

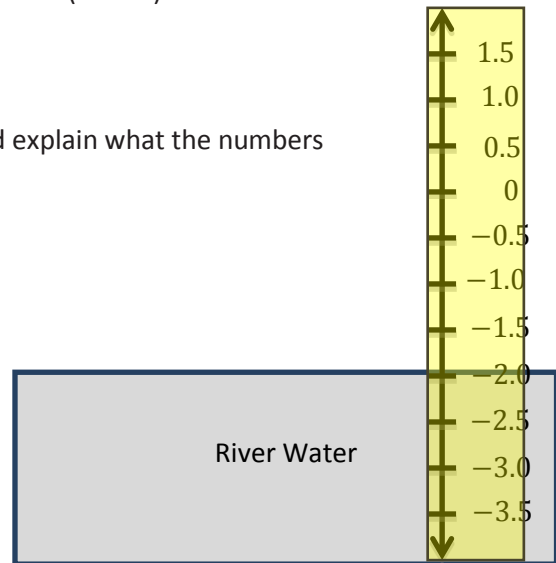
Name _____

Date _____

1. The picture below is a flood gauge that is used to measure how far (in feet) a river's water level is above or below its normal level.

- a. Explain what the number 0 on the gauge represents, and explain what the numbers above and below 0 represent.

- b. Describe what the picture indicates about the river's current water level.

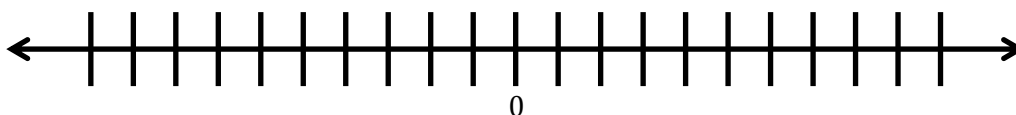


- c. What number represents the opposite of the water level shown in the picture, and where is it located on the gauge? What would it mean if the river water was at that level?
- d. If heavy rain is in the forecast for the area for the next 24 hours, what reading might you expect to see on this gauge tomorrow? Explain your reasoning.

2. Isaac made a mistake in his checkbook. He wrote a check for \$8.98 to rent a video game but mistakenly recorded it in his checkbook as an \$8.98 deposit.

a. Represent each transaction with a rational number, and explain the difference between the transactions.

- b. On the number line below, locate and label the points that represent the rational numbers listed in part (a). Describe the relationship between these two numbers. Zero on the number line represents Isaac's balance before the mistake was made.

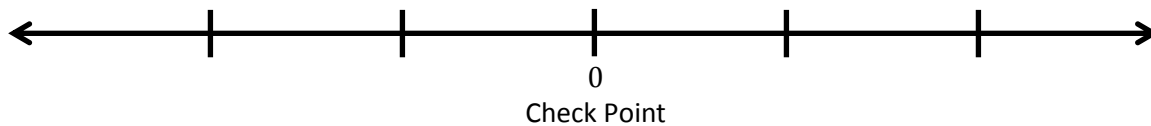


- c. Use absolute value to explain how a debit of \$8.98 and a credit of \$8.98 are similar.

3. A local park's programs committee is raising money by holding mountain bike races on a course through the park. During each race, a computer tracks the competitors' locations on the course using GPS tracking. The table shows how far each competitor is from a check point.

Number	Competitor Name	Distance to Check Point
223	Florence	0.1 mile before
231	Mary	$\frac{2}{5}$ mile past
240	Rebecca	0.5 mile before
249	Lita	$\frac{1}{2}$ mile past
255	Nancy	$\frac{2}{10}$ mile before

- a. The check point is represented by 0 on the number line. Locate and label points on the number line for the positions of each listed participant. Label the points using rational numbers.



- b. Which of the competitors is closest to the check point? Explain.
- c. Two competitors are the same distance from the check point. Are they in the same location? Explain.
- d. Who is closer to finishing the race, Nancy or Florence? Support your answer.

