Word

1. A carpenter builds a triangular roof truss. Each side of the triangular frame measures 10 ft, 10 ft, and 12 ft. She builds a second truss with the same measurements.
How can she prove the two triangular trusses are congruent?

2. Two triangular flower beds in a park have sides measuring 8 m, 15 m, and 17 m.
If the side lengths match exactly, explain why the two beds are congruent and what postulate applies.

3. Two triangular steel supports on opposite sides of a small bridge each have angles measuring 50°, 60°, and 70°. The side between the 50° and 60° angles measures 9 ft in both triangles.
Are the supports congruent? Why?

4. A stained-glass artist designs two triangular glass panels. In each triangle, two sides measure 6 in and 8 in, and the included angle measures 45°.
Are the panels congruent? Explain.

5. A surveyor marks triangle ABC with sides 25 ft, 30 ft, and 35 ft. A second triangular lot DEF has the same side lengths.
How can the surveyor justify that the lots have identical shape and size?

6. Two triangular climbing supports have sides 5 ft, 12 ft, and 13 ft.
Explain why these supports must be congruent.

7. A kite is made by forming two triangles that share a common side. Each triangle has sides of 7 in, 9 in, and 10 in.
Explain how congruent triangles ensure the kite is symmetrical.

8. A designer cuts triangular tiles with sides measuring 9 cm, 9 cm, and 12 cm. Another batch of tiles has the same measurements.
Why will the tiles fit perfectly interchangeably?

9. Two triangular braces supporting a road sign each have angles of 30°, 60°, and 90°. The side between the 30° and 60° angles measures 8 ft.
Are the braces congruent? Which rule applies?

10. A trellis has two triangular decorative pieces. Each has two angles measuring 40° and 80°, and the included side measures 14 in.
Explain why the triangles are congruent.

11. Two triangular sails each have sides 15 ft, 20 ft, and 25 ft.
Prove that the sails are congruent.

12. A machinist cuts two triangular plates. Each has sides 11 cm and 13 cm with an included angle of 90°.
Are the plates congruent?

13. Two wall braces form right triangles. Each has legs measuring 9 ft and 12 ft.
Explain why the braces are congruent.

14. Two triangular flags have angles measuring 45°, 45°, and 90°. The side between the 45° angles measures 10 in.
Why are the flags congruent?

15. Two triangular supports each have sides 18 in, 24 in, and 30 in.
What congruence rule shows the supports match exactly?

16. A quilt pattern uses triangular pieces with sides measuring 4 in, 7 in, and 8 in. The seamstress cuts several identical pieces.
How can she verify they are congruent?

17. Two triangular dock braces have angles 35°, 65°, and 80°. The side between 35° and 65° measures 10 ft in each.
Are the braces congruent?

18. Two triangular fence supports each have sides 6 ft and 8 ft with the included angle measuring 120°.
What justifies that they are congruent?

19. Two triangular metal sculptures each have sides measuring 10 m, 14 m, and 16 m.
Explain how to confirm they are congruent.

20. Two triangular ramp supports each form right triangles. One leg measures 6 ft and the hypotenuse measures 10 ft in both supports.
Explain why the supports are congruent.

ACT/SAT – Triangle Congruence Practice

1. In triangles $\triangle ABC$ and $\triangle DEF$:

- $AB = DE = 7$
- $BC = EF = 9$
- $AC = DF = 12$

Which statement must be true?

A) The triangles are similar but not congruent
B) The triangles are congruent by SSS
C) The triangles are congruent by SAS
D) Not enough information

2. Triangles $\triangle PQR$ and $\triangle XYZ$ have:

- $PQ = XY = 8$
- $\angle Q = \angle Y = 60°$
- $QR = YZ = 10$

Which theorem proves the triangles congruent?

A) SSS
B) ASA
C) SAS
D) AAS

3. Two right triangles have:

- Hypotenuse = 13
- One leg = 5

Which statement is correct?

A) Congruent by SAS
B) Congruent by HL
C) Congruent by ASA
D) Not necessarily congruent

4. Triangles $\triangle ABC$ and $\triangle DEF$ have:

- $\angle A = \angle D = 45°$
- $\angle B = \angle E = 55°$
- $AC = DF = 7$

What additional information is needed to prove congruence?

A) $AB = DE$
B) $BC = EF$
C) No additional information is needed
D) $\angle C = \angle F$

5. Two triangles have:

- $AB = DE = 6$
- $BC = EF = 8$
- $\angle A = \angle D = 40°$

Can congruence be proven?

A) Yes, by SAS
B) Yes, by ASA
C) No, this is SSA and is not sufficient
D) Yes, by SSS

6. In isosceles triangle $\triangle ABC$, $AB = AC$. Point D is on BC such that $BD = DC$.

Which statement is true?

