

Number Line Moves

Solve two-step equations and inequalities, then graph each solution.

GRADE 7 • TEKS 7.10.B

7.10.B "represent solutions for one-variable, two-step equations and inequalities on number lines; and"

NAME _____

DATE _____

SOLVE AND REPRESENT

Show both solving steps. Undo operations to isolate x . Each linear equation on this sheet has one solution point. An inequality uses an open dot for $<$ or $>$, a closed dot for $\leq$ or $\geq$, and a ray toward all solutions. Reverse the inequality when multiplying or dividing by a negative number.

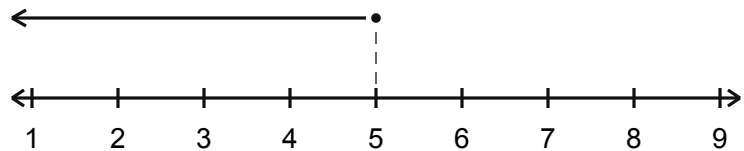
WORKED EXAMPLE

Solve and graph $3x + 2 \leq 17$ over the real numbers.

1. Subtract 2: $3x \leq 15$. Divide by 3: $x \leq 5$.
2. The dot and ray lie above the scale; the dashed guide lines up the endpoint with 5.

Answer: $x \leq 5$: closed dot at 5, ray left.

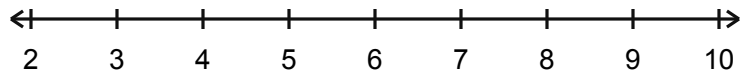
Draw the solution above the scale



PRACTICE 4 problems

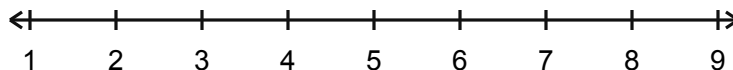
- 1** Solve and graph $3x + 2 = 20$. Check your solution by substitution.

Draw the solution above the scale



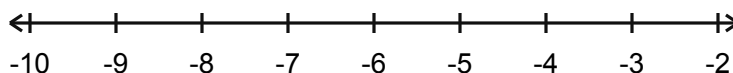
- 2** Solve and graph $5x - 7 \leq 18$. State whether 5 is included and why.

Draw the solution above the scale



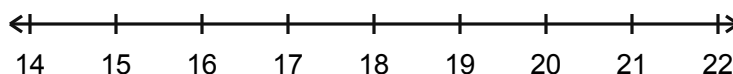
- 3** Solve and graph $-2x + 1 > 13$. Explain the direction change.

Draw the solution above the scale



- 4** Solve and graph $x/3 + 8 \geq 14$.

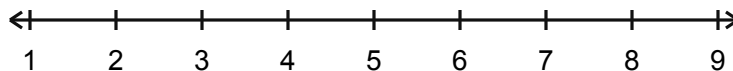
Draw the solution above the scale



APPLY IT Show your work

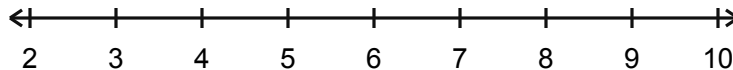
1 A game awards 7 gems per quest. You start with 6 gems and finish with 41. Let x be completed quests. Write and solve an equation, then graph its solution.

Draw the solution above the scale



2 A printer charges a \$2 setup fee and \$3 per meter of banner. The total must be more than \$20. Let x be banner length in meters. Write and solve an inequality. Graph the real-number solution.

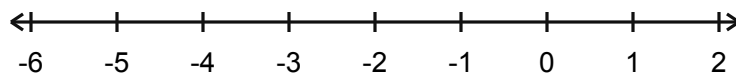
Draw the solution above the scale



CHALLENGE One step up

Solve and graph $-4(x - 3) \leq 20$. Explain why the sign reverses, then check one included value and the boundary.

