

The *Pythagorean* Theorem

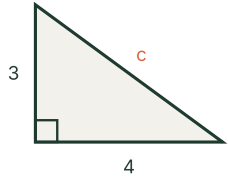
Answer key

8.G.B.6

8.G.B.7

15 problems

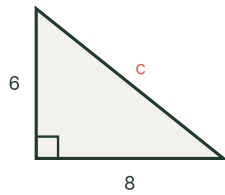
1. Find the length of the hypotenuse c .



Answer $c = 5$

$$c^2 = 3^2 + 4^2 = 9 + 16 = 25, \text{ so } c = \sqrt{25} = 5.$$

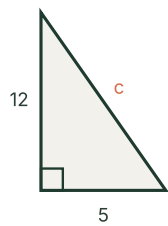
2. Find the length of the hypotenuse c .



Answer $c = 10$

$$c^2 = 6^2 + 8^2 = 36 + 64 = 100, \text{ so } c = \sqrt{100} = 10.$$

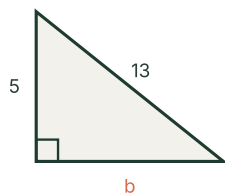
3. Find the length of the hypotenuse c .



Answer $c = 13$

$$c^2 = 5^2 + 12^2 = 25 + 144 = 169, \text{ so } c = \sqrt{169} = 13.$$

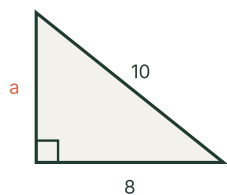
4. The hypotenuse is 13 and one leg is 5. Find the length of the other leg b .



Answer $b = 12$

$$5^2 + b^2 = 13^2, \text{ so } b^2 = 169 - 25 = 144 \text{ and } b = \sqrt{144} = 12.$$

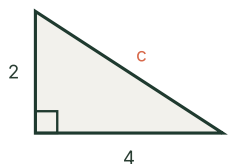
5. The hypotenuse is 10 and one leg is 8. Find the length of the other leg a .



Answer $a = 6$

$$a^2 + 8^2 = 10^2, \text{ so } a^2 = 100 - 64 = 36 \text{ and } a = \sqrt{36} = 6.$$

6. Find the length of the hypotenuse c . Give your answer in simplest radical form.



Answer $c = 2\sqrt{5}$

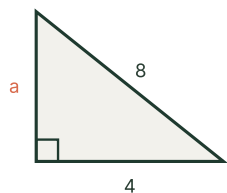
$$c^2 = 2^2 + 4^2 = 4 + 16 = 20, \text{ so } c = \sqrt{20} = \sqrt{4 \cdot 5} = 2\sqrt{5}.$$

7. A right triangle has legs of length 1 and 3. Find the length of the hypotenuse in simplest radical form.

Answer $\sqrt{10}$

$$c^2 = 1^2 + 3^2 = 1 + 9 = 10, \text{ so } c = \sqrt{10}. \text{ Since 10 has no perfect-square factor, } \sqrt{10} \text{ is fully simplified.}$$

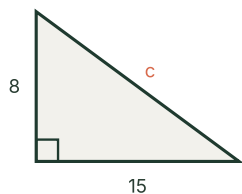
8. The hypotenuse is 8 and one leg is 4. Find the other leg in simplest radical form.



Answer $a = 4\sqrt{3}$

$$a^2 + 4^2 = 8^2, \text{ so } a^2 = 64 - 16 = 48 \text{ and } a = \sqrt{48} = \sqrt{16 \cdot 3} = 4\sqrt{3}.$$

9. Find the length of the hypotenuse c .



Answer $c = 17$

$$c^2 = 8^2 + 15^2 = 64 + 225 = 289, \text{ so } c = \sqrt{289} = 17.$$

10. A right triangle has legs of length 9 cm and 12 cm. How long is the hypotenuse?

Answer 15 cm

$$c^2 = 9^2 + 12^2 = 81 + 144 = 225, \text{ so } c = \sqrt{225} = 15 \text{ cm.}$$

11. Which set of side lengths forms a right triangle?

Answer B) 7, 24, 25

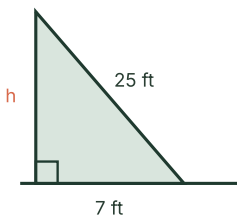
Check $a^2 + b^2 = c^2$ with the longest side as c : $7^2 + 24^2 = 49 + 576 = 625 = 25^2$. The others fail this test.

12. Is a triangle with sides 6, 8, and 11 a right triangle? Explain using the Pythagorean theorem.

Answer No, it is not a right triangle.

Test the longest side as hypotenuse: $6^2 + 8^2 = 36 + 64 = 100$, but $11^2 = 121$. Since $100 \neq 121$, it is not a right triangle.

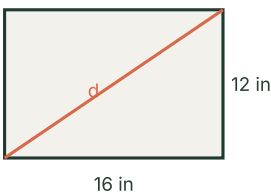
13. A 25-foot ladder leans against a wall. Its base is 7 feet from the wall. How high up the wall does the ladder reach?



Answer 24 ft

The ladder is the hypotenuse: $7^2 + h^2 = 25^2$, so $h^2 = 625 - 49 = 576$ and $h = \sqrt{576} = 24$ ft.

14. A rectangular TV screen is 16 inches wide and 12 inches tall. Find the length of its diagonal.



Answer 20 in

$$d^2 = 16^2 + 12^2 = 256 + 144 = 400, \text{ so } d = \sqrt{400} = 20 \text{ in.}$$

15. A soccer field is 80 m long and 60 m wide. A player runs straight from one corner to the opposite corner. How far does she run?

Answer 100 m

The path is the diagonal: $d^2 = 80^2 + 60^2 = 6400 + 3600 = 10000$, so $d = \sqrt{10000} = 100$ m.