



Why Does a Negative Times a Negative Equal a Positive?

Video: 4:08 · Episode 004

Grades: 6–8 · Math

Time: 30–45 min (video + worksheet + quiz)

Key term: opposite (numbers the same distance from 0, on opposite sides)

Connects to Common Core: 7.NS.A.2a (multiplying signed numbers; $(-1)(-1) = 1$) · 6.NS.C.6a (opposites; the opposite of the opposite is the number itself)

The big idea

On a number line, multiplying by a negative number **flips** the answer to the opposite side of zero, keeping its size. Flip once and you land on the negative side. Flip twice and you are back on the positive side. So -2×-3 is 6 flipped twice: positive 6. A counting pattern $(-9, -6, -3, 0, \text{going up by } 3)$ shows -3×-1 must be 3.

One-line recap students should be able to say: "A negative flips you to the opposite side, so two negatives flip you back."

Learning goals

- Use a pattern to explain why a negative times a negative is positive.
- Describe multiplying by -1 as moving a number to its opposite.
- Predict the sign of a product by counting the negative factors (the flips).
- Interpret a negative times a negative with velocity $\times$ time.

How to use it

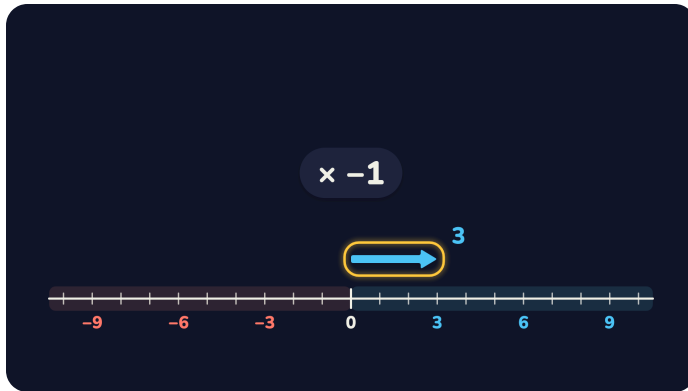
1. **Before watching (3 min):** students answer the prediction on the worksheet. Don't correct them yet.
2. **Watch (4 min):** play it straight through. Optional check-in pause at 2:36 ("you're back on the positive side").
3. **Worksheet (10 min):** finish the pattern table, then draw the flips.
4. **Discuss (10 min):** pick two or three discussion questions.
5. **Quiz (5 min):** six quick questions; answer key on the last page.

What the video simplifies (so you can answer the sharp questions): "flip" means a reflection across zero on the number line (a mirror image), not a rotation. The pattern holds because of the distributive property $(-3 \times (n - 1) = -3n + 3)$. "An even number of flips lands on positive" assumes no factor is zero. The video avoids "two minuses make a plus," which is false for adding $(-2 + -3 = -5)$.

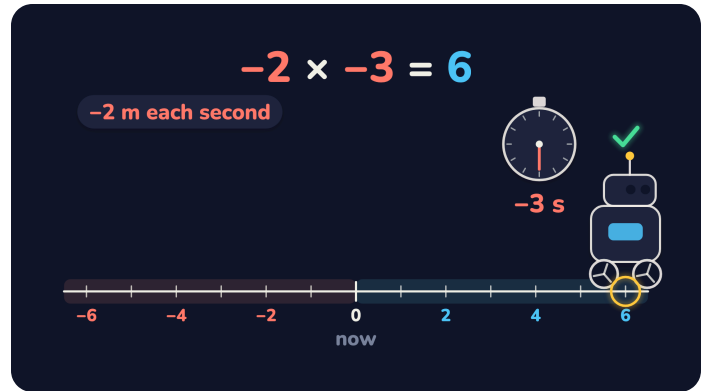


Walk the Number Line

Students act out multiplication on a floor number line. One factor says which way to **face**; the other says whether to walk **forward or backward**, and how many steps. A negative turns you around, so two negatives turn you around twice.



From the video: flip twice, back to positive



Backward speed $\times$ backward time = forward

You need

- Masking tape and a marker: a floor number line from -10 to 10 , one step between marks
- Cards with problems, e.g. 2×3 , 2×-3 , -2×3 , -2×-3 , -4×2 , -1×-4

Rules

1. Start every problem standing on 0, facing the positive end.
2. **First number = steps per move, and direction.** Positive: walk forward. Negative: walk backward.
3. **Second number = how many moves.** Positive: do the moves facing the way you are. Negative: first turn around to face the negative end, then do the moves.
4. Where you end up is the answer. Write it next to the problem.