A) $\triangle ABD \cong \triangle ACD$ by SSS
B) $\triangle ABD \cong \triangle ACD$ by ASA
C) $\triangle ABD \cong \triangle ACD$ by SAS
D) Not enough information

7. If two triangles have three pairs of equal angles, what can you conclude?

A) They are congruent
B) They are similar but not necessarily congruent
C) They are congruent by ASA
D) They are congruent by AAS

8. Triangles $\triangle MNO$ and $\triangle RST$ have:

- $MN = RS = 9$
- $NO = ST = 12$
- $\angle N = \angle S = 90°$

Which postulate applies?

A) ASA
B) SAS
C) SSS
D) AAS

9. Two triangles share side AB.

- $AC = AD$
- $\angle CAB = \angle DAB$

Which additional fact proves $\triangle CAB \cong \triangle DAB$?

A) $CB = DB$
B) $\angle C = \angle D$
C) $AB = AB$
D) No additional fact is needed

10. Two triangles each have sides 7, 10, and 12.

Which statement must be true?

A) They are similar
B) They are congruent
C) They are right triangles
D) They cannot be congruent

ANSWER KEY

1. **B** – SSS
2. **C** – SAS
3. **B** – HL
4. **C** – Two angles imply third; AAS works
5. **C** – SSA is not sufficient
6. **C** – SAS (shared side, equal sides, vertical angle)
7. **B** – AAA gives similarity only
8. **B** – SAS
9. **C** – Reflexive property gives SAS
10. **B** – SSS

SAT-Level Triangle Congruence – Advanced Set

1. In triangle ABC, point D lies on BC.
Given:

- $AB = AC$
- $BD = DC$

Which statement must be true?

A) $\triangle ABD \cong \triangle ACD$ by SSS
B) $\triangle ABD \cong \triangle ACD$ by SAS
C) The triangles are similar but not congruent
D) Not enough information

2. In triangles $\triangle XYZ$ and $\triangle PQR$:

- $XY = PQ$
- $\angle X = \angle P$
- Exterior angle at Y equals exterior angle at Q

What can be concluded?

A) Congruent by SAS
B) Congruent by ASA
C) Similar only
D) Cannot be determined

3. Parallel Lines Trap

Lines $\ell_1 \parallel \ell_2$. A transversal forms triangles $\triangle ABC$ and $\triangle DEF$ such that:

- $AB = DE$
- $BC = EF$
- One pair of corresponding angles are equal (alternate interior)

Which is true?

A) Congruent by SAS
B) Congruent by ASA
C) Similar but not necessarily congruent
D) Not enough information

4. In triangle ABC, D is midpoint of AB and E is midpoint of AC.
If $AD = DB$ and $AE = EC$, which additional fact guarantees
$\triangle ADE \cong \triangle CDE$?

A) $DE = DE$
B) $\angle ADE = \angle CDE$
C) $AD = AE$
D) None — cannot be proven

5. Triangle ABC has vertices

$$A(0,0), B(6,0), C(0,8)$$

Triangle DEF has vertices

$$D(2,3), E(8,3), F(2,11)$$

What can be concluded?

A) Similar only
B) Congruent by SSS
C) Not congruent
D) Congruent by ASA

6. Triangles have:

- Side 10
- Side 14
- Angle opposite the 14-unit side is 40°

Which statement is correct?

A) Congruent by SAS
B) Congruent by SSS
C) Cannot conclude congruence (SSA case)
D) Congruent by AAS

7. Vertical Angles Reasoning

Lines intersect at point O.
Given:

- $AO = CO$
- $BO = DO$

Which additional information is sufficient to prove
$\triangle AOB \cong \triangle COD$?

A) $\angle AOB = \angle COD$
B) $AB = CD$
C) $\angle ABO = \angle CDO$
D) None

8. Triangles $\triangle MNP$ and $\triangle RST$ have:

- $MN = RS$
- $NP = ST$
- $MP = RT$

A student claims they are congruent by SAS.

What is the best evaluation?

A) Correct — SAS
B) Incorrect — SSS
C) Incorrect — AAA
D) Not enough information

9. In isosceles triangle ABC, $AB = AC$.
AD is an angle bisector of $\angle A$.

Which method proves
$\triangle ABD \cong \triangle ACD$?

A) ASA
B) SAS
C) AAS
D) SSS

10. Rectangle $ABCD$ has diagonal AC.

Which statement must be true?

A) $\triangle ABC \cong \triangle CDA$ by SAS
B) $\triangle ABC \cong \triangle CDA$ by SSS
C) $\triangle ABC \sim \triangle CDA$ only
D) Cannot be determined

ANSWER KEY

1. **D**
2. **B**
3. **A**
4. **D**
5. **B**
6. **C**
7. **A**
8. **B**
9. **B**
10. **B**