

# Right Triangles and Trigonometry Foundations

Pythagorean theorem, triangle parts, and basic sine, cosine, tangent reasoning.

Name \_\_\_\_\_ Date \_\_\_\_\_

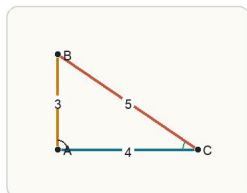
32 main 2-up grid 3 pages

### Completion Reward



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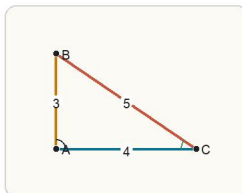
1. In the right triangle, which side is the hypotenuse?



In any right triangle, the hypotenuse is the side across from the 90-degree angle and is always the longest side.

- A. The side labeled 3
- B. The side labeled 4
- C. The side labeled 5
- D. The side opposite theta

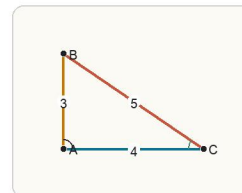
2. Which ratio equals  $\sin(\theta)$ ?



Relative to theta, sine compares the side across from the angle to the hypotenuse.

- A. adjacent / hypotenuse
- B. opposite / adjacent
- C. opposite / hypotenuse
- D. hypotenuse / opposite

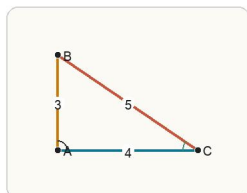
3. Which ratio equals  $\cos(\theta)$ ?



Relative to theta, cosine compares the side next to the angle with the hypotenuse.

- A. opposite / hypotenuse
- B. adjacent / hypotenuse
- C. opposite / adjacent
- D. hypotenuse / adjacent

4. Which ratio equals  $\tan(\theta)$ ?



Relative to theta, tangent compares the side across from the angle to the leg next to the angle.

- A. adjacent / hypotenuse
- B. opposite / hypotenuse
- C. opposite / adjacent
- D. hypotenuse / adjacent

5. In any triangle, what is true about the side opposite the larger angle?

- A. It is shorter.
- B. It is always 1.
- C. It is longer.
- D. It must be horizontal.

6. In a right triangle, which side is the hypotenuse?

- A. The shorter leg
- B. The side opposite the right angle
- C. The side next to every acute angle
- D. The vertical side only

7. Relative to an acute angle in a right triangle, which side is called the opposite side?

- A. The longest side always
- B. The side that touches the angle and is not the hypotenuse
- C. Any side with positive slope
- D. The side across from the angle

8. Which side lengths form a right triangle?

- A. 5, 12, 13
- B. 4, 5, 6
- C. 2, 3, 4
- D. 6, 7, 8

9. Which statement about  $\tan(\theta)$  is true?

- A. It always includes the hypotenuse.
- B. It can only be less than 1.
- C. It is opposite/adjacent.
- D. It equals adjacent/opposite.

10. Which ratio equals  $\sin(\theta)$  in a right triangle?

- A. opposite/hypotenuse
- B. adjacent/hypotenuse
- C. opposite/adjacent
- D. hypotenuse/opposite

11. Which ratio equals  $\cos(\theta)$  in a right triangle?

- A. opposite/hypotenuse
- B. adjacent/hypotenuse
- C. opposite/adjacent
- D. hypotenuse/adjacent

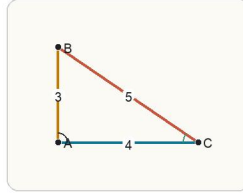
12. Which ratio equals  $\tan(\theta)$  in a right triangle?

- A. opposite/adjacent
- B. opposite/hypotenuse
- C. adjacent/hypotenuse
- D. hypotenuse/opposite

13. In a 5-12-13 right triangle, theta is adjacent to the side of length 12. What is  $\cos(\theta)$ ?

- A. 12/13
- B. 5/13
- C. 12/5
- D. 13/12

14. Relative to angle theta, which side is opposite?



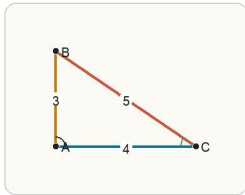
The opposite side is the side directly across from the chosen acute angle, not just whichever side is drawn vertically.

- A. The side labeled 4
- B. The side labeled 5
- C. The side labeled 3
- D. The right angle

15. You know the lengths of both legs of a right triangle and want the hypotenuse. What should you do next?

- A. Use triangle similarity.
- B. Use the Pythagorean theorem.
- C. Add the legs directly.
- D. Use the area formula.

16. A student says  $\tan(\theta) = \text{adjacent} / \text{opposite}$ . What is the mistake?



If a student swaps opposite and adjacent, the ratio changes. Tangent is opposite divided by adjacent, not the other way around.

