Unit 5 · Trigonometry of General Triangles Cheat Sheet

Unit 5 focus: right-triangle trig and the Law of Sines

1 RIGHT-TRIANGLE RATIOS

Ratio	Definition
sin θ	$\frac{\text{opp}}{\text{hyp}}$
cos θ	$\frac{\text{adj}}{\text{hyp}}$
tan θ	$\frac{\text{opp}}{\text{adj}}$

2 SOLVING A RIGHT TRIANGLE

Pick the ratio connecting the known side to the unknown.

Example: Angle 35°, hypotenuse 12. Opposite side?
sin 35° = x ÷ 12: x = 12 sin 35°

Answer: ≈ 6.88

3 THE LAW OF SINES

Use when you know	Formula
AAS or ASA	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
SSA (ambiguous)	check for 0, 1 or 2 triangles

4 LAW OF SINES (AAS)

Find the third angle, then use the ratio.

Example: A = 40°, B = 60°, a = 10. Find b.
Ratio: $b = \frac{10 \sin 60^\circ}{\sin 40^\circ}$

Answer: ≈ 13.47

5 ANGLES OF ELEVATION AND DEPRESSION

Elevation	**measured UP from the horizontal**
Depression	**measured DOWN from the horizontal**
They are equal	**alternate interior angles**

6 QUICK REMINDERS & COMMON MISTAKES

✔ Do remember

- Side a is opposite angle A.
- Angles in a triangle sum to 180°.
- Keep full precision until the end.

✘ Common mistakes

- Using sine law with SAS: use the Law of Cosines
- Calculator in radian mode: degree mode
- Rounding early: round at the end

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More practice: the Law of Cosines, the ambiguous case and triangle area

1 THE LAW OF COSINES

Use when you know	Formula
SAS	$c^2 = a^2 + b^2 - 2ab\cos C$
SSS	$\cos C = \frac{a^2+b^2-c^2}{2ab}$

2 LAW OF COSINES (SAS)

Use the included angle.

Example: a = 7, b = 9, C = 50°. Find c.

Compute: $49 + 81 - 126\cos 50^\circ$

Answer: ≈ 7.00

3 LAW OF COSINES (SSS)

Find the largest angle first (opposite the longest side).

Example: a = 5, b = 7, c = 8. Find C.

cos C: $\frac{25+49-64}{70} = \frac{1}{7}$

Answer: ≈ 81.8°

4 THE AMBIGUOUS CASE (SSA, A ACUTE)

Condition	Triangles
a < b sin A	0
a = b sin A	1 (right)
b sin A < a < b	2
a ≥ b	1

5 TRIANGLE AREA

Given	Area
two sides + included angle	$\frac{1}{2}ab\sin C$
three sides (Heron)	$\sqrt{s(s-a)(s-b)(s-c)}$, $s = \frac{a+b+c}{2}$

Sides 5, 7, 8: s = 10, area = √300 ≈ 17.32.

6 CHECK YOURSELF

- SAS / SSS → Law of Cosines; AAS / ASA → Law of Sines.
- For SSA, did I check for a second triangle?
- Is the longest side opposite the largest angle?
- Do my angles add to 180°?