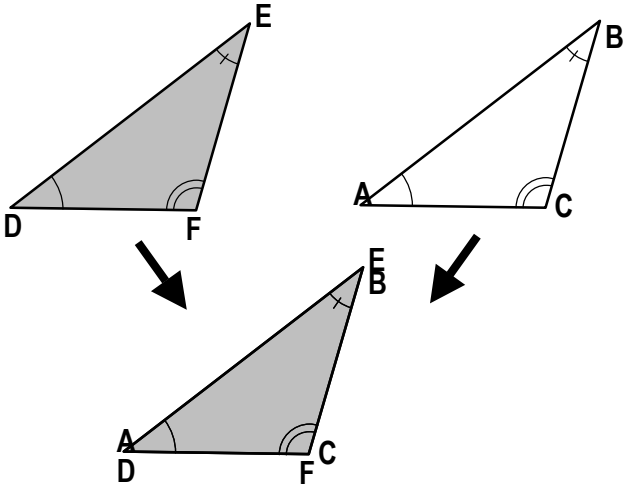
5.4

Name (print first and last) _____ **Per**_____ **Date:** 12/17 due 12/19

5.4 Congruence: AAS≅ and HL≅ **Geometry Regents 2013-2014 Ms. Lomac**

SLO: I can use AAS≅ and HL≅ to prove the isosceles triangle theorem.

(1) ☐ **Does AAA guarantee that triangles congruent?** To answer this, complete the questions below.



☐ (a) List the pairs of congruent angles for the diagram at left:

_____ ≅ _____, _____ ≅ _____, _____ ≅ _____

Does △DEF map to △ABC by rigid transformation? _____

because _____

_____

_____

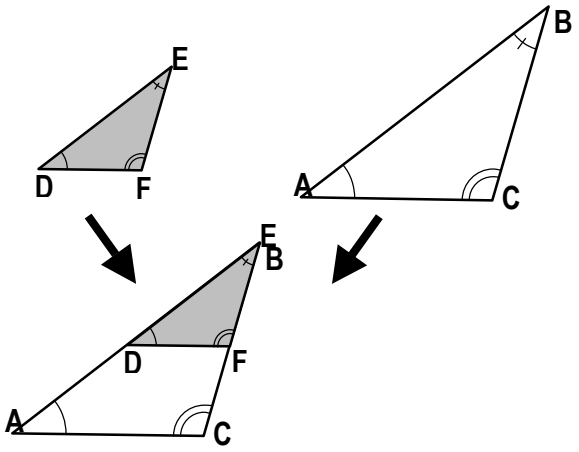
☐ (b) List the pairs of congruent angles for the diagram at right: _____ ≅ _____, _____ ≅ _____, _____ ≅ _____

Does △DEF map to △ABC by rigid transformation? _____

because _____

_____

_____



☐ (c) Based on your responses in parts (a) and (b), does AAA guarantee congruent triangles (that means **always**)?

_____ because _____

_____

_____

_____

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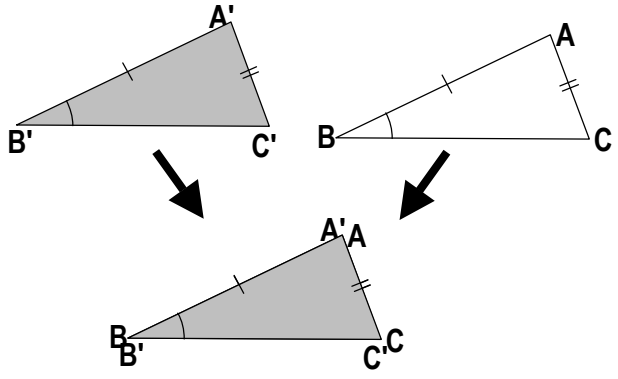
(2) ☐ **Does SSA guarantee congruent triangles?**



☐ (a) List the pairs of congruent parts for the diagram at left:

_____ ≅ _____, _____ ≅ _____, _____ ≅ _____

This is called SSA because the angles are/are not (circle one) between the sides. Does △A'B'C' map to △ABC by rigid transformation? _____ because _____

_____

_____

So, the triangles are/are not (circle one) congruent.

☐ (b) List the pairs of congruent parts for the diagram at right:

_____ ≅ _____, _____ ≅ _____, _____ ≅ _____

Are the pairs of ≅ sides and angles the same as the ones in part (a)?

