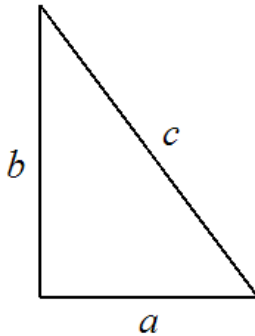


President James Garfield

President James Garfield¹ enjoyed mathematics and delighted in geometry. When he was a member of the House of Representatives, he created a new proof of the Pythagorean Theorem.

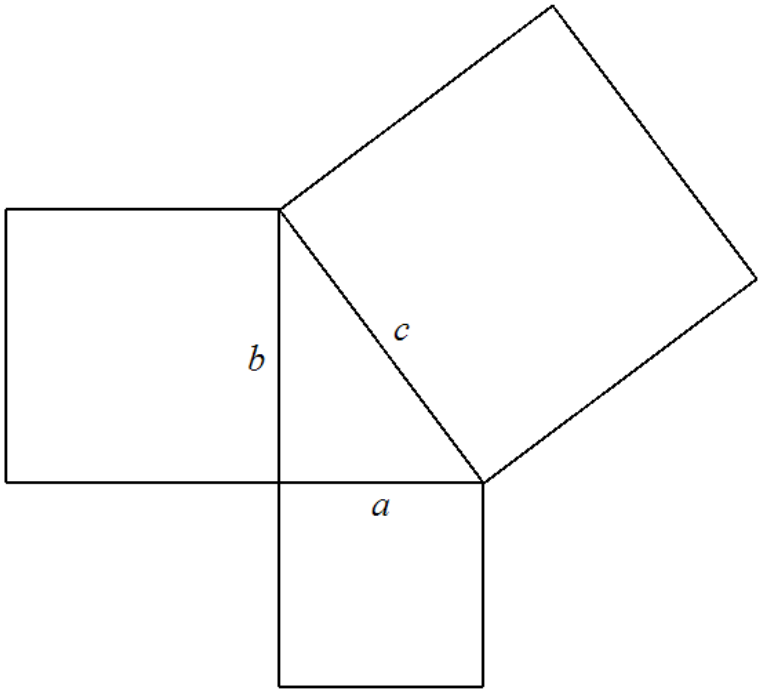
The Pythagorean Theorem has been proven in so many ways the number of distinct proofs is in the hundreds, but whatever the exact number James Garfield owns one of the proofs.

Take any triangle with a right angle as shown.



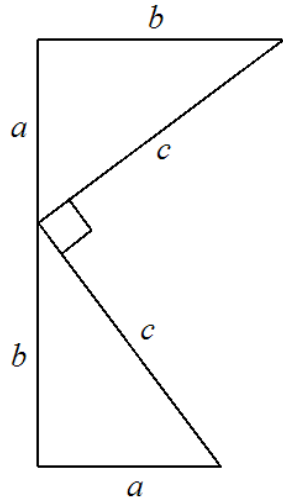
¹ A Union general during the Civil War, he was elected president in November 1880 and took office in March 1881. In July of that year he was shot by an assassin and died in September.

The theorem says $a^2 + b^2 = c^2$, that is, in the figure below the combined area of the two smaller squares is the same as the area of the largest square.



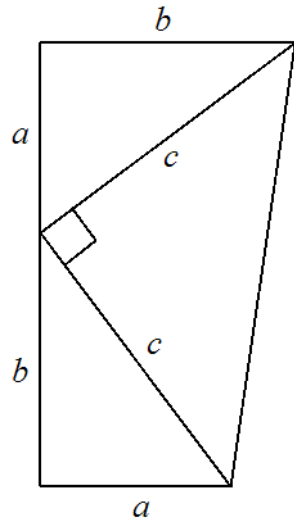
The theorem may be proved purely geometrically, purely algebraically or by mixing geometry and algebra. Let's see how Garfield proves the theorem by mixing the two.

Garfield starts by drawing the triangle twice.

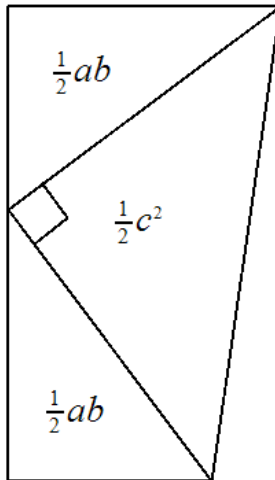


Garfield now adds one line to the diagram to form a trapezoid.

The area of this trapezoid is its height $(a + b)$ multiplied by its average width $\frac{1}{2}(a + b)$, giving us $\frac{1}{2}(a + b)^2$.



The areas of the component triangles are shown below.



This means $\frac{1}{2}(a+b)^2 = \frac{1}{2}ab + \frac{1}{2}ab + \frac{1}{2}c^2$.

Simplifying gives us $a^2 + b^2 = c^2$.

The Garfield proof may be the simplest on record of this ancient theorem.

Corollary: Mathematical talent is not a disqualification for the presidency.