

Inclusion of Sets

• Example 1

Find a subset B of A where A is defined by the following equation. Specify B by extension.

$$A = \{n \in \mathbb{N} \mid 0 < 3n - 7 \leq 12\}$$

\mathbb{N} is the set of natural numbers.

We begin by solving the inequality.

$$\begin{aligned} 0 &< 3n - 7 \leq 12 \\ 7 &< 3n \leq 19 \\ \frac{7}{3} &< n \leq \frac{19}{3} \end{aligned}$$

The natural numbers satisfying the inequality are 3, 4, 5, and 6. Thus $A = \{3, 4, 5, 6\}$.

To find a subset B of A , we are free to choose any number of elements out of this set from none to all. We will choose the subset $B = \{3, 5, 6\}$. Since every element of B is contained in A , B is a subset of A .

• • • CHECK YOURSELF 1

Find a subset C of A , where A is defined by the following equation. Specify C by extension.

$$A = \{m \in \mathbb{N} \mid 1 \leq 4m - 3 \leq 9\}$$

\mathbb{N} is the set of natural numbers.

• • • CHECK YOURSELF ANSWER

1. $C = \{1, 3\}$.

Note: This answer is not unique.

4.2 Exercises

Name _____

Section _____

Date _____

A N S W E R S

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Find a subset B of A , where A is defined by each of the following equations. Specify B by extension. \mathbb{N} represents the set of natural numbers and \mathbb{Z} represents the set of integers.

1. $A = \{m \in \mathbb{Z} \mid 0 < 2m + 9 < 17\}$

2. $A = \{n \in \mathbb{N} \mid 10 < 7 + n \leq 21\}$

3. $A = \{n \in \mathbb{N} \mid 2 \leq 3n - 14 \leq 8\}$

4. $A = \{m \in \mathbb{Z} \mid -5 \leq 2m + 3 \leq -1\}$

5. $A = \{m \in \mathbb{Z} \mid -7 < 5m + 17 \leq 8\}$

6. $A = \{n \in \mathbb{Z} \mid -3 < 4n + 1 < 0\}$

7. $A = \{n \in \mathbb{Z}\}$

8. $A = \{m \in \mathbb{N} \mid m \leq 0\}$

9. $A = \{n \in \mathbb{Z} \mid 4 \leq 6 - 2n \leq 9\}$

10. $A = \{m \in \mathbb{Z} \mid 0 \leq 3 - 4m \leq 10\}$