

Solving Algebraic Equations via Double Number Lines



Our Friends at GCTM



Georgia Council of
Teachers of Mathematics

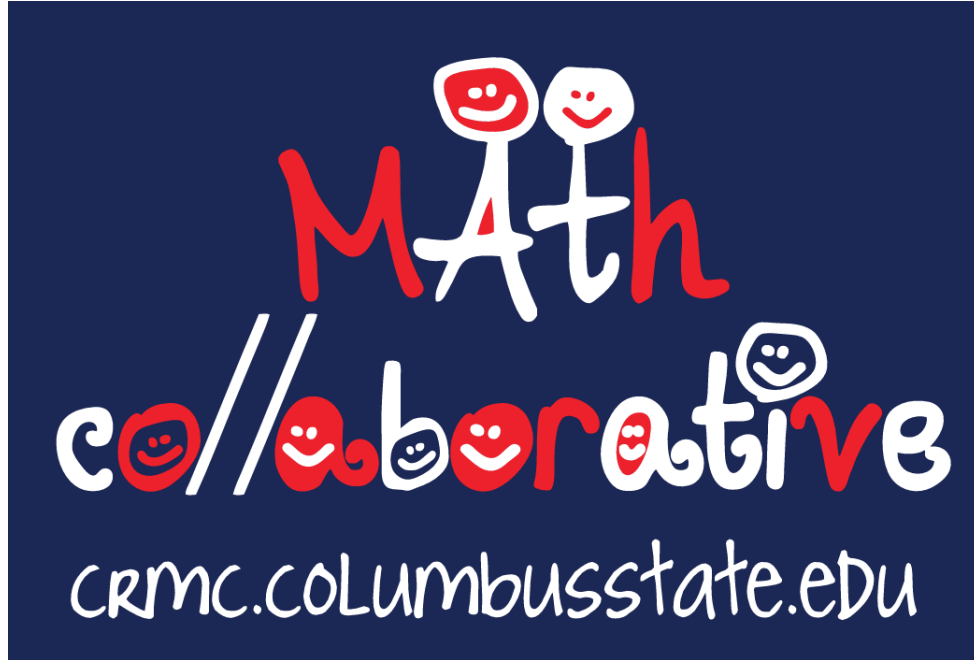
#GMC2023

@gctm_math



Email pics to...
gammillgctm@gmail.com
for
possible inclusion in
eReflections

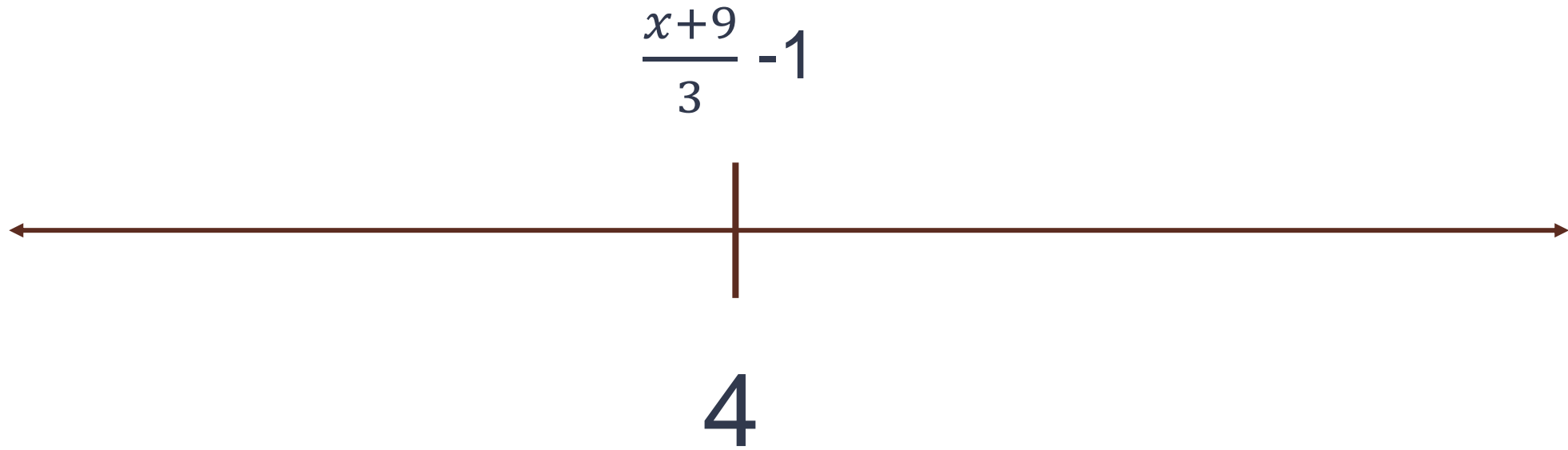
Who We Are



Hope E. Phillips, Ed.S.
Middle Grades Resource Teacher
Math Collaborative
Columbus State University
phillips_hope@columbusstate.edu



Peter Anderson, M.Ed.
Director
Math Collaborative
Columbus State University
anderson_peter2@columbusstate.edu



What does this visual tell you?

How do we get where we are going?

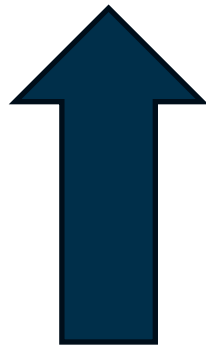


Go back in time...

Multiplication



$$\text{Scaling Factor} \times \text{Multiplicative Unit} = \text{Rescaled Result}$$



Multiplicative Comparisons

4.NR.2.2

Interpret, model, and solve problems involving multiplicative comparison.

Mara has four pencils. Josh has three times as many pencils as Mara. How many pencils does Josh have?

Moving beyond
"groups of"

Multiplication as Scaling (Resizing): 5.NR.3.5

Explain why...

Multiplying a whole number by a fraction greater than one results in a product greater than the whole number;

Multiplying a whole number by a fraction less than one results in a product less than the whole number;

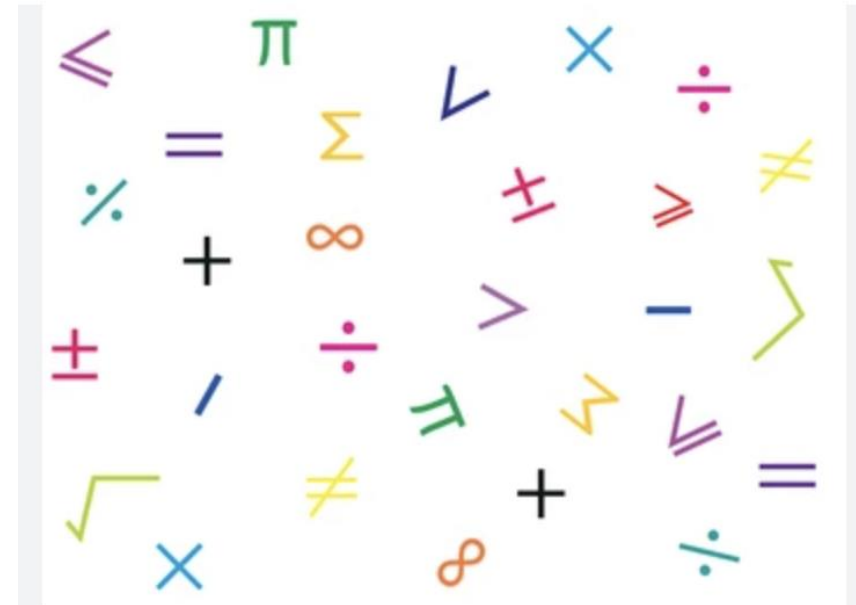
Multiplying a whole number by a fraction equal to one results in a product equal to the whole number.