- A. Tangent is opposite / adjacent, so they reversed the ratio.
- B. Tangent should use the hypotenuse instead.
- C. Tangent is always 1.
- D. Tangent should be added, not divided.

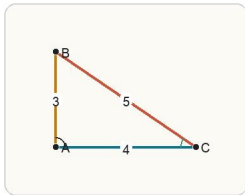
17. A student says the hypotenuse is also the adjacent side for every acute angle. What is wrong?

- A. The hypotenuse is opposite every acute angle.
- B. The adjacent side is the non-hypotenuse side that touches the chosen angle.
- C. Adjacent and opposite are the same side.
- D. The hypotenuse changes when the angle changes.

18. A student labels the same side as opposite for two different acute angles in the same right triangle. Why is that a problem?

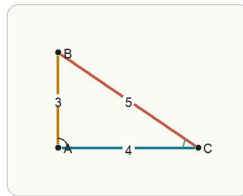
- A. Opposite sides never change names.
- B. Only the hypotenuse can be opposite.
- C. Opposite and adjacent depend on which acute angle is chosen.
- D. Right triangles have only one acute angle.

19. A right triangle has legs 3 and 4. What is the hypotenuse? Answer with a number.



With the two legs known, use  $a^2 + b^2 = c^2$  to determine the hypotenuse.

20. You know the opposite side and the hypotenuse relative to theta. Which trig ratio should you use?



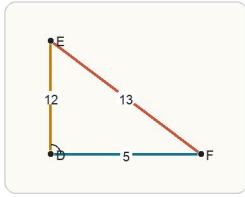
If the known sides are opposite and hypotenuse, sine is the direct trig ratio.

- A. Cosine
- B. Sine
- C. Tangent
- D. Pythagorean theorem only

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

- A. 6, 8, 9
- B. 5, 5, 9
- C. 3, 4, 6
- D. 6, 8, 10

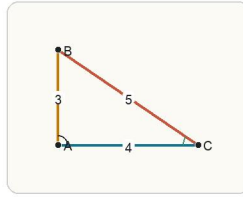
22. You know two side lengths of a right triangle and need the third. What is the best next move?



When two side lengths of a right triangle are known and the third is missing, the Pythagorean theorem is the direct move.

- A. Use a circle formula.
- B. Use the Pythagorean theorem.
- C. Reflect the triangle.
- D. Assume all side lengths are equal.

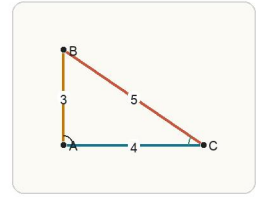
23. A student calls the side labeled 5 the adjacent side relative to theta. What is the issue?



The adjacent side is the leg next to theta. The hypotenuse touches theta too, but it is identified separately because it is opposite the right angle.

- A. The adjacent side is always the longest side.
- B. The side labeled 5 is opposite the right angle, so it is the hypotenuse.
- C. No right triangle has an adjacent side.
- D. The side labeled 5 should be the opposite side instead.

24. In the triangle, what is  $\tan(\theta)$ ? Answer with a number.



Read the opposite and adjacent sides relative to theta, then divide opposite by adjacent.

25. A right triangle has legs 8 and 15. What is the hypotenuse? Answer with a number.

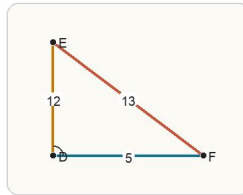
26. A right triangle has hypotenuse 13 and one leg 5. What is the other leg? Answer with a number.

27. A right triangle has hypotenuse 13 and one leg 12. What is the other leg? Answer with a number.

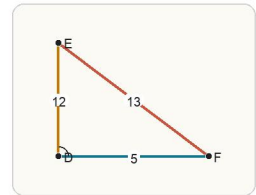
28. If  $\cos(\theta) = 12/13$  in a right triangle and the hypotenuse is 13, what is the adjacent side length? Answer with a number.

29. A right triangle has hypotenuse 13 and one leg 5. What is the other leg? Answer with a number.

30. A right triangle has one leg 12 and hypotenuse 13. What is the other leg? Answer with a number.



When one leg and the hypotenuse are known, subtract their squares appropriately and take the square root to find the other leg.



Use the known leg and hypotenuse in the Pythagorean theorem to solve for the remaining leg.

31. Which explanation best justifies using cosine to find a side?

- A. Cosine is always the easiest ratio, no matter the data.
- B. Cosine uses opposite over adjacent.
- C. Cosine uses adjacent over hypotenuse, so it matches the given information.
- D. Cosine is only for obtuse triangles.

32. In a 3-4-5 triangle, theta is opposite the side of length 3. Student A says  $\sin(\theta) = 3/5$ . Student B says  $\sin(\theta) = 4/5$ . Who is correct?

- A. Student B
- B. Both students
- C. Neither student
- D. Student A