

Honors Algebra II

Notes Section 8.1

Apply the Distance and Midpoint Formulas

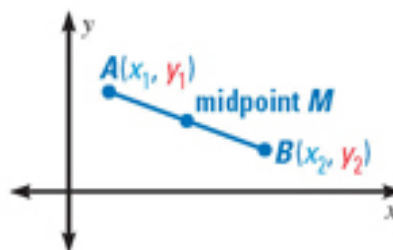
The Distance Formula

The distance d between (x_1, y_1) and (x_2, y_2) is $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

The Midpoint Formula

A line segment's *midpoint* is equidistant from the segment's endpoints. The **midpoint formula**, shown below, gives the midpoint of the line segment joining $A(x_1, y_1)$ and $B(x_2, y_2)$.

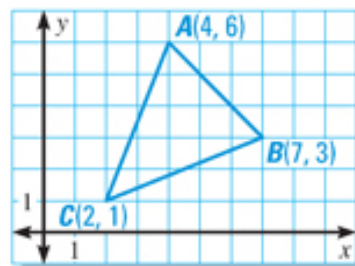
$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$



In words, each coordinate of M is the mean of the corresponding coordinates of A and B .

EXAMPLE 1 What is the distance between $(-3, 5)$ and $(4, -1)$?

EXAMPLE 2 Classify $\triangle ABC$ as scalene, isosceles, or equilateral?

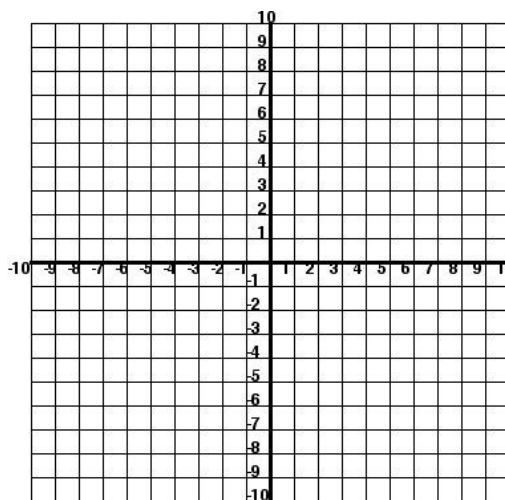


EXAMPLE 3 Find the midpoint of the line segment joining $(-5, 1)$ and $(-1, 6)$.

EXAMPLE 4 Write an equation for the perpendicular bisector of the line segment joining $A(-3, 4)$ and $B(5, 6)$.

STEP 1 Find the M of AB.

STEP 2 Find the m of AB.



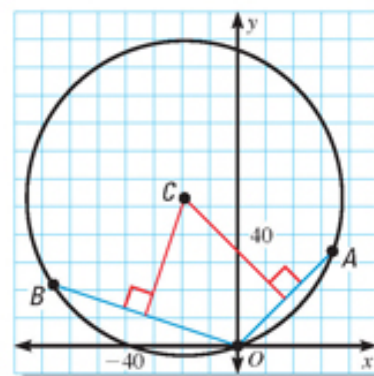
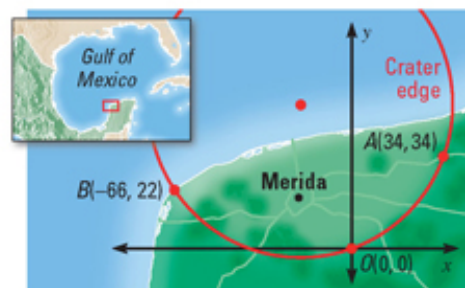
STEP 3 Find the perpendicular slope of AB .

****Remember**** This means the opposite _____

STEP 4 Substitute into $y - y_1 = m(x - x_1)$ and solve for $y = mx + b$.

EXAMPLE 5 Many scientists believe that an asteroid slammed into the Earth about 65 million years ago on what is now Mexico's Yucatan peninsula, creating an enormous crater that is now deeply buried by sediment. **Estimate its diameter.**

STEP 1 Write equations for the perpendicular bisectors of AD & OB .



STEP 2 Find the coordinates of the Center of the Circle.

STEP 3 Find the length of the radius.

STEP 4 Find the length of the crater's diameter.