Using Trig to Determine Area

The formula to determine the area of a triangle is $A=\frac{1}{2}bh$, where $b$ is the base side of a triangle and $h$ is the height at a right angle to the base side. Sometimes, everything that you need is given to you, but not always. Whenever the height is not provided to you, right triangle trigonometry can be used to find it.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | $$\rightarrow $$ |  | $$\rightarrow $$ |  | $$sinC=\frac{h}{a}$$$$asinC=h$$$$h=asinC$$ |
| $$A=\frac{1}{2}bh$$ | $$\rightarrow $$ | $$A=\frac{1}{2}b(asinC)$$$$A=\frac{1}{2}absinC$$ |
| So, if you want to use trigonometry to find the area of the triangle, you can use the modified formula: $A=\frac{1}{2}absinC$, where $C$ is the angle between sides $a \& b$. |

Use the new area formula to determine the area of each triangle. *Note: the triangles are not drawn to scale.*

|  |  |  |
| --- | --- | --- |
| **EXAMPLE**$$A=\frac{1}{2}absinC$$$$where C=43˚, a=7 \& b=16$$$$A=\frac{1}{2}\left(7\right)\left(16\right)\sin(\left(43˚\right))$$$$A=(7)(8)sin⁡(43˚)$$$$A=56\sin(\left(43˚\right))$$$$A=56(0.6820)$$$$$$ | **EXAMPLE**$$A=\frac{1}{2}absinC$$$$where C=24˚, a=12 \& b=8$$$$A=\frac{1}{2}\left(12\right)\left(8\right)\sin(\left(24˚\right))$$$$A=(6)(8)sin⁡(24˚)$$$$A=48sin⁡(24˚)$$$$A=48(0.4067)$$$$$$ | **EXAMPLE**$$A=\frac{1}{2}absinC$$$$where C=97˚, a=9 \& b=6$$$$A=\frac{1}{2}\left(9\right)\left(6\right)\sin(\left(97˚\right))$$$$A=(9)(3)sin⁡(97˚)$$$$A=27sin⁡(97˚)$$$$A=27(0.9925)$$$$$$ |
| 1. | 2. | 3. |
| 4. | 5. | 6. |
| 7. | 8. | 9. |
| 10. | 11. | 12. |
| 13. | 14. | 15. |