF}$, $\angle A \cong \angle D$, $\angle B \cong \angle E$, and $\angle C \cong \angle F$.

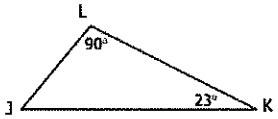
Corresponding parts result from a one-to-one matching of sides and angles from one figure to another. Congruent triangles have three pairs of congruent sides and three pairs of congruent angles.

1. $\Delta ABC \cong \Delta JKL$. Name the six pairs of corresponding parts.

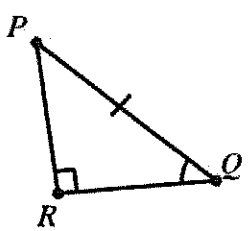
Example 1: $\overline{AB} \cong \overline{JK}$ $\overline{BC} \cong \overline{KL}$ $\overline{AC} \cong \overline{JL}$

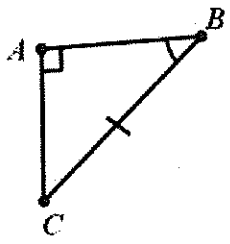
$\angle A \cong \angle J$ $\angle B \cong \angle K$ $\angle C \cong \angle L$





2. You try: $\Delta PQR \cong \Delta CBA$ Name the six pairs of corresponding parts.
3.

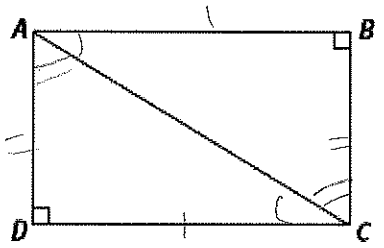




$\overline{PQ} \cong \overline{CB}$ $\overline{QR} \cong \overline{BA}$ $\overline{PR} \cong \overline{CA}$

$\angle P \cong \angle C$ $\angle Q \cong \angle B$ $\angle R \cong \angle A$

6. Rectangle $ABCD$ is divided into two congruent right triangles by diagonal $\overline{AC}$.



Fill in the blanks to show the congruent sides and angles.

a. $\overline{AB} \cong$ $\overline{CD}$ **b.** $\overline{BC} \cong$ $\overline{DA}$

c. $\angle BAC \cong$ $\angle DCA$ **d.** $\angle ACB \cong$ $\angle CAD$

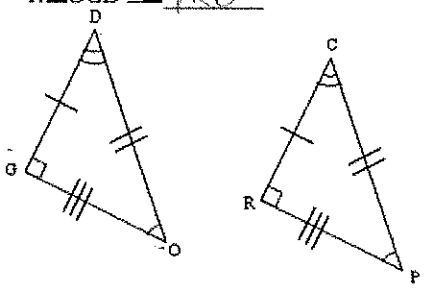
7. $\triangle PQR \cong \triangle GHJ$. **Complete the following.**

a. $\overline{QR} \cong$ $\overline{GH}$ **b.** $\overline{GJ} \cong$ $\overline{PR}$

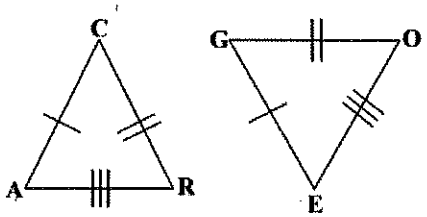
c. $\angle R \cong$ $\angle J$ **d.** $\angle G \cong$ $\angle P$

I. Name the congruent triangles.

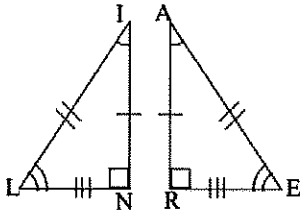
1. $\triangle OGD \cong \triangle$ PRC



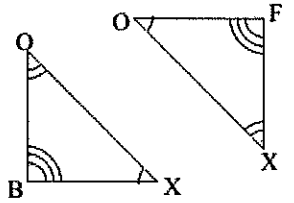
2. $\triangle RAC \cong \triangle$ OEG



3. $\triangle LIN \cong \triangle$ EAR

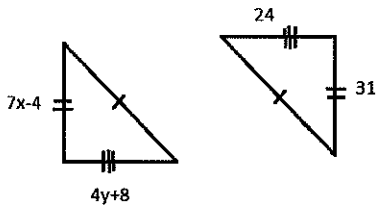


4. $\triangle FOX \cong \triangle$ BXO



5.

Find the values of x and y so that the triangles are congruent.



$7x - 4 = 31$

$7x = 35$

$x = 5$

$4y + 8 = 24$

$4y = 16$

$y = 4$

6.

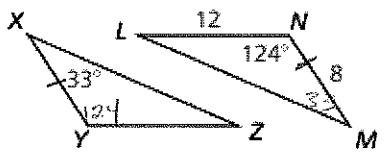
In Exercises 5–8, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.

5. $m\angle Y =$ 124

6. $m\angle M =$ 33°

7. $m\angle Z =$ 23°

8. $XY =$ 8



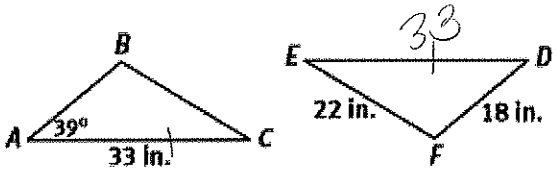
$180 - (124 + 33) = 47$

$180 - 157 = 47$

$23° = 47$

Geometry Unit 4 Day 1 HW

In the figure, $\triangle ABC \cong \triangle DFE$.



8. Find the length of $\overline{AB}$. 18 in

9. Find the measure of all angles in $\triangle DEF$ that it is possible to find. $\angle D = 39°$

10. What is the perimeter of $\triangle DEF$? Explain how you know. 22+18+33 = 73 in add all sides

11. Construct viable arguments. Suppose $\triangle XYZ \cong \triangle TUV$ and that $\overline{XY}$ is the longest side of $\triangle XYZ$. Is it possible to determine which side of $\triangle TUV$ is the longest? Explain.

yes $\overline{TU}$ is $\cong$ to $\overline{XY}$ so it must also be the longest side bc all the other corresponding part are $\cong$.

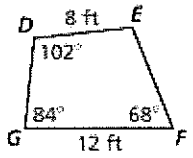
Find the value of x and y.

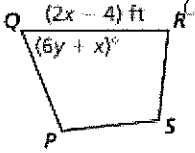
1.

In the diagram, $DEFG \cong SPQR$.

a. Find the value of x. 8

b. Find the value of y. 10



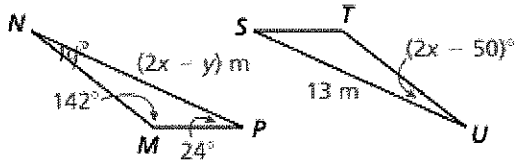


a.) $\overline{QR} = \overline{GF}$
$2x - 4 = 12$
$2x = 16$
$x = 8$

b.) $4Q = 4F$
$6y + x = 68$
$6y + 8 = 68$
$6y = 60$
$y = 10$

2.

$\triangle MNP \cong \triangle TUS$



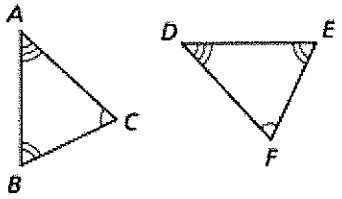
$\angle N = 180 - (142 + 24)$
$= 180 - 166 = 14°$

$\angle U = \angle N$
$2x - 50 = 14°$
$2x = 64$
$x = 32$

$NP = US$
$2x - y = 13$
$2(32) - y = 13$
$64 - y = 13$
$-y = -51$
$y = 51$

In Exercises 3 and 4, identify all pairs of congruent corresponding parts. Then write another congruence statement for the polygons. *(See Example 1.)*

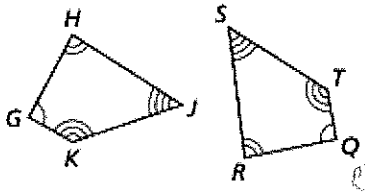
3. $\triangle ABC \cong \triangle DEF$



$\overline{AB} \cong \overline{DE}$ $\angle A \cong \angle D$
$\overline{BC} \cong \overline{EF}$ $\angle B \cong \angle E$
$\overline{AC} \cong \overline{DF}$ $\angle C \cong \angle F$

$\triangle BCA \cong \triangle EFD$

4. $GHJK \cong QRST$



$\overline{GH} \cong \overline{QR}$ $\angle G \cong \angle Q$
$\overline{HJ} \cong \overline{RS}$ $\angle H \cong \angle R$
$\overline{JK} \cong \overline{ST}$ $\angle J \cong \angle S$
$\overline{GK} \cong \overline{QT}$ $\angle K \cong \angle T$

$\triangle HJKG \cong \triangle RSTQ$

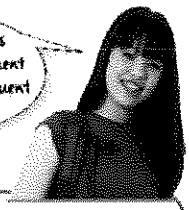
Geometry Unit 4 Day 2 Congruence Criteria

Students will develop criteria for proving triangles congruent.

DO Mystery Triangle!

Talk the Talk

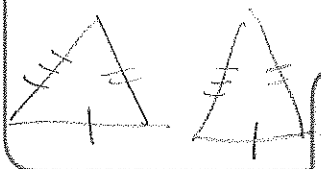
This chapter focused on four methods that you can use to prove that two triangles are congruent. Complete the graphic organizer by providing an illustration of each theorem.



Triangle Congruence Theorems

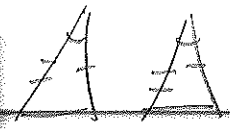
Side-Side-Side Congruence Theorem

If 3 sides of one △ are ≅ to the 3 corresponding sides of another △, then the △'s are ≅.



Side-Angle-Side Congruence Theorem

if 2 sides and their included ∠ in one △ are ≅ to the corresponding 2 sides and their included ∠ in another △, then the △'s are ≅.



Angle-Side-Angle Congruence Theorem

if 2 ∠s and their included side in one △ are ≅ to the corresponding 2 ∠s and their included side in another △, then the △'s are ≅.