Example: -2×-3 . Turn around (the -3). Walk backward 2 steps (the -2), three times. Facing the negative end and walking backward takes you toward the positive end: you stop on 6.

Safety: keep the walking line clear of desks, and have a partner spot anyone walking backward.

Talk about it

- Which problems made you turn around? How many times did you change direction for -2×-3 ?
- For -2×3 and 2×-3 you ended on the same spot. What was different about how you got there?
- How is walking backward while facing the negative end like the robot in the video?



Why Does a Negative Times a Negative Equal a Positive?

Name: _____

Date: _____

Before you watch

What do you think -2×-3 equals? Why?

While you watch: finish the pattern

1. $-3 \times 3 =$ _____

2. $-3 \times 2 =$ _____

3. $-3 \times 1 =$ _____

4. $-3 \times 0 =$ _____

5. Each step down, the answer goes up by _____.

6. So $-3 \times -1 =$ _____ and $-3 \times -2 =$ _____.

7. Nine and negative nine are the same distance from zero. They are called _____.

Draw it

On each number line, draw an arrow for 2×3 . Then show what happens after one flip and after two flips.

ONE FLIP: $2 \times 3 \times (-1)$ **TWO FLIPS: $2 \times 3 \times (-1) \times (-1)$**

Explain it

A robot rolls backward 2 meters every second. Where was it 3 seconds ago? Explain using the video's idea of flips.



Talk It Over, Then Check Yourself

Discussion questions

1. Many people guess $-2 \times -3 = -6$. What would go wrong with the pattern if that were true?
2. "Two minuses make a plus" is a common saying. Why is it not true for $-2 + -3$?
3. The temperature has been dropping 2 degrees every hour. How did the temperature 3 hours ago compare to now? Which numbers are negative here?
4. Without multiplying, how can you tell if $(-1) \times (-1) \times (-1) \times (-1) \times (-1)$ is positive or negative?
5. Make up your own real-life story for a negative times a negative.

Quiz

Name: _____

1. What is -4×-2 ? (Circle one.)
A. -8
B. -6
C. 6
D. 8
2. On a number line, what does multiplying by -1 do to a number?
A. Makes it bigger
B. Moves it to the opposite side of zero
C. Makes it zero
D. Nothing
3. Finish the pattern: $-2 \times 2 = -4$, $-2 \times 1 = -2$, $-2 \times 0 = 0$, $-2 \times -1 = ?$
A. -2
B. 0
C. 2
D. 4
4. True or false: -5×3 is negative. _____
5. Is $(-1) \times (-1) \times (-1)$ positive or negative?
A. Positive, because there are negatives
B. Negative: three flips
C. Positive: three flips
D. Zero
6. A car drives backward 4 meters each second. Where was it 2 seconds ago? Write the multiplication and the answer.



Answer Key

Worksheet: finish the pattern

1. $-9 \cdot 2$. $-6 \cdot 3$. $-3 \cdot 4$. $0 \cdot 5$. three $\cdot 6$. 3 and $6 \cdot 7$. opposites

Draw it: 2×3 is an arrow from 0 to 6. One flip: the same-length arrow from 0 to -6 . Two flips: back from 0 to 6.

Explain it: $(-2 \text{ meters per second}) \times (-3 \text{ seconds}) = +6 \text{ meters}$. Backward speed is one flip, backward time is a second flip, so the robot was 6 meters on the positive side.

Quiz

1. **D.** 8. Four times two is eight; two flips land on positive.
2. **B.** It moves the number to its opposite: same distance from zero, other side.
3. **C.** 2. Each step down, the answer goes up by 2.
4. **True.** One negative factor, one flip: negative 15.
5. **B.** Negative. Three flips: positive $\rightarrow$ negative $\rightarrow$ positive $\rightarrow$ negative.
6. $(-4) \times (-2) = 8$. It was 8 meters on the positive side (in front of where it is now).

Discussion: points to listen for

1. The answers go up by 3 each step ($-9, -6, -3, 0$). Jumping from 3 back to -6 would break that even staircase right at zero.
2. Adding two negatives moves you further left on the number line; the sign rule is about multiplying, not adding.
3. Change per hour -2 , time -3 hours: $(-2) \times (-3) = +6$. Three hours ago it was 6 degrees warmer than now.
4. Count the negatives: five is odd, so the product is negative (-1).
5. Any story with two "reverse" quantities, e.g. a draining tank run backward in time, or a backward-walking video played in reverse.