Predict the size of the product, relative to the multiplicative unit, *without* solving.

$$1 \times 12 =$$

$$\frac{3}{4} \times 12 =$$

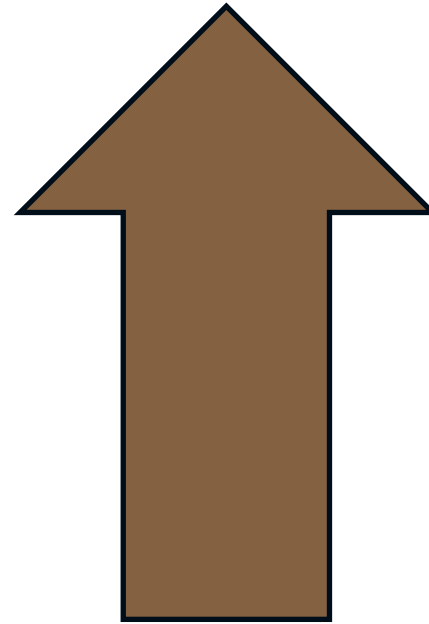
$$1\frac{1}{4} \times 12 =$$



What are the Actions of a Fraction Numerator & Denominator?

counts

splits

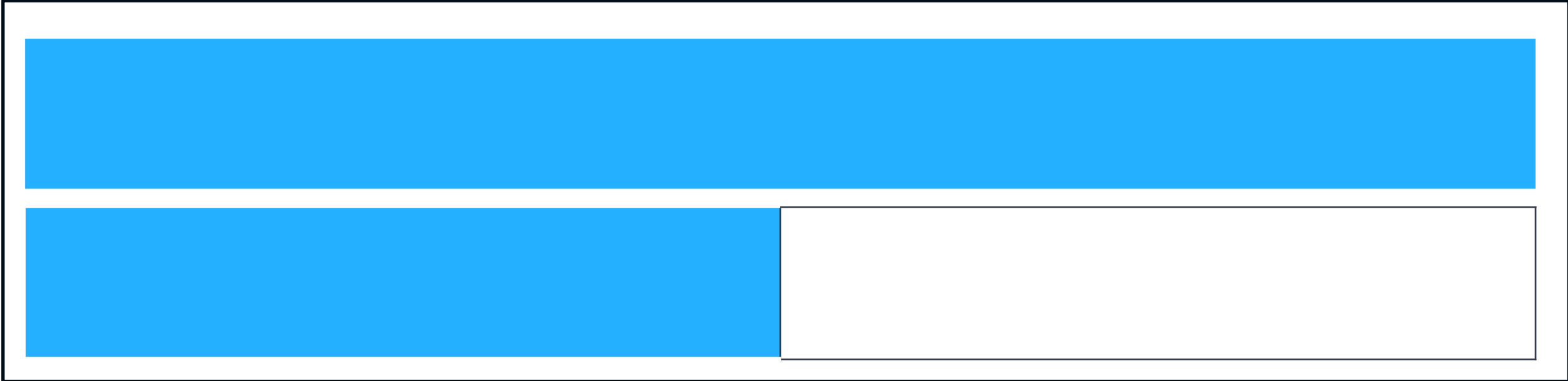


POLYPAD Fraction Bars

This is 1x.



I have this much of "x". How do I get a whole "x"?



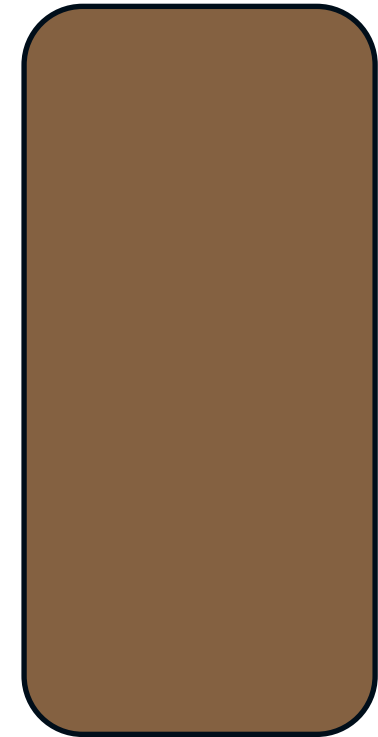
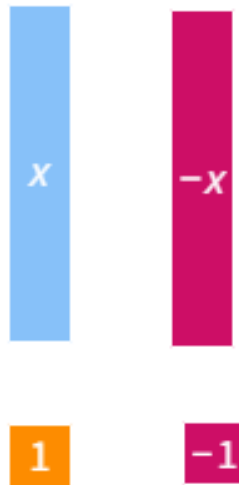
I have this much of "x". How do I get a whole "x"?

Algebra Tiles to Solve Algebraic Expressions & Equations

$$1(x + 5)$$

$$2(x + 5)$$

$$3(x + 5)$$



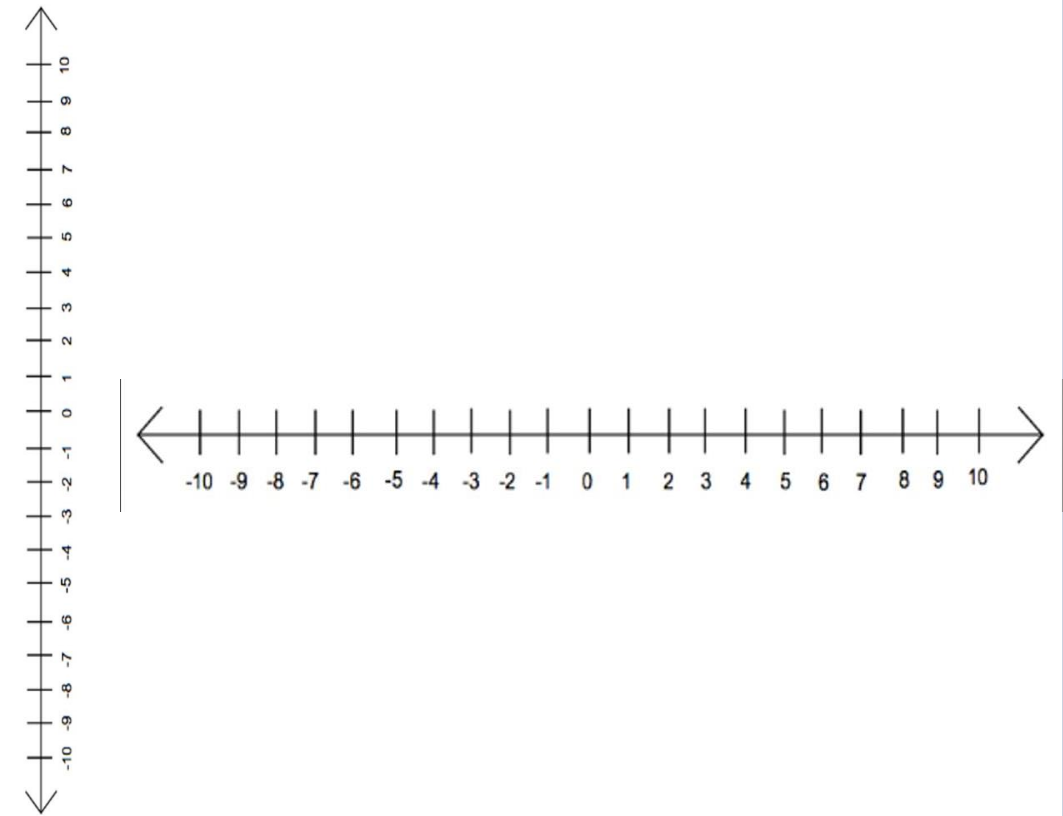
Polypad

*Fractional part
assigned a value

Before we start...a couple of things

Your language matters.