Angle-Angle-Side Congruence Theorem

if 2 ∠s and their nonincluded side in one △ are ≅ to 2 ∠s and their nonincluded side in another △, then the △'s are ≅.

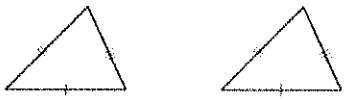
Be prepared to share your solutions and methods.

5.3- 5.6 Day 1 in Class Practice

Do together:

For each pair of triangles, write the triangle congruence criterion, if any, that can be used to show the triangles are congruent.

a.



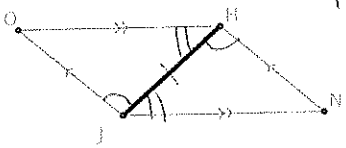
SSS

b.

ASA

a.

none



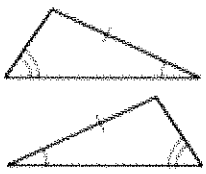
ASA

b.

You try:

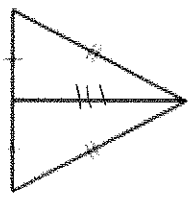
For each pair of triangles, write the congruence criterion, if any, that can be used to show the triangles are congruent.

11.



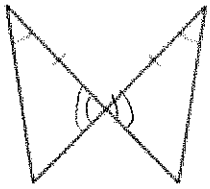
AAS

12.



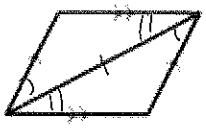
SSS

13.



ASA

14.



ASA

Geometry Unit 4 Day 3 SSS and SAS

Learning Target - Students will prove two triangles are congruent using SSS and SAS.

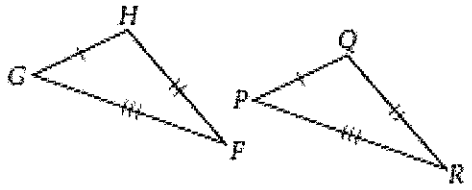
1.) Two triangles are congruent. How many pairs of congruent parts exist? 6

2.) Do you need to know that all of them are congruent before you can prove the two triangles are congruent? No, just 3 SSS, SAS, ASA, or AAS

Postulate 4-1 **Side-Side-Side (SSS) Postulate**

If the three sides of one triangle are congruent to the three sides of another triangle, then the two triangles are congruent.

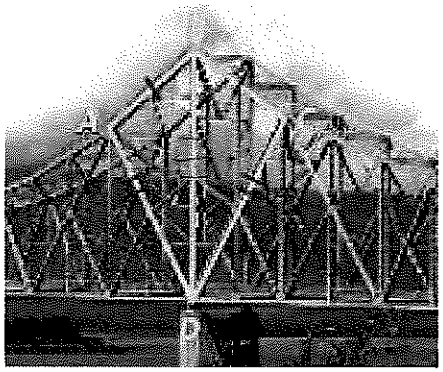
$\triangle GHF \cong \triangle PQR$



3.)

Given: $\overline{AB} \cong \overline{CB}, \overline{AD} \cong \overline{CD}$

Prove: $\triangle ABD \cong \triangle CBD$

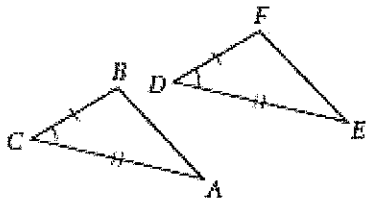


Statements	Reasons
1.) $\overline{AB} \cong \overline{CB}$, $\overline{AD} \cong \overline{CD}$	1.) given
2.) $\overline{BD} \cong \overline{BD}$	2.) reflexive property
3.) $\triangle ABD \cong \triangle CBD$	3.) SSS postulate

Postulate 4-2 **Side-Angle-Side (SAS) Postulate**

If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the two triangles are congruent.

$\triangle BCA \cong \triangle FDE$

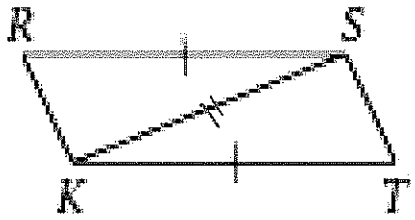


4.) What is an included angle?

the ∠ in-between the 2 pairs of sides

5.)

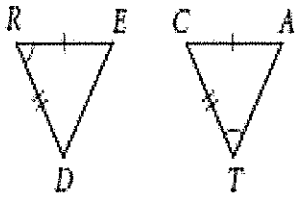
$\overline{RS} \cong \overline{TK}$. What other information do you need to prove $\triangle RSK \cong \triangle TKS$ by SAS?



You know $\overline{KS}$ is $\cong$ to $\overline{KS}$ so you would still need to know the included ∠s are $\cong$.

6.) From the information given, can you prove $\triangle RED \cong \triangle CAT$? Explain.

Given: $\overline{RE} \cong \overline{CA}, \overline{RD} \cong \overline{CT}, \angle R \cong \angle T$



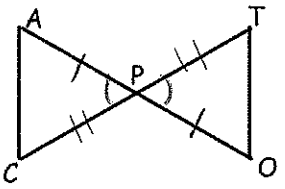
No, ∠T is not the corresponding ∠ to ∠R.

8

7.

Given: P is the midpoint of $\overline{AO}$ and $\overline{CT}$

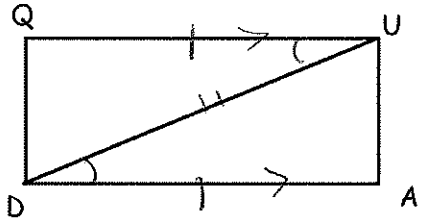
Prove: $\Delta CAP \cong \Delta TOP$



Statements	Reasons
1. P is the midpoint of $\overline{AO}$ and $\overline{CT}$.	1.) given
2.) $\overline{AP} \cong \overline{PO}$ $\overline{CP} \cong \overline{PT}$	2.) definition of midpoint
3.) $\angle APC \cong \angle TPO$	3.) vertical $\angle$s
4.) $\Delta CAP \cong \Delta TOP$	4.) SAS

8. Given $QU \cong AD$; $QU \parallel AD$

Prove: $\Delta QUD \cong \Delta ADU$



Statements	Reasons
1.) $\overline{QU} \cong \overline{AD}$ $\overline{QU} \parallel \overline{AD}$	1.) given
2.) $\angle QUD \cong \angle ADU$	2.) alternate interior $\angle$s
3.) $\overline{DU} \cong \overline{DU}$	3.) reflexive
4.) $\Delta QUD \cong \Delta ADU$	4.) SAS

Geometry HW Unit 4 Day 3

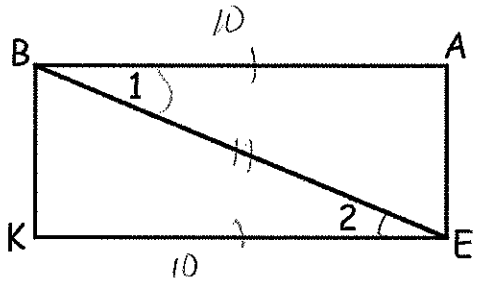
1.

Given: $m\angle 1 = m\angle 2$

$m\overline{BA} = 10cm$

$m\overline{EK} = 10cm$

Prove: $\Delta BAE \cong \Delta EKB$

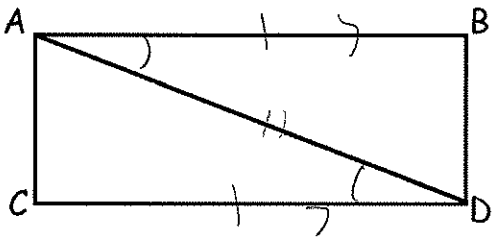


2.

Given: $m\overline{AB} = m\overline{CD}$

$\overline{AB} \parallel \overline{CD}$

Prove: $\Delta ACD \cong \Delta DBA$



3. statements | reasons

1.) P is the midpoint of $\overline{AO}$ and $\overline{CT}$ 1.)

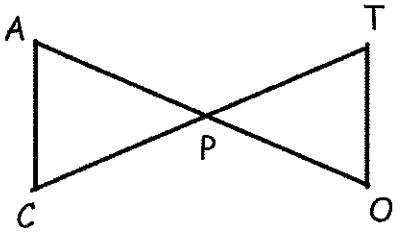
Challenge - on Separate Page!

3.

Given: P is the midpoint of $\overline{AO}$ and $\overline{CT}$

$\overline{AC} \cong \overline{TO}$

Prove: $\Delta CAP \cong \Delta TOP$

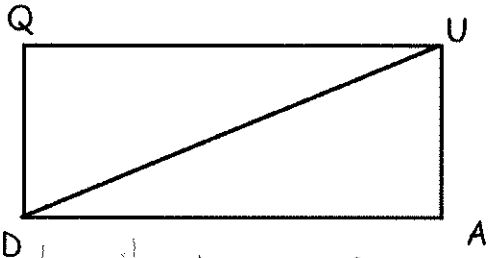


4.

Given: $\overline{QU} \cong \overline{AD}$

$\overline{QD} \cong \overline{AU}$

Prove: $\Delta QUD \cong \Delta ADU$



1.)

statements	reasons
$m\angle 1 = m\angle 2$ $m\overline{BA} = 10$ $m\overline{EK} = 10$	1.) given
2.) $\overline{BA} \cong \overline{EK}$	2.) substitution
3.) $\overline{BE} = \overline{BE}$	3.) reflexive
4.) $\Delta BAE \cong \Delta EKB$	4.) SAS

2.)

statements	reasons
1.) $m\overline{AB} = m\overline{CD}$ $\overline{AB} \parallel \overline{CD}$	1.) given
2.) $\angle BAD \cong \angle CDA$	2.) alt int
3.) $\overline{AD} = \overline{AD}$	3.) reflexive
4.) $\Delta ACD \cong \Delta DBA$	4.) SAS

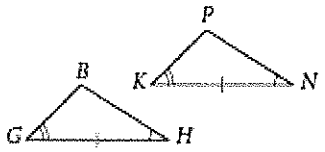
Geometry Unit 4 Day 4 Triangle Congruence by ASA and AAS

Learning Target – Students will prove triangles congruent by ASA and AAS.

