MATHEMATICS · GRADES 7-9

Graphing inequalities on number lines

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you picture a range of numbers on a line, like every score that passes a test or every temperature that is safe for a fridge. A single number cannot show a range, but a line with a shaded stretch shows every value that works at once. You use it to see every age that can ride a ride, every temperature a fridge must stay below, or every score that earns a pass, all in one picture.



Rule

Graphing inequalities: an open circle means the endpoint is not included, and a closed circle means it is.

Shade the side of the line where the values make the inequality true.

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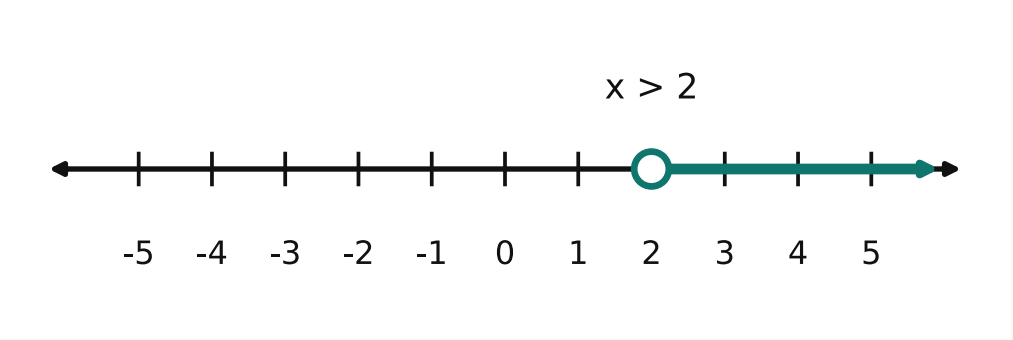
Worked examples

EXAMPLE 1

Q Graph x > 2 on a number line



SOLUTION

Draw a number line and mark 2.

Use an open circle at 2, since 2 itself is not included.

Shade the arrow to the right, where numbers are greater than 2.

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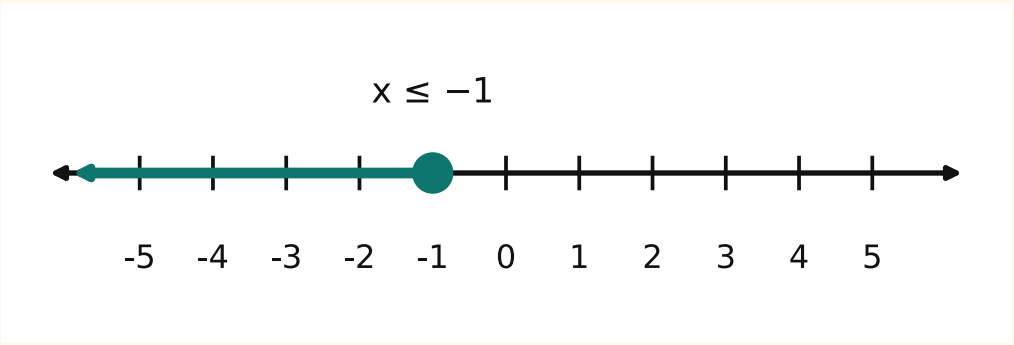
EXAMPLE 2

Q Graph $x \leq -1$ on a number line



SOLUTION

Draw a number line and mark –1.

Use a closed circle at –1, since –1 itself is included.

Shade the arrow to the left, where numbers are less than –1.

Practice questions

1 Graph $x > 3$. Is the circle at 3 open or closed?

A closed

B open

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2 Graph $x \geq 3$. Is the circle at 3 open or closed?

A open

B closed

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3 Graph $x < 0$ on a number line. Which direction is shaded, left or right?

A right

B left

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4 Graph $x > 0$ on a number line. Which direction is shaded, left or right?

A left

B right

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5 Does $x = 5$ satisfy $x \leq 5$? Answer yes or no.

- **A** Yes
- **B** No

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6 Which value is NOT in the solution of $x \geq -2$?

- **A** -2
- **B** 0
- **C** -3
- **D** 5

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7 Graph $x \leq -3$. Is the circle at -3 open or closed, and which way do you shade?

- **A** closed, left
- **B** open, right
- **C** closed, right
- **D** open, left

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8 Graph $x > 2$. Is the circle at 2 open or closed, and which way do you shade?

- **A** open, right
- **B** closed, left
- **C** open, left
- **D** closed, right

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9 The number line shows an open circle at 4 with shading to the left. Which inequality does it show?



A $x < 4$

B $x > 4$

C $x \leq 4$

D $x \geq 4$

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10 **The number line shows a closed circle at -1 with shading to the right. Which inequality does it show?**



A $x \geq -1$

B $x > -1$

C $x \leq -1$

D $x < -1$

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ANSWER KEY

1. open

2. closed

3. left

4. right

5. Yes

6. -3

7. closed, left

8. open, right

9. $x < 4$

10. $x \geq -1$

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