|  |  |  |
| --- | --- | --- |
| |  | | --- | | We are all familiar with the formula for the area of a triangle, http://www.regentsprep.org/regents/math/algtrig/att13/areatr4.gif, where *b* stands for the base and *h* stands for the height drawn to that base. | | http://www.regentsprep.org/regents/math/algtrig/att13/triangleArea.gif  (the lettering used is of no importance) |
| In the triangle at the right, the area could be expressed as: http://www.regentsprep.org/regents/math/algtrig/att13/areatr5.gif | |

Now, let's be a bit more creative and look at the diagram again. By using the right triangle on the left side of the diagram, and our knowledge of trigonometry, we can state that:  
  
  
This tells us that the height, ***h***, can be expressed as ***b*sin*C****.*

|  |  |
| --- | --- |
| If we substitute this new expression for the height, we can write the **triangle area formula** as: http://www.regentsprep.org/regents/math/algtrig/att13/areatr7.gif  **( where *a* and *b* are adjacent sides and *C* is the included angle)** | http://www.regentsprep.org/regents/math/algtrig/att13/triangletrig.gif |

We have just discovered that the area of a triangle can be expressed using the lengths of two sides and the sine of the included angle. This is often referred to as the **SAS** Formula for the area of a triangle.

The "letters" in the formula may change from problem to problem, so try to remember the pattern of "two sides and the sine of the included angle".

**Example 1:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Given the triangle at the right, find its area. Express the area rounded to three decimal places.   |  |  |  | | --- | --- | --- | |  | |  | | --- | | **Be careful!!!** When using your graphing calculator, be sure that you are in DEGREE Mode, or that you are using the degree symbol. | | | http://www.regentsprep.org/regents/math/algtrig/att13/yellowtri.gif |

**Example 2:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Given the parallelogram at the right, find its area to the *nearest hundredth.*   |  | | --- | | **Again!!!** Be sure that you are in DEGREE Mode, **or** that you are using the degree symbol if in RADIAN Mode. |  |  |  |  | | --- | --- | --- | | If this problem had asked for an **EXACT answer**, do **not** use your calculator, as the calculator rounds the value for sin 120º. It will be necessary to use the 30º- 60º- 90º reference triangle in Quadrant II. The EXACT ANSWER will be  http://mathbits.com/MathBits/TISection/Trig/AreaTr15.gif   |  |  | | --- | --- | | Check to see that the exact answer yields the calculator decimal answer. | http://mathbits.com/MathBits/TISection/Trig/AreaTr16.gif | | | http://mathbits.com/MathBits/TISection/Trig/areatripic7.jpg |