-X

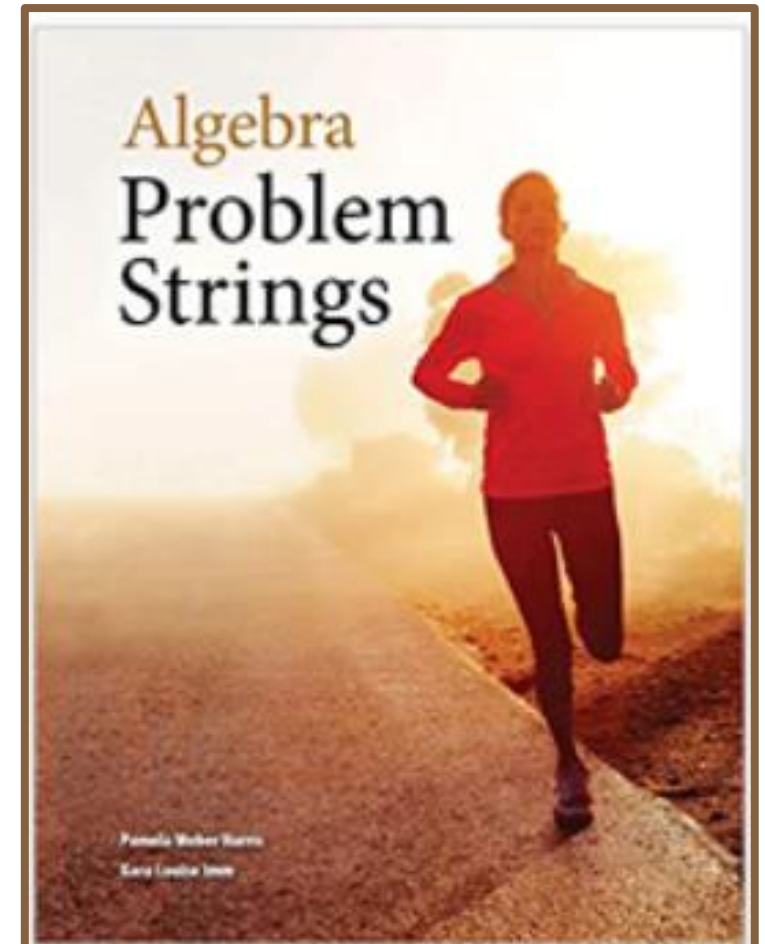


Inspirational Material

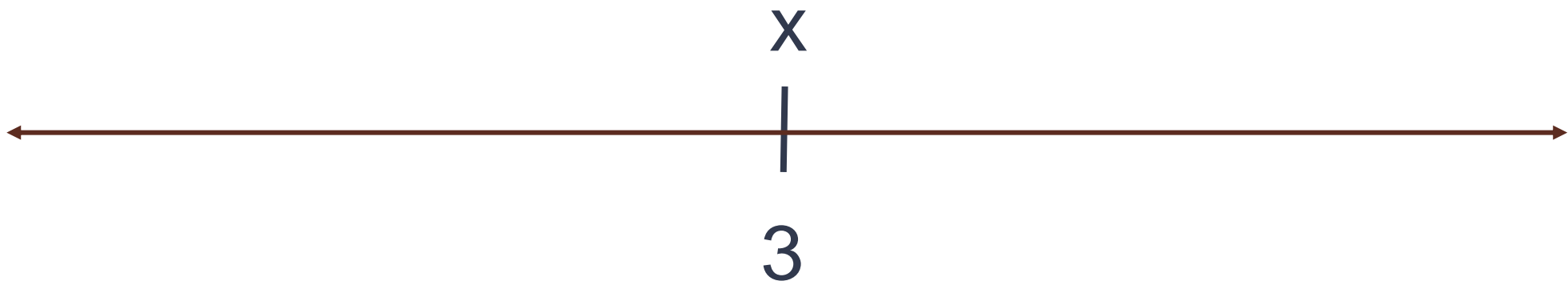
Pam Weber Harris

Algebra Problem Strings

<https://www.mathisfigureoutable.com/>

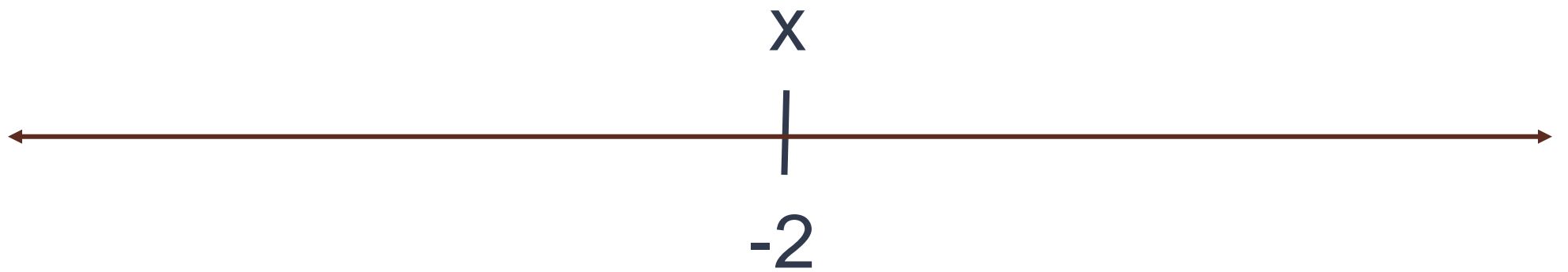


$$x = 3$$



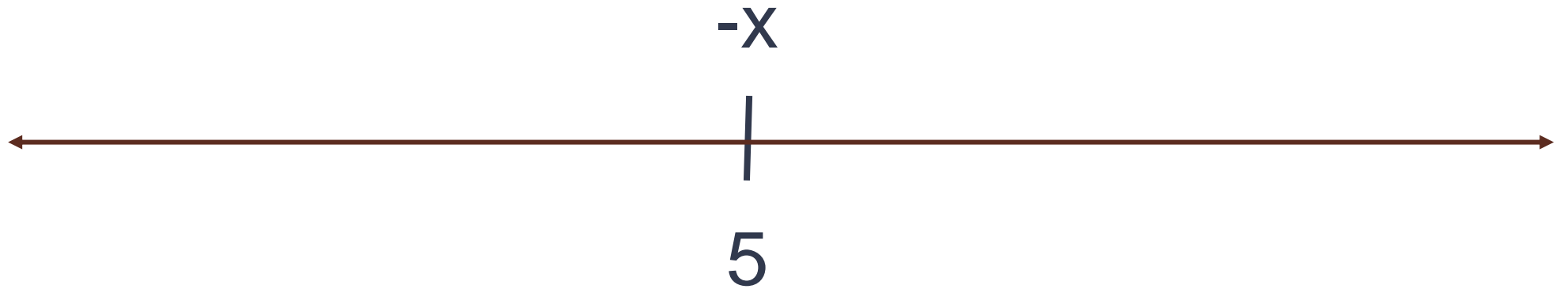
Where is 0?

$$x = -2$$



Where is 0?

