Interdisciplinary Applications

Maps, and the Military

**GEOGRAPHY** The Army trains its soldiers to always know their location by finding their coordinates on a map. One of the methods that the Army teaches is for the soldiers to look for two geographic features they can see and locate the features on a map. The soldiers then determine the coordinates of the two features by using a map. After making some calculations (some with a compass), the soldiers draw a line from each geographic location and can find their exact location at the intersection of the two lines.

In Exercises 1–3, use the following information.

Soldier Brown is on a field expedition. She needs to determine her location. In the distance, she can see two mountains. From her map, she determines the coordinates of Mountain Azure as $(3, 5)$ and Mount Blue as $(12, 7)$. A compass reading gives the slope of the line from Mountain Azure to her position as $2$, and the slope from Mount Blue to her location as $-\frac{3}{2}$. Her location is $(x, y)$ where the two lines intersect.

1. Write an equation of the line that passes through Soldier Brown’s location and Mountain Azure’s location.
2. Write an equation of the line that passes through Soldier Brown’s location and Mount Blue’s location.
3. Use the equations from Exercises 1 and 2 to form a system of equations. Graph the system and find the location of Soldier Brown.

In Exercises 4–6, use the following information.

Soldier Brown’s partner, Soldier Heizingberger, needs to determine his location. She radios him the coordinates of Mount Blue, but he cannot see it. He can see Mountain Azure and knows its coordinates and the slope of the line from Mountain Azure to his location is $-2$. He can also see a water tower and knows from his map that the coordinates of the water tower are $(9, 3)$ and the slope of the line from the water tower to his location is $\frac{3}{2}$.

4. Write an equation of the line that passes through Soldier Heizingberger’s location and the water tower’s location.
5. Write an equation of the line that passes through Mountain Azure’s location and Soldier Heizingberger’s location.
6. Use the equations from Exercises 4 and 5 to determine the location of Soldier Heizingberger.