## Precalculus

Lesson 8.4: Area of a Triangle
Mrs. Snow, Instructor

HA! You WOULDN'T KNoW An isosceles if it bit YOU IN THE HYPOTENUSE! REALLY, FRANK-SOMETIMES You're So obTuSe


AND YOU'RE ALWAYS RIGHT, ALWAYS RIG
VIVIAN.


If we know two sides of a triangle and the included triangle we may apply the general formula for the area of a triangle (SAS).
$\sin C=\frac{h}{a}$
solving for h :

$$
h=\mathrm{a} \sin C
$$

so area is:

$$
K=\frac{1}{2} b h=\frac{1}{2} a b \sin C
$$

To find area of a triangle knowing SAS

$$
\begin{aligned}
K & =\frac{1}{2} a b \sin C \\
K & =\frac{1}{2} a c \sin B \\
K & =\frac{1}{2} b c \sin A
\end{aligned}
$$

From the law of cosines comes Heron's Formula that may be used to find the area of a triangle if only given the lengths of the three sides (SSS):

For a triangle with sides of lengths $a, b$, and $c$, it will have a semiperimeter of:

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

the area of the triangle is:

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

Find the area of a triangle whose sides are $a=4, b=5, c=7$

Find the area of the triangle:


