(DN) Draw isosceles triangle ABC with AB = BC and isosceles
triangle BCD with BD = CD but neither BD nor CD is equal
to AB. (Remember that each letter should only be used
once in a diagram.)

Name _____**Per**_____

LO: I can use SAS ≅ to prove properties of isosceles
triangles including the isosceles triangle theorem.

☐ (1)   **Congruence: Proving properties – base angles of an isosceles triangle**

transparen
cies, dry
erase
markers,
eraser,
compass,
straightedg
e

(1) ☐ Prove: If a triangle is isosceles then the base angles are congruent.

(Add an auxiliary line that bisects the vertex angle.)
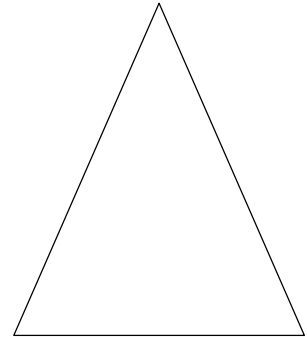
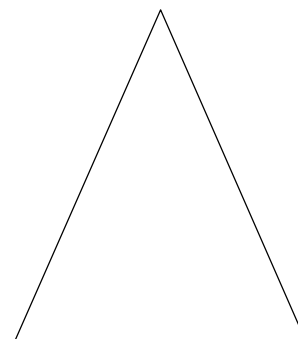| I know that . . .	because . . .

☐ **(1)** **Congruence: Proving properties – Base angles of an isosceles triangle take 2**
cont.

☐ Prove: If a triangle is isosceles then the base angles are congruent.

What does isosceles mean?   *What are base angles?*

① _____ because it is given.

(Label the triangle with letters and mark congruent parts based on definitions.)

② Side _____ ≅ _____ because △_____ is _____.

(What congruent parts did you mark?)

③ _____ bisects the vertex angle → ∠_____ because I can construct an auxiliary line segment.

(Where is the vertex angle? What does bisect mean? The segment needs a letter where it intersects the base of the triangle.)

④ ∠_____ ≅ ∠_____ because segment _____ is the _____ of _____.

(Should you have congruent angles from step 3? Where? Why? Do you have to name them with 3 letters? Mark this fact in the diagram.)

⑤ _____ ≅ _____ because the segment is the same as itself (reflexive property)

(What segment is a side of both triangles? Mark this fact in the diagram.)

⑥ △_____ ≅ △_____ because of _____ triangle congruence.

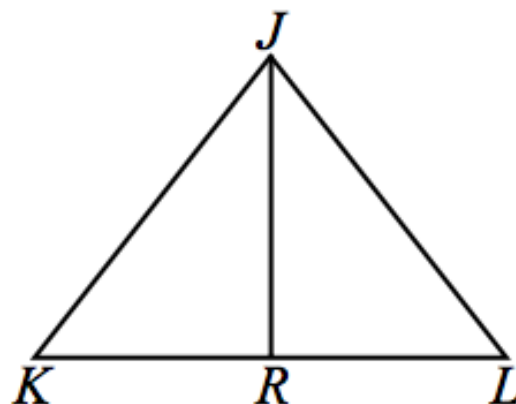*(Check your facts from steps 2, 4, and 5. Is that enough to prove the triangles are congruent? See lesson 5.1)*

⑦ _____ ≅ _____ because when triangles are congruent, all corresponding angle pairs and side pairs are _____. Since _____ and _____ are _____ and are _____ _____ we can say that _____

_____

(What were we trying to prove? What are the base angles?)

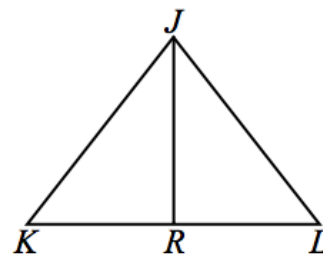☐ (2)   **Congruence: Proving properties – Perpendicular**

☐ Given: $\overline{JK} \cong \overline{JL}$, $\overline{JR}$ bisects ∠KJL   Prove: $\overline{JR} \perp \overline{KL}$

☐ (2) **Congruence: Proving properties – Perpendicular take 2**
cont.

☐ Given: $\overline{JK} \cong \overline{JL}$, $\overline{JR}$ bisects ∠KJL   Prove: $\overline{JR} \perp \overline{KL}$

① I am given _____ AND _____.

(Mark congruent parts in the diagram.)

② ∠ _____ ≅ ∠ _____ because _____ bisects _____.

