

Exploring Distance Formula Using Pythagorean Theorem PBL (Grade 8)

TEKS

- (7) Expressions, Equations, and Relationships. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:
- (A) solve problems involving the volume of cylinders, cones, and spheres;
 - (B) use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders;
 - (C) use the Pythagorean theorem and its converse to solve problems; and
 - (D) determine the distance between two points on a coordinate plane using the Pythagorean theorem.

Objectives: Students will be able to explore the distance formula by using Pythagorean Theorem.

Materials: Geogebra file

Directions: Begin by asking participants to download the activity from website.

Ask participants to relate the sides of right triangle (The Pythagorean Theorem would suggest)

$$(\text{Horizontal})^2 + (\text{Vertical})^2 = (\text{Distance})^2$$

Ask participants to check by changing the values of x_1, y_1 as well as x_2, y_2 using the sliders provided.

Ask participants to solve the general formula for the distance (Distance=)

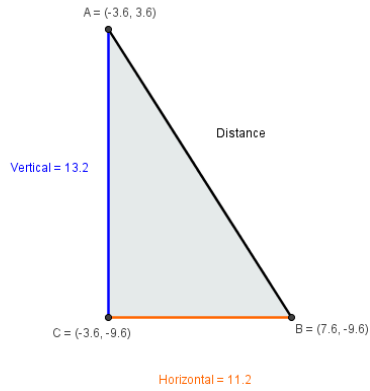
Ask participants to measure the horizontal displacement as well as vertical displacement.

$$(\text{Horizontal} = x_1 - x_2 \text{ and Vertical: } y_1 - y_2).$$

Ask participants to substitute this expression into the Distance Equation.

$$(\text{Distance} =)$$

**An Exploration
of the
Distance Formula**



Use the sliders to change the lengths of the sides of the triangle



Click to Show / Hide

- (1)
- (2)

How would you relate the sides of a right triangle?

Check by changing the values of $X1$, $Y1$ as well as $X2$, and $Y2$ using the sliders provided.

- (3)

Solving the general formula for the Distance, we get:

- (4)

How would you measure the Horizontal Displacement?

- (5)

How would you measure the Vertical Displacement?

- (6)

Substitute these expressions into the Distance Equation to get:

- Result:

Ask participants why they do not see the \pm sign in front of the distance formula.

Ask participants how they relate the distance formula with the formula of a circle.

Reflect on the Activity:

Ask: What did you notice during this activity?