Adding and Subtracting Real Numbers

Vocabulary

● Review

1. Cross out the expressions that do NOT show a *difference.*

| 15 + 6 | 14 − 3 | 4 · 8 | 48 ÷ 12 |

2. Circle the expression that shows a *sum*.

| 45 − 26 | 12 ÷ 3 | 42 + 3 | 22 − 9 |

3. Find the *difference* of 20 and 15.　　　　**4.** Find the *sum* of 38 and 19.

● Vocabulary Builder

inverse (noun) **in** VUHRS

additive inverses
$$-5 + 5 = 0$$
$$5 + (-5) = 0$$

Related Word: invert (verb)

Definition: An **inverse** is the opposite, or reverse, of something.

Example: −5 and 5 are additive **inverses,** or *opposites*. They are the same distance from zero on a number line.

What It Means: Additive **inverses** have a sum of 0.

● Use Your Vocabulary

5. Write the additive *inverse* of each number.

7　　　　　　−3　　　　　　−11　　　　　　9

The **absolute value** of a number is its distance from 0 on a number line. The **absolute value** of −7, written $|-7|$, is equal to 7, because −7 is 7 units from 0 on a number line.

Compare. Write < , >, or =.

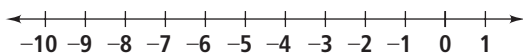**6.** $|3|$ ⬜ $|-3|$　**7.** $|-3|$ ⬜ 3　**8.** −3 ⬜ $|-3|$　**9.** $|3|$ ⬜ −3

Problem 1 **Using Number Line Models**

Got It? What is $-8 + 4$? Use a number line.

10. Use the number line to help you find the sum.

Start at 0.

Move 8 units left. Graph a point at –8 on the number line.

Then move 4 units right. Graph a point at –4 on the number line.

11. Underline the correct word to complete each sentence.

The number -8 tells you to start at 0 and move 8 units to the left / right .

The number 4 tells you to then move 4 units to the left / right .

12. Complete: $-8 + 4 = \boxed{}$

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take note

Key Concept **Adding Real Numbers**

To add two numbers with the **same sign**, add their absolute values. The sum has the same sign as the addends.

To add two numbers with **different signs,** subtract their absolute values. The sum has the same sign as the addend with the greater absolute value.

Problem 2 **Adding Real Numbers**

Got It? What is the sum $-16 + (-8)$?

13. The addends -16 and -8 have different signs / the same sign .

14. When -16 and -8 are added, the answer will be positive / negative .

15. Complete: $-16 + (-8) = \boxed{}$

Got It? What is the sum $-11 + 9$?

16. The addends -11 and 9 have different signs / the same sign .

17. When -11 and 9 are added, the answer will be positive / negative .

18. Complete: $-11 + 9 = \boxed{}$

Got It? What is the sum $9 + (-11)$?

19. The addends of this exercise and those of Exercise 18 are the same / different .

20. Complete: $9 + (-11) = \boxed{}$

Got It? What is the sum $-6 + (-2)$?

21. Complete: $-6 + (-2) = \boxed{}$

Lesson 1-5

Key Concept Subtracting Real Numbers

To subtract a real number, add its opposite: $a - b = a + (-b)$.