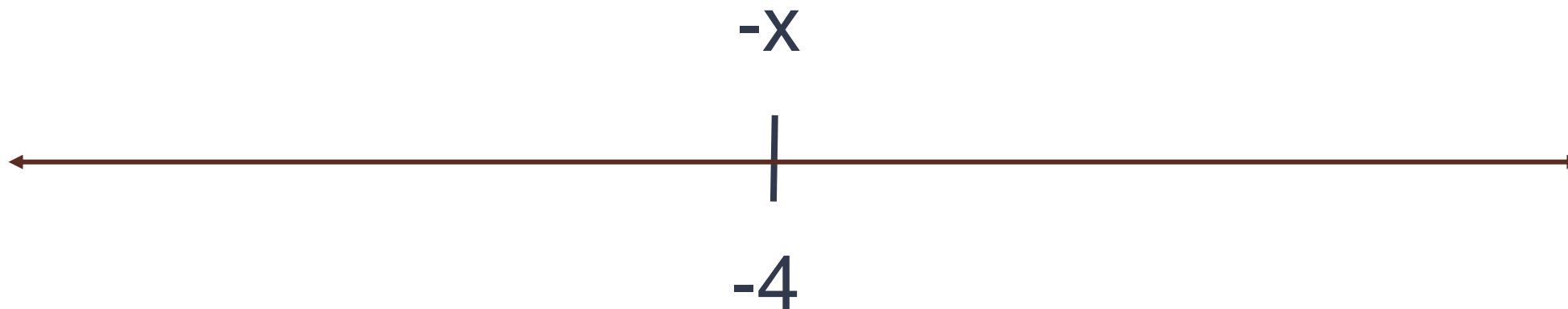
$$-x = 5$$



- Language -- the *OPPOSITE* of x

- Where is 0 ?
- Where is x ?

$$-x = -4$$

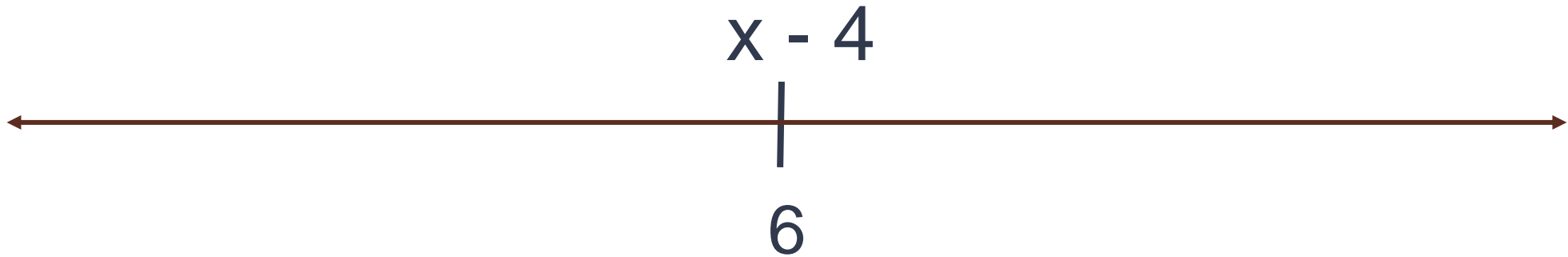


- Where is zero?
- Where is x ?
- How does this relate to inequalities?

$$x - 4 = 6$$



Think: What is happening to "x"?

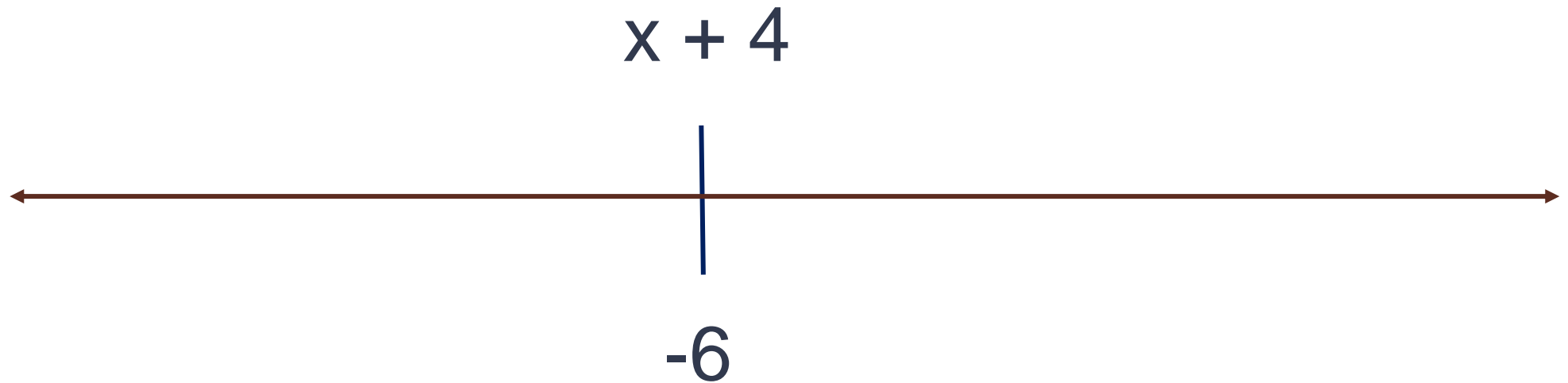


- Where was "x" before 4 was subtracted from it? Where is 0?

$$x + 4 = -6$$

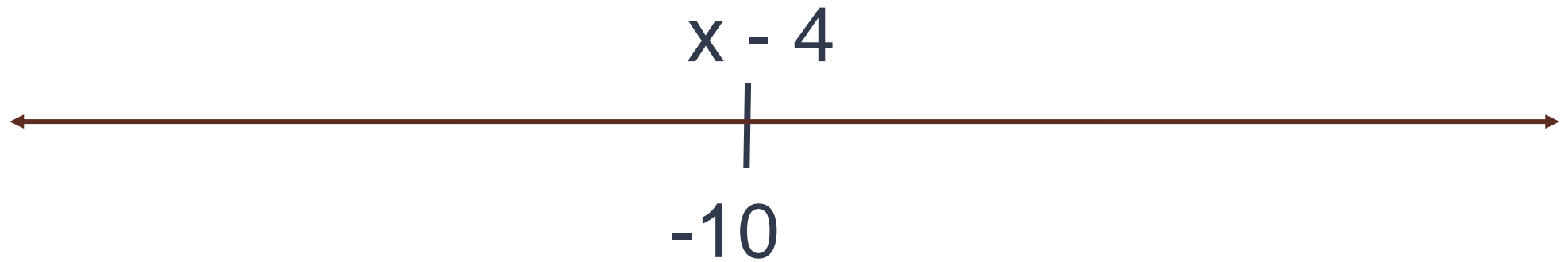


Think: What is happening to "x"?



- Where is 0?

$$x - 4 = -10$$

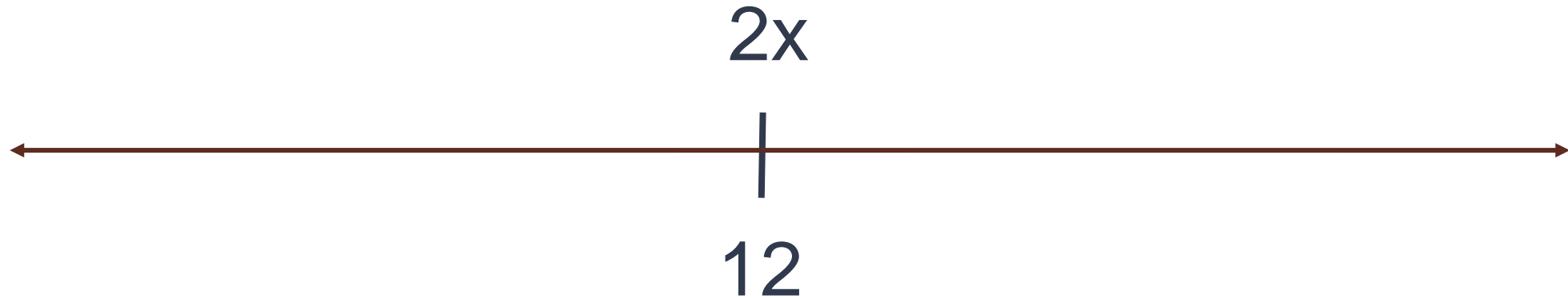


- Where is 0 ?

$$2x = 12$$



Think: Predict the magnitude of "x" compared to 12.