Postulate 4-3 **Angle-Side-Angle (ASA) Postulate**

If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the two triangles are congruent.

$\triangle HGB \cong \triangle NKP$

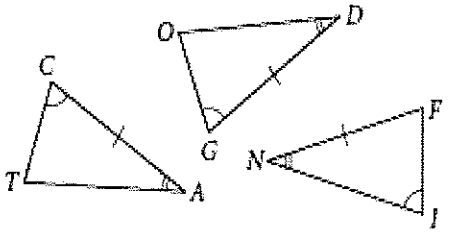


1.) What is an included side? the side between the $\triangle$'s

2.) **Multiple Choice** Which triangle is congruent to $\triangle CAT$ by the ASA Postulate?

(A) $\triangle DOG$ (B) $\triangle INF$

(C) $\triangle GDO$ (D) $\triangle FNI$

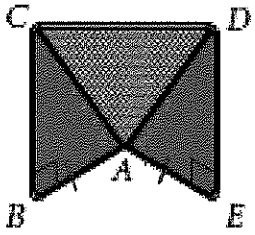


3.)

Lacrosse Study what you are given and what you are to prove about the lacrosse goal. Then write a proof that uses ASA.

Given: $\angle CAB \cong \angle DAE, \overline{AB} \cong \overline{AE}$, $\angle ABC$ and $\angle AED$ are right angles.

Prove: $\triangle ABC \cong \triangle AED$



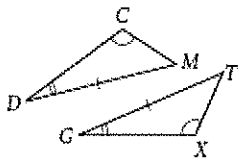
Front view of lacrosse goal

Statements	Reasons
1.) $\angle CAB \cong \angle DAE$, $\overline{AB} \cong \overline{AE}$, $\angle ABC$ & $\angle AED$ are right $\angle$'s	1.) given
2.) $\angle ABC \cong \angle AED$	2.) right $\angle$'s are $\cong$.
3.) $\triangle ABC \cong \triangle AED$	3.) ASA

Theorem 4-2 **Angle-Angle-Side (AAS) Theorem**

If two angles and a nonincluded side of one triangle are congruent to two angles and the corresponding nonincluded side of another triangle, then the triangles are congruent.

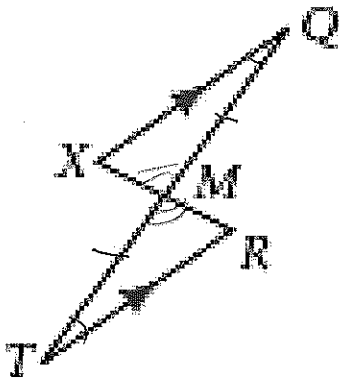
$\triangle CDM \cong \triangle XGT$



4.)

Given: $\overline{XQ} \parallel \overline{TR}$, $\overline{XR}$ bisects $\overline{QT}$.

Prove: $\triangle XMQ \cong \triangle RMT$

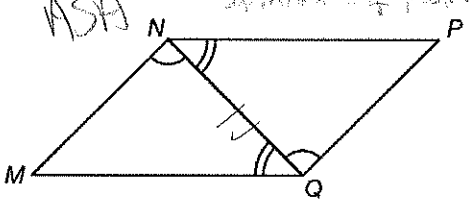


Statements	Reasons
1.) $\overline{XM} \parallel \overline{TR}$, $\overline{XR}$ bisects $\overline{QT}$	1.) given
2.) $\overline{TM} \cong \overline{MQ}$	2.) definition of bisects
3.) $\angle Q \cong \angle T$	3.) alt. int. $\angle$'s
4.) $\angle XMQ \cong \angle RMT$	4.) vertical $\angle$'s
5.) $\triangle XMQ \cong \triangle RMT$	5.) ASA

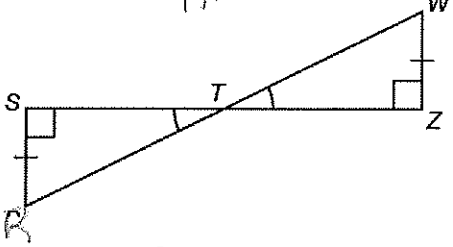
Geometry Unit 4 Day 4 HW

Determine whether there is enough information to prove that each pair of triangles are congruent by ASA or AAS. Write the congruence statements to justify your reasoning.

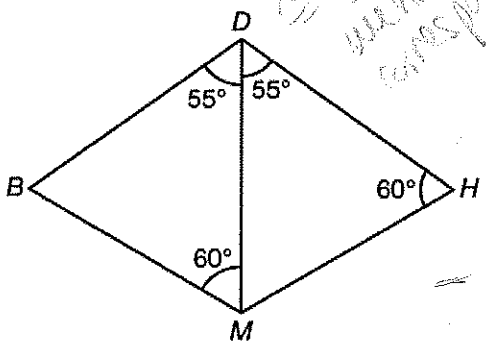
23. $\triangle MNQ \overset{?}{\cong} \triangle PQN$



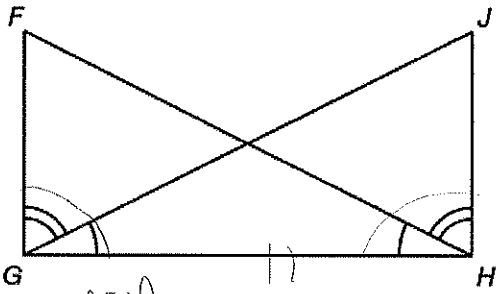
24. $\triangle RST \overset{?}{\cong} \triangle WZT$



25. $\triangle BDM \overset{?}{\cong} \triangle MDH$



26. $\triangle FGH \overset{?}{\cong} \triangle JHG$

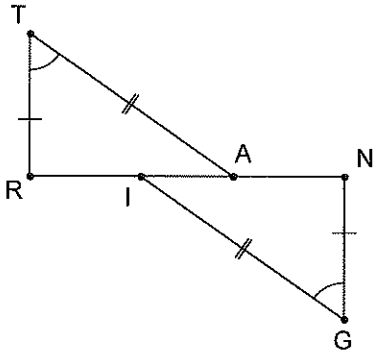


For each question below:

a) State which triangle congruence method, if any, can be used to prove the triangles are congruent. If none, write *none*.

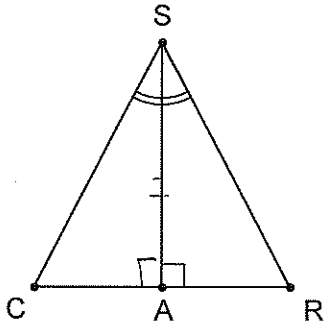
b) *IF* the triangles are congruent, complete the congruence statement.

16.



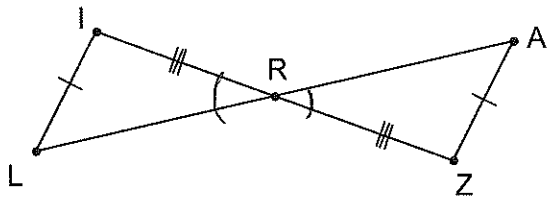
$\triangle TRA \cong$ _____ *by* _____

17.



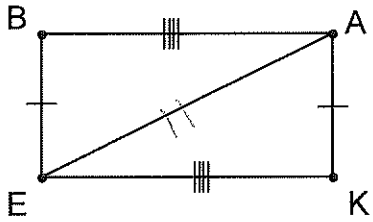
$\triangle CAS \cong$ _____ *by* _____

18.



$\Delta AZR \cong$ _____ *by* _____ Not ≅ SSA Doesn't work!

19.



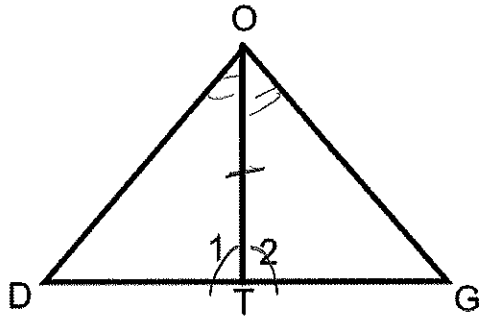
$\Delta BAE \cong$ KEA *by* SSS

1.

Given: $m\angle 1 = m\angle 2$

$\overline{OT}$ *bisects* $\angle DOG$

Prove: $\Delta DOT \cong \Delta GOT$

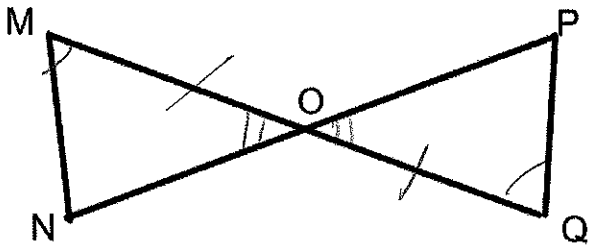


2.

Given: $\angle M \cong \angle Q$

$\overline{MO} \cong \overline{QO}$

Prove: $\Delta MON \cong \Delta QOP$



1.)

statements	reasons
∠1 ≅ ∠2	1.) given
$\overline{OT}$ bisects ∠DOG	
2.) ∠DOT ≅ ∠GOT	2.) definition of bisects
3.) $\overline{OT} \cong \overline{OT}$	3.) reflexive
4.) ΔDOT ≅ ΔGOT	4.) ASA

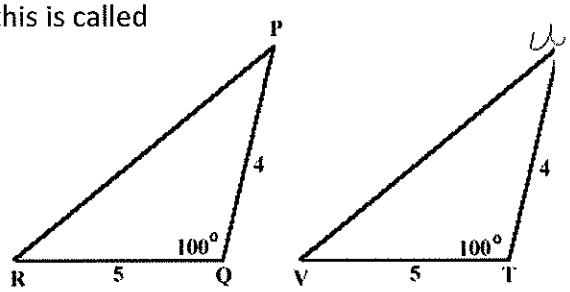
2.)

statements	reasons
1.) ∠M ≅ ∠Q	1.) given
$\overline{MO} \cong \overline{QO}$	
2.) ∠MON ≅ ∠QOP	2.) vertical ∠s
3.) ΔMON ≅ ΔQOP	3.) ASA

Geometry Unit 4 Day 6 CPCTC

Students will prove corresponding parts of congruent triangles are congruent.

