EXAMPLE 3 TAKS PRACTICE: Multiple Choice

What is the midpoint of the line segment with endpoints (−2, −3) and (4, −7)?

Ⓐ (3, −1) Ⓑ (1, −5) Ⓒ (−1, 2) Ⓓ (−5, 2)

ELIMINATE CHOICES
The *y*-coordinate of the midpoint has to be negative because it is an average of the *y*-coordinates of the endpoints of the line segment. Eliminate choices C and D.

Solution

Let $(x_1, y_1) = (-2, -3)$ and $(x_2, y_2) = (4, -7)$.

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{-2 + 4}{2}, \frac{-3 + (-7)}{2}\right)$$ **Substitute.**

$$= (1, -5)$$ **Simplify.**

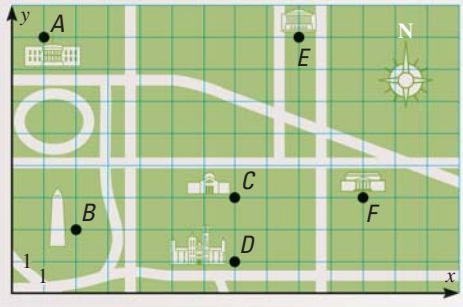
▶ The correct answer is B. Ⓐ Ⓑ Ⓒ Ⓓ

Animated Algebra at classzone.com

EXAMPLE 4 Solve a real-world problem

ANOTHER WAY
For alternative methods for solving Example 4, turn to page 751 for the **Problem Solving Workshop**.

SIGHTSEEING You and a friend are sightseeing in Washington, D.C. You are at the National Gallery of Art, and your friend is at the Washington Monument, as shown on the map. You want to meet at the landmark that is closest to the midpoint of your locations. At which landmark should you meet?



SIGHTS IN WASHINGTON, D.C.
A) White House
B) Washington Monument
C) Natural History Museum
D) Smithsonian Institution
E) National Portrait Gallery
F) National Gallery of Art

Solution

Your coordinates are (11, 3), and your friend's coordinates are (2, 2). First, find the midpoint of your locations, which is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{11 + 2}{2}, \frac{3 + 2}{2}\right) = (6.5, 2.5).$$

Next, find the distance from the midpoint to the Smithsonian Institution, located at (7, 1), and to the Natural History Museum, located at (7, 3).

Distance to Smithsonian Institution: $d = \sqrt{(6.5 - 7)^2 + (2.5 - 1)^2} \approx 1.58$ units

Distance to Natural History Museum: $d = \sqrt{(6.5 - 7)^2 + (2.5 - 3)^2} \approx 0.71$ unit

▶ You should meet at the Natural History Museum.