Topic: Trichotomy

Question: Which answer best illustrates the idea of trichotomy?

Answer choices:

A If $a = b$ and $b = c$, then $a = c$

B If $x \not\geq y$, then $x < y$

C If $x > y$, then $x > y$

D $x = 3$

Solution: B

Trichotomy is the idea that the relationship between two numbers a and b is always defined in one of three ways:

$$a > b$$

$$a = b$$

$$a < b$$

Answer choice B illustrates the trichotomy by saying that if $x \not> y$ and $x \neq y$, then it must be true that $x < y$, because we've removed two of the three options in the trichotomy, leaving only one option.

Topic: Trichotomy

Question: Solve the inequality.

$$4(1-x) \nleq 5(2-x)$$

Answer choices:

A $x < -6$

B $x \ngeq -6$

C $x > 6$

D $x < 6$

Solution: C

Expand both sides by doing the multiplication.

$$4(1-x) \leq 5(2-x)$$

$$4-4x \leq 10-5x$$

Subtract 4 from both sides.

$$4-4x-4 \leq 10-5x-4$$

$$-4x \leq 6-5x$$

Add $5x$ to both sides.

$$-4x+5x \leq 6-5x+5x$$

$$x \leq 6$$

If x is not less than 6 and also not equal to 6, the trichotomy law tells us that it must be greater than 6. Therefore, we can rewrite the solution as

$$x > 6$$

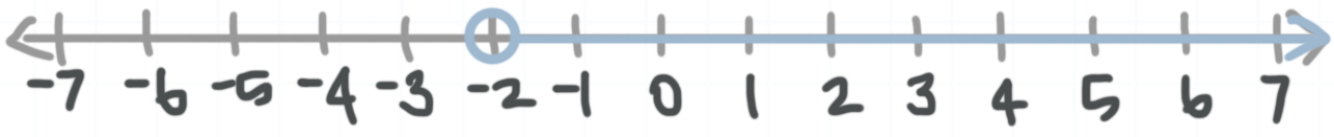
Topic: Trichotomy

Question: Graph $2x - 1 \not> x - 3$ on a number line.

Answer choices:

A

B



C

D

Solution: A

First, simplify the inequality. Add 1 to both sides.

$$2x - 1 \not> x - 3$$

$$2x - 1 + 1 \not> x - 3 + 1$$

$$2x \not> x - 2$$

Subtract x from both sides.

$$2x - x \not> x - 2 - x$$

$$x \not> -2$$

If x is not greater than -2, the trichotomy law tells us that is must be less than or equal to -2. Therefore, we can rewrite the solution as $x \leq -2$. A graph of that would look like