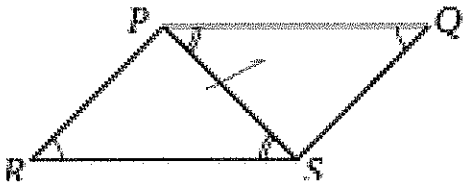
- We have learned to use three pairs of corresponding congruent parts to show that two triangles are congruent.
- Once we have proven the two triangles are congruent, we can conclude that their other three pairs of corresponding parts are congruent as well, this is called CPCTC.
- CPCTC – Corresponding Parts of Congruent Triangles are Congruent



1. How do you know the triangles are congruent?
   SAS
2. Since the triangles are congruent, what else do you know is congruent? the other 3 pairs of corresponding parts
   ∠R ≅ ∠V $\overline{RP} \cong \overline{VU}$ ∠P ≅ ∠U

3. **Given:** $\angle Q \cong \angle R$, $\angle QPS \cong \angle RSP$

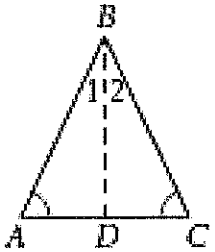
   Prove: $\overline{SQ} \cong \overline{PR}$



Statements	Reasons
1.) ∠Q ≅ ∠R	1.) given
∠PSQ ≅ ∠RSP	
2.) $\overline{PS} \cong \overline{PS}$	2.) reflexive
3.) $\triangle RPS \cong \triangle QSP$	3.) AAS
4.) $\overline{SQ} \cong \overline{PR}$	4.) CPCTC

4. **Given:** $\angle A \cong \angle C$, $\overline{BD}$ bisects $\angle ABC$.

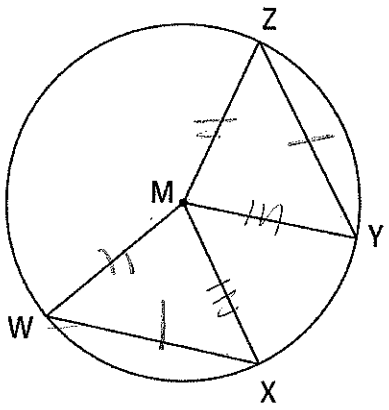
   Prove: $\overline{AB} \cong \overline{CB}$



Statements	Reasons
1.) ∠A ≅ ∠C, $\overline{BD}$ bisects ∠ABC	1. given
2.) ∠1 ≅ ∠2	2.) definition of bisects
3.) $\overline{BD} \cong \overline{BD}$	3.) reflexive
4.) $\triangle ABD \cong \triangle CBD$	4.) AAS
5.) $\overline{AB} \cong \overline{CB}$	5.) CPCTC

5. Given: Circle M ; ZY≅ WX
   Prove: $\Delta MZY \cong \Delta MWX$

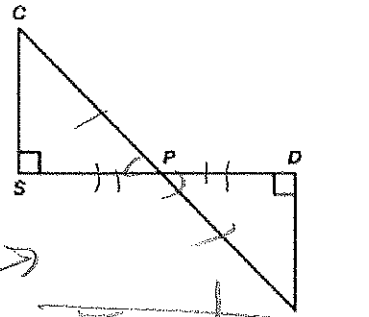
Statements	Reasons
1.) $\overline{ZY} \cong \overline{WX}$	2.) given
2.) $\overline{MW} \cong \overline{MZ}$ $\overline{MY} \cong \overline{MX}$	2.) radii of the same circle are $\cong$,
3.) $\triangle MZY \cong \triangle MWX$	3.) SSS



Geometry Unit 4 Day 6 HW

1. Given: $\overline{CW}$ and $\overline{SD}$ bisect each other

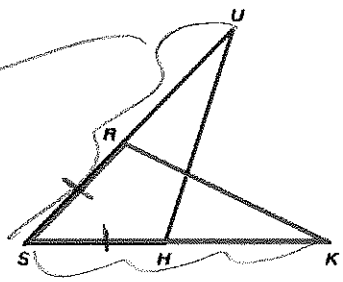
Prove: $\overline{CS} \cong \overline{WD}$



Statements	reasons
1.) $\overline{CW}$ & $\overline{SD}$ bisect each other	1.) given
2.) $\overline{CP} \cong \overline{PW}$, $\overline{SP} \cong \overline{PD}$	2.) definition of bisects
3.) $\angle CPS \cong \angle WPD$	3.) vertical $\angle$s
4.) $\triangle SPC \cong \triangle WPD$	4. SAS
5. $\overline{CS} \cong \overline{WD}$	5. CPCTC

2. Given: $\overline{SU} \cong \overline{SK}$, $\overline{SR} \cong \overline{SH}$

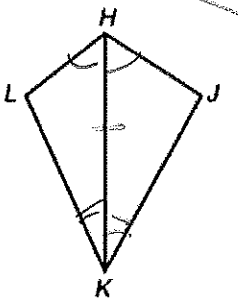
Prove: $\angle U \cong \angle K$



Statements	reasons
1.) $\overline{SU} \cong \overline{SK}$	1.) given
2.) $\overline{SR} \cong \overline{SH}$	2.) reflexive
3.) $\angle S \cong \angle S$	3.) SAS
4.) $\triangle USH \cong \triangle KSR$	4.) CPCTC
5.) $\angle U \cong \angle K$	

3. Given: $\angle JHK \cong \angle LHK$, $\angle JKH \cong \angle LKH$

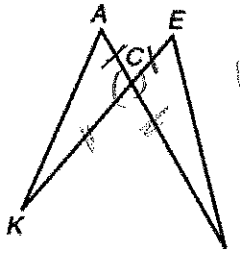
Prove: $\overline{JK} \cong \overline{LK}$



Statements	reasons
1.) $\triangle JHK \cong \triangle LHK$, $\angle JKH \cong \angle LKH$ exist	1. given
2.) $\overline{HK} \cong \overline{HK}$	2. reflexive
3.) $\triangle LHK \cong \triangle JHK$	3.) AAS
4.) $\overline{JK} \cong \overline{LK}$	4.) CPCTC

4. Given: $\overline{AG}$ and $\overline{EK}$ intersect at C, $\overline{AC} \cong \overline{EC}$, $\overline{CK} \cong \overline{CG}$

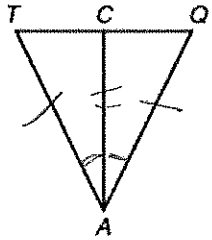
Prove: $\angle K \cong \angle G$



Statements	reasons
1.) $\overline{AG}$ & $\overline{EK}$ intersect at C, $\overline{AC} \cong \overline{EC}$, $\overline{CK} \cong \overline{CG}$	1. given
2.) $\angle ACK \cong \angle ECG$	2.) vertical $\angle$s
3.) $\triangle ACK \cong \triangle ECG$	3.) SAS
4.) $\angle K \cong \angle G$	4.) CPCTC

5. Given: $\overline{AT} \cong \overline{AQ}$, $\overline{AC}$ bisects $\angle TAQ$

Prove: $\overline{AC}$ bisects $\overline{TQ}$



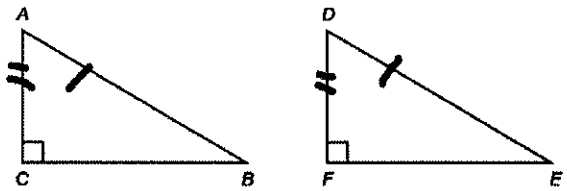
Statements	reasons
1.) $\overline{AT} \cong \overline{AQ}$	1.) given
$\overline{AC}$ bisects $\angle TAQ$	
2.) $\angle TAC \cong \angle QAC$	2.) definition of bisects
3.) $\overline{CA} \cong \overline{CA}$	3.) reflexive
4.) $\triangle TAC \cong \triangle QAC$	4.) SAS
5.) $\overline{TC} \cong \overline{CQ}$	5.) CPCTC
6.) $\overline{AC}$ bisects $\overline{TQ}$	6.) definition of bisects

Geometry Unit 4 Day 7 Notes HL Theorem

Learning Target – Students will prove triangles congruent using the HL theorem.

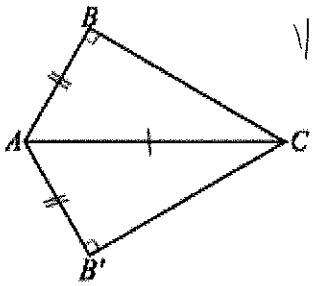
We have already learned that the general case of SSA does not prove that two triangles are congruent. However, in the special case of a right triangle, this congruence criteria can work. It's called HL (Hypotenuse-Leg).

The **Hypotenuse-Leg (HL) Congruence Theorem** states: "If the hypotenuse and leg of one right triangle are congruent to the hypotenuse and leg of another right triangle, then the triangles are congruent."



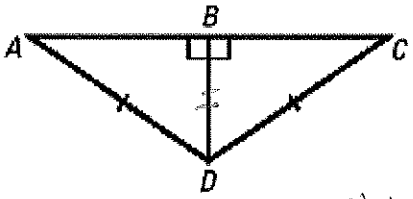
1. Can the pairs of triangles below be proven congruent by HL? If yes, write the congruence statement. If no, explain why not.

A.



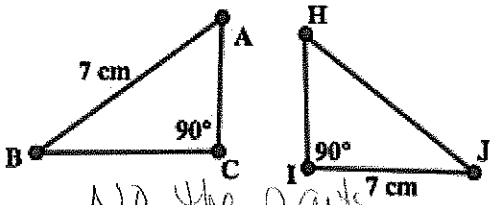
Yes
$\triangle ABC \cong \triangle AB'C$

b.



