Unit 3 · Triangles & Congruence Cheat Sheet

Unit 3 focus: classifying triangles, angle sums, isosceles triangles and side–angle relationships

1 CLASSIFYING TRIANGLES

By sides	By angles
scalene: no congruent sides	**acute**: all angles $< 90^\circ$
isosceles: at least two congruent sides	**right**: one 90° angle
equilateral: three congruent sides	**obtuse**: one angle $> 90^\circ$

2 TRIANGLE SUM THEOREM

The interior angles of a triangle add to 180°.

Example: Angles 48°, 67°, x°
Equation: $115 + x = 180$
Answer: $x = 65^\circ$

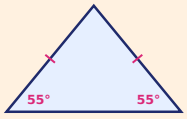
3 EXTERIOR ANGLE THEOREM

An exterior angle equals the sum of the two remote interior angles.

Example: Exterior 110°; remote angles 35° and x°
Equation: $110 = 35 + x$
Answer: $x = 75^\circ$

4 ISOSCELES TRIANGLES

- If two sides are congruent, the **base angles** opposite them are congruent.
- **Converse**: if two angles are congruent, the opposite sides are congruent.
- Vertex angle 70° → base angles $\frac{180-70}{2} = 55^\circ$ each.



5 TRIANGLE INEQUALITY & SIDES

- Any two sides must add to **more** than the third: 4, 6, 8 works ($4 + 6 > 8$); 2, 3, 6 does not ($2 + 3 < 6$).
- The longest side is opposite the largest angle; the shortest side is opposite the smallest angle.
- Third side range: $|a - b| < c < a + b$.

6 QUICK REMINDERS & COMMON MISTAKES

✔ Do remember

- Mark congruent sides with ticks and angles with arcs.
- Write congruent triangles in matching vertex order.
- Use the 180° sum first when angles are missing.

✘ Common mistakes

- Trusting how a picture looks: use the marks and the givens
- Base angles are opposite each other: they are opposite the congruent sides
- Exterior angle = 180 − sum: it equals the remote sum

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More practice: congruence shortcuts, CPCTC and two-column proofs

1 CONGRUENCE SHORTCUTS

Shortcut	Needs
SSS	three pairs of sides
SAS	two sides and the **included** angle
ASA	two angles and the **included** side
AAS	two angles and a non-included side
HL	right triangles: hypotenuse and a leg

Not enough: AAA (similar only) and SSA.

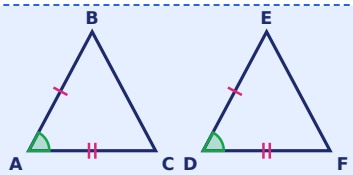
2 SAS EXAMPLE

The angle must be **between** the two sides.

Example: $AB = DE$, $AC = DF$, $\angle A = \angle D$

Shortcut: SAS

Answer: $\triangle ABC \cong \triangle DEF$



3 MATCHING ORDER

- $\triangle ABC \cong \triangle DEF$ means $A \leftrightarrow D$, $B \leftrightarrow E$, $C \leftrightarrow F$.
- So $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, $\angle C \cong \angle F$.

4 CPCTC

- **C**orresponding **P**arts of **C**ongruent **T**riangles are **C**ongruent.
- Use it only **after** you prove the triangles congruent.
- It is how you prove two sides or angles are equal.

5 TWO-COLUMN PROOF

Statement	Reason
$\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, $\overline{AC} \cong \overline{DF}$	Given
$\triangle ABC \cong \triangle DEF$	SSS
$\angle B \cong \angle E$	CPCTC

6 CHECK YOURSELF

- Is the angle in SAS (or side in ASA) really included?
- For HL, are both triangles right triangles?
- Did I write the vertices in matching order?
- Did I prove congruence before using CPCTC?