

4.3

Union of Sets

• Example 1

We write \mathbb{Z} for the set of integers.

$$\text{If } B = \{n \in \mathbb{Z} \mid -14 \leq 3n + 7 < -4\} \cup \{-2, -1\}$$

$$\text{Then } B = \{ \quad \quad \}$$

(You must complete the formula by listing all the elements of B between the curly brackets. This is called a definition *by extension* of the set B .)

We have

$$i \in \{n \in \mathbb{Z} \mid -14 \leq 3n + 7 < -4\}$$

$$\text{if and only if } -14 \leq 3i + 7 < -4, i \in \mathbb{Z}$$

$$\text{if and only if } i \in \{-7, -6, -5\}.$$

Thus,

$$B = \{-7, -6, -5\} \cup \{-2, -1\}$$

$$= \{-7, -6, -5, -2, -1\}$$

● ● ● CHECK YOURSELF 1

Write a definition by extension of the set A determined by the following equation.

$$A = \{n \in \mathbb{Z} \mid -5 \leq 2n + 1 < 3\} \cup \{2, 3\}$$

● ● ● CHECK YOURSELF ANSWER

1. $A = \{-3, -2, -1, 0, 2, 3\}.$

4.3 Exercises

Name _____

Section _____

Date _____

A N S W E R S

1. _____

2. _____

3. _____

4. _____

5. _____

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9. _____

10. _____

Write a definition by extension for each of the sets below. \mathbb{Z} is the set of integers.

1. $A = \{n \in \mathbb{Z} \mid -10 < 5n + 5 \leq 0\} \cup \{0\}$

2. $B = \{n \in \mathbb{Z} \mid 0 \leq 8n - 16 < 8\} \cup \{3, 4, 5\}$

3. $A = \{14, 15\} \cup \{m \in \mathbb{Z} \mid 3 < m - 7 \leq 5\}$

4. $C = \{n \in \mathbb{Z} \mid -13 \leq 3n + 5 \leq -3\} \cup \emptyset$

5. $B = \{n \in \mathbb{Z} \mid -1 < 4n + 8 < 5\} \cup \{-4, -3\}$

6. $A = \{n \in \mathbb{Z} \mid -4 \leq \frac{n}{2} + 3 < 0\} \cup \{-12, -11, -10\}$

7. $C = \{n \in \mathbb{Z} \mid 0 \leq \frac{n}{6} - 4 \leq 1\} \cup \{20, 21, 22\}$

8. $B = \{m \in \mathbb{Z} \mid -3 \leq 2m - 7 < 6\} \cup \emptyset$

9. $A = \{n \in \mathbb{Z} \mid -18 \leq 3n + 9 \leq -10\} \cup \{-6, -5\}$

10. $C = \{n \in \mathbb{Z} \mid -1 \leq 4n < 0\} \cup \{1\}$