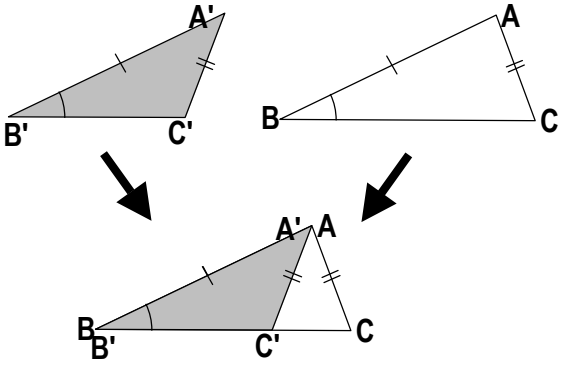
_____ Is this SSA? _____

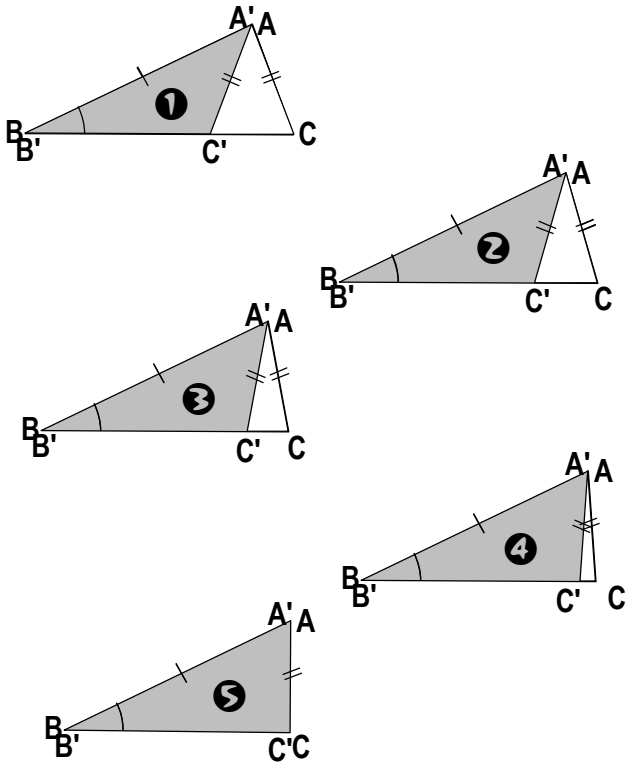
Does △A'B'C' map to △ABC by rigid transformation? _____

because _____

_____

So, the triangles are/are not (circle one) congruent.





☐ (c) Based on your responses in parts (a) and (b), does SSA guarantee congruent triangles (that means **always**)?_____

because _____

_____

☐ (d) In diagrams 1 – 5 at right, SSA is still given. For each diagram, write ***"≅"*** if the pair of overlapping triangles are congruent or ***"not ≅,"*** if they are not.

❶_____ ❷_____ ❸_____ ❹_____ ❺_____

In diagram 5, ∠____ finally coincides with ∠____ and the angle measures _____°. So, △ABC and △A'B'C' are _____ triangles. So, SSA guarantees congruent triangles, but ONLY when the two triangles are _____ triangles. Since it only happens with _____ triangles, we don't call it SSA. Instead, we call it **Hypotenuse Leg Congruence (HL≅)**.

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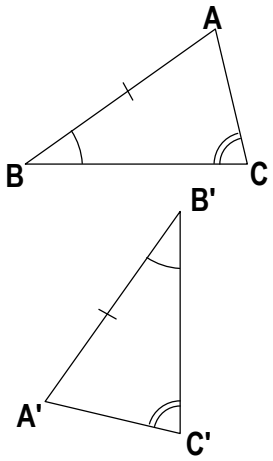
(3) ☐ We have looked at SAS, ASA, SSS, AAA, SSA, and the special case of SSA which is HL. CIRCLE the shortcuts that guarantee congruent triangles. Are there any other shortcuts? What about AAS?



☐ (a) Use the diagram at right to describe the similarities between AAS and ASA.

_____

☐ (b) Use the diagram at right to describe the differences between AAS and ASA.

_____

☐ (c) Lets give angles B and C angle measures to see what we can say about the triangles. Let B = 30° and C = 70°. Based on this information, write the measure of each of the angles below:

A = _____ B' = _____ C' = _____ A' = _____

What do you notice about C and C'?_____

☐ (d) Prove what you observed in part (c).

(1) An equation for △ABC is _____ + _____ +_____ = _____

(2) An equation for △A'B'C' is _____ + _____ +_____ = _____

(3) We know that _____ + _____ + _____ = _____ + _____ + _____ because we can substitute _____ _____.

(4) We also know that _____ + _____ = _____ + _____ because the angle pairs are congruent.

