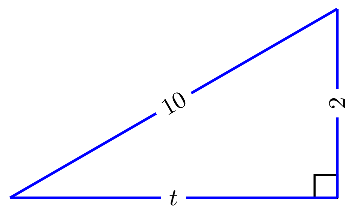
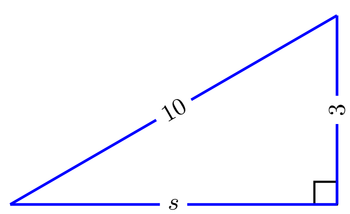
1. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$t^2 + 2^2 = 10^2 \qquad \text{(PT)}$$
$$t^2 + 4 = 100 \qquad \text{(BI)}$$
$$t^2 = 96 \qquad \text{(CLA, Bi)}$$
$$t = \pm\sqrt{96} \qquad \text{(SRP)}$$
$$t = \sqrt{96} \qquad \text{(assume positive real sides)}$$

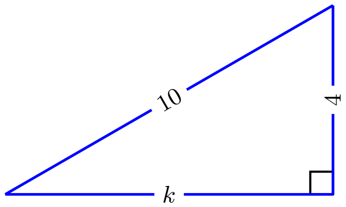
2. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$s^2 + 3^2 = 10^2 \qquad \text{(PT)}$$
$$s^2 + 9 = 100 \qquad \text{(BI)}$$
$$s^2 = 91 \qquad \text{(CLA, Bi)}$$
$$s = \pm\sqrt{91} \qquad \text{(SRP)}$$
$$s = \sqrt{91} \qquad \text{(assume positive real sides)}$$

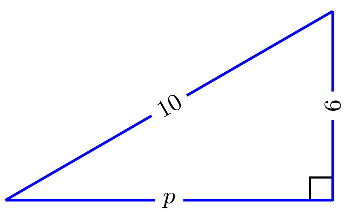
3. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$
\begin{aligned}
k^2 + 4^2 &= 10^2 && \text{(PT)}\\
k^2 + 16 &= 100 && \text{(BI)}\\
k^2 &= 84 && \text{(CLA, Bi)}\\
k &= \pm\sqrt{84} && \text{(SRP)}\\
k &= \sqrt{84} && \text{(assume positive real sides)}
\end{aligned}
$$

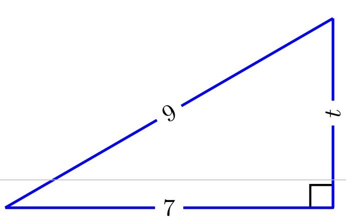
4. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$
\begin{aligned}
p^2 + 6^2 &= 10^2 && \text{(PT)}\\
p^2 + 36 &= 100 && \text{(BI)}\\
p^2 &= 64 && \text{(CLA, Bi)}\\
p &= \pm\sqrt{64} && \text{(SRP)}\\
p &= \sqrt{64} && \text{(assume positive real sides)}
\end{aligned}
$$

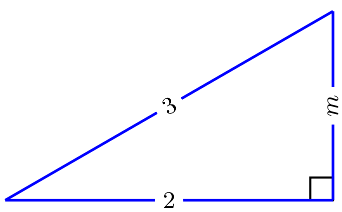
5. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$7^2 + t^2 = 9^2 \quad \text{(PT)}$$
$$t^2 + 49 = 81 \quad \text{(BI)}$$
$$t^2 = 32 \quad \text{(CLA, Bi)}$$
$$t = \pm\sqrt{32} \quad \text{(SRP)}$$
$$t = \sqrt{32} \quad \text{(assume positive real sides)}$$

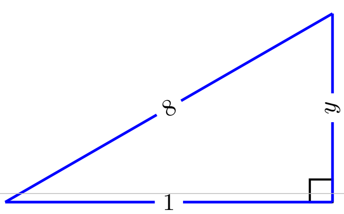
6. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$2^2 + m^2 = 3^2 \quad \text{(PT)}$$
$$m^2 + 4 = 9 \quad \text{(BI)}$$
$$m^2 = 5 \quad \text{(CLA, Bi)}$$
$$m = \pm\sqrt{5} \quad \text{(SRP)}$$
$$m = \sqrt{5} \quad \text{(assume positive real sides)}$$