(What was bisected? What does bisect mean? What congruent parts did you mark?)

③ _____ ≅ _____ because the segment is the same as itself (reflexive property)

(What segment is a side of both small triangles? Mark this fact in the diagram.)

④ _____ ≅ _____ because of _____ triangle congruence.

(Check your facts from steps 1,2, and 3. Is that enough to prove the triangles are congruent? See lesson 5.1)

⑤ _____ ≅ _____ because when triangles are congruent, all corresponding angle pairs and corresponding side pairs are _____.

(What were we trying to prove? What angles will help us do that?)

⑥ _____ + _____ = 180° because they are a linear pair.

(How can 180° help us get to 90°?)

⑦ _____ + _____ = 180° by substitution

(How can we put the information from steps 5 and 6 together?)

⑧ 2(_____) = 180° by combining like terms

(How can we use information from step 7 to help us get what we want for step 9?)
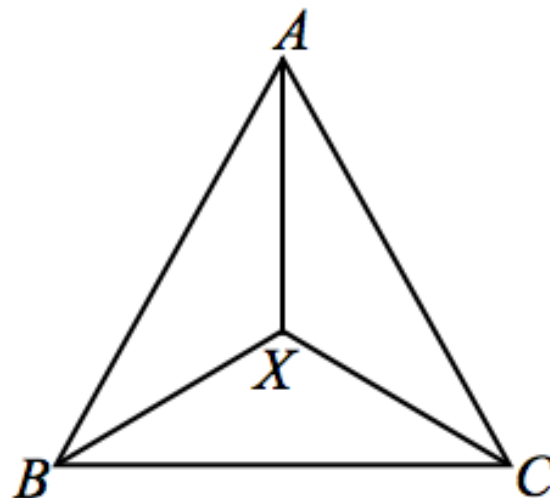
⑨ _____ = _____° by _____ _____

(What kind of angles will help us get what we want in step 10?)

⑩ _____ ⊥ _____ because lines are _____ when they intersect at _____° angles.

(What were we trying to prove? What type of angles will help us do that?)

☐ (3)   **Congruence: Proving properties – angle bisector**

☐ Given: $\overline{AB} \cong \overline{AC}$, $\overline{XB} \cong \overline{XC}$ Prove: $\overline{AX}$ bisects ∠BAC
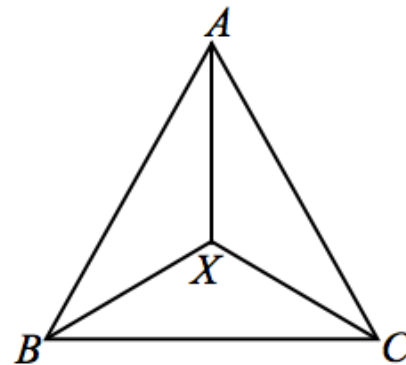
☐ (3)   **Congruence: Proving properties – angle bisector take 2**
cont.

☐ Given: $\overline{AB} \cong \overline{AC}$, $\overline{XB} \cong \overline{XC}$ Prove: $\overline{AX}$ bisects ∠BAC

① _____ AND _____ because it is given.
(Mark congruent parts.)

② ∠ABC ≅ ∠ _____ and ∠XBC ≅ ∠ _____ because base angles of
_____ .
(Refer to notes from lesson 4.5.)

③ ∠ABX = ∠ABC − ∠_____   and   ∠ACX = ∠_____ − ∠_____
   because _____
(What equations can we write with the angles we know?)

④ ∠ABC − ∠_____ = ∠_____ − ∠_____
   because _____
Therefore ∠ABX = ∠ACX
   because _____
(What equations can we write with the angles we know?)

⑤ △_____ ≅ △_____ because _____.
(Which angles must be congruent to prove that?)

⑥ ∠_____ ≅ ∠_____ because when triangles are congruent, all corresponding angle pairs and
corresponding side pairs are _____.
(What were we trying to prove? What angles will help us do that?)

⑦ $\overline{AX}$ bisects ∠_____ because when 2 adjacent angles are congruent, the larger angle formed by the two
angles must have been cut in half (bisected).
(What does bisect mean? What evidence will show us that an angle is bisected?)