(5) We can write _____ + _____ + _____ = _____ + _____ + _____ by substituting equal values from step 4 into the equation from step 2.

(6) Now we know that _____ = _____.

☐ (e) SO WHAT? Well, we can always force an AAS situation into an ASA situation like we did above, but that is a lot of extra work. Since we learned in (d) that we can **always** force AAS into ASA, we can just use _____ as a shortcut for proving triangles congruent and not bother with the extra work of forcing _____ into ASA.

(3) ☐ Complete the triangle congruence notes on the Unit 5 notes packet.

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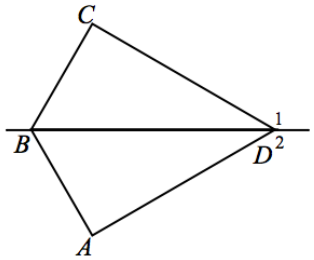
(4) ☐ Given $\overline{BC} \perp \overline{CD}$, $\overline{AB} \perp \overline{AD}$, $\angle 1 \cong \angle 2$ (HINTS: 6 steps, you'll need linear pair OR exterior angle theorem)

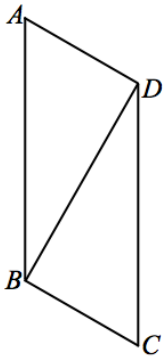
Prove: $\triangle BCD \cong \triangle BAD$



Choose which to use
SAS≅
ASA≅
SSS≅
AAS≅
HL≅

(5) ☐ Given $\overline{AD} \perp \overline{BD}$, $\overline{BD} \perp \overline{BC}$, $\overline{AB} \cong \overline{CD}$ (HINTS: 4+ steps)

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

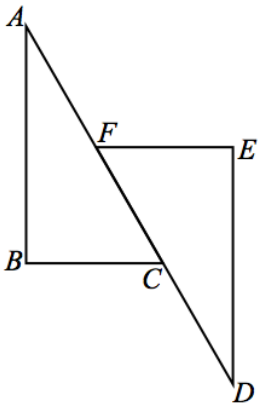


Choose which to use
SAS≅
ASA≅
SSS≅
AAS≅
HL≅

5.4

(6) ☐ Given $\overline{AB} \perp \overline{BC}$, $\overline{DE} \perp \overline{EF}$, $\overline{BC} \parallel \overline{EF}$, $\overline{AF} \cong \overline{DC}$ (HINTS: ≅ segments + same segment are =)

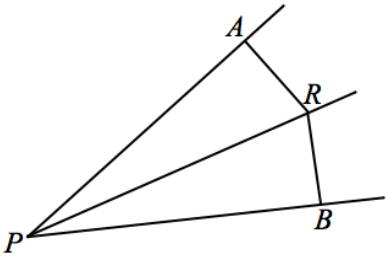
Prove: △ABC ≅ △DEF



Choose which to use
SAS≅
ASA≅
SSS≅
AAS≅
HL≅

(7) ☐ Given $\overline{PR} \perp \overline{AR}$, $\overline{PB} \perp \overline{BR}$, R is equidistant from $\overline{PA}$ and $\overline{PB}$ (HINTS: 7+ steps, equidistant means . . .)

Prove: $\overline{PR}$ bisects ∠APB

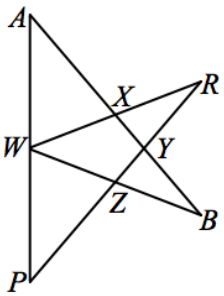


Choose which to use
SAS≅
ASA≅
SSS≅
AAS≅
HL≅

5.4

(8) ☐ Given $\angle A \cong \angle P$, $\angle B \cong \angle R$, W is the midpoint of $\overline{AP}$ (HINTS: 4+ steps, what does midpoint give us, use highlighters or redraw)

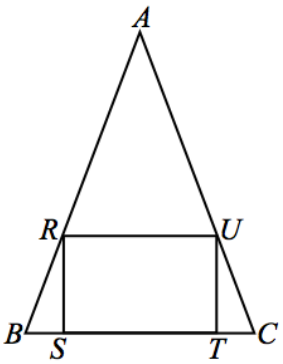
Prove: $\overline{RW} \cong \overline{BW}$