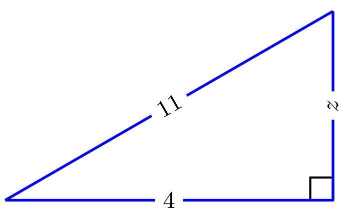
7. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$\begin{aligned} 1^2 + y^2 &= 8^2 && \text{(PT)} \\ y^2 + 1 &= 64 && \text{(BI)} \\ y^2 &= 63 && \text{(CLA, Bi)} \\ y &= \pm\sqrt{63} && \text{(SRP)} \\ y &= \sqrt{63} && \text{(assume positive real sides)} \end{aligned}$$

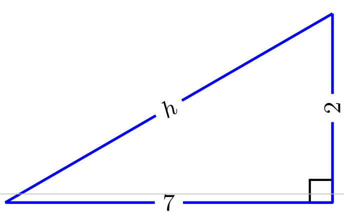
8. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$\begin{aligned} 4^2 + z^2 &= 11^2 && \text{(PT)} \\ z^2 + 16 &= 121 && \text{(BI)} \\ z^2 &= 105 && \text{(CLA, Bi)} \\ z &= \pm\sqrt{105} && \text{(SRP)} \\ z &= \sqrt{105} && \text{(assume positive real sides)} \end{aligned}$$

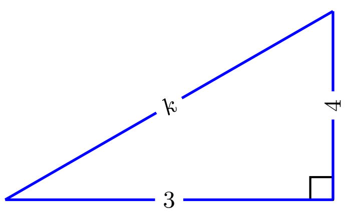
9. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$7^2 + 2^2 = h^2 \quad \text{(PT)}$$
$$49 + 4 = h^2 \quad \text{(BI)}$$
$$53 = h^2 \quad \text{(CLA, Bi)}$$
$$h = \pm\sqrt{53} \quad \text{(SRP)}$$
$$h = \sqrt{53} \quad \text{(assume positive real sides)}$$

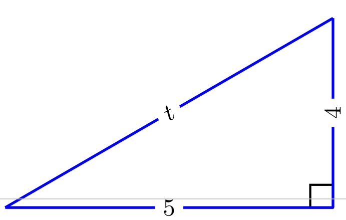
10. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$3^2 + 4^2 = k^2 \quad \text{(PT)}$$
$$9 + 16 = k^2 \quad \text{(BI)}$$
$$25 = k^2 \quad \text{(CLA, Bi)}$$
$$k = \pm\sqrt{25} \quad \text{(SRP)}$$
$$k = \sqrt{25} \quad \text{(assume positive real sides)}$$

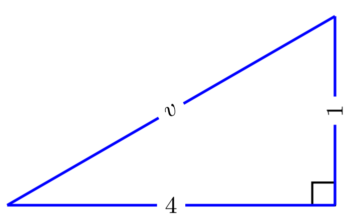
11. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$5^2 + 4^2 = t^2 \quad \text{(PT)}$$
$$25 + 16 = t^2 \quad \text{(BI)}$$
$$41 = t^2 \quad \text{(CLA, Bi)}$$
$$t = \pm\sqrt{41} \quad \text{(SRP)}$$
$$t = \sqrt{41} \quad \text{(assume positive real sides)}$$

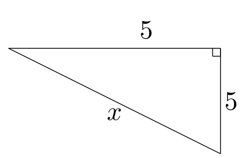
12. Two sides are given, use the *pythagoras theorem* to solve for the third side. For now, assume sides are of real positive length.