Yes $\triangle ABD \cong \triangle CBD$

c.



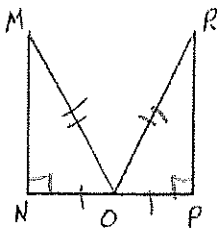
No the parts that are ≅ are not corresponding

d.

No, there are no congruent sides

2.

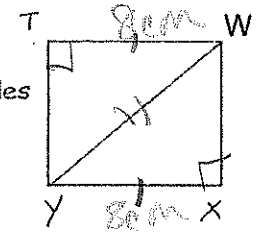
Given: $\angle P$ & $\angle N$ are right angles
O is the midpt of $\overline{NP}$
$\overline{MO} \cong \overline{RO}$
Prove: $\triangle MNO \cong \triangle RPO$



Statements	Reasons
1.) $\angle P$ & $\angle N$ are right $\angle$s, O is the midpoint of $\overline{NP}$, $\overline{MO} \cong \overline{RO}$	1.) given
2.) $\overline{NO} \cong \overline{OP}$	2.) definition of midpoint
3.) $\triangle MNO$ & $\triangle RPO$ are right $\triangle$s	3.) definition of right $\triangle$
4.) $\triangle MNO \cong \triangle RPO$	4.) HL

3.

Given: TW = 8cm
YX = 8cm
∠T & ∠X are right angles
Prove: ΔWTY ≅ ΔYXW



Statements	Reasons
1.) TW = 8cm, YX = 8cm, ∠T & ∠X are right ∠'s	1.) given
2.) $\overline{TW} \cong \overline{YX}$	2.) substitution
3.) $\overline{YW} \cong \overline{YW}$	3.) reflexive
4.) $\triangle WTY \cong \triangle YXW$	4.) HL

Add a ⊥ example

) use # 4 from next page

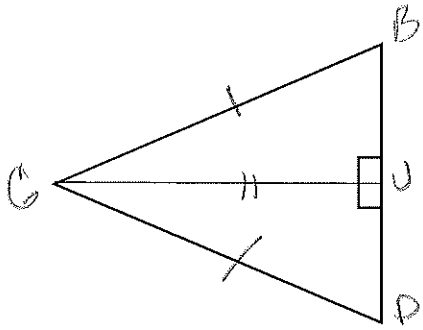
Add the Reasons.

Geometry Unit 4 Day 7 HW

1. **Given**: $\overline{GU} \perp \overline{DB}$

   $\overline{GB} \cong \overline{GD}$

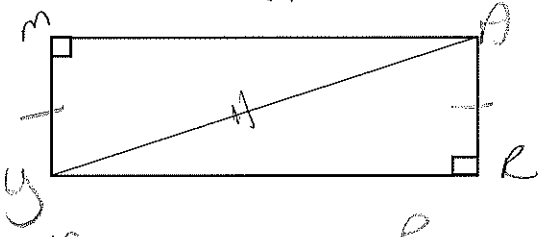
   Prove: $\Delta GUD \cong \Delta GUB$



2. **Given**: $\angle M$ *and* $\angle R$ are right angles

   $\overline{MY} \cong \overline{AR}$

   Prove: $\Delta MAY \cong \Delta RYA$

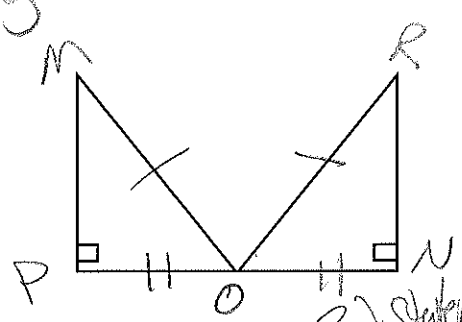


3. **Given**: $\angle P$ *and* $\angle N$ are right angles

   O is the midpoint of $\overline{NP}$

   $\overline{MO} \cong \overline{RO}$

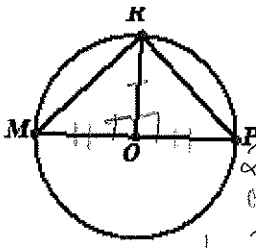
   Prove: $\Delta MNO \cong \Delta RPO$



4. **Given: Circle with center O.**

   $\overline{RO} \perp \overline{MP}$

   Prove: $\overline{MR} \cong \overline{PR}$



4.) 1.) circle with center O, RO ⊥ MP — 1.) given
2.) ∠MOR & ∠POR are right ∠'s — 2.) def of ⊥
3.) ΔMOR & ΔPOR are right Δ's — 3.) def of right Δ's
4.) RO ≅ RO — 4.) reflexive
5.) MO ≅ PO — 5.) all radii of same circle are ≅
6.) ΔMOR ≅ ΔPOR — 6.) H/L
7.) MR ≅ PR — 7.) CPCTC

3.) 1.) ΔMNO & ΔRPO are right Δ's; O is the midpoint of NP; MO ≅ RO — 1.) given
2.) ΔMNO & ΔRPO are right Δ's — 2.) definition of right Δ
3.) PO ≅ NO — 3.) def of midpoint
4.) ΔMNO ≅ ΔRPO — 4.) H/L

1.) 1.) GO ⊥ DB — 1.) given
GOB ≅ GOD
2.) ∠GOD & ∠GOB are right ∠'s — 2.) Definition of perpendicular
3.) ΔGOD and ΔGOB are right Δ's — 3.) definition of right Δ
4.) GB ≅ GD — 4.) reflexive
5.) ΔGOD ≅ ΔGOB — 6.) H/L

2.) 1.) ∠M & ∠R are right ∠'s; MY ≅ AR — 1.) given
2.) YA ≅ YA — 2.) reflexive property
3.) ΔMAY & ΔRYA are right Δ's — 3.) definition of right Δ
4.) ΔMAY ≅ ΔRYA — 4.) H/L

Geometry Unit 4 Day 10 Hinge Theorem and Triangle Inequalities

Learning Target – Students will explore the relationships between angles and sides in triangles.

In this lesson you will explore some angle and side relationships in triangles.

1. Explore the relationship between an angle of a triangle and a side opposite that angle.
   a. As Mrs. Blanton increases the size of the angle, what happens to the length of the third side of the triangle? it increases

The Hinge Theorem – If two sides of one triangle are congruent to two sides of another triangle, and the included angle in the first triangle is larger than the included angle in the other triangle, then the third side of the first triangle is longer than the third side of the other triangle.

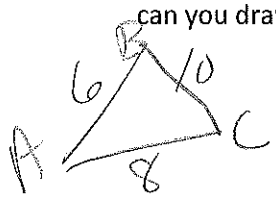
   b. If another student in your class made a triangle with two sides the same length as the ones Mrs. Blanton used, but the included angle is smaller than the included angle in Mrs. Blanton's triangle, what can you conclude about the third side of that student's triangle compared to Mrs. Blanton's triangle? it will be smaller

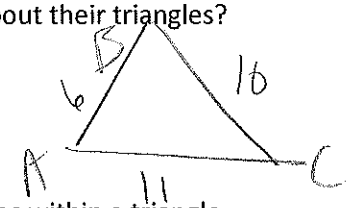
Don't like this

   c. Write the **Converse of the Hinge Theorem**.

If the 3rd side of the 1st △ is longer than the 3rd side of the other △, and two sides of one △ are = to two sides of another △, then the included ∠ in the 1st △ is larger than the included ∠ in the other △

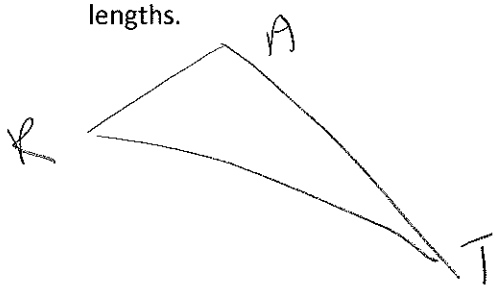
   d. Two students discussed their geometry assignment on the phone. Tony drew triangle ABC with AB=6cm, BC=10cm, AC=8 cm. Angelica drew triangle ABC with AB=6cm, BC=10cm and AC=11 cm. Using the converse of the Hinge Theorem, what conclusion can you draw about their triangles?





Angelica's ∠B is larger than Tony's ∠B.

2. Exploring angles and sides within a triangle.
   a. Draw a scalene triangle. Label the vertex of the largest angle A, the vertex of the smallest angle, T and the third angle R. Measure all the angle measures and side lengths.



b. What is the longest side of your triangle? RT
c. What is the shortest side of your triangle? RA
d. Compare your answers to parts b and c to your neighbor's. What do you notice about the longest side compared to the largest angle in each of your triangles?

The largest ∠ is ⊥ across from the longest side.

e. Based on your results complete the **theorem** and it's converse:

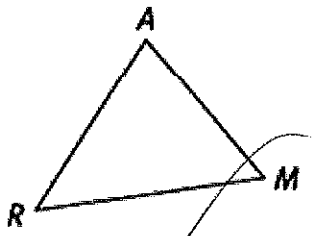
The longest side of a triangle lies opposite the angle with the largest measure and the shortest side lies opposite the angle with the smallest measure.

Conversely, in a triangle, the angle with the greatest measure lies opposite the longest side and the angle with the ~~least~~ measure lies opposite the shortest side.

DO examples

1.) basic
2.) like #42 on HW

3. **The Triangle Inequality Theorem** – The sum of the lengths of any two sides of a triangle must be greater than the length of the third side.



change to own example with numbers

Using the Triangle Inequality Theorem, you know that $RA + AM > RM$.

15. Use the Triangle Inequality Theorem and $\triangle RAM$ to complete the following inequalities.

a. RM + MA > RA

b. MR < AM + RA

change

c. Write an inequality comparing the length of $\overline{AM}$ to the sum of the other two sides of $\triangle RAM$.

$\overline{RA} + \overline{RM} > \overline{AM}$

TRY THESE

Write your answers on notebook paper. Show your work.