4. Andréa and Marta are testing three different coolers to see which keeps the coldest temperature. They placed a bag of ice in each cooler, closed the coolers, and then measured the air temperature inside each after 90 minutes. The temperatures are recorded in the table below:

Cooler	A	B	C
Temperature (°C)	−2.91	5.7	−4.3

Marta wrote the following inequality statement about the temperatures:

$$-4.3 < -2.91 < 5.7.$$

Andréa claims that Marta made a mistake in her statement and that the inequality statement should be written as

$$-2.91 < -4.3 < 5.7.$$

- a. Is either student correct? Explain.
- b. The students want to find a cooler that keeps the temperature inside the cooler more than 3 degrees below the freezing point of water (0°C) after 90 minutes. Indicate which of the tested coolers meets this goal and explain why.

5. Mary manages a company that has been hired to flatten a plot of land. She took several elevation samples from the land and recorded those elevations below:

Elevation Sample	A	B	C	D	E	F
Elevation (ft. above sea level)	826.5	830.2	832.0	831.1	825.8	827.1

- a. The landowner wants the land flat and at the same level as the road that passes in front of it. The road's elevation is 830 feet above sea level. Describe in words how elevation samples B, C, and E compare to the elevation of the road.

- b. The table below shows how some other elevation samples compare to the level of the road:

Elevation Sample	G	H	I	J	K	L
Elevation (from the road)	3.1	-0.5	2.2	1.3	-4.5	-0.9

Write the values in the table in order from least to greatest.

_____ < _____ < _____ < _____ < _____ < _____

- c. Indicate which of the values from the table in part (b) is farthest from the elevation of the road. Use absolute value to explain your answer.

A Progression Toward Mastery

Assessment Task Item		STEP 1 Missing or incorrect answer and little evidence of reasoning or application of mathematics to solve the problem.	STEP 2 Missing or incorrect answer but evidence of some reasoning or application of mathematics to solve the problem.	STEP 3 A correct answer with some evidence of reasoning or application of mathematics to solve the problem, <u>or</u> an incorrect answer with substantial evidence of solid reasoning or application of mathematics to solve the problem.	STEP 4 A correct answer supported by substantial evidence of solid reasoning or application of mathematics to solve the problem.
1	a 6.NS.C.5 6.NS.C.6a	Student is able to determine that the given water level is below normal (or low water) but does not indicate a clear understanding of zero or the numbers above and below zero on the number line. <u>OR</u> Student is unable to determine that the water level is below normal.	Student correctly states that 0 represents the normal water level but does not clearly describe the meanings of numbers above and below zero on the number line.	Student correctly states that 0 represents the normal water level and that either the numbers above zero represent above normal water levels or the numbers below zero represent below normal water levels but does not clearly describe both.	Student correctly states that 0 represents normal water level, numbers above zero (or positive numbers) represent above normal water levels, and numbers below zero (or negative numbers) represent below normal water levels.
	b 6.NS.C.5	Student response is missing or incomplete. For instance, student makes a general statement that the river's water level is below normal but does not refer to magnitude, direction, or a location on the number line.	Student response is incomplete but shows some evidence of understanding such as stating that the water level is at -2 or -1.9 or that the water level is 2 feet (or 1.9 feet) but without details such as units of measurement or direction.	Student correctly interprets the picture to indicate that the current water level is below normal but states it is <i>exactly</i> 2 feet below normal water level, rather than <i>nearly</i> 2 feet below normal water level.	Student response is correct and complete. Student states that the picture indicates that the river's current water level is <i>about</i> 2 feet below normal water level.