Solution:

$$4^2 + 1^2 = v^2 \quad \text{(PT)}$$
$$16 + 1 = v^2 \quad \text{(BI)}$$
$$17 = v^2 \quad \text{(CLA, Bi)}$$
$$v = \pm\sqrt{17} \quad \text{(SRP)}$$
$$v = \sqrt{17} \quad \text{(assume positive real sides)}$$

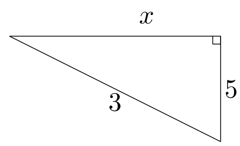
13. **Solve for** x



Solution:
$x = 5\sqrt{2}$ .... very famous..

—

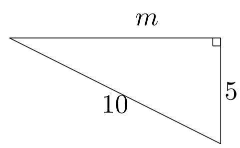
14. **Solve for** x or What is wrong with this picture?



Solution:
impossible.. hypothenuse must be bigger..

—

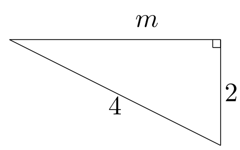
15. **A Very Important Exercise** Solve for the m



Solution:
$x = 5\sqrt{3}$ very famous...

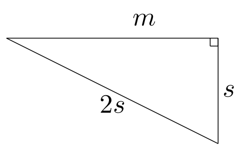
—

16. **A Very Important Exercise** Solve for the m



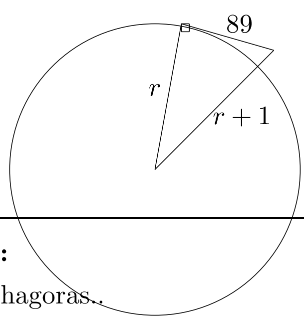
Solution:
$x = 2\sqrt{3}$ very famous...

17. **A Very Important Exercise** Solve for the m



Solution:
$x = s\sqrt{3}$ very famous...

18. **Small World, NOT!** Assume the earth is perfectly round. Suppose when climbing to an altitude of 1 mile, the furthest visible point on the horizon is 89 miles away. *Find the radius of the earth.*



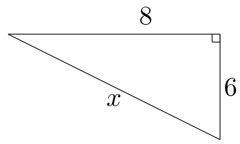
Solution:
apply pythagoras..

$$r^2 + 89^2 = (r+1)^2$$

$r \approx 3961$ clean up..

19. **Got Straight Walls?**

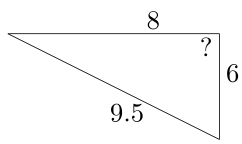
    (a) Suppose you are planning to build a rectangular room 8ft. by 6ft., In theory, how long should the diagonal measurement be? solve for x



Solution:
$x = 10$

(b) Suppose when you are done building the first two walls shown below, you check the diagonal and it measures 9.5 ft. What can you say about the angle between the walls. A. Corner angle is $< 90°$ B. Corner angle is $> 90°$ C. Corner angle is $= 90°$ D. Impossible to know if larger or smaller than $90°$ E. None of These

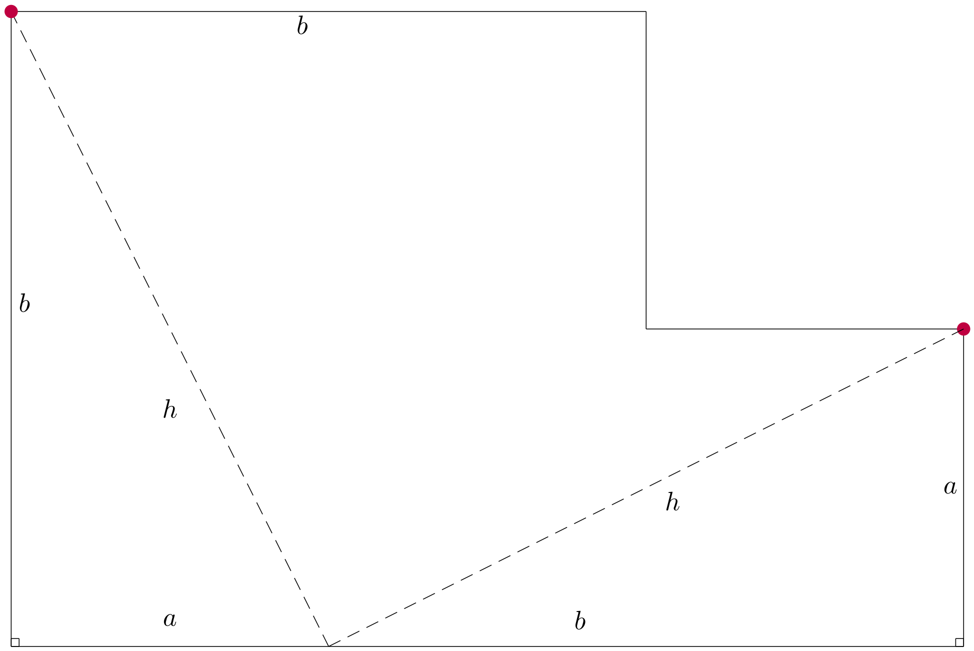
Solution:
if the 'hypothenuse' is shorter than 10, then across from it must be an angles smaller than $90°$



