In this worksheet you will learn how to determine unknown acute angles in a right-angled triangle using inverse trigonometric functions. Each question has an instruction and may require you to perform calculations, interpret diagrams, or produce your own sketch on paper.
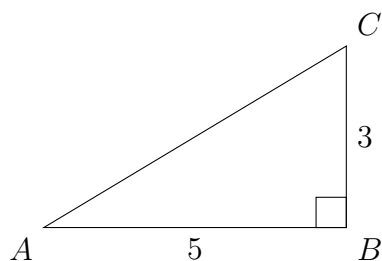
Easy Questions

1. Find the acute angle θ in a right-angled triangle if $\sin\theta = \dfrac{1}{2}$.

2. Find the acute angle θ if $\cos\theta = \dfrac{\sqrt{3}}{2}$.

3. Find the acute angle θ in a right-angled triangle if $\tan\theta = 1$.

4. In a right-angled triangle the length of the adjacent side to an acute angle is 4 and the hypotenuse is 5. Determine the measure of the acute angle.

5. In a right-angled triangle the opposite side of an acute angle measures 3 and the hypotenuse is 5. Find the measure of the acute angle.

Intermediate Questions

6. A right-angled triangle has an opposite side of length 7 and a hypotenuse of length 9. Determine the measure of the corresponding acute angle using the inverse sine function.

7. Find the acute angle θ if $\cos\theta = 0.8$. Give your answer to one decimal place.

8. Determine the measure of the acute angle θ in a right-angled triangle if $\tan\theta = 2.5$.

9. In right-angled triangle ABC with the right angle at A, if the side $AB = 8$ and the hypotenuse $BC = 10$, find the measure of acute angle B using the inverse cosine.

10. In right-angled triangle XYZ with the right angle at X, if side $XY = 6$ and side $XZ = 10$, calculate the measure of acute angle Y using an appropriate inverse trigonometric function.

11. In a right-angled triangle, if $\tan\theta = 0.75$, determine the measure of the acute angle θ.

12. Find the acute angle θ if $\sin\theta = 0.9$. Give your answer to one decimal place.

13. In a right-angled triangle the ratio of the adjacent side to the hypotenuse is $\dfrac{5}{13}$. Find the corresponding acute angle using the inverse cosine function.

14. In a right-angled triangle the opposite and adjacent sides are 3 and 4 respectively. Calculate the measure of the corresponding acute angle using the inverse tangent.

15. Given that $\sin\theta = 0.6$ in a right-angled triangle, determine the measure of acute angle θ to the nearest degree.

16. In a right-angled triangle, if $\tan\theta = \dfrac{4}{3}$, determine the measure of the acute angle θ using the inverse tangent.

17. Find the acute angle θ if $\cos\theta = 0.5$.

18. Determine the acute angle θ in a right-angled triangle if $\sin\theta = 0.7071$. (Hint: use the inverse sine function.)

19. If $\tan\theta = 1.2$, determine the measure of the acute angle θ accurate to two decimal places.

20. Using the diagram below, calculate the measure of acute angle A to two decimal places in the right-angled triangle.

Hard Questions

21. A right-angled triangle has an acute angle θ such that $\tan\theta = \dfrac{2}{3}$. Calculate θ using the inverse tangent function. Then, assume the opposite side length is 2 and compute the hypotenuse. Finally, verify that $\sin\theta$ equals the ratio of the opposite side to the hypotenuse.

22. In a right-angled triangle the adjacent side is 15 and the opposite side is 8. First, determine the acute angle θ using the inverse tangent. Then, compute $\sin\theta$ and $\cos\theta$.

23. Given a right-angled triangle with $\sin\theta = 0.35$, first determine the measure of θ. Then, assuming the hypotenuse is 1, compute $\tan\theta$ by calculating the adjacent side using the Pythagorean theorem.

24. A right-angled triangle has non-hypotenuse sides of lengths 9 and 12. First, determine the hypotenuse. Then, find the acute angle opposite the side of length 9 using the inverse sine function.

25. In a right-angled triangle the acute angle θ satisfies $\cos\theta = 0.92$. Find θ accurate to two decimal places. Next, determine the measure of the other acute angle in the triangle.

26. In a right-angled triangle the opposite side of an acute angle measures 7.5 and the hypotenuse is 10. Calculate the acute angle using the inverse sine function. Then, deduce the measure of the triangle's other acute angle.

27. In a right-angled triangle, if $\tan\theta = 1.1$, determine the measure of the acute angle θ. Afterwards, compute $\sin\theta$ and $\cos\theta$ to three decimal places.

28. In a right-angled triangle the opposite side is 11 and the adjacent side is 5. Find the measure of the acute angle using the inverse tangent. Then, calculate the corresponding values of $\sin\theta$ and $\cos\theta$.

29. Find the acute angle θ in a right-angled triangle when $\sin\theta = 0.77$. Then, determine $\cos\theta$ using the Pythagorean identity.

30. Draw a diagram of a right-angled triangle on paper with the acute angle θ such that the opposite side is 8 and the adjacent side is 6. Using the inverse tangent function, find θ. Then, calculate $\sin\theta$ and $\cos\theta$.