Beginning Activities for Section 5.4

Mathematical Reasoning: Writing and Proof, Version 3

Beginning Activity 1 (An Equation with Two Variables)

1. Each element of the truth set is an ordered pair such that when the first coordinate is substituted for x and the second coordinate is substituted for y, the result is a true equation. Following are some examples of ordered pairs that are in the truth set: $(6, 0)$, $(0, 4)$, $(3, 2)$, $(12, -4)$, $\left(8, \frac{-4}{3}\right)$, $\left(\frac{-3}{2}, 5\right)$, $\left(\pi, \frac{12 - 2\pi}{3}\right)$.
2. The graph is a straight line that passes through the points $(0, 6)$ and $(4, 0)$. The graph shows the points whose ordered pairs are solutions of the equation $2x + 3y = 12$
3. $S = \{(x, y) \mid 2x + 3y = 12\}$

Beginning Activity 2 (The Cartesian Product of Two Sets)

Notice the correct use of set notation in this beginning activity.

1. The ordered pair $(3, a) \in A \times B$ since $3 \in A$ and $a \in B$. We can write $(3, a) \in A \times B$.
2. The ordered pair $(3, a) \notin A \times A$ since $a \notin A$. We can write $(3, a) \notin A \times A$.
3. The ordered pair $(3, 1) \in A \times A$ since $3 \in A$ and $1 \in A$. We can write $(3, a) \in A \times A$.
4. $A \times B = \{(1, a), (1, b), (2, a), (2, b), (3, a), (3, b)\}$.
5. $A \times A = \{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3)\}$
6. The ordered pair $(x, y) \notin C \times D$ provided that $x \notin C$ or $y \notin D$.
