Geometry Practice: G.G.28 #6
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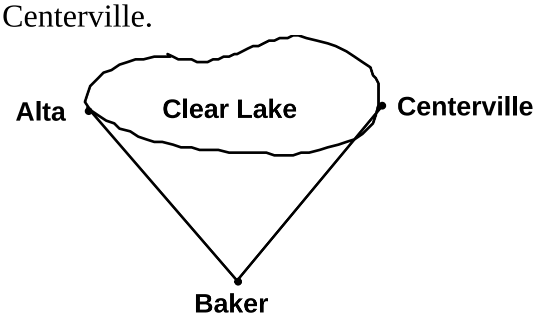
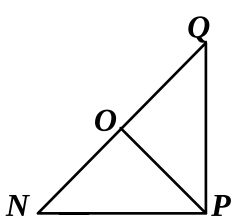
P.I. G.G.28: Determine the congruence of two triangles by using one of the five congruence techniques (SSS, SAS, ASA, AAS, HL), given sufficient information about the sides and/or angles of two congruent triangles

1. Clear Lake lies between Alta and Centerville. If you know the distance from Baker to Alta and Baker to Centerville, explain how you could use congruent triangles to find the distance across the lake from Alta to Centerville.



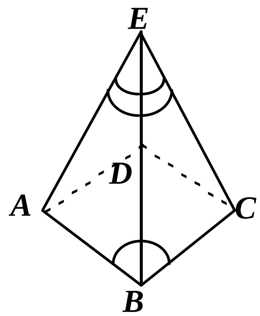
2. Write a flow proof, a two column proof, or a paragraph proof.
Given: $\overline{QO} \perp \overline{PO}$, $\overline{NO} \perp \overline{PO}$, and $\overline{NO} \cong \overline{QO}$.
Prove $\Delta QOP \cong \Delta NOP$.



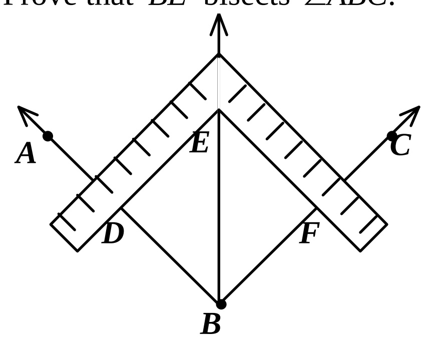
3. Write the inverse of Postulate 8.1: If three sides of one triangle are congruent to three sides of another triangle, then the two triangles are congruent. Use it to show that if $\Delta A'B'C'$ is the image of ΔABC under a dilation with scale factor 2, then $\Delta A'B'C'$ and ΔABC are not congruent.

4. Draw two congruent triangles. Use the SSS or SAS postulate to show that they are congruent.

5. Given $\angle ABE \cong \angle CBE$ and $\angle AEB \cong \angle CEB$, use a two-column proof to show that $\overline{AB} \cong \overline{CB}$.

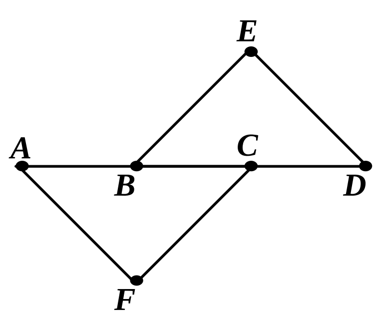


6. A carpenter may bisect an angle using a steel square such as follows: Mark off D on $\overrightarrow{BA}$ and F on $\overrightarrow{BC}$ such that $\overline{BD} \cong \overline{BF}$. Then adjust the square so that $\overline{ED} \cong \overline{EF}$ as shown. Prove that $\overline{BE}$ bisects $\angle ABC$.



7. Point A is on the line $y + 3x = 2$ and is equidistant from points B and C, both of which lie on the line $y = \frac{1}{3}x + 8$. D is on the intersection of both lines. Prove that $y + 3x = 2$ bisects $\overline{BC}$.

8. Write a two-column proof.
Given: $\overline{AB} \cong \overline{CD}$, $\angle A \cong \angle D$, and $\overline{AF} \cong \overline{DE}$.
Prove $\Delta FAC \cong \Delta EDB$.



