# Topic 2-1 Understand Integers

Define Integers and Opposites

**Integers**: the counting numbers, their opposites and _____.
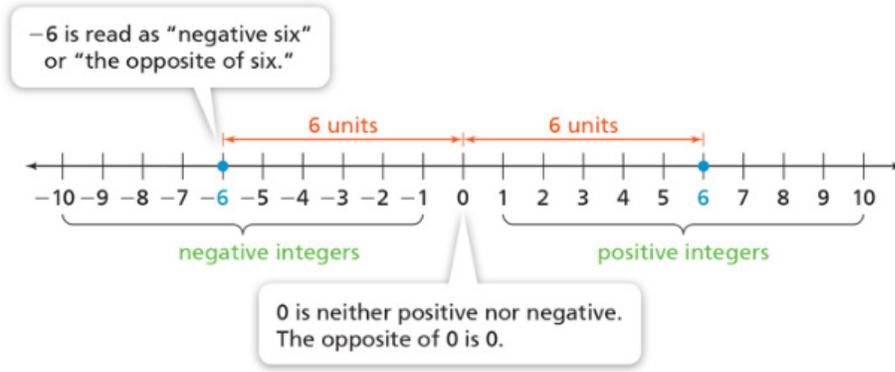
Numbers located on opposite sides of 0 and are the same _____ from 0 on a number line are _____.

Example: What number is the opposite of 6? _____   What number is the opposite of -3?_____

The opposite of the opposite of a number is the _____ itself.
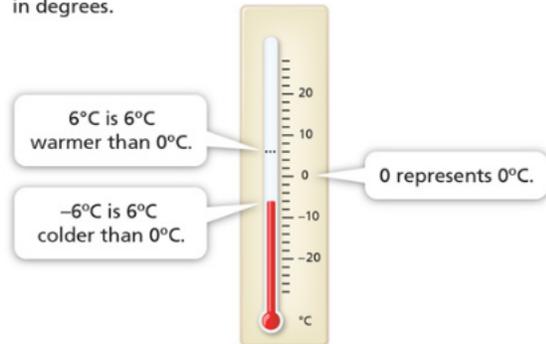
The opposite of 4 is _____. The opposite of -4 is _____.

Number	Opposite	Opposite of Opposite

Compare and Order Integers

Integers farthest to the _____ on the number line are the least.

Integers farthest to the _____ on the number line are the greatest.

Riley recorded the temperatures for five days in January. Which day was the coldest day of Riley's data? Which was the warmest day? Write the temperatures from least to greatest.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature (°F)	−5°F	−2°F	4°F	−3°F	1°F
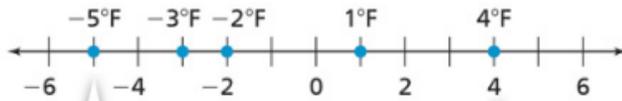
−5°F is the integer farthest to the left on the number line, so Monday was the coldest day.

4°F is the integer farthest to the right on the number line, so Wednesday was the warmest day.

The temperatures from least to greatest are: _____.

Circle the greater integer:

-4 or -27

-11 or −5

-3 or -1

Use Integers to Represent Quantities

Integers are used to describe real-world situations such as altitude, _____, depth, temperature and electric charge. _____ represents a specific value in each situation.
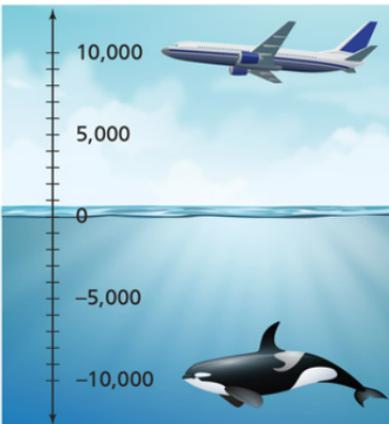
Which integer represents sea level? _____

Which integer represents the airplane? _____

Which integer represents the whale? _____

Write the integer that represents each situation.

a. $10 debt _____

b. Six degrees below zero _____

c. Deposit of $25 _____

Lesson 2-2 Represent Rational Numbers on the Number Line

A _____ _____ is a number that can be written as a fraction.

