

Got It? Do these problems to find out.

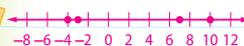
Graph each set of integers on a number line.

- c. $\{-2, 8, -7\}$ d. $\{-4, 10, -3, 7\}$

Show your work.



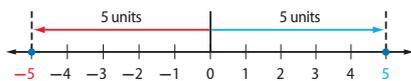
c. _____



d. _____

Absolute Value

Words The absolute value of a number is the distance between the number and zero on a number line.



Examples $|-5| = 5$ $|5| = 5$

Key Concept

On the number line in the Key Concept box, notice that -5 and 5 are each 5 units from 0, even though they are on opposite sides of 0. Numbers that are the same distance from zero on a number line have the same **absolute value**.

Examples



Evaluate each expression.

4. $|-4|$

The graph of -4 is 4 units from 0.
So, $|-4| = 4$.



5. $|-5| - |2|$

$|-5| - |2| = 5 - 2$ $|-5| = 5, |2| = 2$
So, $|-5| - |2| = 3$.

Order of Operations

The absolute value bars are considered to be a grouping symbol. When evaluating $|-5| - |2|$, evaluate the absolute values before subtracting.

Show your work.

e. **8** _____

f. **5** _____

g. **1** _____

Got It? Do these problems to find out.

- e. $|8|$ f. $2 + |-3|$ g. $|-6| - 5$

Need Another Example?

Graph the set of integers $\{-1, 3, -2\}$ on a number line.



IWB



Examples

4. Evaluate expressions.

- AL** • What integer is used in the expression? -4
- OL** • How many units is 4 from zero? 4
- What is the absolute value of -4 ? 4
- BL** • Is the absolute value of a negative integer always negative or positive? Explain. **positive; Sample answer: Absolute value represents a distance and distance is always positive.**

Need Another Example?

Evaluate $|5|$. **5**

5. Evaluate expressions.

- AL** • What is the absolute value of -5 ? 5
- What is the absolute value of 2 ? 2
- OL** • What operation is between the two absolute value signs? **subtraction**
- BL** • Evaluate the expression $|-12| - |-9|$. **3**

Need Another Example?

Evaluate $|-4| - |-3|$. **1**



Example

6. Evaluate expressions with absolute value.

- AL** • *What do you need to find? how many feet Nick climbs*
- *How could you find the answer? Evaluate the given expression.*
- OL** • *In the expression, why is 30 positive? It represents the distance he climbs upward.*
- *In the expression, why is 22 negative? It represents the distance he climbs downward.*
- BL** • *Nick descended another 42 feet. How many total feet did he climb? 94 feet*

Need Another Example?

The number of pounds Megan's dog gained and then lost is represented by the expression $|6| + |-3|$. How many pounds did Megan's dog gain and lose? **9 pounds**

Guided Practice

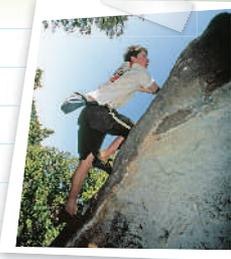
Formative Assessment Use these exercises to assess students' understanding of the concept of the lesson. If they need more help use the Personal Tutors available online.



If some of your students are not ready for assignments, use the differentiated activities below.

AL Paired Heads Together Have students work in pairs to solve Exercises 1–7. Students first complete the exercises individually then turn to their partners to discuss their answers. For Exercise 7, students should pay close attention when graphing integers. Students should check to make sure the dot is at the correct location on the number line.

BL Trade-a-Problem Have students create their own problems, similar to Example 6, using negative integers, positive integers, and a number line as part of their answers. Students will trade their problems, solve each other's problems, and compare solutions. If the solutions do not agree, students should work together and discuss to find the errors.





Example



6. Nick climbs 30 feet up a rock wall and then climbs 22 feet down to a landing area. The number of feet Nick climbs can be represented using the expression $|30| + |-22|$. How many feet does Nick climb?

$$|30| + |-22| = 30 + |-22|$$

The absolute value of 30 is 30.

$$= 30 + 22 \text{ or } 52$$

The absolute value of -22 is 22. Simplify.