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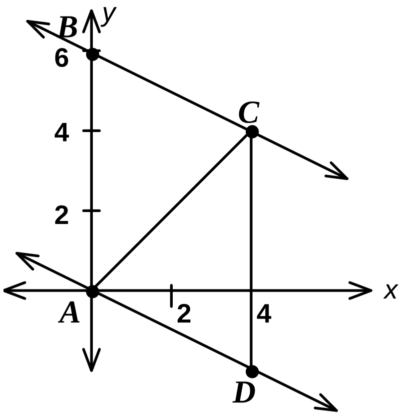
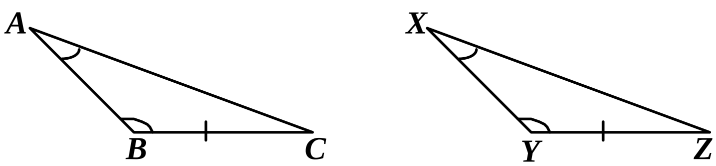
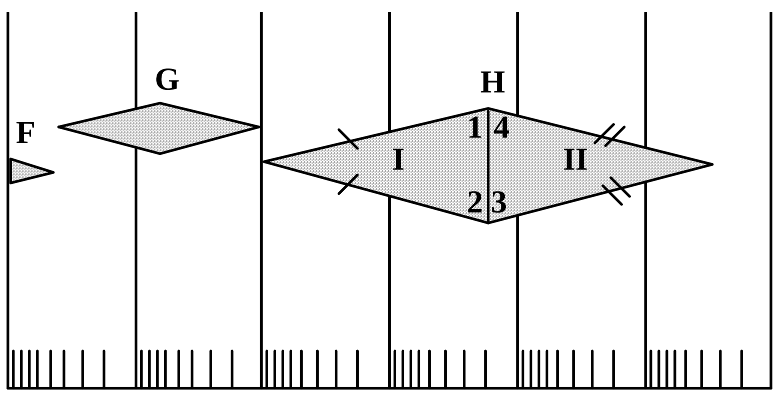
9. Prove that $\Delta ABC \cong \Delta CDA$.



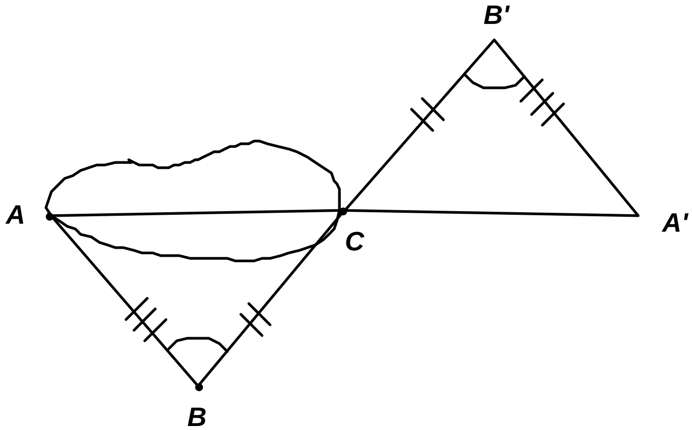
10. Write a two-column proof.
Given: $\angle A \cong \angle X$, $\angle B \cong \angle Y$, $\overline{BC} \cong \overline{YZ}$
Prove: $\Delta ABC \cong \Delta XYZ$



11. The diagram shows visible light waves(F), ultraviolet light(G), and X-rays(H). Outline a proof that triangles I and II are congruent, given $\angle 1 \cong \angle 4$.



[1] Draw another triangle with distances equal to $\overline{AB}$ and $\overline{BC}$ and $\angle B \cong \angle B'$. Measure $\overline{A'C}$. Because the angles are congruent(SAS), $\overline{AC} \cong \overline{A'C}$.



[2] Check students' work. They should show that $\angle NOP$ and $\angle QOP$ are right angles and that they are congruent. Because $\overline{NO} \cong \overline{QO}$ and $\overline{PO} \cong \overline{PO}$, the triangles are congruent by SAS.

[3] If three sides of one triangle are not congruent to three sides of another triangle, then the two triangles are not congruent. Under the dilation, each side in $\Delta A'B'C'$ would be twice the length of the corresponding side in ΔABC, so the sides are not congruent. Hence, the triangles are not congruent.

[4] Check students' work.

[5] Check students' work. They should show that $\Delta ABE \cong \Delta CBE$ using ASA and that $\overline{AB}$ and $\overline{CB}$ are corresponding parts of congruent triangles.

[6] Check students' work. They should show that $\Delta DBE \cong \Delta FBE$ by SSS and therefore $\angle DBE \cong \angle FBE$ by CPCTC. Thus the angle is bisected by definition.

[7] Check students' proofs. They should show that $y + 3x = 2$ is perpendicular to $\overline{BC}$ because its slope (-3) is the negative reciprocal of that of $\overline{BC}$ $\left(\frac{1}{3}\right)$. Then, because *A* is equidistant from *B* and *C*, $\overline{AB} \cong \overline{BC}$. Also, $\overline{AD} \cong \overline{AD}$, so $\Delta ABD \cong \Delta ACD$ by HL. Thus $\overline{BD} \cong \overline{CD}$ and the line bisects $\overline{BC}$.

[8] Check students' work. They should show that $\overline{AC} \cong \overline{BD}$ by adding *BC* to *AB* and *CD* and then using SAS.

[9] $\overline{BC} \parallel \overline{AD}$ since they have the same slope. So, $\angle BCA \cong \angle DAC$ by the Alt. Int. Angles Post. Similarly, $\overline{AB} \parallel \overline{DC}$ since they have the same slope. So, $\angle BAC \cong \angle DCA$. $\overline{AC} \cong \overline{CA}$, so the triangles are congruent by ASA. Other congruence strategies would also work.

[10] Check students' work. Use AAS.

[11] Because the triangles are isosceles, $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$. Since the base of the triangles is congruent to itself, the triangles are congruent by ASA.