(c) Do you think this theorem is 'reversible' that is, if $a^2 + b^2 = h^2$ does that mean we have a right triangle for sure?

Solution:
yes, the above suggests so....

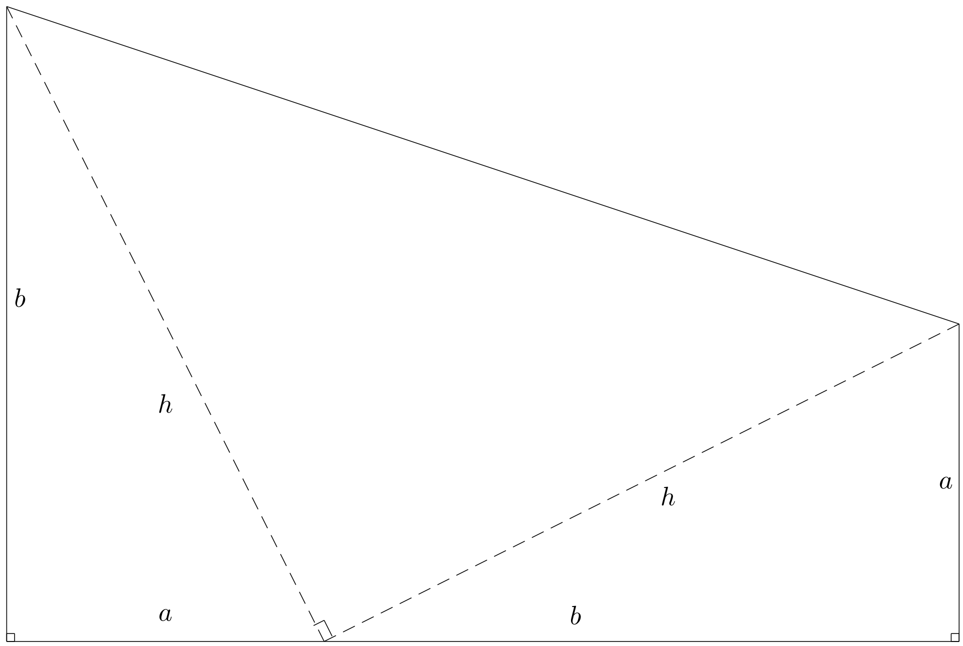
20. **Another Proof of Pythagoras Thm.** Find the area of the figure below. Note its is made up of two squares, one b by b, the other measures, a by a. Then, use scissors to cut out the figure below. After cutting the figure, cut the dashed lines. Can you make a perfect square out of the 3 cut figures? What is the area of the square? What does this show?



Solution:

cut the dotted lines, then use the noted dots, as pivot points to rotate the cut triangles, this should turn the $a^2 + b^2$ shape into a c^2 shape..

21. **Proof by US President, James Garfield (1876)** You know what to do (compare the area of the trapezoid to the sum of the little areas). Just keep in mind: area of a trapezoid is width, $a + b$ in this case, times the average of the heights, $(a + b)/2$.



Solution:

a very nice problem ... think about it...