MATHEMATICS · GRADES 7-9

Graphing Inequalities

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you show a whole range of allowed values, like the ages that can ride a roller coaster or the prices that stay inside a budget. Instead of listing every number that works, you shade the whole region that does, so the answer is visible at a glance. That is how you see every price a shop can charge and still make a profit, every combination of two items you can afford, or every time of day a store is open and staffed.



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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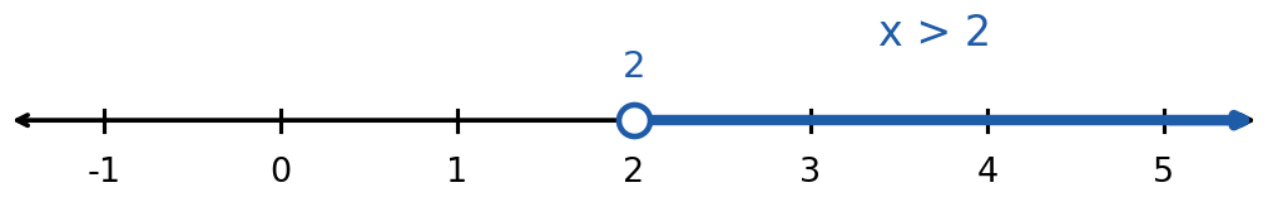
Worked examples

EXAMPLE 1

Q Graph x > 2 on a number line



SOLUTION

Mark 2 on the number line.

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

Shade to the right, where values are greater than 2.

EXAMPLE 2

Q Graph x is less than or equal to 3 on a number line



SOLUTION

Mark 3 on the number line.

Use a closed circle at 3, because 3 itself is included.

Shade to the left, where values are less than 3.

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Practice questions

1 Show $x > 4$ on a number line. Is the circle at 4 open or closed, and which way does the shading go?

- **A** Open, right
- **B** Closed, left
- **C** Open, left
- **D** Closed, right

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2 Show $x \leq 6$ on a number line. Is the circle at 6 open or closed, and which way does the shading go?

- **A** Closed, left
- **B** Open, right
- **C** Closed, right
- **D** Open, left

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3 Graph age ≥ 5 on a number line. Is the circle at 5 open or closed, and which way do you shade?

- **A** Open, left
- **B** Closed, right
- **C** Open, right
- **D** Closed, left

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4 Graph price < 4 on a number line. Is the circle at 4 open or closed, and which way do you shade?

- **A** Closed, right
- **B** Open, left
- **C** Closed, left
- **D** Open, right

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5 Does $x = 2$ satisfy $x > 2$? Answer yes or no.

A Yes

B No

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6 Does $x = 3$ satisfy $x \leq 3$? Answer yes or no.

A Yes

B No

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A number line has 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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8 A number line has 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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9 Which numbers satisfy $x < 0$?

A -1 and 0

B -1 and -2

C 0 and 1

D 1 and 2

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10 Write the inequality for scores of at least 50.

A $x \geq 50$

B $x > 50$

C $x \leq 50$

D $x < 50$

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ANSWER KEY

1. Open, right

2. Closed, left

3. Closed, right

4. Open, left

5. No

6. Yes

7. $x < 4$

8. $x \geq -1$

9. -1 and -2

10. $x \geq 50$

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