

The pythagorean theorem essay example

[Life](#)



Introduction

The concept of The Pythagorean Theorem is one of the most fundamental concepts in geometry. Theorem is widely applied in various areas of life from planning and construction to geography and navigation. The knowledge of The Pythagorean Theorem gives an opportunity to determine the length of any of the sides of the right triangle if 2 other sides are already known. For example, we may apply this concept in practice in our everyday life, when calculate our route to or from school or try to estimate the shortest distance from one point to another. The problem below gives an exciting example of how Theorem shall be applied.

Problem #1.

Consider the following problem:

Ahmed has half of a treasure map, which indicates that the treasure is buried in the desert $2x + 6$ paces from Castle Rock. Vanessa has the other half of the map. Her half indicates that to find the treasure, one must get to Castle Rock, walk x paces to the north, and then walk $2x + 4$ paces to the east. If they share their information, then they can find x and save a lot of digging.

What is x ?

Solution:

If we assume that Vanessa has reached castle Rock, it becomes clear that in order to find the treasure she has to go X paces to the North, and then $2X+4$ paces to the East. By making this way Vanessa will form one part of the right triangle which consists of 2 cathetus. Ahmed shall reach the same place by

walking $2x+6$ paces. Thus, his way will for the hypotenuse of the right triangle.

The right triangle will look as follows:

Now we can apply Pythagorean Theorem, which states that sum of squares of 2 cathetus equals the square of hypotenuse. In other words we will have to solve a compound equation in order to find the exact distance from the Castle Rock to buried treasure:

$$X^2+(2X+4)^2=(2x+6)^2;$$

$$X^2+(4X^2+16X+16)=(4X^2+24X+36);$$

Now we will bring all the components of the equation to the left-hand side:

$$(X^2+4X^2+16X+16)-(4X^2+24X+36)= 0;$$

Get rid of the brackets:

$$X^2+4X^2+16X+16-4X^2-24X-36= 0;$$

Add the components with the same factor:

$$X^2-8X-20= 0;$$

$$D= 8^2+4*1*(-20) = 144;$$

Quadratic equation will have 2 roots:

$$X_1=(8+\sqrt{144})/2 = 10;$$

$$X_2=(8-\sqrt{144})/2 = -2;$$

Since the distance cannot be a negative number, we shall infer that true value of X is 10. Thus, in order to find the treasure Vanessa shall go 10 paces

to the North and $10^2+4= 24$ paces to the East. Ahmed might go straight $2*10+6= 26$ paces to North East.

Conclusion

We now are able to use The Pythagorean Theorem in order to find sides of the right triangle. This knowledge gives us the opportunity to precisely calculate the lengths of any side of the triangle if we now that triangle has an angle of 90 degrees.

References

Dugopolski, M. (2012). Elementary and intermediate algebra (4th ed.). New York, NY: McGraw-Hill Publishing.