

Name _____
Block 5

Date 9-14
Unit 1

Set Notation

A **Set** is: group of elements

The elements in the set are the "things" in the set. They could be numbers, letters, coins, names, etc.

Symbol for set:

$\{ \}$

Example 1:

Let C = the colors of the rainbow. We write:

$C = \{ R, O, Y, G, B, P \}$

Is red an element in the set?

The symbol for "is an element of" is: \in

So we write: $R \in C$. This means "Red is an element in C "

Is Black an element in the set? No

The symbol for "is NOT an element of" is:

So we write: $B \notin C$. This means "Black is not an element in C "

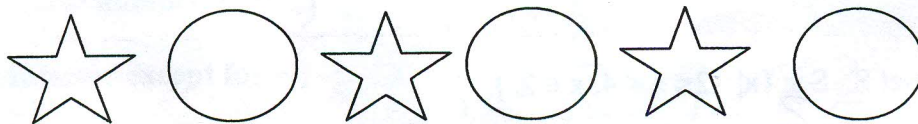
The words "such that" are shown with the symbol: $:$ or $|$

A set that has no element is called **empty set** and is denoted by $\{ \}$ or \emptyset

$\{ \}$ \emptyset

Example 2:

How many elements of the set of five pointed stars are in the following picture? 3



Example 3: How many elements of the set of four pointed stars are in the following picture? 5



Here's what we've learned so far....

A Set is: a group

Symbol for set: $\{ \}$

If something IS in the set we write: \in

If something is NOT in the set we write: \notin



Practice Set 1:

1. Let $S = \{2, 4, 6, 8, 10, \dots\}$
Is $3 \in S$? **NO**

2. Let $E = \{\text{Even Integers}\}$
 - A. Is $3 \in E$? **NO**
 - B. Is $2 \in E$? **yes**
 - C. Is $6.28 \in E$? **NO**

3. Let $P = \{\text{all rational numbers greater than } 5\}$
 - A. Is $6 \in P$? **yes**
 - B. Is $5 \in P$? **NO**
 - C. Is $625.369 \in P$? **yes**
 - D. Is $\pi \in P$? **NO**
 - E. Use the variable x to represent all the elements in P . **$x > 5$**

Insert \in or \notin to make each statement true

4. $-6 \in \mathbb{Z}$ (integers)
5. $-0.5 \notin \mathbb{Z}$
6. Matt \notin {Students in this class}
7. Red \in {Colors of the rainbow}
8. Frog \notin {Colors of the rainbow}
9. $9 \notin$ {All real numbers greater than 15}
10. $6 \in \{x \mid x > 5\}$
11. $12 \notin \{x \mid x < 5\}$
12. $2 \in \{x \mid 0 < x < 5\}$
13. $5 \notin \{x \mid 0 < x < 5\}$
14. $0.25 \notin \{x \mid 0 < x < 1\}$

15. Let $T = \{\text{all } x\text{'s such that } x > 0\}$
Is $3 \in T$? **yes**

16. Let $R = \{x \mid 0 < x < 5\}$
Is $-1 \in R$? **No**

17. List the elements of the set S . $S = \{x \mid -2 < x < 4, x \in \mathbb{Z}\}$
 $\{-1, 0, 1, 2, 3\}$

Set-Builder Notation

Set Builder Notation is: *using math symbols to describe a set*

We use the symbols for such that to "build a set"

$$\{x \mid \dots\} \quad \{x : \dots\}$$



Examples:

Write the following in Set Builder Notation:

1. $\{0, 1, 2, 3, \dots\} = \{x \mid x \geq 0\} = \{x \mid x \in \mathbb{W}\}$

2. $\{-1, 0, 1, 2, 3\} = \{x \mid -1 \leq x \leq 3\}$

3. $\{6, 7, 8, 9, 10, \dots\} = \{x \mid x \geq 6\}$

4. $\{-3, -2, -1, 0, 1, 2\} = \{x \mid -3 \leq x \leq 2\}$

{All real numbers greater than -3} = $\{x \mid x > -3\}$

6. **{All integers greater than 3 and less and or equal to 9}** = $\{x \mid 3 < x \leq 9\}$

7. **{All integers less than or equal to -5}** = $\{x \mid x \leq -5\}$

8. **{All whole numbers}** = $\{x \mid x \geq 0\}$ or $\{x \mid x \in \mathbb{W}\}$

9. **{All rationals from 0 to 10, including 0 and 10}** = $\{x \mid 0 \leq x \leq 10\}$

10. **{All Irrational numbers}** = $\{x \mid x \in \text{irrationals}\}$

11. **{All whole numbers}** = $\{x \mid x \in \mathbb{W}\}$

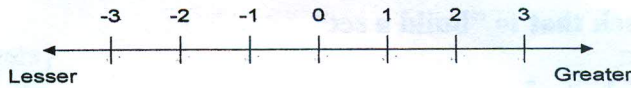
12. **{All Integers except for -4}** = $\{x \mid x \in \mathbb{Z}, x \neq -4\}$

13. **{All integers greater than 133 or less than 52}** = $\{x \mid x \in \mathbb{Z}, x > 133 \text{ or } x < 52\}$

14. **{All even integers}** ****TRICKY!**** = $\{x \mid x \in \mathbb{Z} \text{ and } x = 2 \cdot n\}$

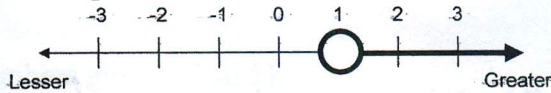
Using Number Lines to Define Sets

Number lines can also be used to indicate sets of numbers.



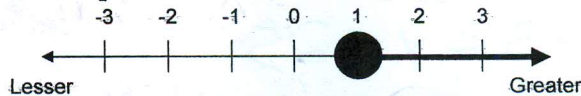
Examples:

What does the number line below represent?



Write it out! $x > 1$
 Set Notation _____
 Set-Builder Notation $\{x \mid x > 1\}$

What does the number line below represent?



Write it out! $x \geq 1$
 Set Notation _____
 Set-Builder Notation $\{x \mid x \geq 1\}$

The **open dot** shows that: Not equal to ($<$, $>$)

The **closed dot** shows that: is equal to (\leq , \geq)

Examples:

What sets do the number lines below represent? Write your answer in set builder notation.

1. $\{x \mid 2 < x < 6\}$
2. $\{x \mid 2 \leq x \leq 6\}$
3. $\{x \mid x < 2 \text{ or } x > 6\}$
4. $\{x \mid x \leq 2 \text{ or } x \geq 6\}$

Here's what we've learned so far....

- A Set is: a group
- Symbol for set: $\{ \}$
- If something IS in the set we write: \in
- If something is NOT in the set we write: \notin
- Two symbols to say "such that": \mid :
- Symbol for less than: $<$
- Symbol for greater than: $>$
- Less than or equal to: \leq
- Greater than or equal to: \geq
- Shaded circle on a number line: \geq, \leq
- Open Circle on a number line: $<, >$