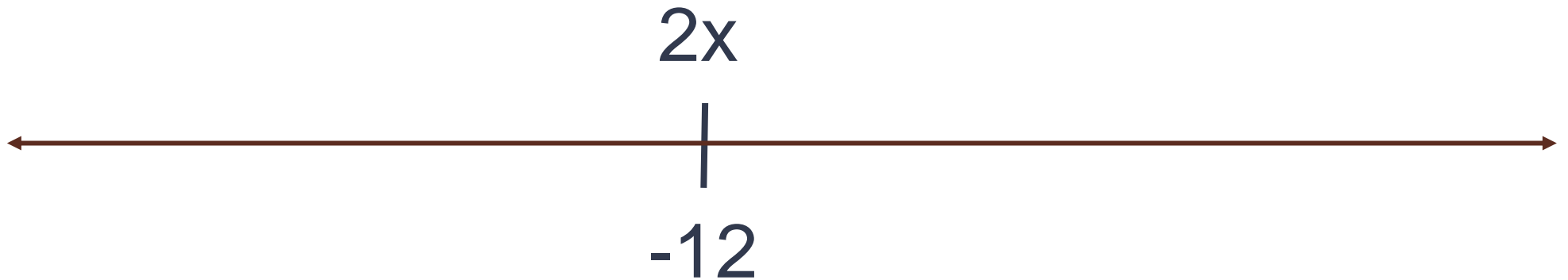


- Where is 0? Where is 1x?

$$2x = -12$$



Think: Predict the magnitude of "x" compared to -12.

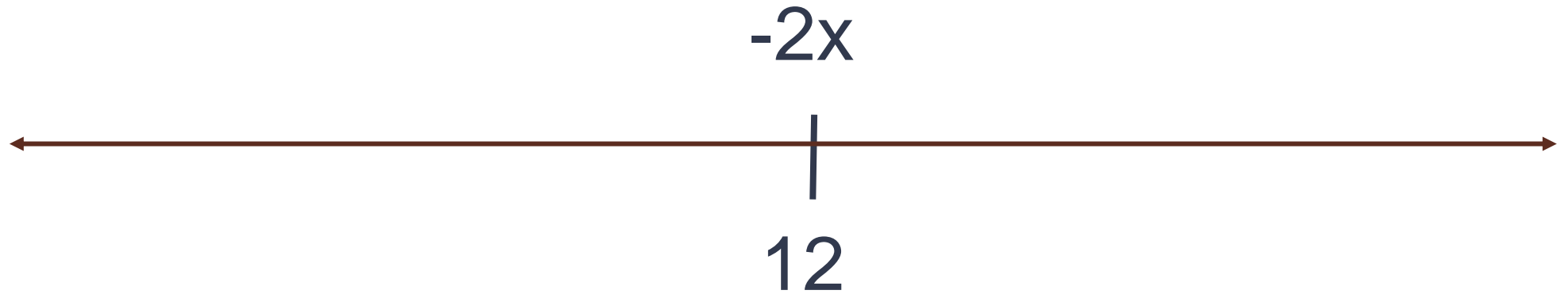


- Where is 0? 1x?

$$-2x = 12$$

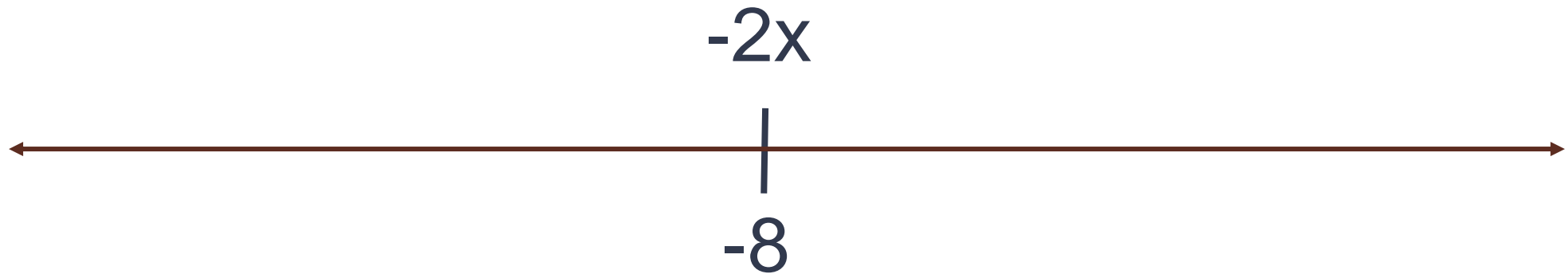


Think: Predict the magnitude of "x" compared to 12.



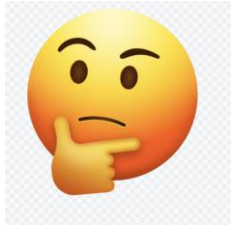
- If the opposite of $2x$ is equal to 12 , what is $2x$ equal to?

$$-2x = -8$$

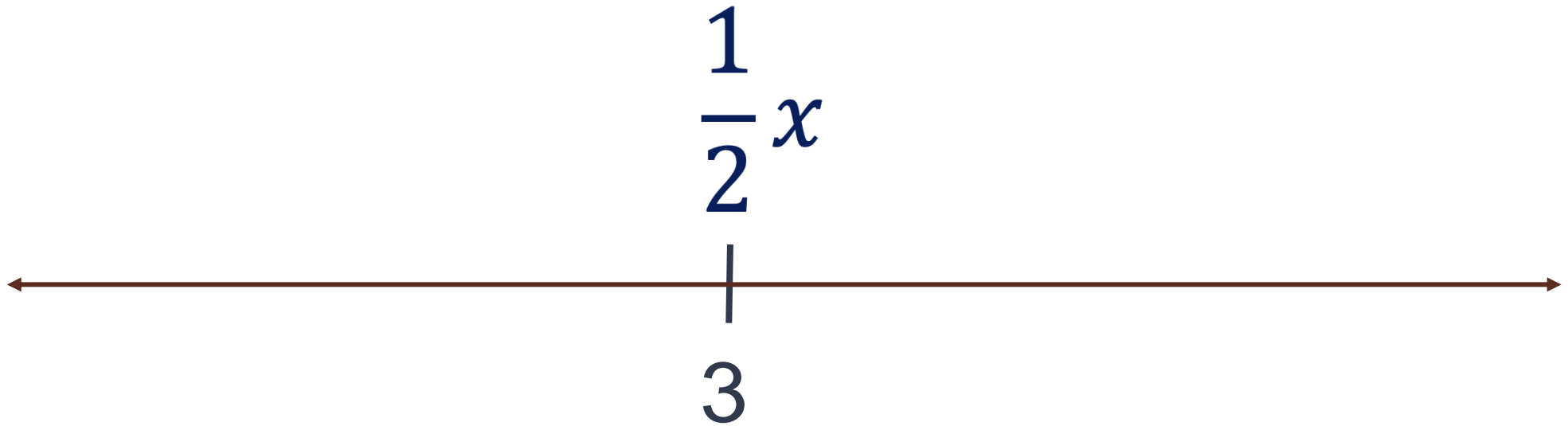


Rewrite the equation to reflect your understanding of "the opposite of"