A rational number can be a _____ _____, a fraction, or a decimal.

$-\frac{8}{9}$ and $\frac{3}{5}$ are rational numbers in the form $\frac{a}{b}$ or $-\frac{a}{b}$.

$-\frac{8}{9}$ $\frac{3}{5}$

-1 $-\frac{1}{2}$ 0 $\frac{1}{2}$ 1

1 is a rational number because it can be written as $\frac{1}{1}$.

Rational Numbers
numbers that can be expressed as a quotient of two integers $\frac{a}{b}$ ($b \neq 0$)

Integers
whole numbers and their opposites

Whole Numbers
zero and natural numbers

Natural Numbers
the set of counting numbers
1, 2, 3, 4, 5, ...
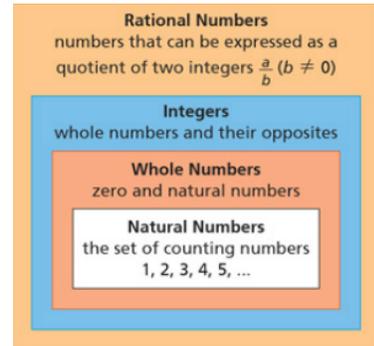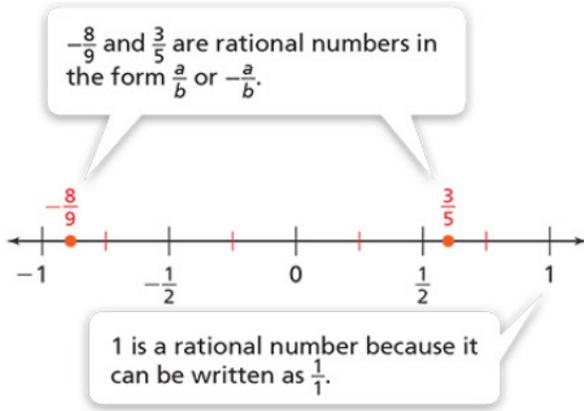
Do You Know How?

In 5–7, write the value that each point represents.

C   A   B

-2 -1 0 1
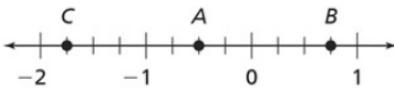
5. A   **6.** B   **7.** C

In 8–11, plot the points on the number line below.

-2 -1 0 1
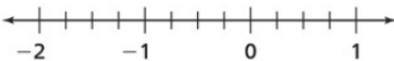
8. P at -1.25 **9.** Q at 0.25

**10.** R at -0.75 **11.** S at -0.25

Plotting Numbers to Compare Value

To compare and order rational numbers on a number line:

1. Plot the numbers.
2. The number(s) further to the _____ have the greater value.

Draw a number line to compare -¾, 7/4, and ⅔.

Order the numbers from least to greatest. Use the number line as needed.

$$\xleftarrow{\hspace{0.5cm}}\!\!\!\!\underset{-2}{|}\,+\,+\,+\,\underset{-1}{|}\,+\,+\,+\,\underset{0}{|}\,+\,+\,+\,\underset{1}{|}\,+\,+\,+\,\underset{2}{|}\!\!\!\!\xrightarrow{\hspace{0.5cm}}$$
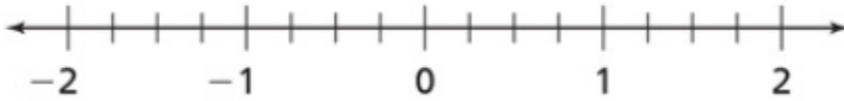
$1, -\dfrac{3}{2}, -\dfrac{5}{4}, 1\dfrac{1}{2}$

Use <, >, or = to compare.