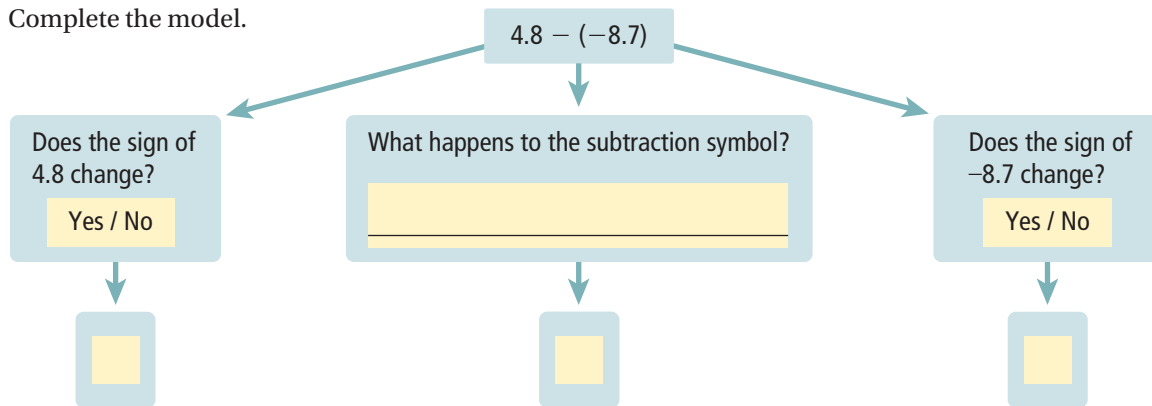**Complete to find each difference.**

22. $-7 - 2 = -7 + ($ [ ] $)$

$\quad = $ [ ]

23. $8.2 - (-2.1) = 8.2$ [ ] 2.1

$\quad = $ [ ]

Problem 3 Subtracting Real Numbers

Got It? What is $4.8 - (-8.7)$?

24. Complete the model.

$4.8 - (-8.7)$

Does the sign of 4.8 change?	What happens to the subtraction symbol?	Does the sign of −8.7 change?
Yes / No	_____	Yes / No
[ ]	[ ]	[ ]

25. Now simplify the expression.

[   ]

Got It? Reasoning For what values of a and b does $a - b = b - a$?

26. Test values of a and b that are different.

Suppose $a = -5$ and $b = 4$.

$a - b = -5 - (4) = -5 + $ [ ] $ = $ [ ]

$b - a = 4 - (-5) = 4$ [ ] $5 = $ [ ]

When $a \neq b$, does $a - b = b - a$? Yes / No

27. Now test values of a and b that are the same.

Suppose $a = -6$ and $b = -6$.

$a - b = -6 - (-6) = -6 + $ [ ] $ = $ [ ]

$b - a = -6 - (-6) = $ [ ] $ + $ [ ] $ = $ [ ]

When $a = b$, does $a - b = b - a$? Yes / No

28. For what values of a and b does $a - b = b - a$?

[   ]

Problem 4 Adding and Subtracting Real Numbers

Got It? A robot submarine dives 803 ft to the ocean floor. It rises 215 ft as the water gets shallower. Then the submarine dives 2619 ft into a deep crevice. Next, it rises 734 ft to photograph a crack in the wall of the crevice. What is the location of the crack in relation to sea level?

29. Follow the steps to find the location of the crack in relation to sea level.
Hint: Use 0 to represent sea level.

1 The submarine dives 803 ft. Where is the submarine in relation to sea level?

$$0 \text{ ft} + \boxed{} \text{ ft} = -803 \text{ ft}$$

↓

2 The submarine rises 215 ft as the water gets shallower. Now where is the submarine in relation to sea level?

$$-803 \text{ ft} + 215 \text{ ft} = \boxed{} \text{ ft}$$

↓

3 Then the submarine dives 2619 ft. Now where is the submarine in relation to sea level?

$$\boxed{} \text{ ft} + (-2619 \text{ ft}) = \boxed{} \text{ ft}$$

↓

4 Next, the submarine rises 734 ft to photograph the crack in the wall of the crevice. Where is the submarine (and the crack) in relation to sea level?

$$\boxed{} \text{ ft} + \boxed{} \text{ ft} = \boxed{} \text{ ft}$$

✓ Lesson Check • Do you UNDERSTAND?

Error Analysis Your friend says that since $-a$ is the opposite of a, the opposite of a number is always negative. Describe and correct the error.

30. Use a counterexample to describe and correct your friend's error.

_____

_____

✓ Math Success

Check off the vocabulary words that you understand.

☐ absolute value ☐ opposites ☐ additive inverses

Rate how well you can *add and subtract real numbers*.

Need to review   0   2   4   6   8   10   Now I get it!

Lesson 1-5