☐ (4) **Congruence: Proving properties – isosceles**

☐ Given: $\overline{JX} \cong \overline{JY}$, $\overline{KX} \cong \overline{LY}$ Prove: △JKL is isosceles
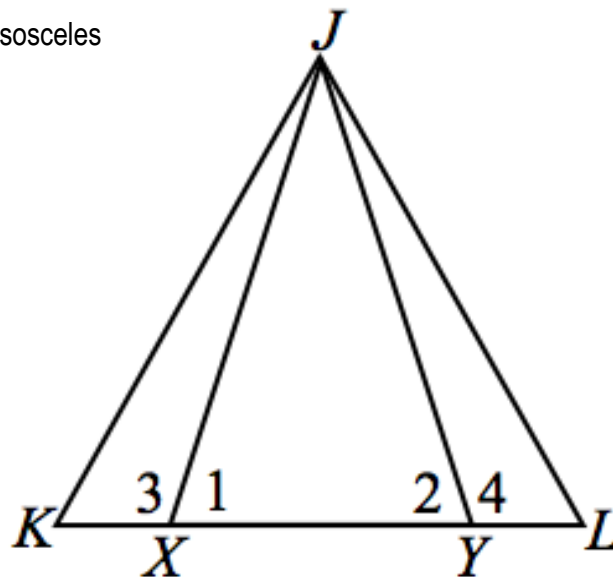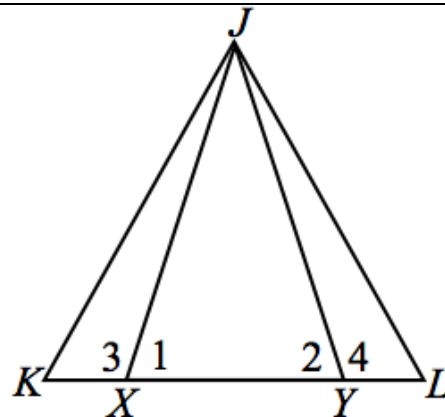
☐ **(4)** **Congruence: Proving properties – isosceles take 2**
cont.

☐ Given: $\overline{JX} \cong \overline{JY}$, $\overline{KX} \cong \overline{LY}$ Prove: △JKL is isosceles

① I am given _____ AND _____.
(Mark congruent parts.)

② ∠____ ≅ ∠____ because base angles of an _____
_____ are_____.
(Refer to notes from lesson 4.5.)

③ ∠____ + ∠____ = _____   and   ∠____ + ∠____ = _____
because _____
(What angle relationships do you see with angles 1, 3, 2, and 4?)

④ ∠____ + ∠____ = ∠____ + ∠____ because _____
Therefore ∠____ = ∠____ because _____
(Since angles 1 and 2 are equal, what can we do to simplify the equation? Mark the diagram.)

⑤ △_____ ≅ △_____ because _____.
(Which pair of triangles should we prove congruent to get the congruent segments we want?)

⑥ _____ ≅ _____ because when triangles are congruent, all corresponding angle pairs and corresponding side pairs are _____.
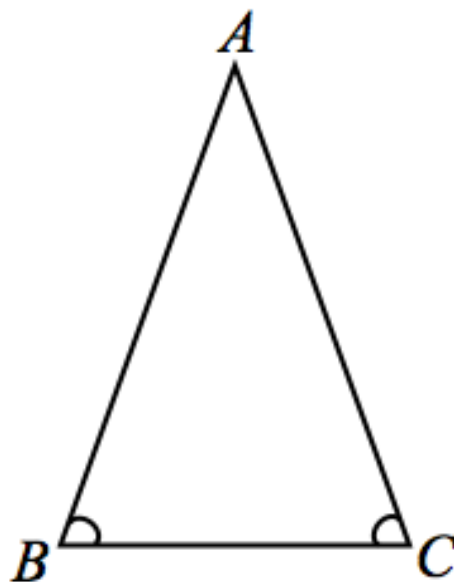*(What were we trying to prove? What segments will help us do that?)*

⑦ △JKL is isosceles because it has _____ congruent sides, side _____ and side _____.
(What does isosceles mean? What evidence will show us that a triangle is isosceles?)

