The goal of Heron's formula is to get the area of a triangle given three sides. We will start with the formula $[ABC] = \frac{1}{2}ab\sin C$. The law of sines isn't useful here, because we would be introducing the cirucmradius, a value that we don't know. Let's try the law of cosines:

$$\sin C = \sqrt{1-\cos^2 C}$$

$$[ABC] = \frac{1}{2}ab\sin C = \frac{ab}{2}\sqrt{1-\cos^2 C}$$

$$= \frac{ab}{2}\sqrt{1-\frac{(c^2-a^2-b^2)^2}{(2ab)^2}} = \frac{ab}{2}\sqrt{1-\frac{(c^2-a^2-b^2)^2}{4a^2b^2}}$$

$$= \sqrt{\frac{a^2b^2}{4}\left(1-\frac{(c^2-a^2-b^2)^2}{4a^2b^2}\right)} = \sqrt{\frac{a^2b^2}{4}-\frac{(c^2-a^2-b^2)^2}{16}}$$

$$= \sqrt{\frac{4a^2b^2-(c^2-a^2-b^2)^2}{16}} = \sqrt{\frac{(2ab-c^2+a^2+b^2)(2ab+c^2-a^2-b^2)}{16}}$$

$$= \sqrt{\frac{[(a+b)^2-c^2][c^2-(a-b)^2]}{16}} = \sqrt{\frac{(a+b-c)(a+b+c)(a-b+c)(-a+b+c)}{16}}$$

Using $s = \frac{a+b+c}{2}$ as the semiperimeter, we finally have Heron's formula:

$$[ABC] = \sqrt{s(s-a)(s-b)(s-c)}$$