Basic Trigonometry Cheat Sheet

by Bunno via cheatography.com/186702/cs/39034/

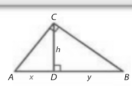
Geometric Mean

Best explained as an example, The geometric mean of a = 9 and b = 4 is 6, because 6 = √9*4.

Geometric Mean Right Triangle Theorems

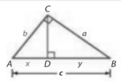
Theorems Right Triangle Geometric Mean Theorems

8.2 Geometric Mean (Altitude) Theorem The altitude drawn to the hypotenuse of a right triangle separates the hypotenuse into two segments. The length of this altitude is the geometric mean between the lengths of these two segments.



Example If $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$ of right $\triangle ABC$, then $\frac{x}{h} = \frac{h}{y}$ or $h = \sqrt{xy}$.

8.3 Geometric Mean (Leg) Theorem The altitude drawn to the hypotenuse of a right triangle separates the hypotenuse into two segments. The length of a leg of this triangle is the geometric mean between the length of the hypotenuse and the segment of the hypotenuse adjacent to that leg.

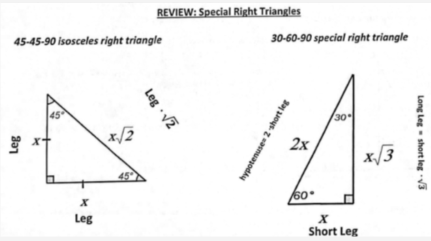


Example If $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$ of right $\triangle ABC$, then $\frac{c}{b} = \frac{b}{x}$ or $b = \sqrt{xc}$ and $\frac{c}{a} = \frac{a}{y}$ or $a = \sqrt{yc}$.

Pythagorean Theorem

a squared + b squared = c squared (Only for Right Triangles)

30-90-60 Triangles and 45-90-45 Triangles



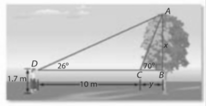
Soh Cah Toa

Sin()	Opposite / Hypotonuse
Cos()	Adjacent / Hypotonuse
Tan()	Opposite / Adjacent

EXAMPLE I CANT EXPIAIN

Example 3 Use Two Angles of Elevation or Depression

TREE REMOVAL **To estimate the height of a tree she wants removed, Mrs. Long sights the tree's top at a 70° angle of elevation. She then steps back 10 meters and sights the top at a 26° angle. If Mrs. Long's line of sight is 1.7 meters above the ground, how tall is the tree to the nearest meter?**



Understand $\triangle ABC$ and $\triangle ABD$ are right triangles. The height of the tree is the sum of Mrs. Long's height and AB.

Plan Since her initial distance from the tree is not given, write and solve a system of equations using both triangles. Let $AB = x$ and $CB = y$. So $DB = y + 10$ and the height of the tree is $x + 1.7$.

Continued

Solve Use $\triangle ABC$.

$\tan 70° = \frac{x}{y}$ $\tan = \frac{\text{opposite}}{\text{adjacent}}$; $m\angle ACB = 70$

$y \tan 70° = x$ Multiply each side by y.

Use $\triangle ABD$.

$\tan 26° = \frac{x}{y + 10}$ $\tan = \frac{\text{opposite}}{\text{adjacent}}$; $m\angle D = 26$

$(y + 10) \tan 26° = x$ Multiply each side by $y + 10$.

Substitute the value for x from $\triangle ABD$ in the equation for $\triangle ABC$ and solve for y.

$$y \tan 70° = x$$
$$y \tan 70° = (y + 10) \tan 26°$$
$$y \tan 70° = y \tan 26° + 10 \tan 26°$$
$$y \tan 70° - y \tan 26° = 10 \tan 26°$$
$$y(\tan 70° - \tan 26°) = 10 \tan 26°$$
$$y = \frac{10 \tan 26°}{\tan 70° - \tan 26°}$$

Use a calculator to find that $y \approx 2.16$. Using the equation from $\triangle ABC$, $x = 2.16 \tan 70°$ or about 5.9.

The height of the tree is 5.9 + 1.7 or 7.6, which is about 8 meters.

Check Substitute the value for y in the equation from $\triangle ABD$.

$x = (2.16 + 10) \tan 26°$ or about 5.9. This is the same value found using the equation from $\triangle ABC$. ✓

Law of Sines

Law of Sines	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Law of Cosines

Law of Cosines	Let $\triangle ABC$ be any triangle with a, b, and c representing the measures of the sides opposite the angles with measures A, B, and C, respectively. Then the following equations are true. $a^2 = b^2 + c^2 - 2bc \cos A$ $b^2 = a^2 + c^2 - 2ac \cos B$ $c^2 = a^2 + b^2 - 2ab \cos C$