# Practice Set on Pythagoras Theorem (Advanced Level)

Here are 100 challenging questions on Pythagoras Theorem designed to deepen your understanding and problem-solving skills related to right-angled triangles, coordinate geometry, 3D geometry, and applications involving surds and algebra.

1. Find the length of the diagonal of a rectangle with sides 21 cm and 28 cm.
2. Given a right-angled triangle with legs $x$ and $x + 1$, and hypotenuse $\sqrt{85}$, find $x$.
3. Prove that a triangle with sides 13 cm, 14 cm, and 15 cm is not right angled.
4. Calculate the diagonal of a cuboid with edges 3 cm, 4 cm, and 12 cm.
5. Find the distance between points $(7, -4)$ and $(-1,2)$.
6. Determine the length of the shadow cast by a 15 m pole when the tip of the shadow is 17 m from the base of the pole.
7. A triangle has two sides of lengths 9 and 12 with a hypotenuse of $\sqrt{225 + k^2}$. Find $k$ when the triangle is right angled.
8. Given right triangle legs 7 and 24, find the hypotenuse in simplest surd form.
9. Find the side length of a square whose diagonal is $10\sqrt{2}$.
10. A ladder leans against a wall. The foot of the ladder is 5 m from the wall, and the ladder reaches 13 m up the wall. Find the ladder length.
11. In a right triangle, one leg measures 8 cm and the hypotenuse is 17 cm. Find the length of the other leg.
12. Two points are located at $(2,3)$ and $(-4, -1)$. Calculate the distance between them.
13. A triangle has sides $2x$, $x + 15$, and $x + 17$. For what $x$ is the triangle right angled?
14. Find the length of a diagonal of a rhombus with side length 10 cm and interior angle 60°.
15. Calculate the space diagonal of a cube with edge length 5 cm.
16. Find the hypotenuse of a right triangle whose legs are $3\sqrt{2}$ and $5\sqrt{3}$.
17. Calculate the coordinates of the midpoint of a segment joining points $(9, -2)$ and $(-3,6)$.
18. Given a rectangle whose diagonal is 25 m and one side 7 m, find the other side.

19. A triangle has sides 21 cm, $x$ cm, and 29 cm. Find $x$ if the triangle is right angled.
20. The feet of a 12 m ladder is 5 m from the wall. How high up the wall does it reach?
21. A right triangle has an area of 60 $cm^2$ and one leg is 12 cm. Find the length of the other leg.
22. Determine the length of the hypotenuse of a right triangle with legs $x$ and $x + 2$ if the hypotenuse is $x + 4$.
23. Find the distance between points $(t^2, t)$ and (0,0) in terms of $t$.
24. Calculate the diagonal length of a rectangular prism with edges 6 cm, 8 cm, and 10 cm.
25. If the hypotenuse of a right triangle is 10 cm and one leg is $x$, express the other leg in terms of $x$.
26. Given a right triangle where one leg is twice the other and the hypotenuse is 10 cm, find the lengths of all sides.
27. Show that a triangle with sides 5, 12, and 13 cm is right-angled.
28. Find the length of the side opposite the right angle in a triangle with legs 13 cm and 84 cm.
29. Determine the length of the diagonal of a square inscribed in a circle with radius 5 cm.
30. In triangle ABC, angle C is a right angle; AB = 26 cm and AC = 10 cm. Find BC.
31. Calculate the distance between $(-7,1)$ and (3,9).
32. A rectangle has sides $3x$ and $4x$. Find the diagonal in terms of $x$.
33. Find the height of a triangle which has a base of 24 cm and hypotenuse 26 cm.
34. Find the length of the diagonal in a trapezium with parallel sides 6 cm and 10 cm and legs 5 cm and 7 cm.
35. Calculate the length of a wire stretched diagonally across a rectangular room 5 m by 12 m.
36. Given points $A, B$, and $C$ such that $AB = 8$, $BC = 15$, and $AC = 17$, verify if triangle ABC is right angled.
37. Express the diagonal of a square as a function of its side length $s$.
38. Find the length of the diagonal of a right-angled triangle with hypotenuse 65 cm and one leg 33 cm.
39. A rectangle has a perimeter of 60 cm and length 18 cm. Find the length of the diagonal.
40. If the two legs of a right triangle are in ratio 5:12 and hypotenuse is 65 cm, find the shorter leg.
41. Calculate the distance between points $(a, b)$ and $(-a, -b)$.
42. Find the diagonal length of a rectangle with area 54 $m^2$ and side 9 m.
43. A triangle has side lengths 7 cm, 24 cm, and $x$. Find $x$ if the triangle is right angled.