For Items a through d, use the Triangle Inequality Theorem to determine whether a triangle can be formed with the given side lengths.

a. 8 in., 6 in., 4 in. 4+6>8 yes

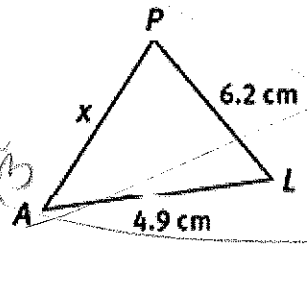
b. 3 cm, 4 cm, 7 cm 3+4≯7 No

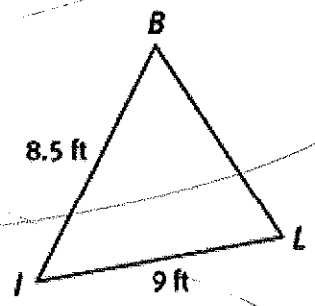
c. 7 yd, 4 yd, 4 yd 4+4>7 yes

d. 8 m, 8 m, 8 m 8+8>8 yes

e. In $\triangle PAL$, _____ $< x <$ _____

f. In $\triangle IBU$ _____ $> BU >$ _____



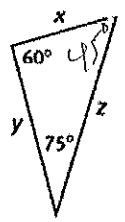


CHECK YOUR UNDERSTANDING

Write your answers on notebook paper. Show your work.

1. Use the given angle measures to put side measures x, y, and z in numerical order. The triangle is not drawn to scale.

x, z, y



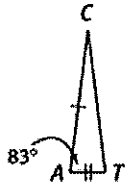
2. Tina plans to create triangular flower bed frames using each of the sets of board lengths listed below. Will each set of boards create a triangle? Explain why or why not.

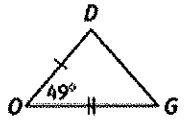
a. 1 ft, 2 ft, 3 ft No 1+2≯3

b. 6 ft, 9 ft, 11 ft 6+9>11 yes

c. 2 ft, 5 ft, 8 ft 2+5≯8 No

3. Given $\triangle CAT$ and $\triangle DOG$ with measures as shown (not to scale), which of the following must be true?

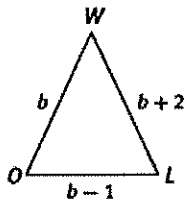




a. $CT < DG$ No **b.** $CT = DG$

c. $CT > DG$ yes **d.** Not enough information

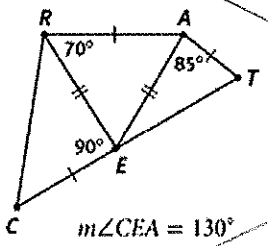
4. The given triangle is not drawn to scale. State which angle must be the largest and explain how you know.



∠O – opposite the longest side.

CHECK YOUR UNDERSTANDING (continued)

5. Use the diagram with the given measures to compare each pair of segments. Use <, =, or > to state the relationships.



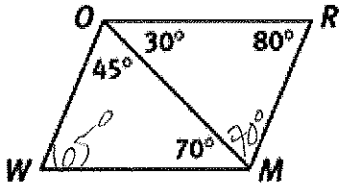
$m\angle CEA = 130°$

a. CR ___ ET **b.** EA ___ ET

c. RE ___ ET **d.** CR ___ EA

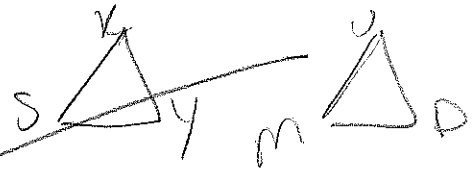
6. MATHEMATICAL REFLECTION Daniel is a student who missed class for this activity. Write an email message telling him the mathematical ideas you've learned.

9. The segments in the diagram shown are not drawn to scale. Given the angle measures shown, which segment would be the longest if the diagram was drawn to scale? Explain.



OM is the largest side of △ OEM but OW is the largest side of △ WOM. So since OM is also a side of △WOM, OW must be the largest.

Given two triangles, $\triangle SKY$ and $\triangle MUD$, and the given information in each item, complete each statement in Items 10–12 with *always*, *sometimes*, or *never*.



10. If $m\angle S > m\angle M$ and $m\angle K > m\angle U$, then $m\angle Y$ is always greater $m\angle D$.

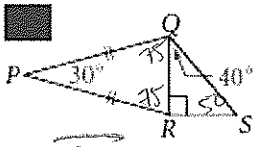
11. If $SK = MU$ and $KY = UD$, then SY is sometimes equal to MD.

12. If $m\angle SKY > m\angle MUD$, $KS = UM$, and $YK = DU$, then YS is ___?___ greater than DM.

Geometry Unit 4 Day 10 HW

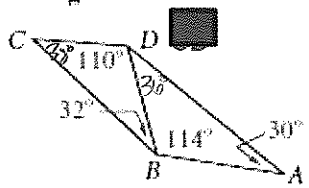
Critical Thinking **Determine which segment is shortest in each diagram.**

35.



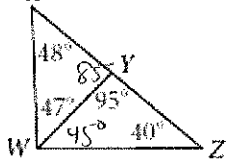
RS

36.



CD

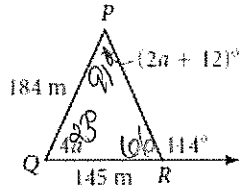
37.



XY

42. For $\triangle PQR$, which is the best estimate for PR?

A. 137 m B. 145 m
C. 163 m D. 187 m



42. $6a+4a+12+2a+12=180$
$6a+16a+12=180$
$88+16a=180$
$16a=92$
$a=5.75$
$2a=4(5.75)=23°$

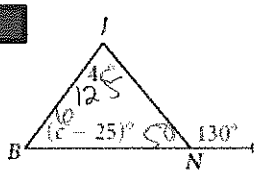
43. Two sides of a triangle measure 13 and 15. Which length is NOT possible for the third side?

F. 2 G. 8
H. 14 J. 20

$2<x<28$

44. Which statement is true for the figure at the right?

A. $JN > JB$
B. $JN > BN$
C. The shortest side is $\overline{JB}$.
D. The longest side is $\overline{BN}$.



not to scale

44) $c-25+50+4c=180$
$5c+25=180$
$5c=125$
$c=31$

47. For $\triangle JKL$, $LJ < JK < KL$. What must be true about angles J, K, and L?

F. $m\angle L < m\angle J < m\angle K$ G. $m\angle L > m\angle J > m\angle K$
H. $m\angle J < m\angle L < m\angle K$ J. $m\angle J > m\angle L > m\angle K$

32. Algebra Find the longest side of $\triangle ABC$, if $m\angle A = 70, m\angle B = 2x - 10$, and $m\angle C = 3x + 20$.

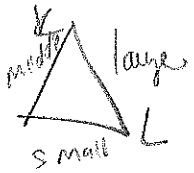
AB

Two sides of a triangle are given. Give the range of values that are possible for the length of the third side of the triangle.

23. 5 in., 16 in.

26. 4 yd, 7 yd

47.)



23. $11<x<21$

26.) $3<x<11$

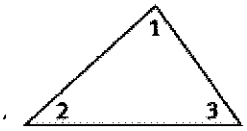
32.)

$70+2x-10+3x+20=180$
$80+5x=180$
$5x=100$
$x=20$

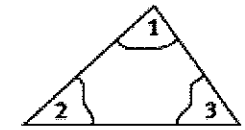
Geometry Unit 4 Day 11 Triangle angle sum

Learning Target – Students will discover and apply the triangle angle sum theorem and triangle exterior angle theorem.

1. Draw or trace the triangle below.



2. Tear off each corner of the triangle.



3. Arrange the corners so they are adjacent. What is formed?

4. What appears to be true about the sum of the measures of the angles of a triangle? Write a conjecture. This is known as the *Triangle Sum Theorem*.

They make 180°

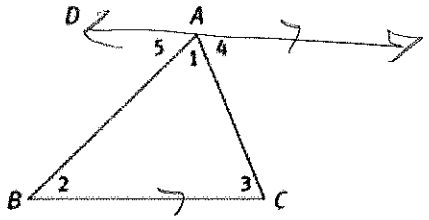
5.

Complete the proof of the Triangle Sum Theorem.

Theorem: The sum of the angles of a triangle is 180°.

Given: $\triangle ABC$

Prove: $m\angle 2 + m\angle 1 + m\angle 3 = 180°$

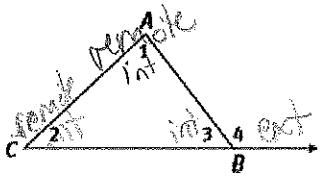


Statement	reasons
1.) $\triangle ABC$	1.) given
2.) $\angle 1 + \angle 4 + \angle 5 = 180$	2.) straight line
3.) $\angle 5 \cong \angle 2$, $\angle 4 \cong \angle 3$	3.) alt. int. $\angle$s
4.) $m\angle 1 + m\angle 3 + m\angle 2 = 180$	4.) substitution
5.) $\angle 2 + m\angle 1 + m\angle 3 = 180$	5.) commutative

An ***interior angle*** of a triangle is formed by two sides of the triangle. An ***exterior angle*** of a triangle is formed by one side of the triangle and the extension of an adjacent side. A ***remote interior angle*** of a triangle is an interior angle that is not adjacent to a given exterior angle.

Label each angle of the triangle using one of the following terms: interior angle, exterior angle, remote interior angle.

6.

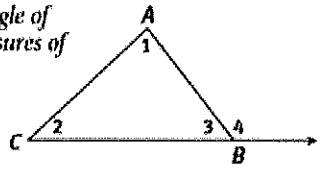


The Triangle Exterior Angle Theorem - the measure of an exterior angle of a triangle is equal to the sum of the measures of it's two remote interior angles.