☐ (5) **Congruence: Proving properties – equal sides**

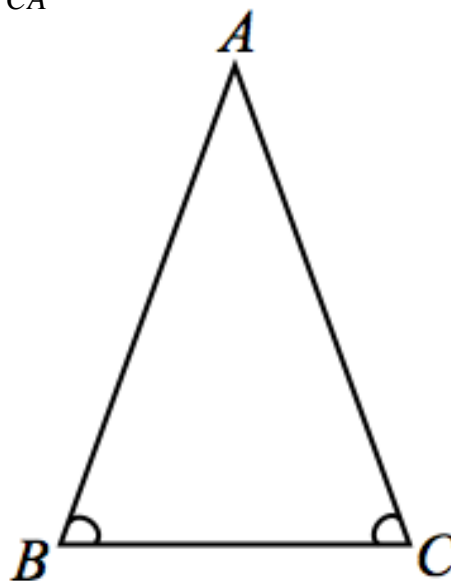☐ Given: △ABC with ∠CBA ≅ ∠BCA   Prove: $\overline{BA} \cong \overline{CA}$

☐ (5)   **Congruence: Proving properties – equal sides take 2**
cont.

☐ Given: △ABC with ∠CBA ≅ ∠BCA   Prove: $\overline{BA} \cong \overline{CA}$

① I am given _____ .
(Mark congruent parts.)

② Construct the perpendicular bisector of $\overline{BC}$ and label the point of intersection D.

Now, ∠_____ = ∠_____ = _____° and

_____ ≅ _____ because _____

_____

_____

(Refer to unit 2. What do we know when we have a perpendicular bisector? Mark this in your diagram)

③ When reflected across the perpendicular bisector, ray BA and ray _____ coincide because points B and _____ coincide and ∠B and ∠C are _____. Point A must be on the perpendicular bisector because the rays intersect at point ____ which means _____ must coincide with itself when the rays coincide. The only way for this to occur is if point A is on the _____ _____

(Does A have to be on the perpendicular bisector?)

④ _____ ≅ _____ because the segment is the same as itself (reflexive property)

(What segment is a side of both triangles? Mark this fact in the diagram.)

⑤ △_____ ≅ △_____ because _____ .

*(Which pair of triangles should we prove congruent to get the congruent segments we want?)*

⑥ _____ ≅ _____ because when triangles are congruent, all corresponding angle pairs and corresponding side pairs are _____ .

(What were we trying to prove? Could we prove it if we had congruent triangles?)

☐ (6)   **Congruence: Proving properties – Base angles of an isosceles triangle take 2**

☐ Given: △ABC, $\overline{XY}$ bisects ∠BYA and $\overline{BC} \parallel \overline{XY}$,
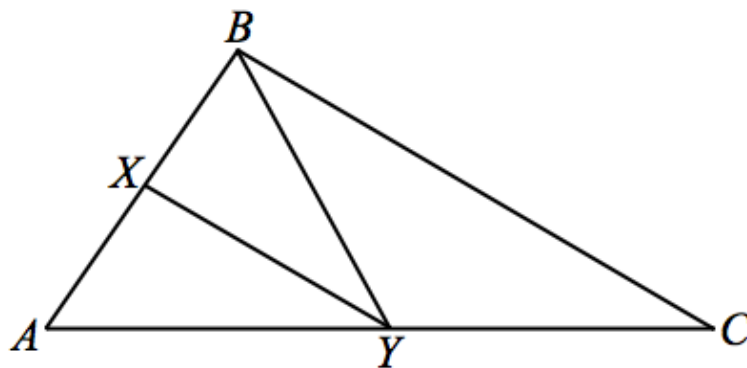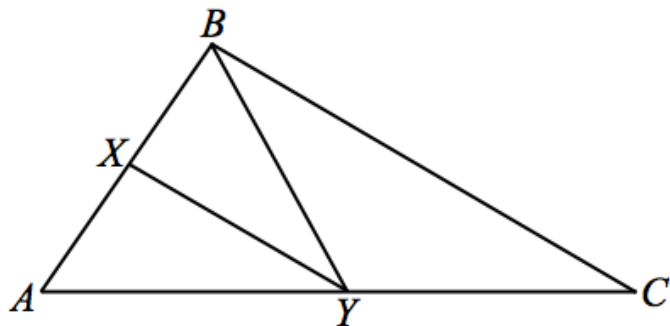
Prove: $\overline{YB} \cong \overline{YC}$

☐ (6) **Congruence: Proving properties – Base angles of an isosceles triangle take 2**
cont.

☐ Given: △ABC, $\overline{XY}$ bisects ∠BYA and $\overline{BC} \parallel \overline{XY}$,

Prove: $\overline{YB} \cong \overline{YC}$

① I am given _____
_____.

② ∠____ ≅ ∠____ because _____
_____
(What does bisect mean? Mark the diagram.)

③ ∠____ ≅ ∠____ because _____
_____
(What do we get out of parallel lines? Refer to notes from lesson 4.5. Mark the diagram.)

