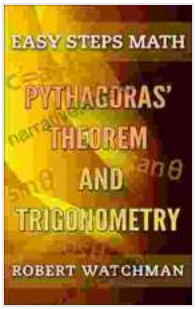
Pythagoras Theorem And Trigonometry Easy Steps Math

Learn the basics of the Pythagorean theorem and trigonometry with this easy-to-follow guide.

The Pythagorean theorem is a fundamental theorem in geometry that states that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. In other words, if a, b, and c are the lengths of the sides of a right triangle, then $a^2 + b^2 = c^2$.

Trigonometry is the branch of mathematics that deals with the relationships between the sides and angles of triangles. It is used in a wide variety of applications, such as navigation, surveying, and engineering.



Pythagoras' Theorem and Trigonometry (Easy Steps Math Book 7) by Robert Watchman

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In this guide, we will learn the basics of the Pythagorean theorem and trigonometry. We will start with the Pythagorean theorem and then move on

to trigonometry. By the end of this guide, you will be able to solve even the most challenging problems in no time.

Pythagorean Theorem

The Pythagorean theorem is a fundamental theorem in geometry that states that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. In other words, if a, b, and c are the lengths of the sides of a right triangle, then $a^2 + b^2 = c^2$.

The Pythagorean theorem can be used to solve a variety of problems. For example, you can use it to find the length of the hypotenuse of a right triangle if you know the lengths of the other two sides. You can also use it to find the length of a side of a right triangle if you know the lengths of the other two sides and the angle between them.

Example 1

Find the length of the hypotenuse of a right triangle if the lengths of the other two sides are 3 and 4.

Solution:

Using the Pythagorean theorem, we have:

$$a^2 + b^2 = c^2$$

$$3^2 + 4^2 = c^2$$

$$9 + 16 = c^2$$

$$25 = c^2$$

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

Therefore, the length of the hypotenuse is 5.

Example 2

Find the length of a side of a right triangle if the lengths of the other two sides are 5 and 12 and the angle between them is 30 degrees.

Solution:

Using the Pythagorean theorem, we have:

$$a^2 + b^2 = c^2$$

$$5^2 + b^2 = 12^2$$

$$25 + b^2 = 144$$

$$b^2 = 119$$

$$b = \sqrt{119}\approx 10.91$$

Therefore, the length of the side is approximately 10.91.

Trigonometry

Trigonometry is the branch of mathematics that deals with the relationships between the sides and angles of triangles. It is used in a wide variety of applications, such as navigation, surveying, and engineering.

In trigonometry, we use the following trigonometric functions:

- Sine
- Cosine
- Tangent
- Cosecant
- Secant
- Cotangent

The trigonometric functions are defined as follows:

- Sine: $$\sin \theta = \frac{opposite}{hypotenuse}$$
- Cosine: $$\cos \theta = \frac{adjacent}{hypotenuse}$$
- Tangent: $$\tan \theta = \frac{opposite}{adjacent}$$
- Cosecant: $$\csc \theta = \frac{hypotenuse}{opposite}$$
- Secant: $$\sec \theta = \frac{hypotenuse}{adjacent}$$
- Cotangent: $$\cot \theta = \frac{adjacent}{opposite}$$

where θ is the angle between the opposite and adjacent sides.

The trigonometric functions can be used to solve a variety of problems. For example, you can use them to find the height of a building if you know the length of its shadow and the angle of elevation from the ground to the top of the building. You can also use them to find the distance to a star if you know its parallax angle and the distance from the Earth to the Sun.

Example 1

Find the height of a building if the length of its shadow is 50 feet and the angle of elevation from the ground to the top of the building is 30 degrees.

Solution:

Using the tangent function, we have:

$$\tan \theta = \frac{opposite}{adjacent}$$

$$\tan 30^\circ = \frac{height}{50}$$

$$\height = 50 \tan 30^\circ = 28.87 \text{ feet}$$

Therefore, the height of the building is 28.87 feet.

Example 2

Find the distance to a star if its parallax angle is 0.01 arcseconds and the distance from the Earth to the Sun is 93 million miles.

Solution:

Using the parallax angle, we can find the distance to the star as follows:

$$\text{distance}= \frac{1 \text{ AU}}{\parallax angle}$$

$$\text{distance}= \frac{1 \text{ AU}}{0.01 \text{ arcseconds}}= 100 \text{ AU}$$

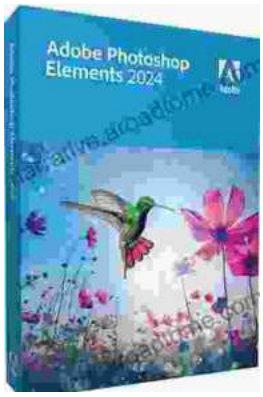
Converting 100 AU to miles, we get:

$$\text{distance}= 100 \text{ AU}\times 93 \text{ million miles/AU}= 9.3 \text{ billion miles}$$

Therefore, the distance to the star is 9.3 billion miles.

In this guide, we learned the basics of the Pythagorean theorem and trigonometry. We started with the Pythagorean theorem and then moved on to trigonometry. By now, you should be able to solve even the most challenging problems in no time.

If you have any questions, please feel free to leave a comment below. I will be happy to help.



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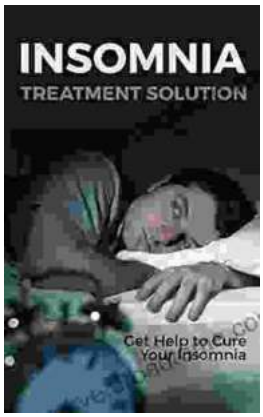

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