

Main Ideas/Questions

Pythagorean Theorem

Notes

- ✓ Used to find the missing side of a right triangle.
- ✓ Sides a and b are called legs.
- ✓ Side c is called the hypotenuse.
- ✓ For any right triangle: $a^2 + b^2 = c^2$.

Pythagorean Triples

A set of nonzero whole numbers a, b, and c that satisfy the equation $a^2 + b^2 = c^2$

Ex: 3, 4, 5 $3^2 + 4^2 = 5^2$ $9 + 16 = 25$ $25 = 25$ ✓	5, 12, 13 $5^2 + 12^2 = 13^2$ $25 + 144 = 169$ $169 = 169$ ✓	8, 15, 17 $8^2 + 15^2 = 17^2$ $64 + 225 = 289$ $289 = 289$ ✓	7, 24, 25 $7^2 + 24^2 = 25^2$ $49 + 576 = 625$ $625 = 625$ ✓
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Practice! Find the value of x. Write your answer in simplest form.

1.

$$6^2 + 8^2 = x^2$$

$$36 + 64 = x^2$$

$$100 = x^2$$

$$\sqrt{100} = x$$

$10 = x$

2.

$$10^2 + 5^2 = x^2$$

$$100 + 25 = x^2$$

$$125 = x^2$$

$$\sqrt{125} = x$$

$$\sqrt{25} \sqrt{5} = x$$

$5\sqrt{5} = x$

3.

$$7^2 + x^2 = 9^2$$

$$49 + x^2 = 81$$

$$x^2 = 32$$

$$x = \sqrt{32}$$

$$x = \sqrt{16} \sqrt{2}$$

$x = 4\sqrt{2}$

4.

$$15^2 + x^2 = 18^2$$

$$225 + x^2 = 324$$

$$x^2 = 99$$

$$x = \sqrt{99}$$

$$x = \sqrt{9} \sqrt{11}$$

$x = 3\sqrt{11}$

5.

$$8^2 + x^2 = 20^2$$

$$64 + x^2 = 400$$

$$x^2 = 336$$

$$x = \sqrt{336}$$

$$x = \sqrt{16} \sqrt{21}$$

$x = 4\sqrt{21}$

6.

$$26^2 + x^2 = 27^2$$

$$484 + x^2 = 676$$

$$x^2 = 192$$

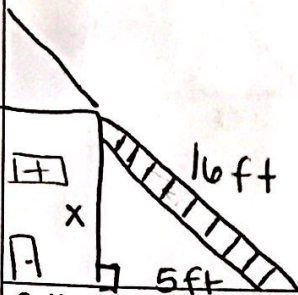
$$x = \sqrt{192}$$

$$x = \sqrt{64} \sqrt{3}$$

$x = 8\sqrt{3}$

Applications! Draw a picture, then solve for the missing side. Round your answers to the nearest tenth.

8. A roofer leaned a 16-foot ladder against a house. If the base of the ladder is 5 feet from the house, how high up the house does the ladder reach?



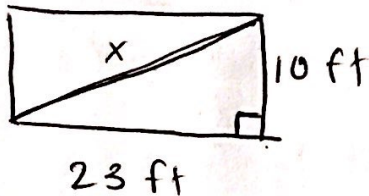
$$x^2 + 5^2 = 16^2$$

$$x^2 + 25 = 256$$

$$x^2 = 231$$

$$x = \sqrt{231} \approx 15.2 \text{ ft}$$

9. Kurt is building a rectangular deck. If the dimensions of the deck are 10 feet by 23 feet, what is the length of the diagonal of the deck?



$$10^2 + 23^2 = x^2$$

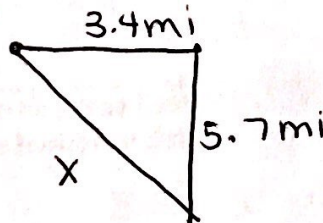
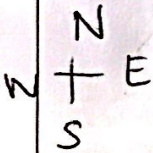
$$100 + 529 = x^2$$

$$629 = x^2$$

$$\sqrt{629} = x$$

$$x = 25.1 \text{ ft}$$

10. Ashley jogged 3.4 miles east, then 5.7 miles south. How far is Ashley from her starting point?



$$3.4^2 + 5.7^2 = x^2$$

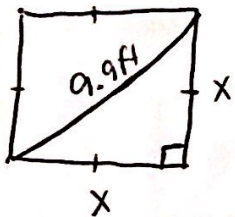
$$11.56 + 32.49 = x^2$$

$$44.05 = x^2$$

$$\sqrt{44.05} = x$$

$$x = 6.6 \text{ mi}$$

11. If the diagonal of a square is approximately 9.9 ft, find the **area** and **perimeter** of the square.



$$x^2 + x^2 = 9.9^2$$

$$2x^2 = 98.01$$

$$x^2 = 49$$

$$x = \sqrt{49}$$

$$x = 7$$

$$\text{area} = 7 \cdot 7 = 49 \text{ ft}^2$$

$$\text{perimeter} = 7 + 7 + 7 + 7 = 28 \text{ ft}$$