

Line Up Solutions

Solve equations, functions, and inequalities, then read their graphs.

HIGH SCHOOL • MA.912.AR.2

MA.912.AR.2 "Write, solve and graph linear equations, functions and inequalities in one and two variables."

NAME _____

DATE _____

You will need: Pencil; Ruler

SOLVE AND SHOW

Undo operations and check a linear equation by substitution. A one-variable solution is a point or interval on a number line. In two variables, graph a line using its slope and intercept. For an inequality, draw a solid boundary for $\leq$ or $\geq$ and a dashed boundary for $<$ or $>$; test a point to choose the shaded side.

WORKED EXAMPLE

Point A is placed at the solution on the number line.
Solve $x + 11 = 19$. Is A placed correctly?



1. Subtract 11 from both sides: $x = 19 - 11$.
2. Simplify: $x = 8$.
3. Point A is at 8, so the placement is correct.

Answer: $x = 8$; yes, A is placed correctly.

PRACTICE 6 problems

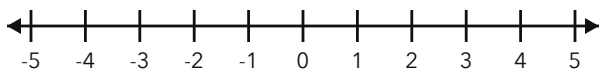
1 Solve $3x - 7 = 14$.

ANSWER _____

2 Solve $-2x + 9 = -15$.

ANSWER _____

3 Solve $4x + 6 = -2$. Plot the solution on the number line and label it A.

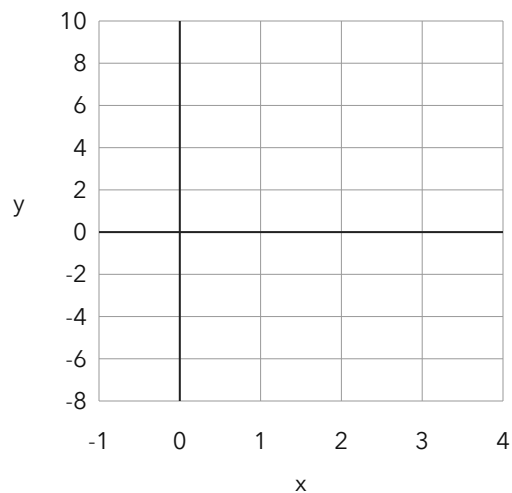


ANSWER _____

4 For $f(x) = -3x + 7$, find $f(2)$.

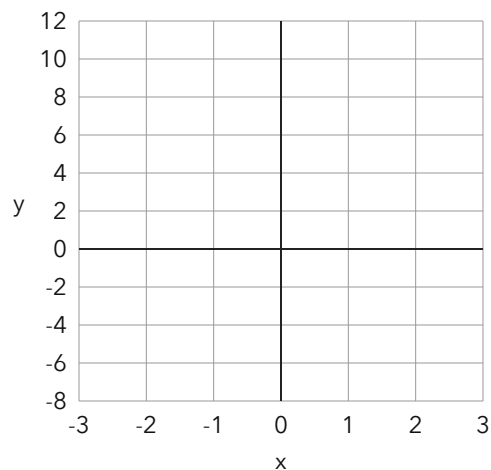
ANSWER _____

- 5** Write the equation of the line with slope 4 and y-intercept -6. Graph it on the plane.



ANSWER _____

- 6** Solve $3x + 2 < 20$ for x . Then graph the two-variable inequality $y < 3x + 2$ on the plane. Explain whether each boundary is included.



ANSWER _____

APPLY IT Show your work

- 1** A streaming plan has a starting fee and a constant cost per hour. Use the table to write a linear function y for total cost in dollars after x hours. Then find the cost for 9 hours.