A. $\dfrac{1}{10}$ ◯ 0.09

B. $-1\dfrac{44}{100}$ ◯ $-1\dfrac{1}{4}$

C. −0.66... ◯ −0.8

⤵ EXAMPLE 3   **Interpret Rational Numbers in Real-World Contexts**

Sam and Rashida are scuba diving. Their locations are shown relative to sea level.
Use <, >, or = to compare the two depths and explain their relationship.

Sam swims at –25 feet.

Rashida swims at –40 feet.

−40 < −25. Rashida is at a greater depth than Sam.

☑ Try It!   At 10:00 P.M. one winter night, the temperature was −3°C. At midnight, the temperature was −7°C. Use <, >, or = to compare the two temperatures and explain their relationship.

Lesson 2-3 Absolute Values of Rational Numbers

The _____ _____ of a number is its distance from 0 on the number line.

Distance is ALWAYS _____ (Absolute value is ALWAYS positive except for zero. Zero is neither negative nor positive).

It's the absolute value washing machine-no matter what goes in, everything comes out POSITIVE!

Opposite numbers have the same absolute values because they are the same distance from

_____.

We represent absolute value like this:

- The absolute value of -5 is written as _____.
- The absolute value of 5 is written as _____.

|-5| = _____ |5| =_____

Comparing Absolute Values

When you compare absolute values, the greatest absolute value is the one _____ from zero.

Try It! The students in a science class recorded the change in water level of a local river. During which week did the water level change by the greatest amount?

Week	1	2	3
Change in Water Level (in.)	−7.5	2.2	−4.38

Use absolute values to represent the change in water level.

The water level changed by the greatest amount in Week [ ].

Convince Me! Can a lesser number represent a greater change in water level than a greater number? Explain.

Week 1: |−7.5| = [ ] in

Week 2: |2.2| = [ ] in.

Week 3: |−4.38| = [ ] in.

Find absolute value:

1. |-4| = _____   4. |-3| = _____
2. |0| = _____   5. -|2| = _____
3. |3| = _____   6. -|-5| = _____

Yasmin is a business owner. The table shows three account balances that represent her gallery's debts.

A. Which account has the least balance?

B. Which account has the greatest debt?

	Yasmin's Gallery	
	E	**F**
	Account	**Balance**
	A	−$35.42
	B	−$50.99
	C	−$12.75

−$50.99   −$35.42   −$12.75

−55 −50 −45 −40 −35 −30 −25 −20 −15 −10 −5 0
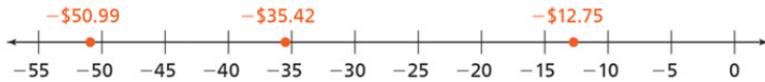
Practice:

Find each absolute value:

18. $|-46|$ **19.** $|0.7|$

Find the value of each expression:

31. $-|15|$ **32.** $-\left|-6\frac{3}{4}\right|$

Order the absolute values from least to greatest:

$|-12|, \left|11\frac{3}{4}\right|, \left|-20\frac{1}{2}\right|, |2|$

Use Patterns and Structure Ana and Chuyen are exploring underwater sea life while on a helmet diving adventure. Ana's location relative to sea level is −30 feet, and Chuyen's location is −12 feet. Which girl is located farther from sea level, and how much farther?

The table at the right shows the scores at the end of the first round of a golf tournament. The scores are relative to par. 🔴 6.NS0.1.4, 6.NS0.1.3

Golfer	Kate	Sam	Lisa	Carlos
Score	−6	5	2	−3

PART A

Par is represented as 0. Using absolute value, show the distance each score is from par.

PART B

The golfer with the least score wins the round. Who won the first round of the tournament? Explain.

Lesson 2-4 Adding Integers

Adding Integer Song:

Same _____, _____ and _____.

