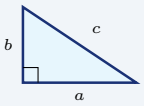
The Pythagorean Theorem

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

In a right triangle, $a^2 + b^2 = c^2$, where a and b are the legs and c is the hypotenuse (the side opposite the right angle, always the longest). To find the hypotenuse, add the squares of the legs and take the square root. To find a leg, subtract: $b^2 = c^2 - a^2$.

▷ **Example:** A right triangle has legs 3 and 4. Find the hypotenuse.
Work: Use $a^2 + b^2 = c^2$: $3^2 + 4^2 = 9 + 16 = 25$. The hypotenuse is the square root, $\sqrt{25}$.
★ **Answer:** 5

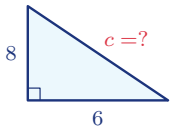


$a^2 + b^2 = c^2$.

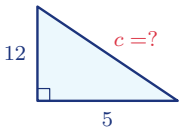
Practice Problems

Use each right-triangle diagram to find the missing side. Simplify radicals.

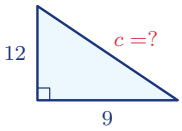
1. Find the hypotenuse.



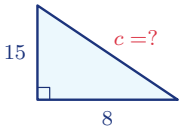
2. Find the hypotenuse.



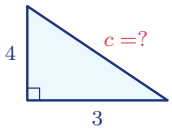
3. Find the hypotenuse.



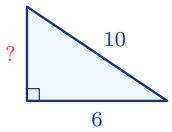
4. Find the hypotenuse.



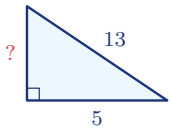
5. Find the hypotenuse.



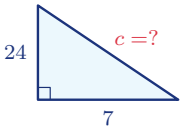
6. Find the missing leg.



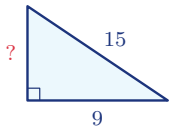
7. Find the missing leg.



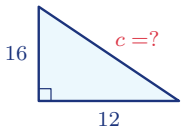
8. Find the hypotenuse.



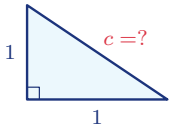
9. Find the missing leg.



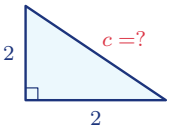
10. Find the hypotenuse.



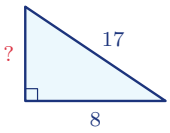
11. Find the hypotenuse.



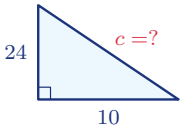
12. Find the hypotenuse.



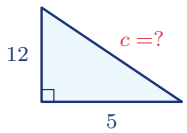
13. Find the missing leg.



14. Find the hypotenuse.



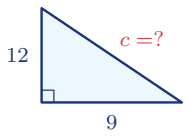
Word Problems



15. A ladder's base is 5 ft from a wall and it reaches 12 ft up. How long is the ladder?

Use $a^2 + b^2 = c^2$

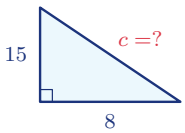
Work: _____



16. A rectangular field is 9 m by 12 m. How long is the diagonal walk across it?

Use $a^2 + b^2 = c^2$

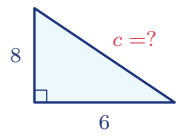
Work: _____



17. A right triangle has legs 8 and 15. Find the hypotenuse.

Use $a^2 + b^2 = c^2$

Work: _____



18. A wire runs from the top of an 8-ft pole to a point 6 ft from its base. How long is the wire?

Use $a^2 + b^2 = c^2$

Work: _____

Answer Keys

1. $\boxed{10}$	**7.** $\boxed{12}$	**13.** $\boxed{15}$
2. $\boxed{13}$	**8.** $\boxed{25}$	**14.** $\boxed{26}$
3. $\boxed{15}$	**9.** $\boxed{12}$	**15.** $\boxed{13\text{ ft}}$
4. $\boxed{17}$	**10.** $\boxed{20}$	**16.** $\boxed{15\text{ m}}$
5. $\boxed{5}$	**11.** $\boxed{\sqrt{2}}$	**17.** $\boxed{17}$
6. $\boxed{8}$	**12.** $\boxed{2\sqrt{2}}$	**18.** $\boxed{10\text{ ft}}$

Step-by-Step Explanations

1. Start by naming the process: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is Use $a^2 + b^2 = c^2$: $6^2 + 8^2 = 36 + 64 = 100$. The hypotenuse is $\sqrt{100} = 10$. So the final answer is 10.