STREAMING PLAN COST

x , hours	y , dollars
0	3
1	5
2	7
3	9

REASONING AND ANSWER

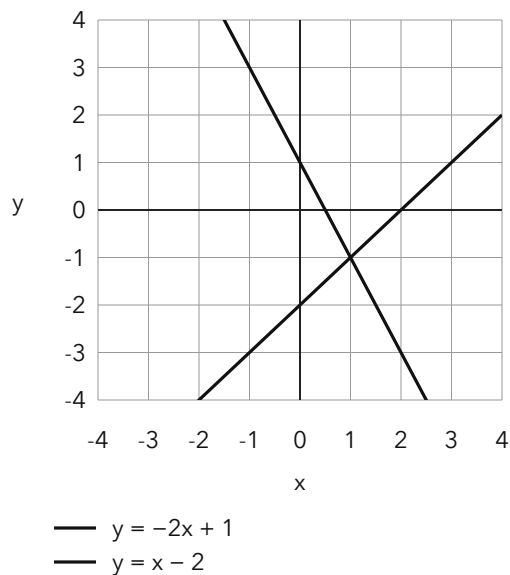
- 2** At an arcade event, admission costs \$7 and each game token costs \$3. You have at most \$28. Write and solve an inequality for x , the number of tokens you can buy. State which whole-number values of x are possible.

WORK SPACE

REASONING AND ANSWER

CHALLENGE One step up

The grid shows $y = -2x + 1$ and $y = x - 2$. Find their intersection point and explain why it solves both equations.



WORK SPACE AND ANSWER

PRACTICE 1

$x = 7$

PRACTICE 2

$x = 12$

PRACTICE 4

$f(2) = 1$

APPLY IT 1

$y = 2x + 3$; $y = 21$ when $x = 9$. The cost increases by 2 dollars for each additional hour, and the starting cost is 3 dollars. Substitute 9 for x .

APPLY IT 2

$3x + 7 \leq 28$ gives $x \leq 7$. In context, x is one of 0, 1, 2, 3, 4, 5, 6, 7; the maximum is 7 tokens. Add the admission cost and token cost, then keep the total at or below 28. Solve the inequality by subtracting 7 and dividing by 3.

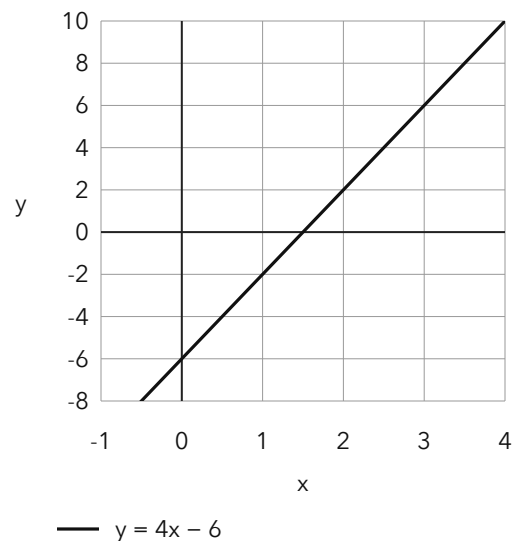
PRACTICE 3

$x = -2$; place a filled point A at -2.



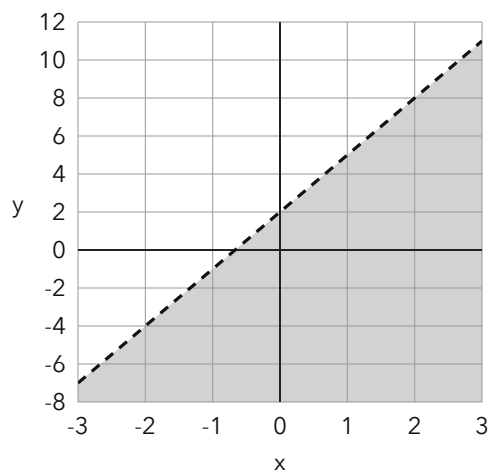
PRACTICE 5

$y = 4x - 6$. A line through (0, -6), (1, -2), (2, 2), and (3, 6).



PRACTICE 6

One variable: $x < 6$; 6 is excluded. **Two variables:** draw the dashed line $y = 3x + 2$ and shade below it. The origin satisfies $0 < 2$ and is shaded; the line is excluded.



CHALLENGE

The intersection is (1, -1): $-2(1) + 1 = -1$ and $1 - 2 = -1$. Both equations hold at that point.

Accept equivalent equation forms. Require the plotted point in practice 3, a complete line in practice 5, and a dashed boundary with correct shading in practice 6. A one-variable interval and a two-variable half-plane are different solution sets. Graph-window edges do not impose restrictions. Token counts must be nonnegative whole numbers.