	c 6.NS.C.5 6.NS.C.6a	Student answer is incomplete or missing. Explanation shows little or no evidence of how to find opposites on a number line.	Student completes the first step stating that the opposite of -2 is 2 (or the opposite of -1.9 is 1.9 , etc.) but with no further details or correct statements.	Student correctly states that the opposite of -2 is 2 (or the opposite of -1.9 is 1.9 , etc.) and that in the opposite situation the river's water level would be higher than normal but does not clearly describe its location on the number line/gauge. <u>OR</u> Student correctly identifies and clearly describes the location of the opposite number on the number line/gauge but does not address what this level would mean in the context of the situation.	Student correctly addresses all parts of the question. Student correctly states that the opposite of -2 is 2 (or the opposite of -1.9 is 1.9 , etc.) and explains where the positive number is located specifying the number of units above 0 or on the opposite side of zero from the negative value. Student also states that the positive number would mean the river's water level is that many feet higher than the normal level.
	d 6.NS.C.5	Student explanation is missing. <u>OR</u> The written explanation demonstrates little or no correct mathematical interpretation of the situation such as claiming that tomorrow's water level would be below the current level shown.	Student correctly states that the water level would be higher than the level shown but does not provide a specific reading (level) and does not provide adequate reasoning to support the claim.	Student correctly states that the water would rise to a specific level higher than the level shown and identifies the new level but fails to provide a clear explanation to support the claim. <u>OR</u> Student correctly states that the water level would be higher than the level shown and provides adequate reasoning to support the claim but does not provide a specific reading (level).	Student response is complete and correct. Student states that the water level would rise to a specific level higher than the level shown, identifies a specific new level, and provides a clear explanation to support the claim.
2	a 6.NS.C.5 6.NS.C.6a	Student answer is incorrect or missing. Student neither arrives at both rational number representations nor provides a correct explanation of the difference in the two transactions, although one transaction may have been represented with a correct rational number.	Student correctly explains the difference in the two transactions but makes an error in representing one or both transactions as rational numbers. <u>OR</u> Student uses the correct two rational numbers to represent the transactions but does not explain the difference in the transactions.	Student correctly represents the check as -8.98 and the deposit as 8.98 . Student explains that the check will decrease the account balance or that the deposit will increase the account balance but not both.	Student response is complete and correct. The check is represented as -8.98 , and the deposit is represented as 8.98 . Student provides a clear and accurate explanation of the difference in the transactions.

	b 6.NS.C.6a 6.NS.C.6c	Student work is missing or incomplete. Student correctly locates and/or labels one point on the number line but shows no other accurate work.	Student shows intent to graph -8.98 and 8.98 correctly on the number line but does not accurately locate both points and/or has an error in the scale. Student does not state that the numbers are opposites.	Student correctly locates and labels -8.98 and 8.98 on the number line but does not state that the numbers are opposites. <u>OR</u> Student correctly locates -8.98 and 8.98 on the number line and states that the numbers are opposites but does not label the points.	Student response is correct and complete. Student correctly locates and labels -8.98 and 8.98 on the number line and states that the numbers are opposites.
	c 6.NS.C.7c	Student explanation shows little or no evidence of understanding the concept of absolute value.	Student response indicates some evidence of correct reasoning such as stating that the transactions change the account balance by the same amount of money, but the explanation is incomplete and does not include a direct reference to absolute value.	Student states that a debit of $\$8.98$ and credit of $\$8.98$ are similar because both have the same absolute value, but the written response is not complete and does not demonstrate evidence of solid reasoning.	Student response is correct and complete. Student explains that a debit of $\$8.98$ and a credit of $\$8.98$ are similar because the two transactions, which are represented by -8.98 and 8.98 , have the same absolute value, which is 8.98 ; so they change the account balance by the same amount of money but in opposite directions.
3	a 6.NS.C.5 6.NS.C.6c	Student accurately locates and labels two of the five points, at most, on the number line using rational numbers.	Student accurately locates and labels three of the five points on the number line using rational numbers.	Student accurately locates and labels four of the five points on the number line using rational numbers.	Student accurately locates and labels all five points on the number line using rational numbers.
	b 6.NS.C.6c 6.NS.C.7c	Student response is incomplete and incorrect such as stating that a competitor other than Florence is closest to the checkpoint without explaining why.	Student states that Florence is closest to the checkpoint without justification. <u>OR</u> Student states another competitor's name and attempts to justify the answer, but the explanation is incomplete.	Student states that Florence is closest to the checkpoint, but the justification contains an error. <u>OR</u> Student states another competitor's name and justifies the answer based on the response to part (a).	Student correctly states that Florence is closest to the checkpoint and provides clear and accurate justification for the claim.

