



WHY SSA IS NOT A CONGRUENCE CRITERION

Two Triangles, One, or None?

8 boxes · SSA and SAS · no preparation

FREE

1

Angle A is 30° . $AB = 12$ cm. The distance from B to the lower side is 6 cm. **$BC = 5$ cm.**

How many triangles ABC can be drawn?

No triangle → **go to box 8**

One triangle → **go to box 4**

Hint: Compare BC with the distance from B to the lower side.

2

Angle A is 30° . $AB = 10$ cm. The distance from B to the lower side is 5 cm. **$BC = 5$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 7**

Two triangles → **go to box 5**

Hint: Compare BC with the distance from B to the lower side.

3

Angle A is 30° . $AB = 10$ cm. The distance from B to the lower side is 5 cm. **$BC = 7$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 4**

Two triangles → **go to box 6**

Hint: Compare BC with the distance from B. Then compare BC with AB.

4

Angle A is 30° . $AB = 12$ cm. The distance from B to the lower side is 6 cm. **$BC = 9$ cm.**

How many triangles ABC can be drawn?

Two triangles → **go to box 6**

One triangle → **go to box 3**

Hint: Picture an arc of radius BC from B. Where can it meet the lower side?

5

Angle A is 30° . $AB = 12$ cm. The distance from B to the lower side is 6 cm. **$AC = 7$ cm.**

How many triangles ABC can be drawn?

Two triangles → **go to box 6**

One triangle → **go to box 1**

Hint: Name the sides that meet at A. Is the given length on either of them?

6

Angle A is 30° . $AB = 8$ cm. The distance from B to the lower side is 4 cm. **$AC = 5$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 1**

Two triangles → **go to box 5**

Hint: Check which sides meet at the angle at A.

1. **Give each student page 3.** No preparation.
2. **Say this once:** “Start at box 3. Pick an answer and go where it says. Write every box number in the row at the bottom.”
3. **Check the row of numbers.** A clean run is 3, 6, 1, 8, 2, 7, then out. Nothing else is needed.

Maze page 3, one per student.
Answers page 4, for you.

What each box asks. Every box gives the angle at A, the side AB, and the distance from B to the lower side of the angle. Then it gives one more side and asks how many triangles ABC fit. When the extra side is BC, the angle is not between the two sides (SSA). The answer can be two, one or none. Compare BC with the distance first. If BC is shorter, there is no triangle. If it is equal, there is one. If BC is between the distance and AB, there are two. If BC is longer than AB, there is one. In one box on the route the extra side is AC instead. Then the angle is between the two sides (SAS), and exactly one triangle fits.

Every wrong answer comes from one of two mistakes. Some students think SSA always gives two triangles. Others think three parts always give exactly one triangle, and do not believe “no triangle” is an answer. Each mistake sends the student to a box off the route with the same kind of question. Both answers there lead back to the route.

A long row of numbers means a student went off the route. Ask: “Imagine an arc of radius BC drawn from B. Where does it meet the lower side?”

Guessing does not get a student out. Every simple guessing rule, such as always taking the first answer, goes wrong within the first four boxes.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it.

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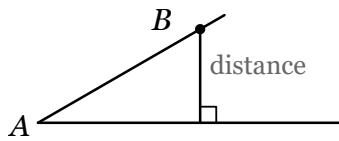
Maze — two triangles, one, or none?

Two sides and an angle

Name _____

Period _____

Date _____



Every box is about a triangle ABC like this one. C must be on the lower side of the angle.

Start at box 3. Read the lengths and pick an answer. Go to the box it names. Write each box number in the row at the bottom as you go. If a box sends you back, do that box again.

1

Angle A is 30° . $AB = 12$ cm. The distance from B to the lower side is 6 cm. **$BC = 5$ cm.**

How many triangles ABC can be drawn?

No triangle → **go to box 8**

One triangle → **go to box 4**

Hint: Compare BC with the distance from B to the lower side.

2

Angle A is 30° . $AB = 10$ cm. The distance from B to the lower side is 5 cm. **$BC = 5$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 7**

Two triangles → **go to box 5**

Hint: Compare BC with the distance from B to the lower side.

3

Angle A is 30° . $AB = 10$ cm. The distance from B to the lower side is 5 cm. **$BC = 7$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 4**

Two triangles → **go to box 6**

Hint: Compare BC with the distance from B. Then compare BC with AB.

4

Angle A is 30° . $AB = 12$ cm. The distance from B to the lower side is 6 cm. **$BC = 9$ cm.**

How many triangles ABC can be drawn?