Different signs _____. Keep the sign of the _____ number, then you'll be exact!!!

Same Signs: positive + positive = positive

negative + negative = negative

Different Signs: Make it subtraction (subtract the absolute values), putting the larger number on top. Then keep the sign of the _____ number.

Same signs:

10+12 = _____   3+9 = _____   7+12=_____   26 + 17 = _____

-2 + -6 = _____   -4 + -6 = _____   -5 + -18 = _____   -21 + -15 = _____

Different signs:

5 + -4 = _____   -3 + 4 = _____   7 + -3 = _____   -10 + 5 = _____

-11 + 2 = _____   6 + -16 = _____   12 + -24 = _____   -18 + 23 = _____

Identify Additive Inverses and Opposites:

Additive Inverses and Opposites are two numbers that have a sum of _____.
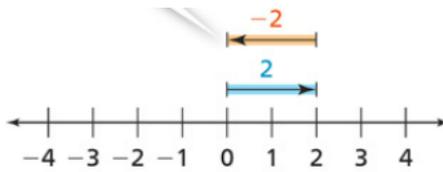
What is the opposite of each integer?

2 = _____   -5 = _____   16 = _____   -23 = _____   -19 = _____

Word Problem Practice:

Serena bought a bike that cost $260. She had a
coupon that was worth $55 off the cost of any
bike. Use the expression 260 + (−55) to find how
much Serena paid for her bike.

A deep-sea diver dives 81 feet from the surface.
He then dives 14 more feet. The diver's depth
can be represented by −81 + (−14). What is the
diver's present location?

Lesson 2-5 Subtract Integers

Subtracting Integers: _____ the opposite

2 - 8 *To subtract 8, add its opposite, -8*

2 - 8 = 2 + (-8)

Steps:

1. Change subtraction to _____.
2. Change the second number to its _____.
3. Add! (remember the song)

    Same signs _____ and keep.

    Different signs _____, keep the sign of the _____ number, then you'll be exact!!

    Examples:

    1. 3 - 12   2. 6 - 8   3. -2 - 9

    4. -7 - 5   5. 8 - (-7)   6. 4 - (-12)

A football team gains 3 yards on first down.
On second down, they lose 8 yards. What is the
total change in yards after the first two downs?
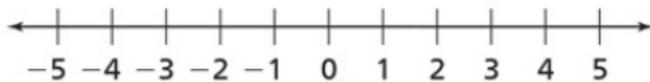
It was 12°C when Amelia got home from school.
The weather report shows a storm front moving
in that will drop the temperature by 17°C. What
is the expected temperature after the drop?

Lesson 2-6 Multiply Integers

If the signs of the factors are the _____, the product is _____.

      positive x positive = positive product (7 x 3 = 21)

      negative x negative = positive product (-7 x -3 = 21)

If the signs of the factors are _____, the product is _____.

      positive x negative = negative product (5 x -3 = -15)

      negative x positive = negative product (-5 x 3 = -15)

9. $(-6) \cdot (-2)$

10. $4 \cdot (-8)$

11. $7 \cdot (-5)$

12. $-5 \cdot 2$

13. $-1 \cdot (-24)$

14. $(5) \cdot (-9) \cdot (-2)$

Apply Math Models A football team lost the same number of yards on each of 3 consecutive plays. What is the total change in yards from where the team started?
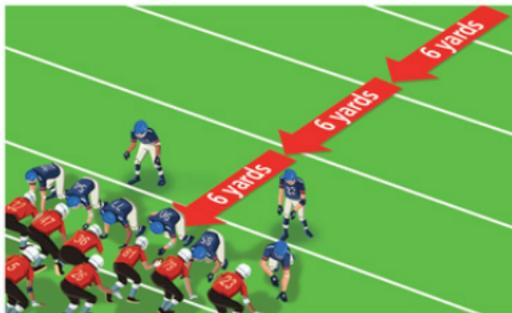
Anya makes withdrawals from and deposits to her bank account.

a. What integer represents the change in the amount in her account if Anya withdraws $12 once each day for four days?

b. What integer represents the change in the amount in her account if Anya deposits $12 once each day for four days?

