Name _____ Date _____

The Distance Between Two Rational Numbers

Two 7th grade students, Monique and Matt, both solved the following math problem:

If the temperature drops from $7°\text{F}$ to $-17°\text{F}$, by how much did the temperature *decrease?*

The students came up with different answers. Monique said the answer is $24°\text{F}$, and Matt said the answer is $10°\text{F}$. Who is correct? Explain, and support your written response with the use of a formula and a vertical number line diagram.

1. $|-19-12|$

2. $|19-(-12)|$

3. $|10-(-43)|$

4. $|-10-43|$

5. $|-1-(-16)|$

6. $|1-16|$

7. $|0-(-9)|$

8. $|0-9|$

9. $|-14.5-13|$

10. $|14.5-(-13)|$

11. Describe any patterns you see in the answers to the problems in the left- and right-hand columns. Why do you think this pattern exists?

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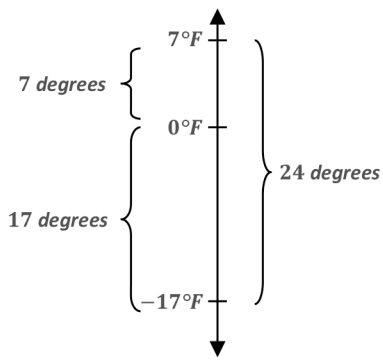
Monique is correct. If you use the distance formula, you take the absolute value of the difference between 7 and -17 and that equals 24. Using a number line diagram you can count the number of units between 7 and -17 to get 24.

$|7 - (-17)| = |7 + 17| = |24| = 24$. *There was a $24°F$ drop in the temperature.*



1. $|-19 - 12| = |-19 + (-12)| = |-31| = 31$
2. $|19 - (-12)| = |19 + 12| = |31| = 31$
3. $|10 - (-43)| = |10 + 43| = |53| = 53$
4. $|-10 - 43| = |-10 + (-43)| = |-53| = 53$
5. $|-1 - (-16)| = |-1 + 16| = |15| = 15$
6. $|1 - 16| = |1 + (-16)| = |-15| = 15$
7. $|0 - (-9)| = |0 + 9| = |9| = 9$
8. $|0 - 9| = |0 + (-9)| = |-9| = 9$
9. $|-14.5 - 13| = |-14.5 + (-13)| = |-27.5| = 27.5$
10. $|14.5 - (-13)| = |14.5 + 13| = |27.5| = 27.5$

11. Describe any patterns you see in the answers to the problems in the left- and right-hand columns. Why do you think this pattern exists?

    Each problem in the right-hand column has the same answer as the problem across from it in the left-hand column. That is because you are finding the distance between the opposite numbers as compared to the first column. The difference between the opposite numbers is opposite the difference between the original numbers. The absolute values of opposite numbers are the same.

MP.7