

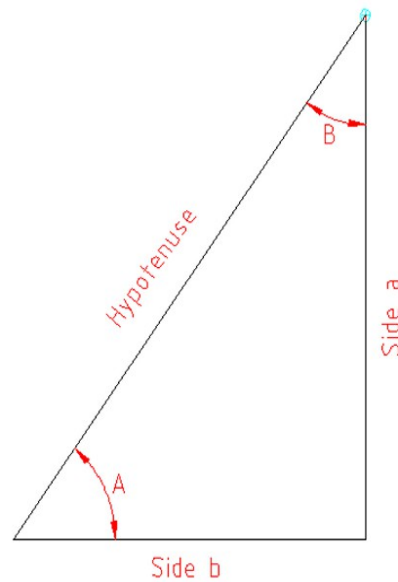
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EPISODE 36 – A right triangle Summary

In this episode I summarize everything we learned about a right triangle.

All of what follows will reference this diagram of a right triangle.



First, we know that all triangles have 3 angles and the sum of those angles add up to be 180 deg.

Since a right triangle has one angle of 90 deg, if one of the remaining angles is know, the other can be calculated easily. So Angle A = 90 - Angle B and Angle B = 90 – Angle A.

We also learned early on about Pythagoreans Theorem.

The Hypotenuse squared = (Side a squared + Side b Squared) or written another way.

The Hypotenuse = Square Root of $(a^2 + b^2)$.

Later we learned that if we have two triangles with the same angles inside we can scale up or scale down to calculate similar values in the 2nd triangle,

Finally we learned the trigonometry functions related to a triangle.

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The sine of an angle = the opposite side / hypotenuse. (This is written SIN on spreadsheets and calculators.)

The cosine of an angle = the adjacent side / hypotenuse (This is written COS on spreadsheets and calculators)

The tangent of an angle (TAN) = the opposite side / adjacent side.

Lastly I introduced the inverse functions.

Angle Value = ArcSin (opposite side / hypotenuse) (Asin on computers)

Angle Value = ArcCos (adjacent side / hypotenuse) (Acos on computers)

Angle Value = ArcTan (opposite side / adjacent side) (Atan on computers)

This means if you know one side and one angle or if you know 2 sides you know everything about a right triangle.

Solving for unknowns on a right triangle:

Know the dimensions of 2 sides				
Side a	Hypotenuse	Then		Angle A = <u>ArcSine</u> (Side a / Hypotenuse)
			&	Angle B = 90 deg – Angle A deg
			&	Side b = Cos(Angle A) X Hypotenuse
Side b	Hypotenuse	Then		Angle B = <u>ArcSine</u> (Side b / Hypotenuse)
			&	Angle A = 90 deg – Angle B deg
			&	Side b = Cos(Angle B) X Hypotenuse
Side a	Side b	Then		Angle A = <u>ArcTan</u> (Side a / Side b)
			&	Angle B = 90 deg – Angle A deg
			&	Hypotenuse = Side a / Sin(A)
	see note	or		Angle B = <u>ArcTan</u> (Side b / Side a)
			&	Angle A = 90 deg – Angle B deg
			&	Hypotenuse = Side b / Sin(B)
Know the dimension of 1 side & 1 Angle				
	Angle A	Then		Angle B = 90 deg – Angle A deg
	Angle B	Then		Angle A = 90 deg – Angle B deg
Angle A	side a	Then		Hypotenuse = Side a / Sin(Angle A)
			&	Side b = Cos(Angle A) X Hypotenuse
Angle A	side b	Then		Hypotenuse = Side b / Cos(Angle A)
			&	Side a = Sin(Angle A) X Hypotenuse

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The important note on the above is that if one of the sides is close to zero, then it is more accurate to choose the set of formulas not using that side in the denominator.

The spreadsheet does the similar calculations for you.