④ ∠____ ≅ ∠____ because _____
_____
(What do we get out of parallel lines? Refer to notes from lesson 4.5. Mark the diagram.)

⑤ _____ ≅ _____ because _____.
(What congruent angles will help us prove that the segments are congruent?)

⑥ _____ ≅ _____ because _____.
(Can we prove that segments are congruent? Can we show that base angles of a triangle are congruent so we can get congruent sides?)

☐ (7) **Exit Ticket**

    ☐ Given: $\overline{CD}$ bisects ∠BCA

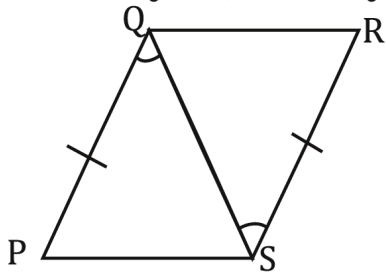 $\overline{CA} \cong \overline{CB}$
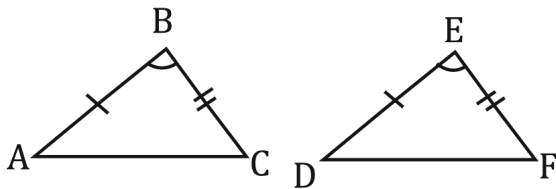
    Prove: $\overline{AD} \cong \overline{BD}$
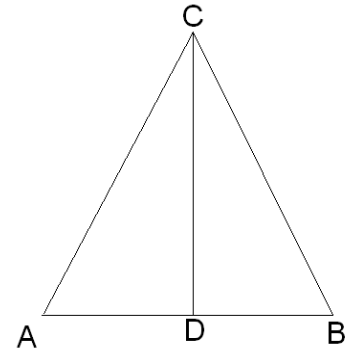
☐ (8) **Homework**

(1) Given: $\overline{PQ} \cong \overline{RS}$, and ∠PQS≅∠RSQ

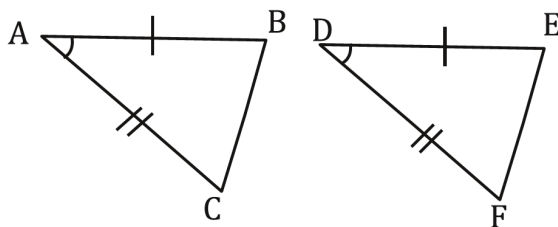   Prove: △ABC≅△DBC

(2) Given: $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, and ∠B≅∠E

    Prove: △ABC≅△DEF

(3) Given: $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and ∠A≅∠D

    Prove: △ABC≅△DEF

☐ (8) **Homework**
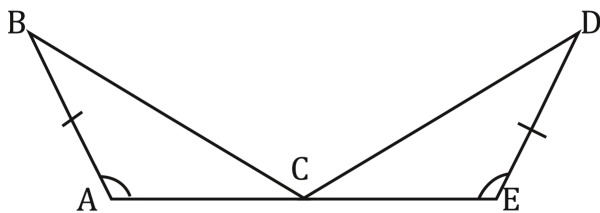
(4)   Given: $\overline{AB}\cong\overline{DC}$, $\overline{AB}\|\overline{DC}$, and $\overline{BC}\cong\overline{CE}$
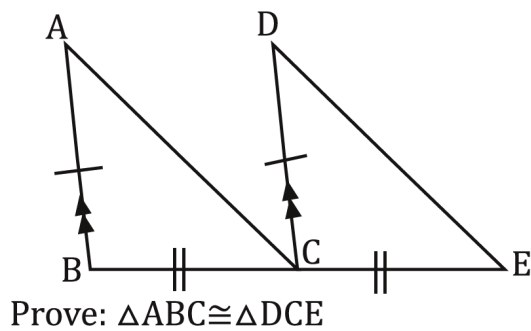
Prove: △ABC≅△DCE

(5) Given: $\overline{AB}\cong\overline{CD}$, ∠ABD≅∠CDB
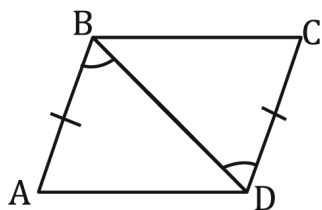
Prove: △ABD≅△CDB

(6) Given: C is the midpoint of $\overline{AE}$, $\overline{BA}\cong\overline{DE}$, and ∠A≅∠E

Prove: △ABC≅△EDC