Learning Targets:

- Apply congruence criteria to figures on the coordinate plane.
- Prove the AAS criterion and develop the HL criterion.

SUGGESTED LEARNING STRATEGIES: Visualization, Discussion Groups, Debriefing

You can use the triangle congruence criteria on the coordinate plane.

1. Reason quantitatively. Greg's boss hands him a piece of graph paper that shows the plans for a truss. Greg's boss asks him if he can prove that \( \triangle DBE \) is congruent to \( \triangle FCE \).

![Graph showing \( \triangle DBE \) and \( \triangle FCE \)]

a. Use the distance formula to find each length.

\[
\begin{align*}
BD &= 3\sqrt{2} \\
CF &= 3\sqrt{2} \\
DE &= 5 \\
FE &= 5 \\
BE &= \sqrt{13} \\
CE &= \sqrt{13}
\end{align*}
\]

b. Can Greg use this information to prove that \( \triangle DBE \cong \triangle FCE \)? Explain.

\[ \triangle DBE \cong \triangle FCE \text{ by SSS} \]

2. In Item 5 of Lesson 11-2, you discovered that SSS, SAS, and ASA are not the only criteria for proving two triangles are congruent. You also discovered that there is an AAS congruence criterion. What does the AAS congruence criterion state? Mark the triangles below to illustrate the statement.

![Diagram illustrating AAS congruence criterion]
4. Below are pairs of triangles in which congruent parts are marked. For each pair of triangles, name the angle and side combination that is marked and tell whether the triangles appear to be congruent.

(a.)

SSA, yes
appear to be

(b.)

SSA, no
not

(c.)

SSA

(d.)

SSA

5. We know that in general SSA does not always determine congruence of triangles. However, for two of the cases in Item 4 the triangles appear to be congruent. What do the congruent pairs of triangles have in common?

They both have a pair of right angles.
Lesson 11-4
Extending the Congruence Criteria

6. In a right triangle, we refer to the correspondence SSA shown in Items 4a and 4c as hypotenuse-leg (HL). Write a convincing argument in the space below to prove that HL will ensure that right triangles are congruent.

7. Is it possible to prove that △LKM ≅ △JKM using the HL congruence criterion? If not, what additional information do you need?

NO, you need KM + JL + KM ≅ KM by reflexive to prove △'s ≅ by HL.

8. Do you think there is a leg-leg congruence criterion for right triangles? If so, what does the criterion say? If not, why not? Review your answers. Be sure to check that you have described the situation with specific details, included the correct mathematical terms to support your reasoning, and that your sentences are complete and grammatically correct.
**LESSON 11-4 PRACTICE**

9. **Construct viable arguments.** On a coordinate plane, plot triangles $ABC$ and $DEF$ with vertices $A(-3, -1)$, $B(-1, 2)$, $C(1, 1)$, $D(3, -4)$, $E(1, -1)$, and $F(-1, -2)$. Then prove $\triangle ABC \cong \triangle DEF$.

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

10. $\triangle ABC \cong \triangle DEF$ (SSS)

11. $\triangle ABC \cong \triangle DEF$ (AAS)

12. $\triangle ABC \cong \triangle DEF$ (unknown)

13. $\overline{PQ}$ bisects $\angle SPT$.

$\triangle ABC \cong \triangle DEF$ (SSS)

So $BC \cong EF$, $AB \cong ED$ and $AC \cong FD$.

$\triangle ABC \cong \triangle DEF$ (SSS)