LESSON MAKER PRO

Points and Rays

Solve, graph, and describe values on a number line

HIGH SCHOOL · FA.A.10

FA.A.10 "Graph the solution point of an equation and the solution set of an inequality in one variable on a horizontal number line. For inequalities, be able to interpret and write the solution set in a variety of ways (e.g., set notation)."

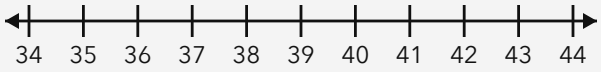
NAME _____ DATE _____

GRAPH THE VALUES

Each equation on this sheet has one solution, so mark its value with a solid point. For an inequality, use a solid endpoint for <= or >= and an open endpoint for < or >, then shade the values that work. Reverse the inequality symbol when you divide by a negative number. Set notation such as {x | x > 3} names all values of x greater than 3.

WORKED EXAMPLE

Use the number line to graph the solution of x/13 - 17 >= -14. Write the solution in set notation.

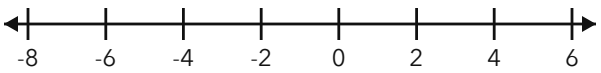


1. Add 17 to both sides: x/13 >= 3.
2. Multiply both sides by 13: x >= 39.
3. Put a solid point at 39 and shade to the right.

Answer: {x | x >= 39}

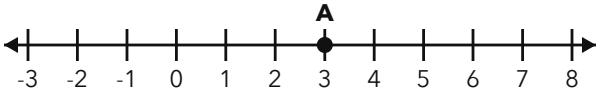
PRACTICE 6 problems

1 Solve 3x + 2 = -4. Graph its solution on the number line.



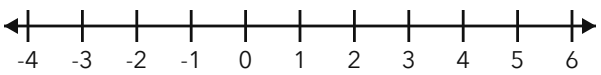
ANSWER _____

2 Point A shows the value of x. Complete the equation 2x + 1 = ___.



ANSWER _____

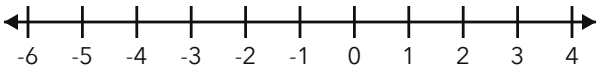
3 Solve 2x - 8 <= -2. Graph the solution and write it in set notation.



ANSWER _____

_____

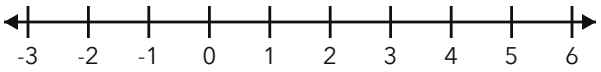
4 Solve -2x + 6 > 12. Graph the solution and write it in set notation.



ANSWER _____

_____

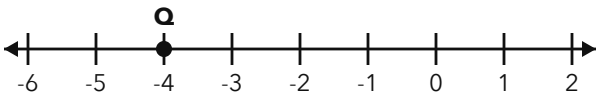
5 Graph {x | x >= 2}. State whether the endpoint is included.



ANSWER _____

_____

6 Point Q shows the value of x. Complete the equation 6x + 1 = ___.



ANSWER _____

APPLY IT Show your work

1 A concert ticket costs $18, and each snack costs $3. You can spend at most $30. Let x be the number of snacks. Write and solve an inequality. Mark every possible whole-number value of x on the number line.



ANSWER _____

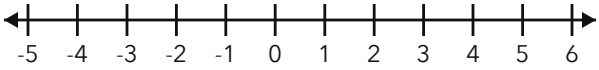
2 A workout app gives you 12 points to start and 4 points for each session. You need more than 32 points to unlock a badge. Let x be the number of sessions. Write and solve an inequality. Mark all possible values shown on the number line, and give the smallest possible value.



ANSWER _____

CHALLENGE One step up

A value must satisfy both -3(2x - 1) <= 15 and x < 4. Graph the values that satisfy both inequalities. Write the answer in set notation and interval notation.



WORK SPACE AND ANSWER

Points and Rays

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve 3x + 2 = -4. Graph its solution on the number line.	**x = -2; solid point at -2.**
2	Point A shows the value of x. Complete the equation 2x + 1 = ___.	**2x + 1 = 7.**
3	Solve 2x - 8 <= -2. Graph the solution and write it in set notation.	**{x | x <= 3}; solid point at 3, shaded left.**
4	Solve -2x + 6 > 12. Graph the solution and write it in set notation.	**{x | x < -3}; open point at -3, shaded left.**
5	Graph {x | x >= 2}. State whether the endpoint is included.	**Solid point at 2, shaded right. The endpoint is included.**
6	Point Q shows the value of x. Complete the equation 6x + 1 = ___.	**6x + 1 = -23.**

PART 2 · APPLY IT

1. **18 + 3x <= 30, so x <= 4. Mark 0, 1, 2, 3, and 4.** Subtract 18, then divide by 3. A snack count must be a nonnegative whole number.
2. **12 + 4x > 32, so x > 5. Mark 6, 7, 8, 9, and 10 on the line; larger whole numbers also work. The smallest possible value is 6.** Subtract 12, then divide by 4. Because x counts sessions, only whole numbers greater than 5 are possible.

CHALLENGE

{x | -2 <= x < 4}; [-2, 4). Graph a solid point at -2, an open point at 4, and shade between them.

Accept equivalent descriptions of each graph. In the word problems, accept only nonnegative whole-number counts, not every real number in the solved inequality.