Lesson 2-7 Divide Integers

If the signs of the dividend and divisor are the _____, the quotient is _____.

      Positive ÷ positive = positive quotient (4 ÷ 2 = 2)

      Negative ÷ negative = positive quotient (-4 ÷ -2 = 2)

If the signs of the dividend and divisor are _____, the quotient is _____.

      Positive ÷ negative = negative quotient (12 ÷ -3 = -4)

      Negative ÷ positive = negative quotient (-12 ÷ 3 = -4)

Find each quotient:

1. $\dfrac{18}{3}$
                      2. $\dfrac{-5}{-1}$

3. $\dfrac{24}{-6}$
                      4. $\dfrac{-10}{-1}$

5. $\dfrac{-25}{5}$
                      6. $-\dfrac{8}{2}$

A company loses $780 as a result of a shipping delay. The 6 owners of the company must share the loss equally.

a. Write an expression to show the change in profit for each owner.

b. Evaluate the expression.

Check for Reasonableness Which of the quotients are equivalent to 2.5? Select all that apply.

☐ $\dfrac{10}{-4}$
           ☐ $\dfrac{-5}{-2}$

☐ $\dfrac{10}{4}$
   ☐ $\dfrac{-5}{2}$

☐ $\dfrac{-10}{-4}$
        ☐ $\dfrac{5}{2}$

Analyze and Persevere Find each quotient and plot it on the number line. Which of the expressions are undefined?

$-8 \div 4$ $\dfrac{-21}{-7}$ $-4 \div 0$ $-25 \div (-5)$ $\dfrac{36}{-9}$ $\dfrac{9}{0}$ $0 \div (-8)$ $-6 \div (-6)$
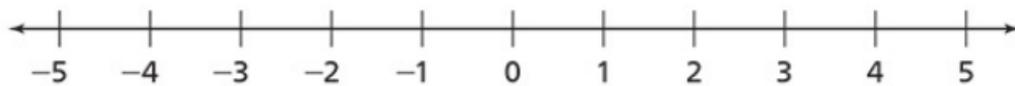
Lesson 2-8 Solve Problems with Absolute Value

1. Evaluate the _____ _____

2. Use Order of _____ to evaluate the expression.

    a. Parenthesis

    b. Exponents

    c. Division and Multiplication (left to right)

    d. Addition and Subtraction (left to right)

10. $9 + |{-3}| \cdot 12$

$= 9 + \boxed{} \cdot 12$

$= 9 + \boxed{}$

$= \boxed{}$

11. $14 \div |{-5} - 2|$

$= 14 \div |\boxed{}|$

$= 14 \div \boxed{}$

$= \boxed{}$

Remember: _____ is always _____. We represent distance in an expression or equation with _____ _____.

Example:

A bottlenose dolphin swims downward 5 feet per second for 15 seconds. Then it swims up 50 feet. What is the total distance the dolphin swims?

Try It! A dive pod descends 80 feet and then rises 3 feet per second for 12 seconds. The distance the pod travels is represented by the expression $|{-80}| + 3 \cdot 12$. What is the total distance the dive pod travels?

5. $-5 \cdot |-4|$

6. $8 + |3 - 7|$

7. $|-15 \cdot 2| + 3$

Which expression has the greater value?

$|-56 \div 7| + 5$ $4 \cdot |-2 - 1|$

Try It!   A pot of soup was placed in the refrigerator. The temperature of the soup decreased by 52°F per hour for 2 hours. The soup was then placed in the freezer, and the temperature decreased by 12°F per hour for 4 hours. In which location, the refrigerator or the freezer, did the soup have the greater change in temperature?