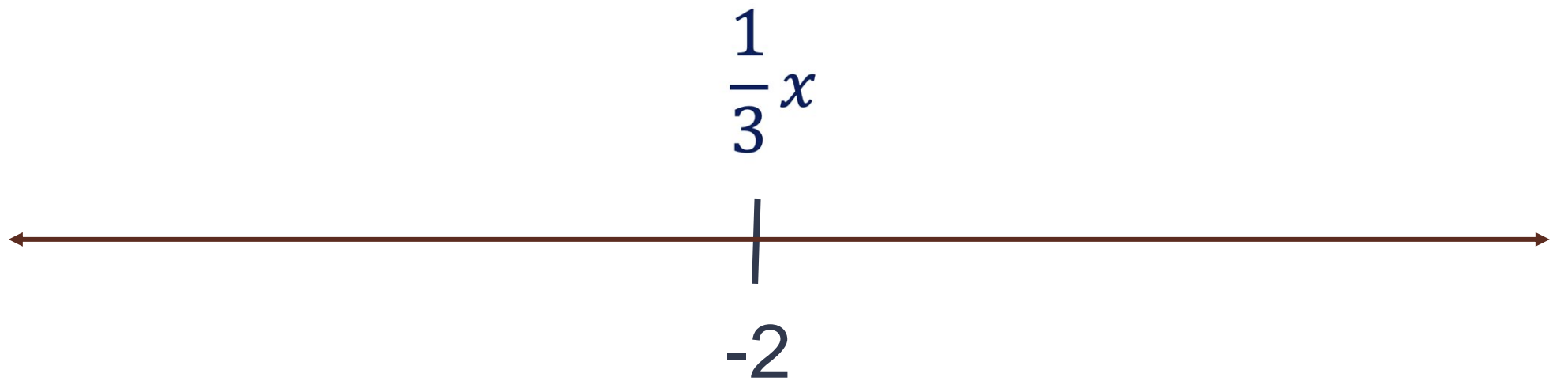
$$\frac{1}{2}x = 3$$



Think: Predict the magnitude of "x" compared to 3.

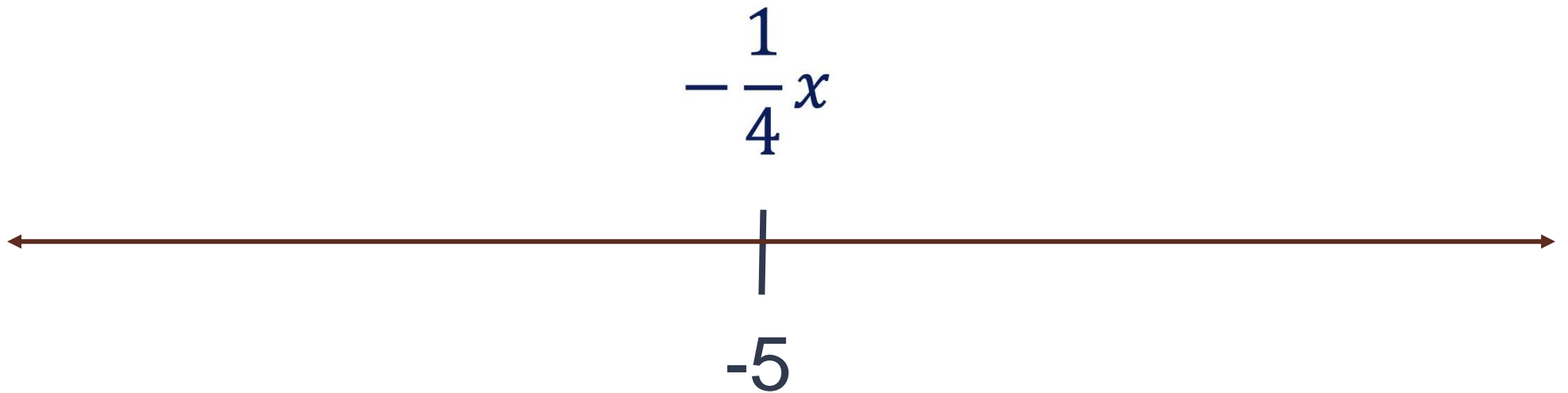


$$\frac{1}{3}x = -2$$



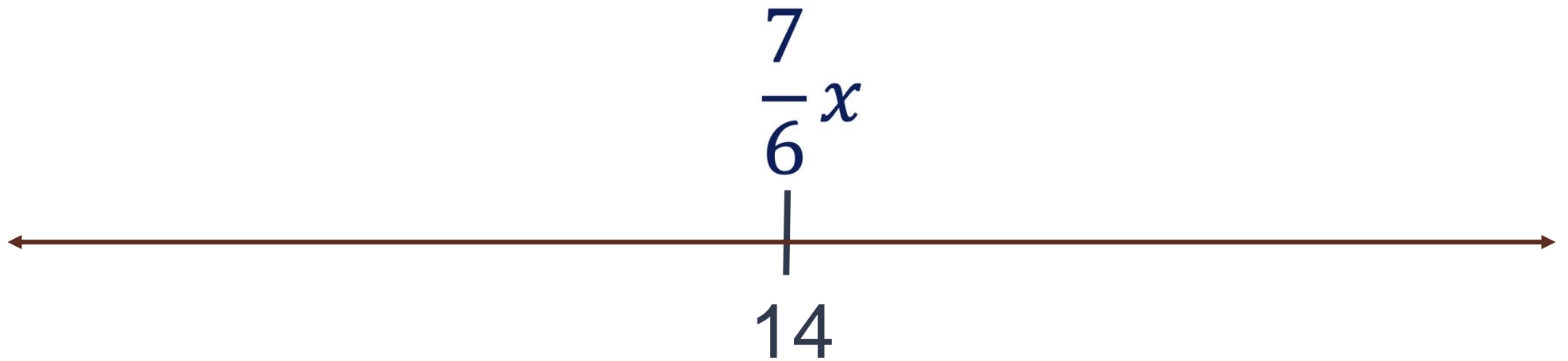
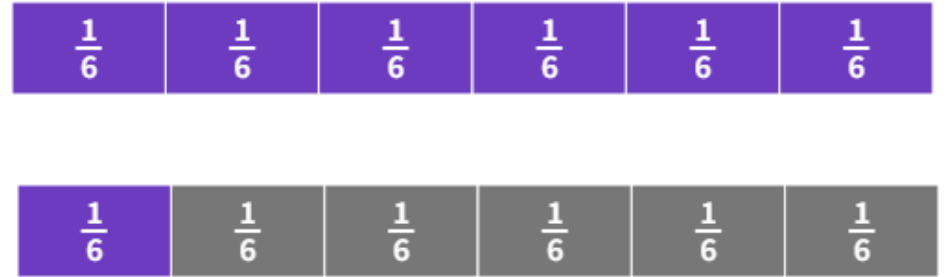
- Predict the magnitude of "x" compared to -2

$$-\frac{1}{4}x = -5$$



- Predict the magnitude of "x" compared to -5

$$\frac{7}{6}x = 14$$

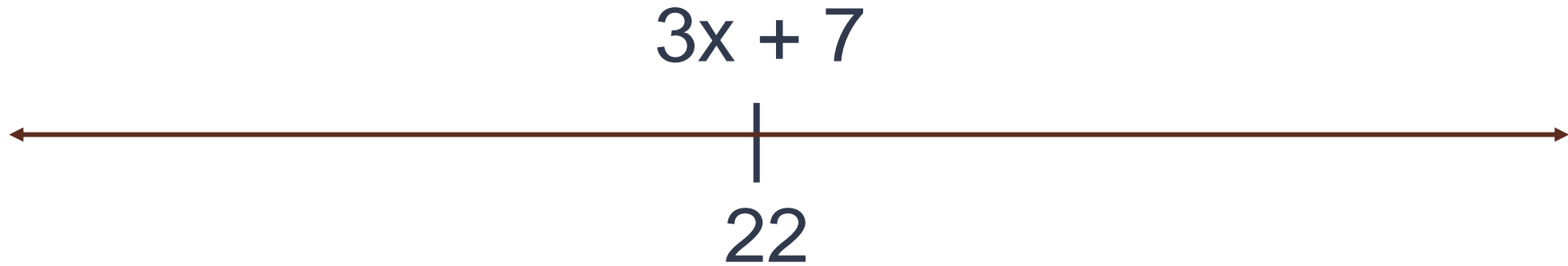


- Predict the magnitude of "x" compared to 14.