	c 6.NS.C.5 6.NS.C.6c 6.NS.C.7c	Student response is incomplete and incorrect, such as stating that two competitors <i>other than</i> Rebecca and Lita are the same distance from the checkpoint, and no further explanation is provided.	Student is able to determine that Rebecca and Lita are the same distance away from the checkpoint, but the explanation does not address whether or not the competitors are in the same location.	Student states that Rebecca and Lita are the same distance from the checkpoint but on opposite sides; however, the explanation does not specifically answer whether or not the competitors are in the same location.	Student correctly indicates and explains that Rebecca and Lita are both 0.5 miles from the checkpoint but that they are positioned on opposite sides of the checkpoint and so they are not in the same location.
	d 6.NS.C.7b 6.NS.C.7c	Student explanation shows little or no evidence of understanding. For instance, student incorrectly states Nancy is closer to finishing the race with no explanation why.	Student incorrectly determines Nancy is closer to finishing the race but uses a valid argument based on earlier work. <u>OR</u> Student correctly states that Florence is closer to finishing the race but with no further explanation.	Student correctly states Florence is closer to finishing the race, but the justification for the claim contains an error in reasoning or a misrepresentation.	Student correctly determines and states that Florence is closer to finishing the race and justifies the claim using valid and detailed reasoning.
4	a 6.NS.C.7a 6.NS.C.7b	Student explanation shows little or no evidence of understanding. For instance, student states that neither Marta nor Andréa are correct.	Student states that Marta is correct but does not support the claim. <u>OR</u> Student states that Andréa is correct, but the explanation includes an error in reasoning.	Student correctly states that Marta is correct, but the explanation contains reasoning that is not clear and complete.	Student response is correct and complete. Student states that Marta is correct, justifying the claim by accurately describing the order of the rational numbers on the number line.
	b 6.NS.C.7b 6.NS.C.7d	Student incorrectly states cooler A or B and C met the goal and provides no justification or provides an explanation that contains multiple errors in reasoning.	Student states that cooler C met the goal but provides no justification for the claim. <u>OR</u> Student determines that coolers A and C met the goal and includes a complete explanation but erroneously identifies -2.91 degrees as being more than 3 degrees below zero.	Student correctly states that cooler C met the goal and justifies the claim, but the explanation contains a slight error. For instance, student describes the numbers to the left of -3 on the number line as being more than -3 rather than less than -3 .	Student correctly states that cooler C met the goal and justifies the claim by describing that “more than 3 degrees below zero” indicates the numbers must be to the left of -3 (below -3) on the number line and that -4.3 is the only piece of data that meets that criteria.

5	a 6.NS.C.5 6.NS.C.7b	Student's comparison of the elevation samples to the level of the road is incorrect. The written work shows little or no understanding of ordering rational numbers.	Student's comparison of the elevation samples to the level of the road is partially correct. Student correctly compares only one or two of the samples (B, C, or E) to the elevation of the road.	Student states that sample C is higher than the elevation of the road and sample E is lower than the elevation of the road and that sample B is about level with the road but <i>does not distinguish</i> whether sample B's elevation level is higher or lower than 830 feet.	Student accurately describes each sample's relative position compared to the elevation of the road, stating that samples B and C are higher than the elevation of the road, and sample E is lower than the elevation of the road.
	b 6.NS.C.7b	Student response shows little or no evidence of understanding. Student may place the negative values left of the positive values but made several errors in order.	Student response shows some evidence of understanding. Student correctly orders four of the six values from least to greatest.	Student correctly orders all six values from least to greatest but copies one of the values incorrectly.	Student correctly orders and writes all six values from least to greatest (i.e., $-4.5 < -0.9 < -0.5 < 1.3 < 2.2 < 3.1$).
	c 6.NS.C.7c	Student indicates sample K but does not provide any further detail. <u>OR</u> Student states a different sample such as G and justifies the choice using clear reasoning but does not address absolute value.	Student indicates sample K and provides a valid explanation but does not address absolute value in the explanation. <u>OR</u> Student incorrectly states sample G and justifies the choice by addressing the order of the positive numbers.	Student correctly states sample K and justifies the statement using absolute value correctly in the explanation, but the explanation is not complete. <u>OR</u> Student incorrectly states sample G and justifies the choice using absolute value in a correct manner but without considering the absolute value of -4.5 for sample K.	Student correctly states sample K is the farthest from the elevation of the road and justifies the statement by comparing the absolute values of the samples from the table in part (b) using the order of rational numbers to reach the answer.

