2D Triangle Solution Worksheet

This worksheet allows you to solve a triangle knowing 3 values where, at least one, must be the length of a side.

Depending on the calculation mode (**AAS**, **ASA**, **SAS**, **SSA** or **SSS**) the menu dynamically changes indicating, what variables are inputs (**Black** colored buttons), and what variables are calculated (**Red** colored Buttons).

Each time a value is entered in an input variable by touching a black colored button, all the calculations are performed at once. If an input value results in an invalid triangle with no solution, "———" is shown as the calculated values.

In general, a triangle has a solution if some basic conditions are met:

• The length of sides 'a', 'b' and 'c' must be greater than 0.
• The sum of any two sides must be greater than the other side.
• The angles 'A', 'B' and 'C' must be greater than 0.
• The angles 'A', 'B' and 'C' must be less than π (180º)
• The sum of any two angles must be less than π (180º).

The following table summarize all the possibilities of the input and output buttons depending in the selected calculation mode:

Mode	Button	Description
[AAS ▶]	[Side 'a'] [Side 'b'] [Side 'c'] [Angle 'A'] [Angle 'B'] [Angle 'C']	Calculates the side 'a' length. Stores side 'b' length. Calculates the side 'c' length. Stores angle 'A' in current angle unit. Stores angle 'B' in current angle unit. Calculates the angle 'C'.
[ASA ▶]	[Side 'a'] [Side 'b'] [Side 'c'] [Angle 'A'] [Angle 'B'] [Angle 'C']	Calculates the side 'a' length. Calculates the side 'b' length. Stores side 'c' length. Stores angle 'A' in current angle unit. Stores angle 'B' in current angle unit. Calculates the angle 'C'.
[SAS ▶]	[Side 'a'] [Side 'b'] [Side 'c'] [Angle 'A'] [Angle 'B'] [Angle 'C']	Stores side 'a' length. Stores side 'b' length. Calculates the side 'c' length. Calculates the angle 'A'. Calculates the angle 'B'. Stores angle 'C' in current angle unit.
[SSA ▶]	[Side 'a'] [Side 'b'] [Side 'c'] [Angle 'A'] [Angle 'B'] [Angle 'C']	Calculates the side 'a' length. Stores side 'b' length. Stores side 'c' length. Calculates the angle 'A'. Stores angle 'B' in current angle unit. Stores angle 'C' in current angle unit.
[SSS ▶]	[Side 'a'] [Side 'b'] [Side 'c'] [Angle 'A'] [Angle 'B'] [Angle 'C']	Stores side 'a' length. Stores side 'b' length. Stores side 'c' length. Calculates the angle 'A'. Calculates the angle 'B'. Calculates the angle 'C'.
[Perimeter]		Calculates the triangle Perimeter.
[Area]		Calculates the triangle Area.

Example: (SSS)

In a triangle ABC, the sides are 6 cm, 10 cm and 14 cm. Show that the triangle is obtuse and the obtuse angle is 120º.

Solution: (DEG angle mode)

Keystrokes	Description
[SSS ▶]	Set 'SSS' calculation mode.
6 [Side 'a'] 10 [Side 'b'] 14 [Side 'c']	Store the 'a' side length. Store the 'b' side length. Store the 'c' side length.
[Angle 'C']	The Angle 'C' is 120º which is greater than 90º.

Example: (SAS)

Two sides of a triangle are 78 and 56 cm and their included angle is 60º. Solve the triangle. What is the triangle's area and perimeter?

Solution: (DEG angle mode)

Keystrokes	Description
[SAS ▶]	Set 'SAS' calculation mode.
78 [Side 'a'] 56 [Side 'b'] 60 [Angle 'C']	Store the 'a' side length. Store the 'b' side length. Store the 'C' angle in degrees.
[Perimeter]	The perimeter of the triangle is **203.66** cm
[Area]	The area of the triangle is **1,891.40** cm^2