Two triangles → **go to box 6**

One triangle → **go to box 3**

Hint: Picture an arc of radius BC from B. Where can it meet the lower side?

5

Angle A is 30° . $AB = 12$ cm. The distance from B to the lower side is 6 cm. **$AC = 7$ cm.**

How many triangles ABC can be drawn?

Two triangles → **go to box 6**

One triangle → **go to box 1**

Hint: Name the sides that meet at A. Is the given length on either of them?

6

Angle A is 30° . $AB = 8$ cm. The distance from B to the lower side is 4 cm. **$AC = 5$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 1**

Two triangles → **go to box 5**

Hint: Check which sides meet at the angle at A.

7

Angle A is 30° . $AB = 8$ cm. The distance from B to the lower side is 4 cm. **$BC = 6$ cm.**

How many triangles ABC can be drawn?

One triangle → **go to box 4**

Two triangles → **you are out!**

Hint: Compare BC with the distance from B. Then compare BC with AB.

8

Angle A is 30° . $AB = 6$ cm. The distance from B to the lower side is 3 cm. **$BC = 8$ cm.**

How many triangles ABC can be drawn?

Two triangles → **go to box 5**

One triangle → **go to box 2**

Hint: Compare BC with AB. The lower side starts at A.

Write every box number here, in order.

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The route, in order. Boxes 5 and 4 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

3 → 6 → 1 → 8 → 2 → 7 → out

Box	The lengths	Right answer, and why	Wrong answer, and why a student picks it
3	Angle A is 30° . AB = 10 cm. The distance from B to the lower side is 5 cm. BC = 7 cm.	Two triangles , go to box 6. BC (7 cm) is longer than the distance (5 cm) and shorter than AB (10 cm). The arc from B meets the lower side at two points, so two different triangles fit.	One triangle, go to box 4. A student who thinks three parts always fix one triangle picks this.
6	Angle A is 30° . AB = 8 cm. The distance from B to the lower side is 4 cm. AC = 5 cm.	One triangle , go to box 1. The angle at A is between AB and AC, so this is SAS. C is on the lower side, 5 cm from A: one point, so one triangle.	Two triangles, go to box 5. A student who reads AC as if it were BC (SAS read as SSA) picks this.
1	Angle A is 30° . AB = 12 cm. The distance from B to the lower side is 6 cm. BC = 5 cm.	No triangle , go to box 8. BC (5 cm) is shorter than the distance from B (6 cm). An arc of radius 5 cm from B cannot reach the lower side, so no triangle can be drawn.	One triangle, go to box 4. A student who does not believe that "no triangle" can be an answer picks this.
8	Angle A is 30° . AB = 6 cm. The distance from B to the lower side is 3 cm. BC = 8 cm.	One triangle , go to box 2. BC (8 cm) is longer than AB (6 cm). The arc meets the lower side once, then passes to the left of A, where there is no side. So one triangle fits.	Two triangles, go to box 5. A student who thinks SSA always gives two triangles picks this.
2	Angle A is 30° . AB = 10 cm. The distance from B to the lower side is 5 cm. BC = 5 cm.	One triangle , go to box 7. BC equals the distance from B (5 cm). The arc just touches the lower side at one point, so one triangle fits.	Two triangles, go to box 5. A student who thinks SSA always gives two triangles picks this.
7	Angle A is 30° . AB = 8 cm. The distance from B to the lower side is 4 cm. BC = 6 cm.	Two triangles , you are out. BC (6 cm) is longer than the distance (4 cm) and shorter than AB (8 cm). The arc from B meets the lower side at two points, so two different triangles fit.	One triangle, go to box 4. A student who thinks three parts always fix one triangle picks this.
5	Angle A is 30° . AB = 12 cm. The distance from B to the lower side is 6 cm. AC = 7 cm.	One triangle , go to box 1. The angle at A is between AB and AC, so this is SAS. C is on the lower side, 7 cm from A: one point, so one triangle.	Two triangles, go to box 6. A student who reads AC as if it were BC (SAS read as SSA) picks this.
4	Angle A is 30° . AB = 12 cm. The distance from B to the lower side is 6 cm. BC = 9 cm.	Two triangles , go to box 6. BC (9 cm) is longer than the distance (6 cm) and shorter than AB (12 cm). The arc from B meets the lower side at two points, so two different triangles fit.	One triangle, go to box 3. A student who thinks three parts always fix one triangle picks this.

A student can find the last four boxes of the route by following the arrows backward from “you are out.” So ask a student with a clean row to explain one box.