Course: Algebra 2
Unit: Conic Sections
Section: Introduction to Conic Sections

Example: Distance Formula

Problem:
Find the distance between points P negative four, negative two and Q four, four.

Solution:
We will first work this graphically and then use the distance formula to find the distance.

Let's start by visualizing the distance that we are trying to find. Plot the two points on the coordinate axis.

Draw a straight line from one point to the next and draw a right triangle with this line segment as its hypotenuse.

Label the lengths of each leg by simply counting to find the length. In this case, the base has length eight and the height has length six. The hypotenuse is the distance, d, we are looking for.

We can use the Pythagorean Theorem to write eight squared plus six squared equals d squared.

Sixty-four plus thirty-six equals d squared.

One hundred equals d squared, which means the distance equals 10.

Now, let's use the distance formula to find this same distance. Watch how the same numbers show up in the problem.

D equals the square root of the quantity x two minus x one quantity squared plus y two minus y one quantity squared.

Substitute the values given for point P and Q. D equals the square root of the quantity four minus negative four quantity squared plus four minus negative two quantity squared.

Be very careful with negatives here. D equals the square root of the quantity eight squared plus six squared. Notice that these are the same numbers we saw when we did this problem graphically.

Now we can just simplify. D equals the square root of the quantity sixty-four plus thirty-six, which equals the square root of one-hundred, which is ten.

Although you do not need to work each problem graphically as well as algebraically, it helps to visualize the distance to be sure the answer you come up with is reasonable.