

Inequalities: Solution Set Notation

SETS AND SET NOTATION

A **set** is a collection of objects called elements or members. The members of a set are either written using **roster notation**, which lists all the members of the set, or **set-builder notation**, which tells how the set is created. The elements of a set are displayed between brackets-- $\{ \}$ and sets are named using capital letters.

For the multiples of five larger than 20,

Roster notation is $\{25, 30, 35, 40, 45, \dots\}$. The three dots indicate to continue the pattern.

Set-builder notation is $\{x|x > 20 \text{ and } x \text{ is a multiple of } 5\}$. This is read "the set of all x such that x is greater than 20 and a multiple of five."

Some very commonly used sets are:

\mathbb{Z} --the set of integers

\mathbb{Q} --the set of rational numbers, and

\mathbb{N} --the set of natural numbers

\mathbb{R} --the set of real numbers

Examples

Write in roster and set-builder notation.

M, the set of whole numbers less than ten.

roster: $M = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

set-builder: $M = \{x|x \text{ is whole and } x < 10\}$

B, the set of even, negative numbers.

roster: $B = \{\dots, -8, -6, -4, -2\}$

set-builder: $B = \{x|x \text{ is even and } x < 0\}$

Problems

Write in roster and set-builder notation.

1. A, the set of integers greater than or equal to -5 .
2. B, the integers divisible by three.
3. C, the integers between -2 and 2 inclusive.
4. D, the prime numbers less than 20 .
5. E, the perfect squares between 10 and 100 .
6. F, the odd integers less than 10 .

Interval Notation

Interval Notation is an **alternative to expressing your answer as an inequality.**

Use $()$ _____ and $[]$ _____

For Example:

Inequality: $x \leq 3$

Inequality: $-4 \leq x \leq 6$

Inequality: $0 < x \leq 20$

Interval Notation: $(-\infty, 3]$

Interval Notation: $[-4, 6]$

Interval Notation: $(0, 20]$

Try These: Write each Inequality in Interval Notation.

1. $2 < x < 5$

2. $x > 23$

3. $-5 \leq x \leq -1$

On your Own: **Write the Inequality First.**

1. All numbers between 1 and 5 including the 1 and the 5.

2. All numbers greater than or equal to 5 and less than 12.

3. All numbers greater than 2.

4. All numbers between -3 and 3, inclusive.

I can determine and graph solution sets given various solution set notations

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roster: $M = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

set-builder: $M = \{x|x \text{ is whole and } x < 10\}$

B, the set of even, negative numbers.

roster: $B = \{\dots -8, -6, -4, -2\}$

set-builder: $B = \{x|x \text{ is even and } x < 0\}$

A: $\{-5, -4, -3, -2, \dots\}$

A: $\{x | x \text{ is an integer and } x \geq -5\}$

Problems

Write in roster and set-builder notation.

1. A, the set of integers greater than or equal to -5 .

C: $\{-2, -1, 0, 1, 2\}$

2. B, the integers divisible by three.

3. C, the integers between -2 and 2 inclusive.

C: $\{x | x \text{ is an integer and } -2 \leq x \leq 2\}$

4. D, the prime numbers less than 20 .

5. E, the perfect squares between 10 and 100 .

F: $\{\dots 1, 3, 5, 7, 9\}$

6. F, the odd integers less than 10 .

F: $\{x | x \text{ is odd and } x < 10\}$

Interval Notation

Interval Notation is an **alternative to expressing your answer as an inequality.**

Use () $<$ $>$ and [] \leq \geq

For Example:

Inequality: $x \leq 3$

Inequality: $-4 \leq x \leq 6$

Inequality: $0 < x \leq 20$

Interval Notation: $(-\infty, 3]$

Interval Notation: $[-4, 6]$

Interval Notation: $(0, 20]$

Try These: Write each Inequality in Interval Notation.

1. $2 < x < 5$

$(2, 5)$

2. $x > 23$

$(23, \infty)$

3. $-5 \leq x \leq -1$

$[-5, -1]$

On your Own: **Write the Inequality First.**

1. All numbers between 1 and 5 including the 1 and the 5.

$1 \leq x \leq 5$
 $[1, 5]$

2. All numbers greater than or equal to 5 and less than 12.

$5 \leq x < 12$
 $[5, 12)$

3. All numbers greater than 2.

$x > 2$
 $(2, \infty)$

4. All numbers between -3 and 3, inclusive.

$-3 \leq x \leq 3$
 $[-3, 3]$