Draw the solution above the scale

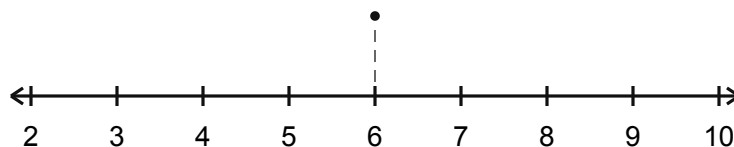


Every task has its own equally spaced number line. Equations use one point; inequalities need the correct open/closed boundary and ray. Check algebra, boundary position and direction separately. The banner model permits fractional meters.

PRACTICE 1

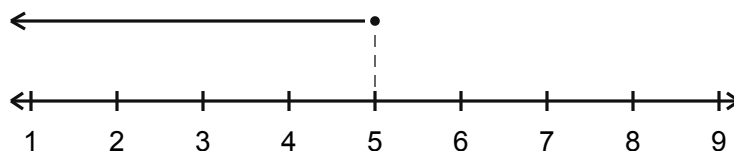
Draw the solution above the scale

$3x = 18$; $x = 6$. Plot a single closed dot at 6. Check: $3(6) + 2 = 20$.

**PRACTICE 2**

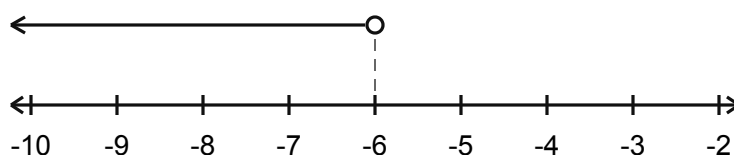
Draw the solution above the scale

$5x \leq 25$; $x \leq 5$. Closed dot at 5, ray left. 5 is included because $5(5) - 7 = 18$.

**PRACTICE 3**

Draw the solution above the scale

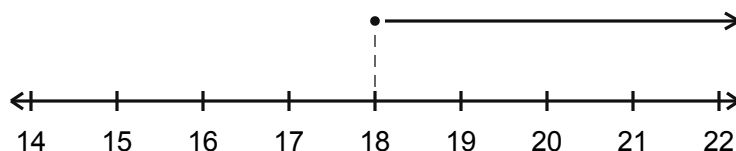
$-2x > 12$; $x < -6$. Division by -2 reverses $>$ to $<$. Open dot at -6 , ray left.



PRACTICE 4

$x/3 \geq 6$; $x \geq 18$. Closed dot at 18, ray right.

Draw the solution above the scale

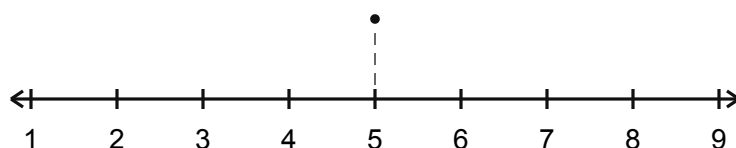


APPLY IT 1

$7x + 6 = 41$; $7x = 35$; $x = 5$ quests. One closed dot at 5.

Check that the representation and explanation agree with the given quantities.

Draw the solution above the scale

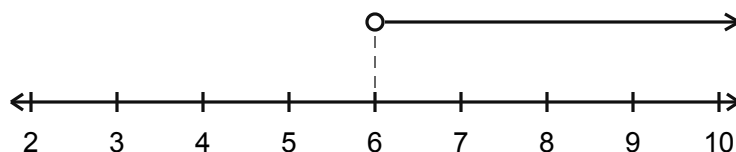


APPLY IT 2

$3x + 2 > 20$; $3x > 18$; $x > 6$ meters. Open dot at 6, ray right; exactly 6 meters costs \$20 and is excluded.

Check that the representation and explanation agree with the given quantities.

Draw the solution above the scale



CHALLENGE

$x - 3 \geq -5$; $x \geq -2$. Closed dot at -2, ray right. Dividing by -4 reverses the inequality. At $x = 0$: $12 \leq 20$; at $x = -2$: $20 \leq 20$.

Draw the solution above the scale

