

Triangle Area Formulas

Given $\triangle ABC$:

- $\frac{1}{2}bh$ (When you know the **Altitude or Height** and the **Base**: One Half Base Times Height)
- $\frac{1}{2}ab \sin C = \frac{1}{2}bc \sin A = \frac{1}{2}ac \sin B$ (For **Oblique** Triangles: One Half the Product of any two sides times the sine of the included angle)
- $\sqrt{s(s-a)(s-b)(s-c)}$ (When you know **3 Sides**: Heron's Formula where s is the semi-perimeter $= \frac{a+b+c}{2}$)

Examples:

- Find the area of $\triangle FPN$ where $f = 19$, $p = 25$, $n = 32$.

$$s = \frac{19+25+32}{2} = 38 \quad \text{Area} = \sqrt{38(38-19)(38-25)(38-32)} = \boxed{237.3099239}$$

- Find the area of $\triangle DEF$ where $D = 54^\circ$, $e = 85$, $f = 90$.

$$\frac{1}{2}(85)(90) \sin 54^\circ = \boxed{3094.490003}$$

- Find the area of $\triangle FQR$ where $F = 90^\circ$, $q = 201$, $r = 45$.

$$\frac{1}{2}(201)(45) = \boxed{4511.5}$$
 Notice that this is a right triangle where the legs are base and height.

1. $\triangle BPN$, $B = 92^\circ$, $p = 209$, $N = 52^\circ$. Solve the Triangle.

2. $\triangle BPN$, $B = 92^\circ$, $p = 209$, $N = 52^\circ$. Find the Area.

3. $\triangle DRQ$, $d = 68$, $r = 92$, $q = 47$. Solve the Triangle.

4. $\triangle DRQ$, $d = 68$, $r = 92$, $q = 47$. Find the Area.

5. $\triangle MAP$, $M = 71^\circ$, $a = 58$, $p = 62$. Solve the Triangle.

6. $\triangle MAP$, $M = 71^\circ$, $a = 58$, $p = 62$. Find the Area.

7. $\triangle ABC$, $A = 52^\circ$, $a = 63$, $b = 80$. Solve the Triangle.

8. $\triangle ABC$, $A = 52^\circ$, $a = 63$, $b = 80$. Find the Area