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

Given: $\triangle ABC$

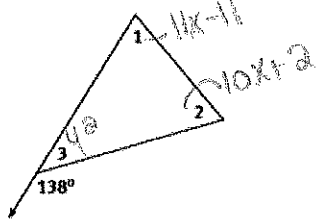
Prove: $m\angle 4 = m\angle 1 + m\angle 2$



Statements	Reasons
1. $\triangle ABC$ with exterior angle 4	1. given
2. $\angle 1+\angle 2+\angle 3=180$	2. Triangle Sum Theorem
3. $m\angle 3 + m\angle 4 = 180°$	3. linear pair
4. $m\angle 4 = 180° - m\angle 3$	4. Subtraction Pot E
5. $\angle 1+\angle 2=180-\angle 3$	5. Subtraction Pot
6. $\angle 4=\angle 1+\angle 2$	6. transitive

Do one with #'s

7. If $m\angle 2 = (10x + 2)°$ and $m\angle 1 = (11x - 11)°$, complete the following.



a. $m\angle 1 =$ 66°

b. $m\angle 2 =$ 72°

c. $m\angle 3 =$ 42

$11x-11+10x+2+42=180$

$21x+33=180$

$21x=147$

$x=7$

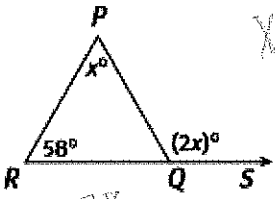
Geometry Unit 4 Day 11 HW

Use the figure for Items 1–3. The measure of ∠1 is equal to the measure of ∠2. Find the measure of the interior angle of the triangle.

1. $m\angle 1 =$ 25
2. $m\angle 2 =$ 25
3. $m\angle 3 =$ 130°

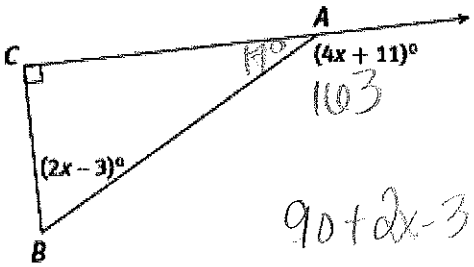
For each triangle, find the value of x. Then find the measure of each interior angle.

10.



$x =$ 58
$m\angle P =$ 58
$m\angle PQR =$ 64
$m\angle R =$ [illegible]

11.

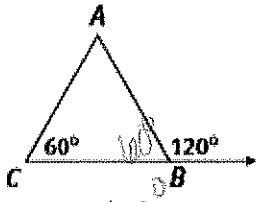


$x =$ 38
$m\angle C =$ 90
$m\angle CAB =$ 19°

90 + 2x − 3 = 4x + 11
87 = 2x + 11
76 = 2x
38 = x

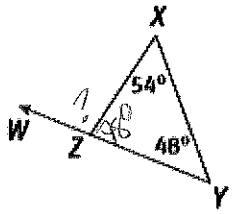
Continued

4.



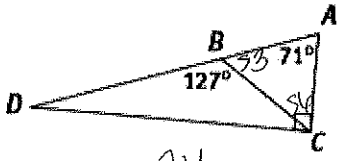
$m\angle A =$ 120°

5.



$m\angle WZX =$ 102°

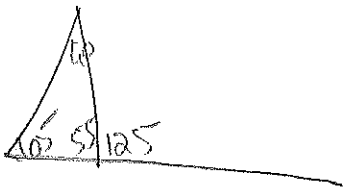
6.



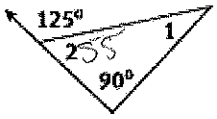
$m\angle BCD =$ 34

7. The measure of an exterior angle of a triangle is 125°. The measure of one of its remote interior angles is 65°. What is the measure of the other remote interior angle?

60°

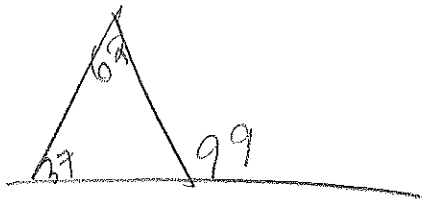


Use the figure below to find each measure.

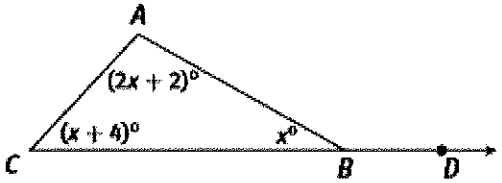


17. $m\angle 1 = 35^\circ$ **18.** $m\angle 2 = 55^\circ$

19. Reason abstractly. Two remote interior angles of a triangle measure 37° and 62°. What is the measure of the exterior angle associated with the remote interior angles? What is the measure of the third angle of the triangle? 99° & 81°



Use the figure below to find each measure.



20. $m\angle A = 89$ **21.** $m\angle C = 47.5$

22. $m\angle ABC = 43.5$ **23.** $m\angle ABD = 136.5$

$x + x+4 + 2x+2 = 180$

$4x + 6 = 180$

$4x = 174$

$x = 43.5$

Geometry Unit 4 Day 12 Segments In Triangles

Students will identify and use the perpendicular bisector, altitude, median and angle bisector in a triangle.

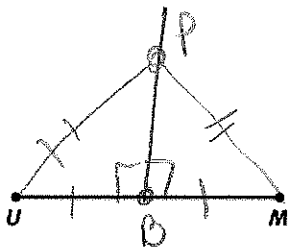
4 types of segments in triangles

- Altitude – a segment from a vertex of the triangle, perpendicular to the opposite side.
- Median – a segment from a vertex of the triangle to the midpoint of the opposite side.
- Perpendicular bisector – a line or part of a line that is perpendicular to the side of a triangle, through the midpoint.
- Angle bisector – a line or part of a line that splits an angle of a triangle into two congruent parts.

1.) Add the definition of each type of segment to your vocabulary.

2.) Draw a triangle and a picture of each segment in your vocab. Be sure to mark the congruent parts.

A **perpendicular bisector** of a segment is perpendicular to the segment at its midpoint.



11. On the segment above:

a. Draw the perpendicular bisector of $\overline{UM}$, label the midpoint of $\overline{UM}$ point B and ~~share the instructions you would give to a classmate who wanted to recreate your drawing.~~

b. Pick a point, P, on the perpendicular bisector and describe the relationship of the segments $\overline{PU}$ and $\overline{PM}$. Justify your answer.

They are ≅ b/c they are corresponding parts of ≅ Δ's
The Δ's are ≅ by SAS

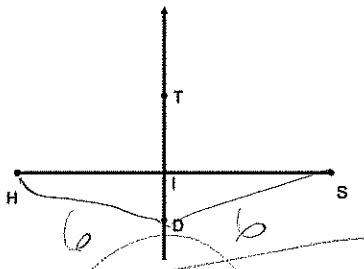
12. Classify $\triangle UMP$ by side length. isosceles

13. Add the **perpendicular bisector theorem** to your vocab.

3.) If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.

Geometry Homework unit 4 day 12

1.



a. DS = 6, DH = 6. What can you conclude about $\overleftrightarrow{DT}$?

it's the ⊥ bisector of $\overline{HS}$

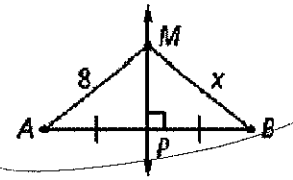
b. I is the midpoint of $\overline{HS}$.

c. $\overline{TH} \cong \overline{TS}$

d. $m\angle DIS = 7x + 13$. Find x.

$7x + 13 = 90$
$7x = 77$
$x = 11$

2. Use the diagram below



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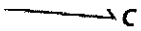
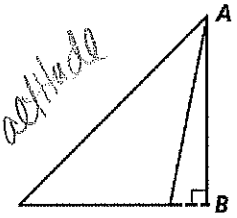


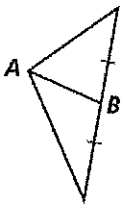
Is $\overline{AB}$ a perpendicular bisector, an angle bisector, an altitude, a median, or none of these?

5.



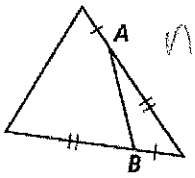
altitude

6.



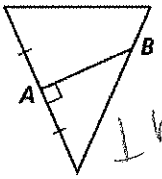
median

7.



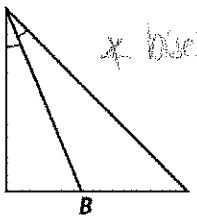
none

8.



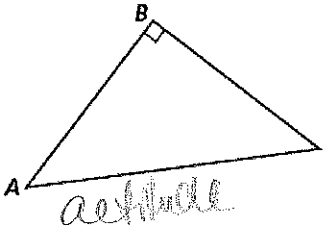
∠ bisector

9.



⊥ bisector

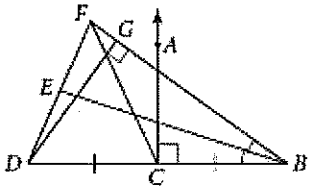
10.



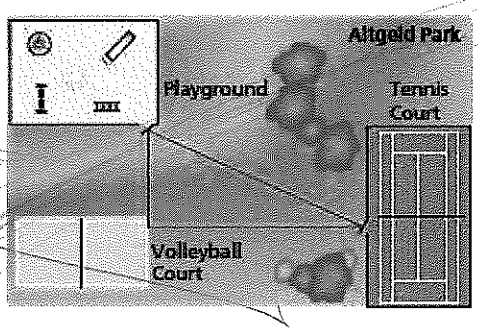
altitude

In Exercises 19–22, name each figure in $\triangle BDF$.

19. an angle bisector [redacted] EB
20. a median [redacted] FC
21. a perpendicular bisector [redacted] AC
22. an altitude [redacted] DG



10. City Planning Copy the diagram of Altgeld Park. Show where park officials should place a drinking fountain so that it is equidistant from the tennis court, the playground, and the volleyball court.



Geometry Unit 4 Day 13 Isosceles and Equilateral Triangles

Learning Target – Students will apply theorems about isosceles and equilateral triangles.

Isosceles

- Iso – Greek meaning same/equal. Skelos – Greek meaning leg.

Theorem 4-5

The bisector of the vertex angle of an isosceles triangle is the perpendicular bisector of the base.

