Lesson 18: Expressions with Rational Numbers

Let's develop our signed number sense.

18.1: True or False: Rational Numbers

Decide if each statement is true or false. Be prepared to explain your reasoning.

1. $(-38.76)(-15.6)$ is negative

2. $10,000 - 99,999 < 0$

3. $\left(\frac{3}{4}\right)\left(-\frac{4}{3}\right) = 0$

4. $(30)(-80) - 50 = 50 - (30)(-80)$

18.2: Card Sort: The Same But Different

Your teacher will give you a set of cards. Group them into pairs of expressions that have the same value.

18.3: Near and Far From Zero

a	b	$-a$	$-4b$	$-a + b$	$a \div -b$	a^2	b^3
$-\frac{1}{2}$	6						
$\frac{1}{2}$	-6						
-6	$-\frac{1}{2}$						

1. For each set of values for a and b, evaluate the given expressions and record your answers in the table.

2. When $a = -\frac{1}{2}$ and $b = 6$, which expression:

   has the largest value? has the smallest value? is the closest to zero?

3. When $a = \frac{1}{2}$ and $b = -6$, which expression:

   has the largest value? has the smallest value? is the closest to zero?

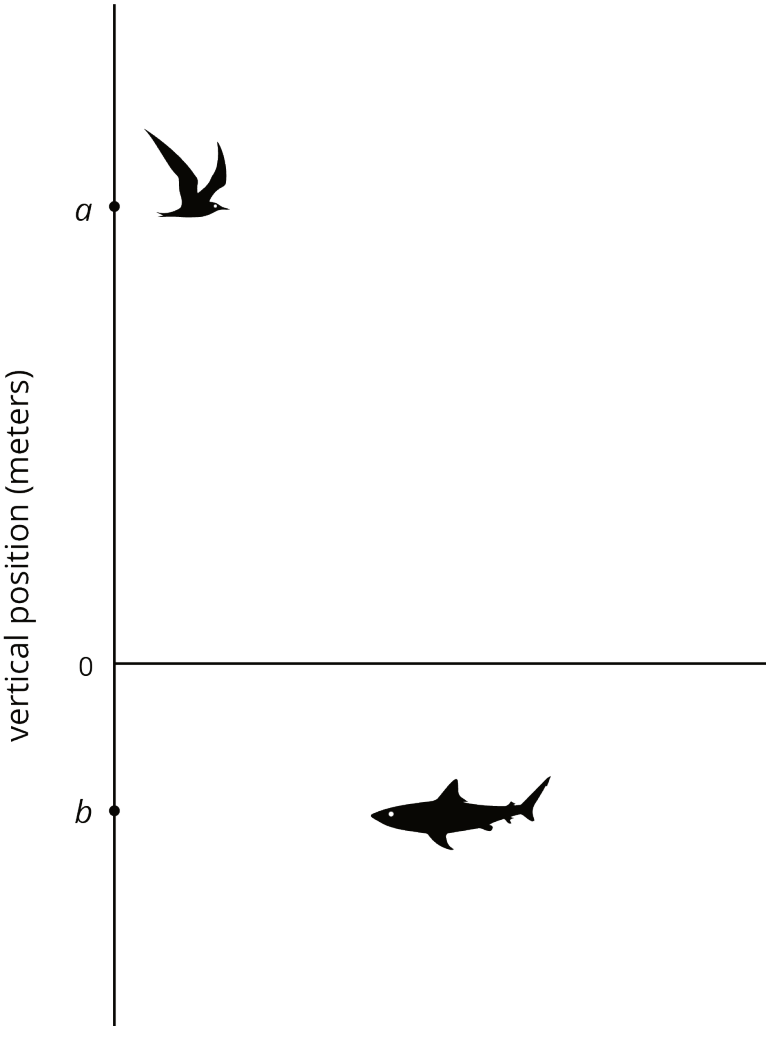
4. When $a = -6$ and $b = -\frac{1}{2}$, which expression:

   has the largest value? has the smallest value? is the closest to zero?

Are you ready for more?

Are there any values could you use for a and b that would make all of these expressions have the same value? Explain your reasoning.

18.4: Seagulls and Sharks Again



A seagull has a vertical position a, and a shark has a vertical position b. Draw and label a point on the vertical axis to show the vertical position of each new animal.

1. A dragonfly at d, where $d = -b$
2. A jellyfish at j, where $j = 2b$
3. An eagle at e, where $e = \frac{1}{4}a$.
4. A clownfish at c, where $c = \frac{-a}{2}$
5. A vulture at v, where $v = a + b$
6. A goose at g, where $g = a - b$

Lesson 18 Summary

We can represent sums, differences, products, and quotients of **rational numbers**, and combinations of these, with numerical and algebraic expressions.

Sums:	Differences:	Products:	Quotients:
$\frac{1}{2} + \text{-}9$	$\frac{1}{2} - \text{-}9$	$(\frac{1}{2})(\text{-}9)$	$\frac{1}{2} \div \text{-}9$
$\text{-}8.5 + x$	$\text{-}8.5 - x$	$\text{-}8.5x$	$\frac{\text{-}8.5}{x}$

We can write the product of two numbers in different ways.

- By putting a little dot between the factors, like this: $\text{-}8.5 \cdot x$.
- By putting the factors next to each other without any symbol between them at all, like this: $\text{-}8.5x$.

We can write the quotient of two numbers in different ways as well.

- By writing the division symbol between the numbers, like this: $\text{-}8.5 \div x$.
- By writing a fraction bar between the numbers like this: $\frac{\text{-}8.5}{x}$.

When we have an algebraic expression like $\frac{\text{-}8.5}{x}$ and are given a value for the variable, we can find the value of the expression. For example, if x is 2, then the value of the expression is -4.25, because $\text{-}8.5 \div 2 = \text{-}4.25$.