$$3x + 7 = 22$$

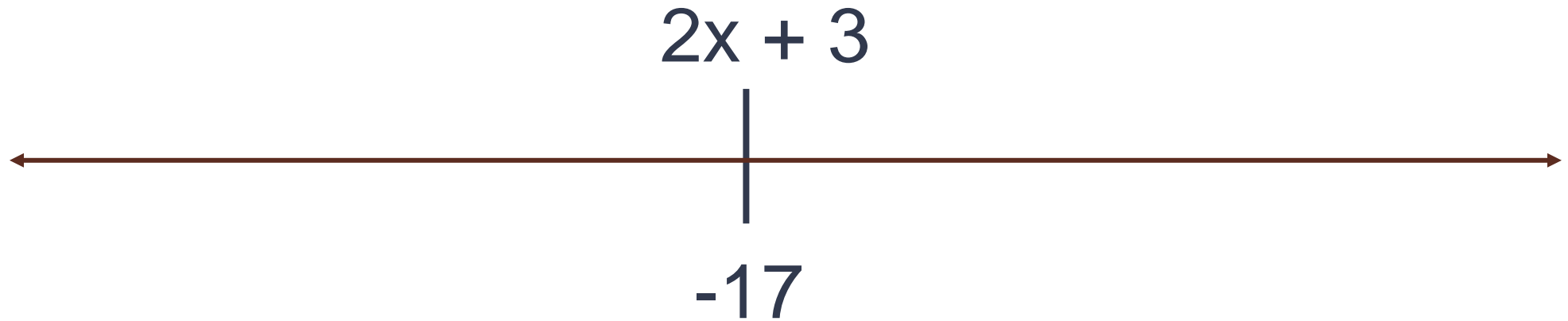


Think: What is happening to "x"?



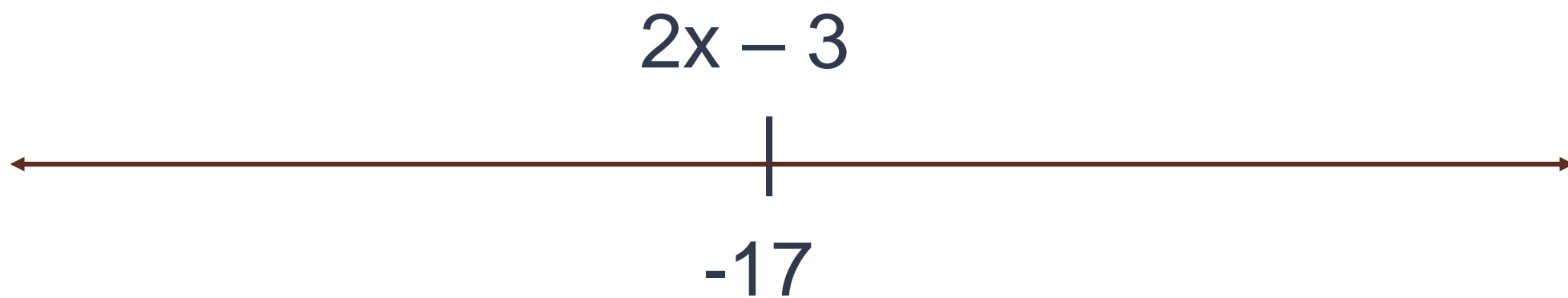
What does $3x$ mean?

$$2x + 3 = -17$$



• What does $2x$ mean?

$$2x - 3 = -17$$

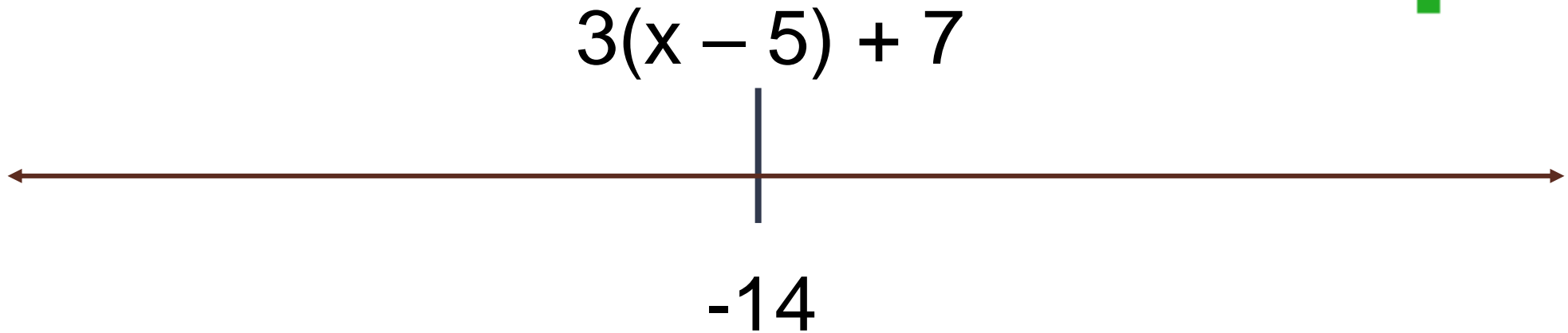
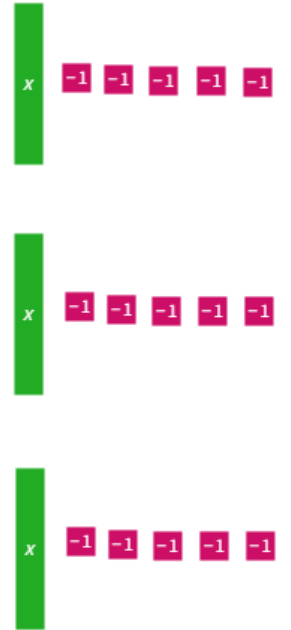


• Where is 0?

$$3(x - 5) + 7 = -14$$

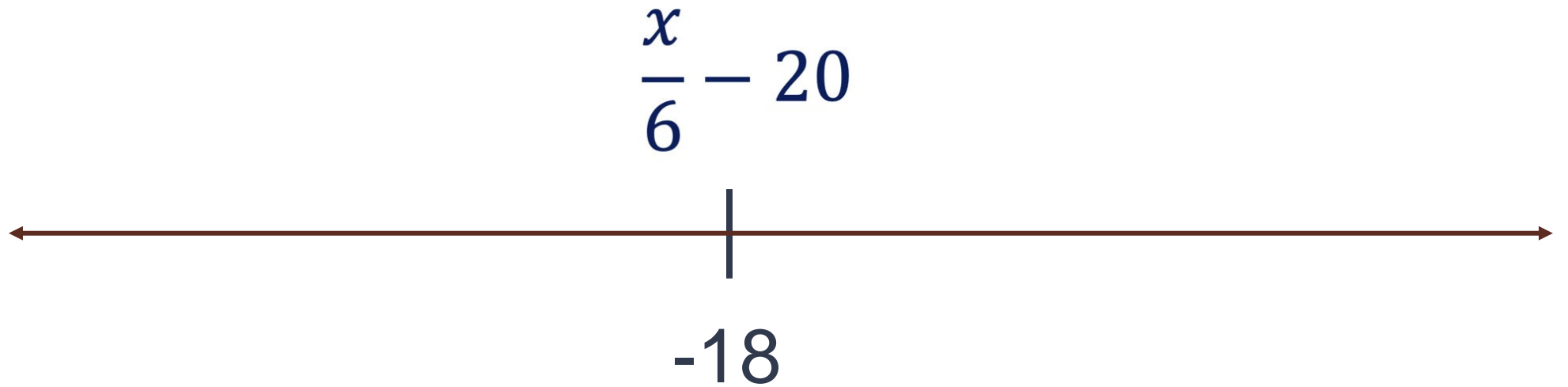


Think: What does $3(x - 5)$ mean?



