ACTIVITY 3

MATHia CONNECTION
• Using Absolute Value

Signed Numbers
TOPIC 1 — LESSON 2

Getting Started — Activity 1 2 3 — Talk the Talk

Using Absolute Value to Solve Real-World Problems

In this activity, you will use absolute value to solve real-world problems.

HABITS OF MIND
• Reason abstractly and quantitatively.
• Construct viable arguments and critique the reasoning of others.

In the building Melanie works in, the lobby is on the ground floor, or floor zero, with 10 floors of offices above it. The building also has 4 floors of garage below the lobby.

Melanie has an office on the 9th floor and parks on the 3rd floor below the ground floor.

1 Taylor and Cecelia determine how many floors Melanie must go up from her car to reach her office.

• Taylor represents the 9th floor as 9 and the 3rd floor below ground as −3. She says that since 9 − 3 = 6, Melanie travels 6 floors to get from her car to her office.

• Cecelia says that the ground floor to the 9th floor is 9 floors, and from the ground floor to the 3rd garage level is 3 floors, so Melanie travels $|9| + |-3|$, or 9 + 3, floors. This is a total of 12 floors.

Who is correct? **Explain your reasoning.**

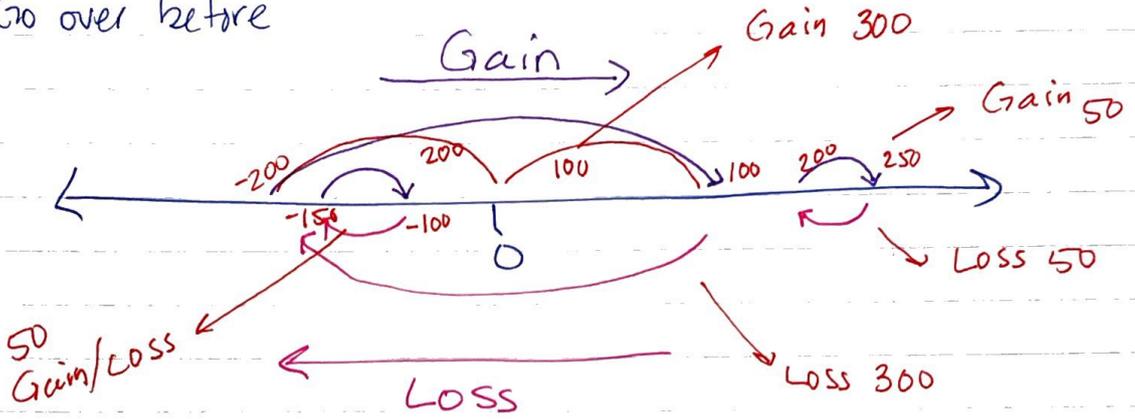*Cecelia is correct.*
To determine how far Melanie travels, you must add the distances from   garage → ground floor
*   and*
*   ground floor → office floor*

❯ Write a numeric expression using absolute values that would represent each situation. Then calculate the answer.

2 Caleb parks his car on the 2nd floor below ground and works on the 7th floor. How many floors must he go up from his car to reach his office?

ON BOARD

Go over before

Gain

Gain 300

Gain 50

-200   200   100   100   200°   250

-150   -100   0

50
Gain/Loss

Loss

Loss 50

Loss 300

☆ Cross zero > add
   (- & +)

3. Lucinda is working on the 8th floor. At lunch, she goes to her car on the 4th floor below ground, and then back up to the lobby. How many total floors does Lucinda travel?

4. If Damon goes from his office on the 10th floor to a meeting on the 5th floor, how many floors does he travel and in which direction?

The table shows the Top Notch company's balance sheet for the first 8 weeks of operation. Amounts within parentheses represent a negative balance.

5. Use estimation to enter the gains/losses between consecutive weeks in the table.

6. Between which two weeks did Top Notch have the largest gain in money? What was the actual gain? **Weeks 2 & 3**

   201.35
   + 231.57
   $432.92

7. Between which two weeks did Top Notch have the largest loss in money? What was the actual loss? **Week 3-4**

   231.57
   + 456.45
   $688.02

8. What was the difference between the company's lowest balance and its highest balance?

   456.45
   + 281.34
   $737.79

Week	Balance	Gain/Loss
1	($159) - 160	
2	($201.35) - 200	1-2 -40
3	$231.57 230	2-3 430
4	($456.45) - 450	3-4 -680
5	($156) -150	4-5 300
6	($12.05) -10	5-6 140
7	$281.34 280	6-7 290
8	$175 180	7-8 -100

9. Order the estimated gains and losses that you determined in Question 5 from least to greatest. **Use a negative sign to indicate losses.**

   -680, -100, -40, 140, 290, 300, 430

10. Order the estimated gains and losses that you determined in Question 5 from least to greatest according to their absolute values. What does the absolute value mean in the context of this problem?

$|-40|, |-100|, |140|, |290|, |300|, |430|, |-680|$

11. Why are the orders different in Questions 9 and 10?

#9 is based on positives & negatives

#10 is based on a numbers distance from zero

> As part of a long-term science experiment, scientists connected two rulers at zero and used that to measure a pond's water level. They placed the connected rulers in the pond so that the water level aligned at zero. The scientists measured the water level each week for 10 weeks.

Week	1	2	3	4	5	6	7	8	9	10
Water Level	$2\frac{3}{4}$	$-2\frac{1}{8}$	$1\frac{7}{8}$	$-\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{8}$	$-\frac{7}{8}$	$1\frac{1}{4}$	-2	$-\frac{3}{16}$

12. What do the positive numbers represent? What do the negative numbers represent?

13. Between which two weeks did the water level change the most? What was the change?

14. Between which two weeks did the water level change the least? What was the change?