2. A good way to think about this is: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $5^2 + 12^2 = 25 + 144 = 169$, so $c = \sqrt{169} = 13$. So the final answer is 13.

3. Step by step: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $9^2 + 12^2 = 81 + 144 = 225$, so $c = \sqrt{225} = 15$. So the final answer is 15.

4. Take it one move at a time: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $8^2 + 15^2 = 64 + 225 = 289$, so $c = \sqrt{289} = 17$. So the final answer is 17.

5. Start by naming the process: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $3^2 + 4^2 = 9 + 16 = 25$, so $c = \sqrt{25} = 5$. So the final answer is 5.

6. A good way to think about this is: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is To find a leg, subtract: $10^2 - 6^2 = 100 - 36 = 64$, so the leg is $\sqrt{64} = 8$. So the final answer is 8.

7. Step by step: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $13^2 - 5^2 = 169 - 25 = 144$, so the leg is $\sqrt{144} = 12$. So the final answer is 12.

8. Take it one move at a time: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $7^2 + 24^2 = 49 + 576 = 625$, so $c = \sqrt{625} = 25$. So the final answer is 25.

9. Start by naming the process: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $15^2 - 9^2 = 225 - 81 = 144$, so the leg is $\sqrt{144} = 12$. So the final answer is 12.

10. A good way to think about this is: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $12^2 + 16^2 = 144 + 256 = 400$, so $c = \sqrt{400} = 20$. So the final answer is 20.

11. Step by step: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $1^2 + 1^2 = 2$, so $c = \sqrt{2}$ (already in simplest form). So the final answer is $\sqrt{2}$.

12. Take it one move at a time: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $2^2 + 2^2 = 8$, so $c = \sqrt{8} = 2\sqrt{2}$. So the final answer is $2\sqrt{2}$.

13. Start by naming the process: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $17^2 - 8^2 = 289 - 64 = 225$, so the leg is $\sqrt{225} = 15$. So the final answer is 15.

14. A good way to think about this is: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $10^2 + 24^2 = 100 + 576 = 676$, so $c = \sqrt{676} = 26$. So the final answer is 26.

15. Step by step: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is The wall height and the base distance are the legs: $5^2 + 12^2 = 25 + 144 = 169$, so the ladder is $\sqrt{169} = 13$ ft. So the final answer is 13 ft.

16. Take it one move at a time: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is The diagonal is the hypotenuse: $9^2 + 12^2 = 81 + 144 = 225$, so $\sqrt{225} = 15$ m. So the final answer is 15 m.

17. Start by naming the process: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is $8^2 + 15^2 = 64 + 225 = 289$, so the hypotenuse is $\sqrt{289} = 17$. So the final answer is 17.

18. A good way to think about this is: For a right triangle, use $a^2 + b^2 = c^2$ and solve for the missing side. The setup/work is The pole height and the ground distance are the legs: $8^2 + 6^2 = 64 + 36 = 100$, so the wire is $\sqrt{100} = 10$ ft. So the final answer is 10 ft.

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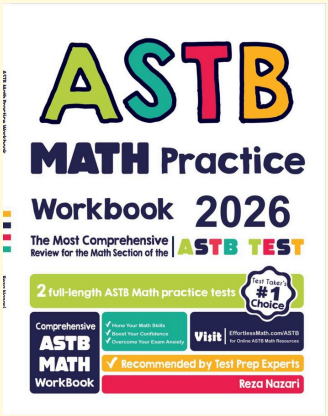

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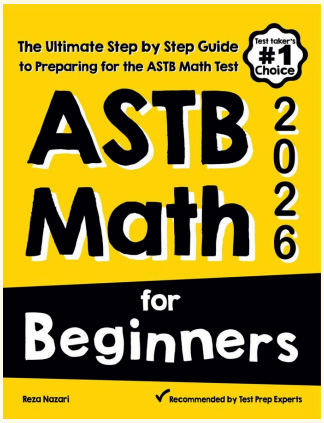

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