

Above, Below, Zero

Use signed rational numbers to show direction and position.

GRADE 6 • MA.6.NSO.1.2

MA.6.NSO.1.2 "Given a mathematical or real-world context, represent quantities that have opposite direction using rational numbers. Compare them on a number line and explain the meaning of zero within its context."

NAME _____

DATE _____

DIRECTION ON A NUMBER LINE

Choose a reference point as zero. Amounts above, right, forward, or gained are positive, while amounts below, left, backward, or lost are negative. On a number line, numbers farther right are greater, and zero names the reference point.

WORKED EXAMPLE

A fish is 8.4 meters below the water level. Use water level as zero. Represent the fish's position and compare it with zero.

1. Water level is the reference point, so write 0 for water level.
2. Below water level means use a negative number: -8.4.
3. On a number line, -8.4 is left of 0, so $-8.4 < 0$.

Answer: The fish is at -8.4 m. $-8.4 < 0$. Zero means water level.

PRACTICE 6 problems

- 1** A drone is 3.2 meters above its launch point. Use the launch point as zero. Write the drone's signed position. What does zero mean?

ANSWER _____

- 2** A cave explorer is $\frac{5}{8}$ mile below the cave entrance. Use the entrance as zero. Write the explorer's signed position.

ANSWER _____

- 3** Compare -4 and $-\frac{1}{2}$. Write $<$, $>$, or $=$.

ANSWER _____

- 4** A game token starts at zero. One move goes 6 spaces left, and another move goes 6 spaces right. Write a signed number for each move.

ANSWER _____

- 5** Order these numbers from least to greatest: -2.7, 1.4, -3.

ANSWER _____

- 6** A temperature is -9 C. Compare it with 0 C. What does 0 C mean in this context?

ANSWER _____

APPLY IT Show your work

- 1** At a video game tournament, Maya's score is $2\frac{1}{4}$ points below the starting score. Luis's score is $1\frac{3}{4}$ points above the starting score. Use the starting score as zero. Write each signed score, compare them, and explain what zero means.

WORK SPACE

ANSWER _____

- 2** At a skate park, the top of a ramp is $4\frac{1}{2}$ feet above ground level. The bottom of a bowl is $3\frac{1}{4}$ feet below ground level. Use ground level as zero. Represent both positions, compare them, and explain what zero means.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A museum map uses the lobby as zero. The Fossil Lab is $2\frac{2}{5}$ levels below the lobby, the Planet Room is $1\frac{3}{5}$ levels above the lobby, and the Art Studio is $\frac{1}{5}$ level below the lobby. Write a signed number for each location. Order the locations from least to greatest, name the location closest to the lobby, and explain what zero means.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A drone is 3.2 meters above its launch point. Use the launch point as zero. Write the drone's signed position. What does zero mean?	+3.2; zero means the drone is at its launch point.
2	A cave explorer is $\frac{5}{8}$ mile below the cave entrance. Use the entrance as zero. Write the explorer's signed position.	$-\frac{5}{8}$
3	Compare -4 and $-\frac{1}{2}$. Write $<$, $>$, or $=$.	$-4 < -\frac{1}{2}$
4	A game token starts at zero. One move goes 6 spaces left, and another move goes 6 spaces right. Write a signed number for each move.	Left: -6; right: +6
5	Order these numbers from least to greatest: -2.7, 1.4, -3.	-3, -2.7, 1.4
6	A temperature is -9 C. Compare it with 0 C. What does 0 C mean in this context?	$-9 < 0$; 0 C means zero degrees Celsius.

PART 2 • APPLY IT

- Maya: $-2\frac{1}{4}$; Luis: $+1\frac{3}{4}$; $-2\frac{1}{4} < +1\frac{3}{4}$. Zero means the starting score.** A score below the starting score is negative, and a score above it is positive. Maya's number is left of Luis's number on a number line.
- Ramp: $+4\frac{1}{2}$; bowl: $-3\frac{1}{4}$; $-3\frac{1}{4} < +4\frac{1}{2}$. Zero means ground level.** Above ground is positive and below ground is negative. The bowl is left of zero, while the ramp is right of zero.

CHALLENGE

Fossil Lab: $-2\frac{2}{5}$; Planet Room: $+1\frac{3}{5}$; Art Studio: $-\frac{1}{5}$. Least to greatest: Fossil Lab, Art Studio, Planet Room. The Art Studio is closest to the lobby. Zero means the lobby level.

Accept positive numbers written with or without a plus sign. Accept equivalent fraction forms and correct comparison explanations that identify zero as the stated reference point.