

6.3 LAB
CONSTRUCTION TRIANGLES (Given: angle, side, side)

Website: <https://www.geogebra.org/m/JHgTXKrt>

In $\triangle ABC$, $AB=10\text{cm}$

- a. Try to construct $\triangle ABC$, angle A is 30° . For each length of side BC: 4cm, 5cm, 6cm, 8cm, 10cm, and 10.5 cm.

Length of BC	Value of BC/AB	How does BC/AB compare with Sin A? Note: $\sin 30^\circ = \frac{1}{2} = 0.5$	Description of possible triangles
4cm	$\frac{4\text{cm}}{10\text{cm}} = 0.4$	$0.4 < 0.5$	No triangles are possible
5cm	$\frac{5\text{cm}}{10\text{cm}} = 0.5$	$0.5 = 0.5$	1 Right Triangle
6cm	$\frac{6\text{cm}}{10\text{cm}} = 0.6$	$1 > 0.6 > 0.5$	2 scalene triangles
8cm	$\frac{8\text{cm}}{10\text{cm}} = 0.8$	$1 > 0.8 > 0.5$	2 scalene triangles
10cm	$\frac{10\text{cm}}{10\text{cm}} = 1$	$1 > 0.5$	1 isosceles triangle
10.5cm	$\frac{10.5\text{cm}}{10\text{cm}} = 1.05$	$1.05 > 0.5$	1 scalene triangle

- b. Repeat Part A for angle A= 60° . For each side length of side BC: 4cm, 8cm, 9cm, 9.5cm, 10cm, 11cm, 12cm

Length of BC	Value of BC/AB	How does BC/AB compare with Sin A?	Description of possible triangles
4cm	$\frac{4\text{cm}}{10\text{cm}} = 0.4$	$0.4 < 0.866$	No triangles are possible
8cm	$\frac{8\text{cm}}{10\text{cm}} = 0.8$	$0.5 < 0.866$	No triangles are possible
9cm	$\frac{9\text{cm}}{10\text{cm}} = 0.9$	$1 > 0.9 > 0.866$	2 scalene triangles
9.5cm	$\frac{9.5\text{cm}}{10\text{cm}} = 0.95$	$1 > 0.95 > 0.866$	2 scalene triangles
10cm	$\frac{10\text{cm}}{10\text{cm}} = 1$	$1 > 0.866$	1 equilateral triangle
11cm	$\frac{11\text{cm}}{10\text{cm}} = 1.1$	$1.1 > 0.866$	1 scalene triangle
12cm	$\frac{12\text{cm}}{10\text{cm}} = 1.2$	$1.2 > 0.866$	1 scalene triangle

- c. Repeat Part A for angle $A = 45^\circ$. For each side length of side BC: 4 cm, 5cm, 8.5cm, 9cm, 10cm, 11 cm, 12cm

Length of BC	Value of BC/AB	How does BC/AB compare with Sin A?	Description of possible triangles
4cm	$\frac{4cm}{10cm} = 0.4$	$0.4 < 0.707$	No triangles are possible
5cm	$\frac{5cm}{10cm} = 0.5$	$0.5 < 0.707$	No triangles are possible
8.5cm	$\frac{8.5cm}{10cm} = 0.85$	$1 > 8.5 > 0.707$	2 scalene triangles
9cm	$\frac{9cm}{10cm} = 0.9$	$1 > 9 > 0.707$	2 scalene triangles
10cm	$\frac{10cm}{10cm} = 1$	$1 > 0.707$	1 isosceles triangle
11cm	$\frac{11cm}{10cm} = 1.1$	$1.1 > 0.707$	1 scalene triangle
12cm	$\frac{12cm}{10cm} = 1.2$	$1.2 > 0.707$	1 scalene triangle

- d. Complete the chart to summarize your results.

Description of possible triangles	Ratio
No Triangle	$\frac{BC}{AB} < \sin A$
1 Right Triangle	$\frac{BC}{AB} = \sin A$
1 Isosceles Triangle	$\frac{BC}{AB} = 1$
1 Scalene Triangle	$\frac{BC}{AB} > 1$
2 Scalene Triangles	$\sin A < \frac{BC}{AB} < 1$

Note: If we are given an angle and two sides to create a triangle, when we are given a side, angle, and side (S.A.S), we must check for two possible triangles!