So, Nick climbs 52 feet.

Guided Practice



Write an integer for each situation. (Examples 1 and 2)

1. a deposit of \$16 **16**

2. a loss of 11 yards **-11**

3. 6°F below zero **-6**

Evaluate each expression. (Examples 4–6)

4. $|-9| =$ **9**

5. $|18| - |-10| =$ **8**

6. $|-11| - |-6| =$ **5**

7. Graph the set of integers $\{11, -5, -8\}$ on a number line. (Example 3)



8. Building on the Essential Question Why is the absolute value of a nonzero number positive? Explain your reasoning. **Sample answer: The absolute value of any number represents the distance from zero on a number line regardless of direction. Distance is always positive.**

Rate Yourself!

I understand integers and absolute value.

I still have some questions about integers and absolute value.

Great! You're ready to move on!

 **No Problem! Go online to access a Personal Tutor.**

3 Practice and Apply

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions



Write an integer for each situation. (Examples 1 and 2)

1. a profit of \$9 9

2. a bank withdrawal of \$50 -50



3. 53°C below zero -53

4. 7 inches more than normal 7

Graph each set of integers on a number line. (Example 3)

5. $\{0, 1, -3\}$



6. $\{-5, -1, 10, -9\}$



Evaluate each expression. (Examples 4 and 5)

7. $|10| =$ 10

8. $|-7| - 5 =$ 2

9. $1 + |7| =$ 8

10. The number of yards a football team moves on the field can be represented using the expression $|8| + |-4|$. How many yards does the football team move? (Example 6)

12 yards

11. In golf, scores are often written in relationship to *par*, the average score for a round at a certain course. Write an integer to represent a score that is 7 under par. (Examples 1 and 2)

-7

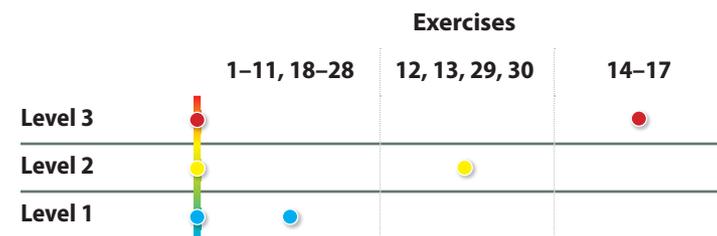


Independent Practice and Extra Practice

The Independent Practice pages are meant to be used as the homework assignment. The Extra Practice page can be used for additional reinforcement or as a second-day assignment.

Levels of Complexity

The levels of the exercises progress from 1 to 3, with Level 1 indicating the lowest level of complexity.



Suggested Assignments

You can use the table below that includes exercises of all complexity levels to select appropriate exercises for your students' needs.

Differentiated Homework Options		
AL	Approaching Level	1–11, 13, 14, 16, 29, 30
OL	On Level	1–11 odd, 12–14, 16, 29, 30
BL	Beyond Level	12–17, 29, 30

Watch Out!

Common Error Students may confuse the term *opposite* with absolute value. Remind them that absolute value is a distance and therefore never negative.

Name _____ My Homework _____

Extra Practice

Write an integer for each situation.

18. 2 feet below flood level -2

Homework Help

Because it represents below flood level, the integer is -2 .

19. an elevator goes up 12 floors 12

CCSS Model with Mathematics Graph each set of integers on a number line.

20. $\{3, -7, 6\}$



21. $\{-2, -4, -6, -8\}$



Evaluate each expression.

22. $|-12| = 12$

23. $7 + |4| = 11$

24. $|-9| + |-5| = 14$

25. $|-10| \div 2 \times |5| = 25$

26. $12 - |-8| + 7 = 11$

27. $|27| \div 3 - |-4| = 5$

28. Jasmine's pet guinea pig gained 8 ounces in one month. Write an integer to describe the amount of weight her pet gained.

 8 **Create Your Own Homework Online**

SolutionsManual can be used to create worksheets for the suggested assignments on page 195, or create your own worksheets for differentiated homework or review.