

2.3

Using Models to Divide Integers



Quick Review

Division is the inverse of multiplication.

So, $10 \div 5 = ?$ is the same as $? \times 5 = 10$.

The product means, "how many sets of 5 produce 10?"

You can "walk" a number line to model the division of two integers.

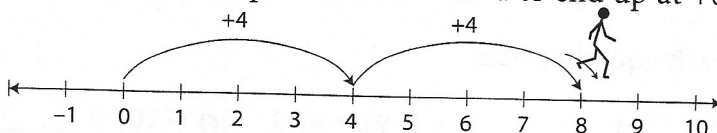
If the step size is positive, walk forward. If the step size is negative, walk backward.

The number of steps is the quotient and the direction you are facing at the end determines its sign.

► Positive ÷ Positive

Divide: $(+8) \div (+4)$

Start at 0. Take steps of size 4 forward to end up at +8.

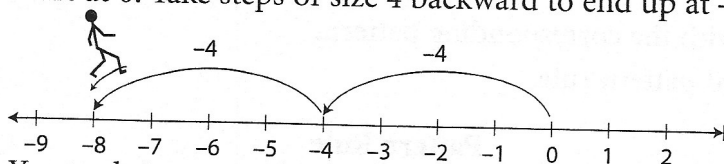


You took 2 steps and are facing the positive end of the line. So, $(+8) \div (+4) = +2$

► Negative ÷ Negative:

Divide: $(-8) \div (-4)$

Start at 0. Take steps of size 4 backward to end up at -8.

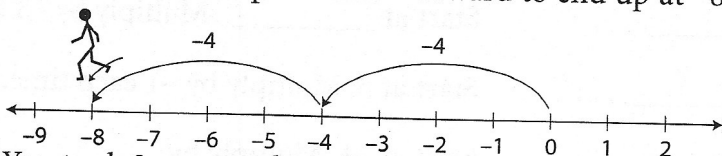


You took 2 steps and are facing the positive end of the line. So, $(-8) \div (-4) = +2$.

► Negative ÷ Positive:

Divide: $(-8) \div (+4)$

Start at 0. Take steps of size 4 forward to end up at -8.

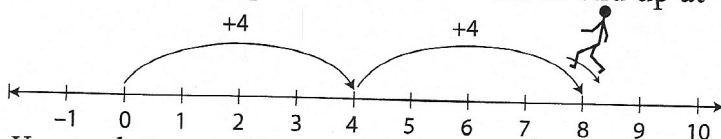


You took 2 steps and are facing the negative end of the line. So, $(-8) \div (+4) = -2$.

► Positive ÷ Negative:

Divide: $(+8) \div (-4)$

Start at 0. Take steps of size 4 backward to end up at +8.



You took 2 steps. You are facing the negative end of the line. So, $(+8) \div (-4) = -2$

Practice

1. Write 2 related multiplication equations for each division equation.

a) $(+60) \div (+10) = +6$ _____, _____

b) $(+36) \div (-9) = -4$ _____, _____

c) $(-45) \div (-9) = +5$ _____, _____

d) $(-16) \div (+2) = -8$ _____, _____

2. Suzanne wanted to model division using a number line. She started at zero and took steps backward of size 3. She ended up at -21 .

a) Illustrate this problem using a number line.

b) Model this problem using a division equation. _____

c) How many steps did Suzanne take? _____

3. Use a number line. Find each quotient.

a) $(+24) \div (-8) =$ _____

b) $(-20) \div (-5) =$ _____

c) $(+25) \div (+5) =$ _____

d) $(-18) \div (-9) =$ _____

4. Find each quotient.

a) $(-12) \div (+4) =$ _____ b) $(-12) \div (-6) =$ _____ c) $(-8) \div (+4) =$ _____

5. The water level in a well dropped 4 cm each hour. The total drop in the water level was 28 cm. Use an integer model to find out how long it took for the water level to change.

6. Use coloured tiles, a number line, or another model to clearly show your thinking. Find each quotient.

a) $(+10) \div (+2) =$ _____

b) $(-10) \div (-2) =$ _____

c) $(+10) \div (-2) =$ _____

d) $(-10) \div (+2) =$ _____

Compare the quotients. What do you notice? _____

7. The temperature dropped a total of 12°C over a 4-h period. The temperature dropped the same amount each hour. Using a model, show the hourly drop in temperature.