44. Calculate the shortest distance between two points $(1,2)$ and $(4,6)$.
45. The altitude on the hypotenuse of a right triangle divides it into lengths 9 cm and 16 cm. Find the altitude.
46. Find the length of vector $\overrightarrow{AB}$ if $A = (2,3)$ and $B = (7,11)$.
47. Calculate the distance from point $(3,4,5)$ to $(7,1,9)$ in 3D space.
48. A rhombus has side 10 cm and height 8 cm. Find the length of the longer diagonal.
49. Find the length of the diagonal of a square whose perimeter is 40 cm.
50. Calculate the height a ladder reaches if it leans against a wall 12 m high and the base is 5 m from the wall.
51. A right triangle has legs $x + 1$ and $x + 3$ and hypotenuse $x + 5$. Find $x$.
52. Calculate the length of the diagonal of a rectangular cuboid with edges 2 cm, 9 cm, and 12 cm.
53. Find the distance from the point $(3,4,12)$ to the origin.
54. Given a square, find the length of the diagonal if the area is 98 $cm^2$.
55. Check if the triangle with sides 8 cm, 15 cm, and 16 cm is right angled.
56. The length of a diagonal of a rectangular triangle is 13 cm and one leg is 5 cm. Find the length of the other leg.
57. A triangle has two legs of 14 cm and 48 cm. Find the hypotenuse.
58. Determine the length of the diagonal from one corner of a cuboid measuring 7 m, 24 m, and 25 m.
59. Find an equation that satisfies the relationship among sides in a right-angled triangle with legs $a$, $b$, and hypotenuse $c$.
60. The legs of a right-angled triangle are 20 cm and 29 cm apart from the hypotenuse. Find the hypotenuse.
61. Find the height of an equilateral triangle with side 12 cm using Pythagoras theorem.
62. A triangle's sides are $3x$, $4x$, and $5x$ cm. If the longest side is 25 cm, find $x$.
63. Compute the diagonal length of a rectangular box with dimensions 4 cm by 10 cm by 15 cm.
64. A triangle with sides 9, 10, and 15. Find the measure of the longest altitude.
65. Find the distance between points $(x, y)$ and $(x + 3, y + 4)$.
66. In a right triangle, the hypotenuse is 20 cm, and one leg measures 16 cm. What is the length of the other leg?

67. Determine the unknown side of a right triangle if one leg is $x^2 + 1$, the other leg is $2x$, and hypotenuse is $x^2 + 5$.
68. Calculate the length of the diagonal of a cube with side length $s$.
69. Find the length of the diagonal of a square inscribed in a circle of diameter 10 cm.
70. Calculate the length of the diagonal of a triangle where the legs are 8 and 15 cm.
71. Determine the length of the diagonal across the base of a pyramid with a square base of side 12 m.
72. A rectangular prism has edges 3 cm, 4 cm, and $x$ cm, and its diagonal measures 13 cm. Calculate $x$.
73. Using Pythagoras theorem, find the distance between points $(1,1,1)$ and $(4,5,5)$.
74. Find the base of a right triangle if the hypotenuse is 15 and one leg is 9.
75. A staircase rises 4 m over a horizontal distance of 3 m. Find the length of the staircase.
76. Find the distance between points $(5,7,-2)$ and $(9,13,4)$.
77. Calculate the length of a diagonal of an equilateral triangle with side $x$.
78. Find the length of the diagonal of a rectangle measuring 11 cm by 60 cm.
79. A right triangle has one leg $x$ cm and the other is twice that. The hypotenuse is $\sqrt{5}x$. Find $x$.
80. Find the hypotenuse of a right triangle in which the legs are $k$ and $k + 3$ and the hypotenuse measures $k + 5$.
81. Calculate the diagonal of a cuboid with dimensions 8 cm, 15 cm, and 17 cm.
82. Find the length of the diagonal between two opposite corners of a cube of edge length 4 units.
83. The base and height of a right-angled triangle are $7x$ and $24x$. If the hypotenuse is 25 cm, find $x$.
84. Determine the exact length of a ladder leaning against a wall if the top is 8 m high and the foot is 3 for meters from the wall.
85. Calculate the length of the diagonal of a square field with a perimeter of 160 m.
86. Find the length of the diagonal of a rectangle measuring $9x$ and $12x$.
87. Find the distance between the points $(x, y)$ and $(x + 5, y + 12)$.
88. Determine the missing leg in a right triangle with hypotenuse $2x + 1$ and leg $x - 2$.
89. Find the length of the diagonal of a rectangular cuboid with edges 9 cm, 12 cm, and 20 cm.
90. Calculate the height of an isosceles right triangle with hypotenuse 10 cm.
91. If the sides of an isosceles right triangle are $x, x, x\sqrt{2}$, find $x$ when the perimeter is 30 cm.

92. A right-angled triangle's sides are consecutive integers. Find the three side lengths.

93. Given a right triangle with sides 7, 24, and 25, compute the area of the triangle.

94. The perimeter of a right angled triangle with legs $x$ and $x + 1$ and hypotenuse $x + 2$ is 30 cm. Find $x$.

95. Find the distance between points (3,4,5) and (0,0,0).

96. The hypotenuse of a right triangle is 29 cm, and one leg is 20 cm. Find the other leg.

97. Find the length of a diagonal in an equilateral triangle with side length 8 cm.

98. Calculate the ladder length if it reaches 9 m up a wall and the foot is 4 m from the wall.

99. Determine the side lengths of a triangle where the hypotenuse is 10 and legs are in ratio 3:4.

100. Calculate the length of the diagonal of a rectangular prism with edges 8 cm, 15 cm, and 17 cm.