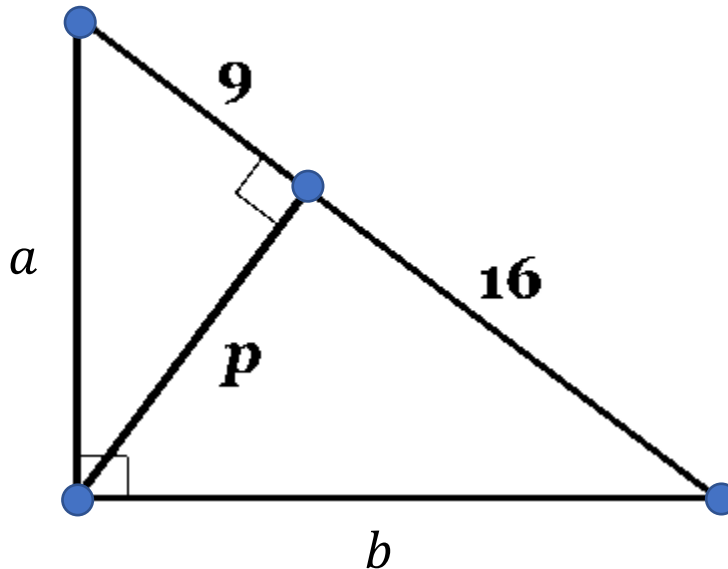


1869 MIT Entrance Geometry Exam Question No. 6

By C. D. Chester (Source: <https://libraries.mit.edu/archives/exhibits/exam/geometry.html>)

“The perpendicular [line] dropped from the vertex of the right angle upon the hypotenuse [of a triangle] divides it into two segments of 9 and 16 ft. respectively. Find the lengths of the perpendicular [line (p in the diagram)], and the two legs of the triangle [(a and b in the diagram)].”



$$a^2 + b^2 = 625$$

$$a^2 = p^2 + 81 \rightarrow p^2 = a^2 - 81$$

$$b^2 = p^2 + 256 \rightarrow p^2 = b^2 - 256$$

$$\therefore a^2 - 81 = b^2 - 256 \rightarrow b^2 = a^2 + 175$$

$$\therefore a^2 + (a^2 + 175) = 625 \rightarrow 2a^2 = 450 \rightarrow a^2 = 225 \rightarrow a = 15$$

$$\therefore 15^2 + b^2 = 625 \rightarrow b^2 = 400 \rightarrow b = 20$$

$$\therefore p^2 = 225 - 81 = 144 \rightarrow p = 12$$