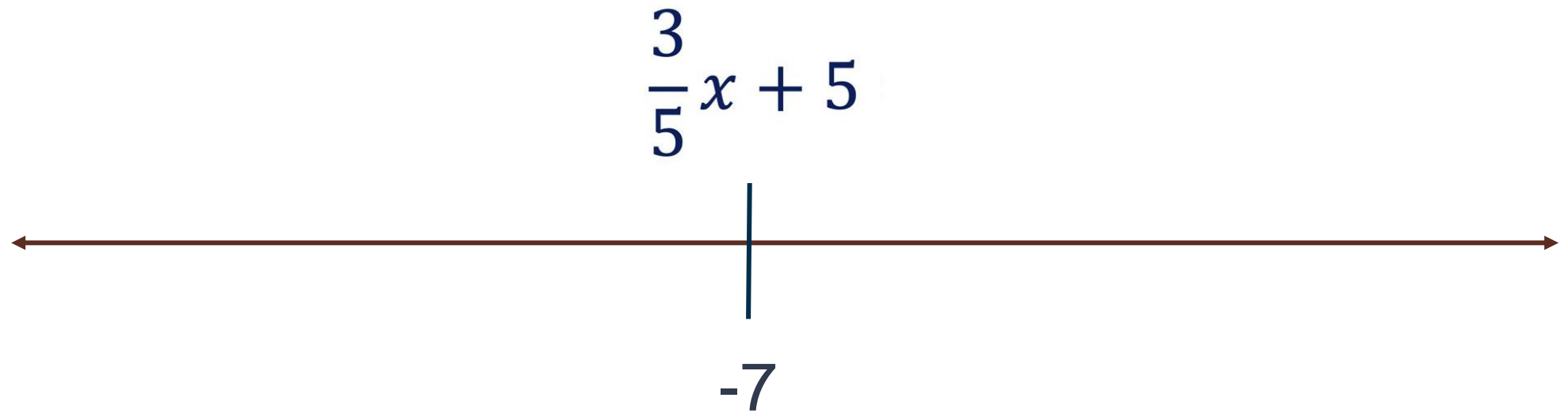
- No need to distribute...as most students would do!

$$\frac{x}{6} - 20 = -18$$



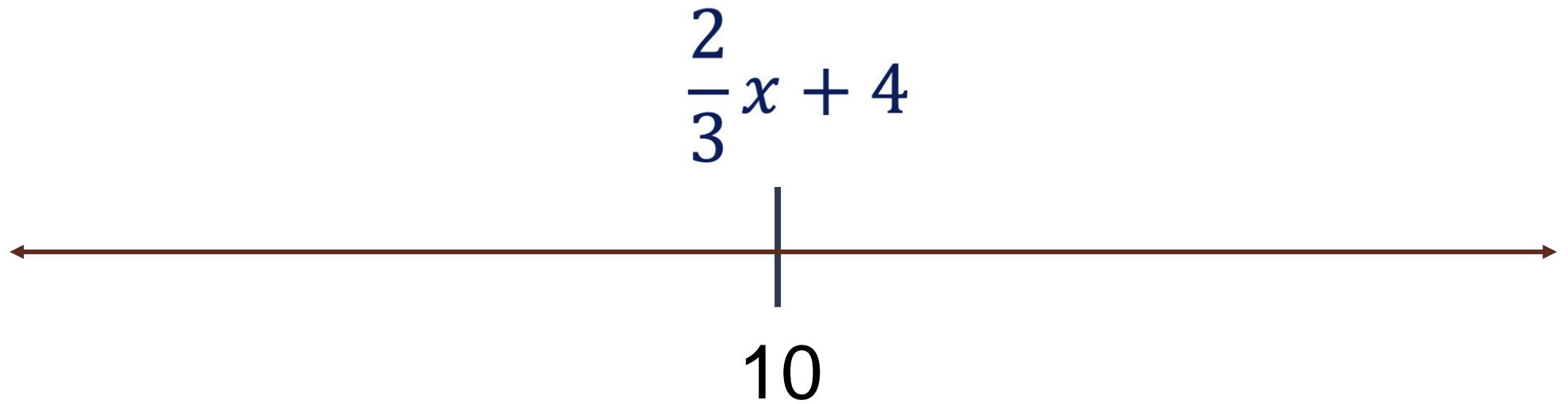
- What is an equivalent expression to $\frac{x}{6}$?

$$\frac{3}{5}x + 5 = -7$$




- How much of "x" do we have initially?

$$\frac{2}{3}x + 4 = 10$$



- How much of "x" do we have initially?

$$\frac{x + 9}{3} - 1 = 4$$

$$\frac{x + 9}{3} - 1$$


A horizontal number line with arrows at both ends. A vertical tick mark is drawn at the position of the number 4, extending both above and below the line.

What is an equivalent way to write the algebraic fraction?

$$2 + 4x = x + 8$$



- Which expression goes where?
- Where to begin? Does it matter?

$$2x + 4 = 3x - 5$$



- Try placement both ways.
- Which is better? Is there a better way?

Follow Us on Social Media



Let's Get Connected for Our Latest News & Updates



on LinkedIn @columbus-regional-mathematics-collaborative



on Facebook @Columbusregionalmathematicscollaborative



on Instagram @mathcollab



Columbus Regional Mathematics Collaborative

1127 Broadway
Columbus, Georgia
31907

www.columbusstate.edu/crmc

Contact the Math Collaborative Today!



SCAN ME



Columbus Regional Mathematics Collaborative

1127 Broadway
Columbus, Georgia
31907

www.columbusstate.edu/crmc

Connect with The Math Collaborative

Conference Evaluation Forms

Please use this form to comment on the overall conference. Place completed forms in the boxes (registration area, Dining Hall, Auditorium).

The form is available electronically. Complete the survey at <https://tinyurl.com/2023GMCjoy>

Scan the QR code

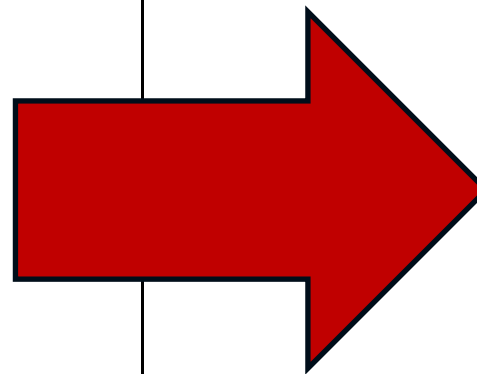


Session Evaluation Forms

Please use this form to comment on individual sessions. All speakers have several forms. Place completed forms in the boxes (registration area, Dining Hall, Auditorium).

The form is available electronically. Complete the survey at <https://tinyurl.com/2023GMCsessions>

Scan the QR code



Ways to Submit Feedback