Choose which to use
SAS≅
ASA≅
SSS≅
AAS≅
HL≅

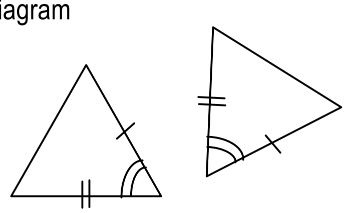
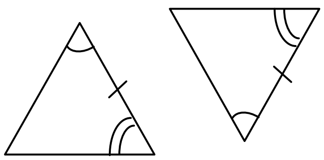
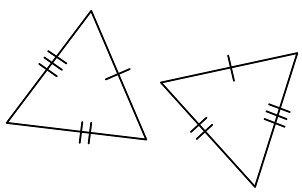
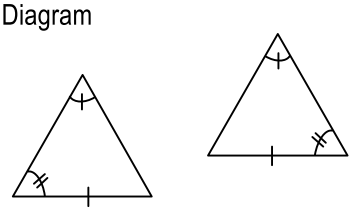
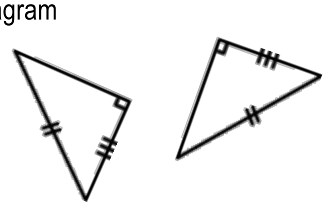
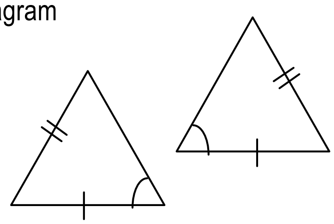
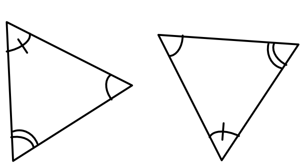
(9) ☐ Given $\overline{BR} \cong \overline{CU}$, rectangle RSTU (HINTS: 6+ stepsprove △RBS≅△UCT, what do we know about rectangle sides and angles, can we get ≅ base angles to prove ≅ sides)

Prove: △ARU is isosceles



Choose which to use
SAS≅
ASA≅
SSS≅
AAS≅
HL≅

5.4 PROOF NOTES: TRIANGLE CONGRUENCE PAGE 1

Diagram 	Abbreviation Guarantees congruence YES or NO	Description
Diagram 	Abbreviation Guarantees congruence YES or NO	Description
Diagram 	Abbreviation Guarantees congruence YES or NO	Description
Diagram 	Abbreviation Guarantees congruence YES or NO	Description
Diagram 	Abbreviation Guarantees congruence YES or NO	Description
Diagram 	Abbreviation Guarantees congruence YES or NO	Description
Diagram 	Abbreviation Guarantees congruence YES or NO	Description

5.4 PROOF NOTES PAGE 2

Term	Diagram	What do I get out of having this information?
Angle Bisector Abbreviation or Symbol **None**		_____
Term **Segment Bisector** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____
Term **Midpoint** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____
Term **Parallel Lines** Abbreviation or Symbol	Diagram	What do I get out of having this information? **(also 4.2 & 4.5 notes)** _____ _____ _____ _____
Term **Vertical Angles** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____
Term **Linear Pair** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____
Term **Triangle Sum** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____

5.4 PROOF NOTES PAGE 3

Term	Diagram	What do I get out of having this information?
Reflexive Property Abbreviation or Symbol **None**		_____
Term **Isosceles Triangle And Isosceles Triangle Theorem** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____ _____
Term **Perpendicular Lines** Abbreviation or Symbol	Diagram	What do I get out of having this information? _____
Term **Exterior Angle Theorem** Abbreviation or Symbol **None**	Diagram	What do I get out of having this information? _____
Term **Substitution of equal values** Abbreviation or Symbol **None**	Example	What do I get out of having this information? _____
Term **Inverse operations** Abbreviation or Symbol **None**	Example	What do I get out of having this information? _____
Term **$\cong\triangle$'s have $\cong$ corresp. parts** Abbreviation or Symbol **None**	Diagram/Example	What do I get out of having this information?

5.4 PROOF NOTES PAGE 4

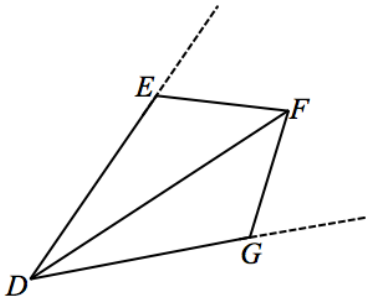
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?
Term Abbreviation or Symbol	Diagram/Example	What do I get out of having this information?

5.4 Exit Ticket Name_____Per_____

- ☐ I got this!
- ☐ I can with a bit of help
- ☐ I will, given lots of help
- ☐ I can't
- ☐ I won't bother to
- ☐ I refuse to

Write a proof.

☐ Given: $\overline{DE} \cong \overline{DG}$, $\overline{EF} \cong \overline{GF}$ Prove: $\overline{DF}$ bisects $\angle EDG$



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