Name _____

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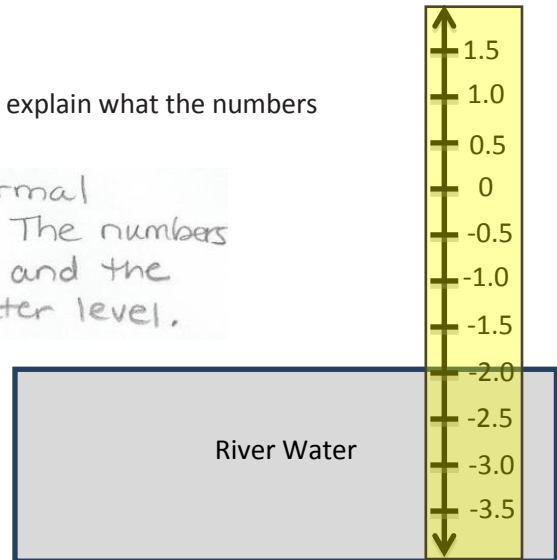
1. The picture below is a flood gauge that is used to measure how far (in feet) a river's water level is above or below its normal level.

- a. Explain what the number 0 on the gauge represents, and explain what the numbers above and below 0 represent.

The number 0 represents the normal average water level in the river. The numbers below 0 indicate low water level and the numbers above 0 indicate high water level.

- b. Describe what the picture indicates about the river's current water level.

The river's water level is about 2 feet below normal.



- c. What number represents the opposite of the water level shown in the picture, and where is it located on the gauge? What would it mean if the river water was at that level?

The water level is currently at approximately -2.0 feet. The opposite of -2 is 2. 2 is on the opposite side of 0, or above zero. If the river was at 2, the water level would be higher than normal.

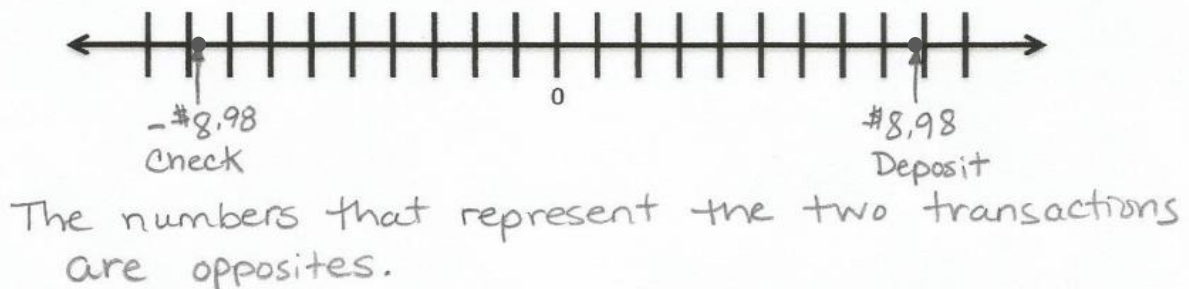
- d. If heavy rain is in the forecast for the area for the next 24 hours, what reading might you expect to see on this gauge tomorrow? Explain your reasoning.

I would expect to see the water level closer to 0 or even higher. Heavy rain should cause the amount of water in the river to increase, so its level would move up the number line.

2. Isaac made a mistake in his checkbook. He wrote a check for \$8.98 to rent a video game but mistakenly recorded it in his checkbook as an \$8.98 deposit.
- a. Represent each transaction with a rational number, and explain the difference between the transactions.

A check will decrease his account balance
so it can be represented by -8.98 .
A deposit will increase his account balance
so it can be represented by 8.98 .

- b. On the number line below, locate and label the points that represent the rational numbers listed in part (a). Describe the relationship between these two numbers. Zero on the number line represents Isaac's balance before the mistake was made.