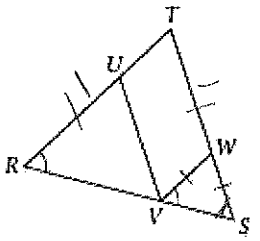
$\overline{CD} \perp \overline{AB}$ and $\overline{CD}$ bisects $\overline{AB}$.

5. By drawing in the red segment, what have I created? 2 ≅ Δ's

6. How do you know? SAS

7. How could you use this knowledge to prove the isosceles triangle theorem? only the Δ's once your parts are big CPCTC

8. Use the figure to the right for question 8.



Explain why each statement is true.

a. $\angle WVS \cong \angle S$ isosceles Δ theorem

b. $\overline{TR} \cong \overline{TS}$ converse of isos Δ theorem

c. Can you deduce that triangle RUV is isosceles? Explain.

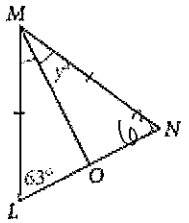
No, you don't know if 2 sides or 2 ∠s are ≅.

9.

Multiple Choice Find the value of y.

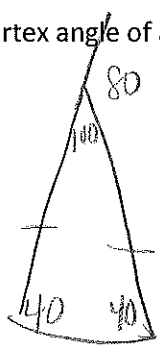
(A) 17 (B) 27 (C) 54 (D) 90

$\frac{180-126}{2} = \frac{54}{2} = 27°$



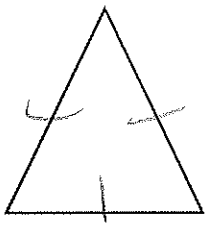
Explain why the other three answer choices must be incorrect.

10. An angle exterior to the vertex angle of an isosceles triangle measures 80 degrees. Find the angle measures of the triangle.



40° each

11. Mark the triangle so it is equilateral.



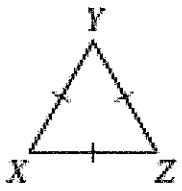
12. Based on what we just learned about an isosceles triangle, what can you conclude about the angles of an equilateral triangle. Justify your answer.

They are = by the isosceles Δ theorem

Corollary **Corollary to Theorem 4-3**

If a triangle is equilateral, then the triangle is equiangular.

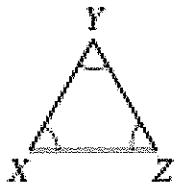
$\angle X \cong \angle Y \cong \angle Z$



Corollary **Corollary to Theorem 4-4**

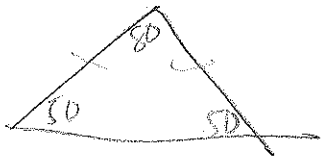
If a triangle is equiangular, then the triangle is equilateral.

$\overline{XY} \cong \overline{YZ} \cong \overline{ZX}$



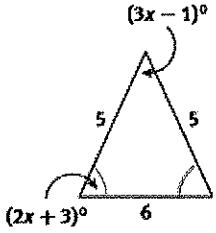
Geometry Unit 4 Day 13 HW

7. The measure of the vertex angle of an isosceles triangle is 80°. What is the measure of a base angle? 50°



8. The measure of one base angle of an isosceles triangle is 25°. What is the measure of the vertex angle? 130°

9. Solve for x.

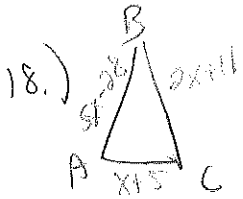


9.) $2x+3+2x+3+3x-1=180$

$7x+5=180$

$7x=175$

$x=25$



$5x-25=2x+11$

$3x=36$

$x=12$

18. $\triangle ABC$ is an isosceles triangle with vertex angle B, $AB = 5x - 28$, $AC = x + 5$, and $BC = 2x + 11$. Determine the length of the base of the triangle. 17

19. The measure of the vertex angle of an isosceles triangle is 120°. What is the measure of a base angle? 30°

20. Given $\triangle ABC$, $m\angle A = (x + 14)°$, $m\angle B = (4x + 6)°$, and $m\angle C = (15x + 40)°$.

a. Find the value of x. 20

b. Determine the measure of each of the three angles. 30, 30, 120

c. Classify $\triangle ABC$ by side length and angle measure. scalene, obtuse

20.) $130+15x+40+4x+6+x+14=180$

$20x+190=180$

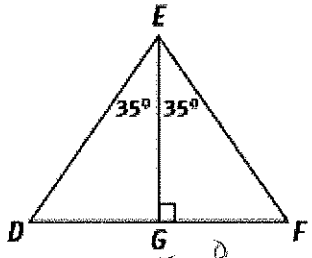
$20x=-10$

$x=-6$

21. Critique the reasoning of others. Juan said that he drew a triangle with angles of measure 118°, 30°, and y°. He said that by choosing the correct value of y he could make the triangle an isosceles triangle. Do you agree or disagree? Why?

21.) No b/c $y=32$ since $\triangle$s sum to 180°

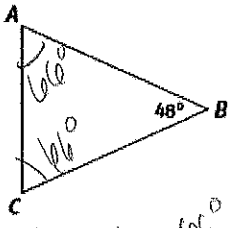
12.



$m\angle EDG =$ 55°

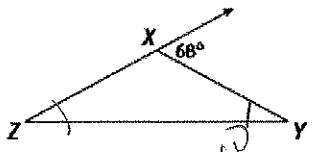
Find the measure of the base angles for each isosceles triangle.

13.



$m\angle A = m\angle C =$ 66°

14.



$m\angle Y = m\angle Z =$ 34°

Geometry Unit 4 Day 14

- Draw, label and cut out a large scalene triangle, ABC. Name the angles on the inside, so you don't cut them away when you cut the angle out. Label the largest angle C.
- Fold A onto C. What does the fold mark? Label this point L.
- Fold B onto C. What does the fold mark? Label this point N.
- Draw line LN.
- Fold the triangle on LN.
- Fold A to C.
- Fold B to C.
- How does line LN compare to line AB?
- Make a conjecture about how the segment joining the midpoints of the two sides of a triangle is related to the third side of the triangle.

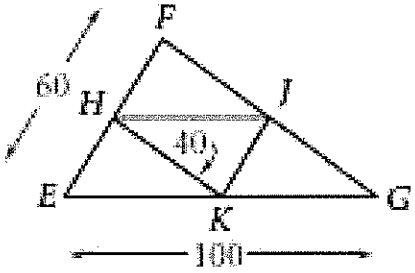
Midsegment – segment of a triangle connecting the midpoints of the two sides.

Theorem 5-1 **Triangle Midsegment Theorem**

If a segment joins the midpoints of two sides of a triangle, then the segment is parallel to the third side, and is half its length.

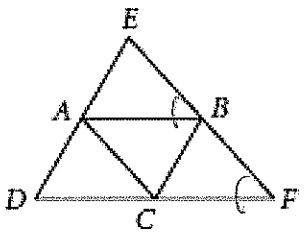
1. In $\triangle EFG$, H, J, and K are midpoints. Find HJ, JK, and FG.

50 30 80



2. In $\triangle DEF$, A, B, and C are midpoints. Name pairs of parallel segments. $\overline{AC} \parallel \overline{EF}$ $\overline{BC} \parallel \overline{ED}$ $\overline{AB} \parallel \overline{DF}$
3. Justify your thinking. $\triangle$ midSegment theorem
4. What can you conclude about angle EBA and angle BFC? Justify your thinking.

They are corresponding $\angle$s so they are $\cong$.

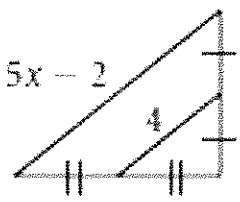


Geometry Unit 4 Day 14 HW

Honors Geometry Homework Midsegments

Show all work for credit

6.



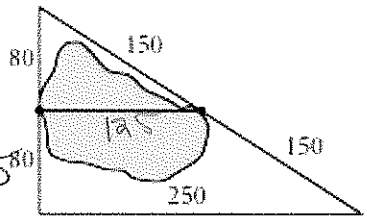
$5x-2=8$
$5x=10$
$x=2$

Find the value of x.

20. Indirect Measurement Kate wants to paddle her canoe across the lake. To determine how far she must paddle, she paced out a triangle, counting the number of strides, as shown.

a. If Kate's strides average 3.5 ft, what is the length of the longest side of the triangle? 262.5 ft

b. What distance must Kate paddle across the lake? 437.5 ft



26. Coordinate Geometry The coordinates of the vertices of a triangle are $E(1, 2)$, $F(5, 6)$, and $G(3, -2)$.

a. Find the coordinates of H, the midpoint of $\overline{EG}$, and J, the midpoint of $\overline{FG}$. (2,0) (4,2)

b. Verify that $\overline{HJ} \parallel \overline{EF}$. **c.** Verify that $HJ = \frac{1}{2}EF$.

You will want to use graph paper – hints – slope ,midpoint, distance

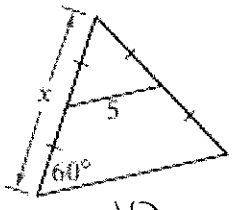
Slope $= \frac{2-0}{4-2} = \frac{2}{2} = 1$ EF slope $= \frac{1-5}{6-2} = \frac{-4}{4} = -1$ Same slope = parallel

a) $HJ = \sqrt{(2-4)^2+(0-2)^2}$
$= \sqrt{(-2)^2+(-2)^2}$
$= \sqrt{4+4} = \sqrt{8} = 2.82$

$EF = \sqrt{(1-5)^2+(2-6)^2}$
$= \sqrt{4^2+4^2}$
$= \sqrt{32} = 5.66$

Find the values of the variables.

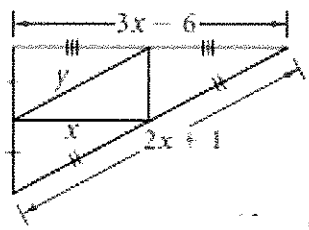
32.



10

$x=10$

33.



$2x=3x-6$
$-x=-6$
$x=6$

$2y=2(6)+1$
$2y=13$
$y=6.5$