PHYSICS PHOR PHUN
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TRIANGLE TRIGONOMETRY

MATH AND SCIENCE TUTORING
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Definitions

polygon - A closed plane figure formed by three or more line segments joined at their endpoints.
triangle - A three sided polygon. ***right angle –*** A 90º angle. ***right triangle –*** A triangle with a right angle.
hypotenuse – The side opposite the right angle of a right triangle; also the longest side of a right triangle.
altitude – A perpendicular (90º) line segment from one side of a triangle to the opposite vertex.
median – A line segment from one vertex of a triangle to the midpoint of the opposite side.

Triangle Centers

circumcenter	***incenter***	***centroid***	***orthocenter***
intersection of perpendicular bisectors	intersection of angle bisectors	intersection of medians; also the center of gravity	intersection of altitudes

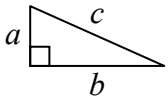
Postulates, theorems, and corollaries

Angle sum theorem - The sum of the angles in a triangle is 180º. ***corollaries:*** The acute angles of a right triangle are complimentary**;** There can be at most one right or obtuse angle in a triangle.
3rd angle theorem – If two angles of a triangle are congruent (≅) to those of another, then the 3rd angles are ≅.
Exterior angle theorem – An exterior angle of a triangle is equal to the sum of the two remote interior angles.
SSS postulate – If the sides of one triangle are ≅ to those of another, then the triangles are ≅.
SAS postulate – If two sides and the included angle of a triangle are ≅ to those of another, then the triangles are ≅.
ASA postulate - If two angles and the included side of a triangle are ≅ to those of another, then the triangles are ≅.
AAS theorem – If two angles and a nonincluded side of a triangle are ≅ to those of another, then the triangles are ≅.
Isoceles triangle theorem – If two sides of a triangle are ≅, then the angles opposite those sides are ≅.

Right Triangles

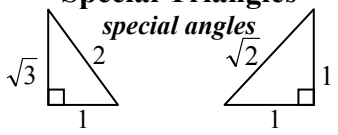
Pythagorean Theorem

$a^2 + b^2 = c^2$



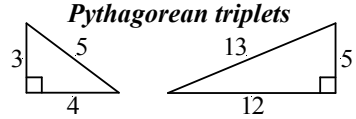
Special Triangles

special angles



30-60-90 **45-45-90**

Pythagorean triplets



Trignometric Functions

SOH-CAH-TOA

$\text{Sin} = \frac{\text{Opp}}{\text{Hyp}}$ $\text{Cos} = \frac{\text{Adj}}{\text{Hyp}}$ $\text{Tan} = \frac{\text{Opp}}{\text{Adj}}$

Reciprocal functions

$\csc = \frac{\text{hyp}}{\text{opp}}$ $\sec = \frac{\text{hyp}}{\text{adj}}$ $\cot = \frac{\text{adj}}{\text{opp}}$

Inverse functions

$\sin^{-1}\left(\frac{\text{opp}}{\text{hyp}}\right) = \theta$ $\cos^{-1}\left(\frac{\text{adj}}{\text{hyp}}\right) = \theta$

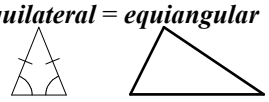
$\tan^{-1}\left(\frac{\text{opp}}{\text{adj}}\right) = \theta$

Oblique Triangles

acute

all angles less than 90º

equilateral = ***equiangular***



isoceles *2 sides equal* ***scalene*** *no sides equal*

obtuse

one angle greater than 90º

Law of cosines

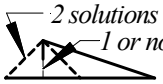
$a^2 = b^2 + c^2 - 2bc\cos A$

used if **SAS** *or* **SSS** *known*

Law of sines

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

used if **AAS** *or* **ASA** *known or for* **SSA** *the "ambiguous case"*



***AAA** has no solution*

Area

Right trangles

$A = \frac{1}{2}bh$

Oblique triangles

SAS known

$A = \frac{1}{2}ab\sin C$

SSS known

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$s = \frac{1}{2}(a+b+c)$

Heron's formula