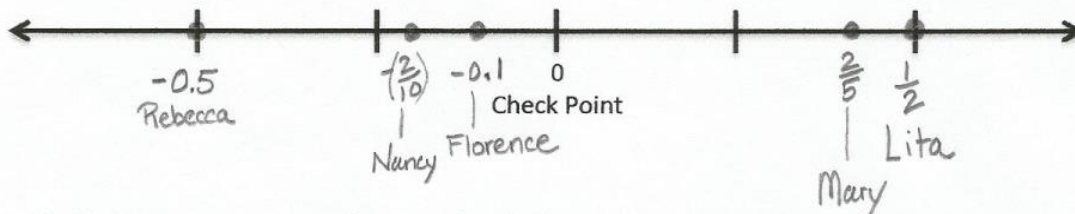
- c. Use absolute value to explain how a debit of \$8.98 and a credit of \$8.98 are similar.

The check and deposit have the same absolute value (8.98) so they will change his account balance by the same amount of money, but they change the balance in opposite directions.

3. A local park's programs committee is raising money by holding mountain bike races on a course through the park. During each race, a computer tracks the competitors' locations on the course using GPS tracking. The table shows how far each competitor is from a check point.

Number	Competitor Name	Distance to Check Point
223	Florence	0.1 mile before
231	Mary	$\frac{2}{5}$ mile past
240	Rebecca	0.5 mile before
249	Lita	$\frac{1}{2}$ mile past
255	Nancy	$\frac{2}{10}$ mile before

- a. The check point is represented by 0 on the number line. Locate and label points on the number line for the positions of each listed participant. Label the points using rational numbers.



- b. Which of the competitors is closest to the check point? Explain.

Florence is closest to the checkpoint because her distance to the checkpoint is 0.1 miles which is less than any of the other girls' distances.

- c. Two competitors are the same distance from the check point. Are they in the same location? Explain.

Rebecca and Lita are both 0.5 miles from the checkpoint; they are just on opposite sides of the check point.

- d. Who is closer to finishing the race, Nancy or Florence? Support your answer.

Florence is closer to finishing the race because the number representing her position (-0.1) is to the right of ($-\frac{2}{10}$) on the number line which is Nancy's position.

4. Andréa and Marta are testing three different coolers to see which keeps the coldest temperature. They placed a bag of ice in each cooler, closed the coolers, and then measured the air temperature inside each after 90 minutes. The temperatures are recorded in the table below:

Cooler	A	B	C
Temperature ($^{\circ}\text{C}$)	-2.91	5.7	-4.3

Marta wrote the following inequality statement about the temperatures:

$$-4.3 < -2.91 < 5.7.$$

Andréa claims that Marta made a mistake in her statement and that the inequality statement should be written as

$$-2.91 < -4.3 < 5.7.$$

- a. Is either student correct? Explain.

Marta is correct because the order of the numbers in her inequality is the same as the order of the numbers on the number line moving from left to right (or from down to up.).

- b. The students want to find a cooler that keeps the temperature inside the cooler more than 3 degrees below the freezing point of water (0°C) after 90 minutes. Indicate which of the tested coolers meets this goal and explain why.

More than 3 degrees below 0°C means less than -3°C . The only cooler to keep the temperature less than -3°C is cooler C. Cooler C held a temperature of -4.3°C which is to the left of -3°C on the number line.

5. Mary manages a company that has been hired to flatten a plot of land. She took several elevation samples from the land and recorded those elevations below:

Elevation Sample	A	B	C	D	E	F
Elevation (ft. above sea level)	826.5	830.2	832.0	831.1	825.8	827.1

- a. The landowner wants the land flat and at the same level as the road that passes in front of it. The road's elevation is 830 feet above sea level. Describe in words how elevation samples B, C, and E compare to the elevation of the road.

Samples B and C are higher than 830 feet and so higher than the road. Sample E is lower than 830 feet and so lower than the road.

- b. The table below shows how some other elevation samples compare to the level of the road:

Elevation Sample	G	H	I	J	K	L
Elevation (from the road)	3.1	-0.5	2.2	1.3	-4.5	-0.9

Write the values in the table in order from least to greatest.

-4.5 < -0.9 < -0.5 < 1.3 < 2.2 < 3.1

- c. Indicate which of the values from the table in part (b) is farthest from the elevation of the road. Use absolute value to explain your answer.

-4.5 (Sample K) is furthest from the elevation of the road because its absolute value (4.5) is greater than the absolute values of the other samples in the table.