

Algebra RH

Essential Questions: How do we perform operations with rational numbers? How do we evaluate algebraic expressions with rational numbers?

Do Now: Perform the indicated operation.

a. $-9 - 8$

-17

b. $-10 + 5$

-5

c. $-14 - (-3)$

-11

d. $6 - 8 + 3 - 4 - 6$

-9

e. $(-9)(-4)(-2)$

-72

f. $(-1)^{24}$

1

g. $12 \div -4$

-3

h. $|-2 - 5|$

7

Operations with Integers

Reading Variables

-N is read as "the inverse of N" or "the opposite of N"

-N means take the opposite of N or multiply N by -1

a. Evaluate -N when N = 5

$-(5) \rightarrow -5$

b. Evaluate -N when N = -5

$-(-5) \rightarrow 5$

Raising Integers to a Power



What is the difference between -6^2 and $(-6)^2$?

opposite of 6^2

-36

$-6 \cdot -6$
 36

Evaluating Algebraic Expressions with Integers

-Always follow the order of operations (PEMDAS)

-When evaluating algebraic expressions, parentheses must be used to...

- Raise a negative number to a power
- Subtract a negative number
- Show multiplication between signed numbers

Find the value of

Evaluate each expression when $x = -3$, $y = -2$ and $z = 6$. Show all work!

1. $\frac{z}{y} - xy$

$\frac{6}{-2} - (-3)(-2)$

$-3 - 6$

-9

2. $x - y^2$

$-3 - (-2)^2$

$-3 - 4$

-7

3. $-z|x - y|$

$-6|-3 - (-2)|$

$-6|-3 + 2|$

$-6|-1|$

$-6 \cdot 1$

-6

4. $x \left(\frac{y - z}{4y} \right)^4$

$-3 \left(\frac{-2 - 6}{4(-2)} \right)^4$

$-3 \left(\frac{-8}{-8} \right)^4$

$-3(1)^4$

$-3(1)$

-3

5. T/F If $x =$ any integer and $x \neq 0$, then $-x^4$ is always negative.

TRUE

-2^4

$-(-2)^4$

-16

-16

Operations with Rational Numbers

All rules that apply for integers apply for fractions, decimals and signed numbers!

a. $-\frac{1}{4} - \frac{2}{3}$

$$\frac{-3}{12} - \frac{8}{12}$$

$$\boxed{\frac{-11}{12}}$$

b. $\frac{-240}{-12}$

$$\frac{-240}{-12}$$

$$\boxed{20}$$

c. $-\frac{5}{8} + \frac{1}{3}$

$$\frac{-15}{24} + \frac{8}{24}$$

$$\boxed{\frac{-7}{24}}$$

Fractions and Powers



What is the difference between $\frac{4^2}{9}$ and $(\frac{4}{9})^2$?

$$\begin{array}{cc} \downarrow & \downarrow \\ \frac{16}{9} & \frac{16}{81} \end{array}$$

Order of Operations with Rational Numbers

1. $\frac{(-0.9)^2}{-5+4.7}$

$$\frac{81}{-3}$$

$$\frac{8.1}{-3}$$

$$\boxed{-2.7}$$

2. $\frac{1}{2} - \frac{1}{2} \div \frac{1}{4}$

$$\frac{1}{2} - \frac{1}{2} \cdot \frac{4}{1}$$

$$\frac{1}{2} - 2$$

$$\boxed{-\frac{3}{2} \text{ or } -1\frac{1}{2}}$$

3. $(\frac{4}{7} - \frac{5}{7})^2 \div \frac{1}{49}$

$$(\frac{-1}{7})^2 \div \frac{1}{49}$$

$$\frac{1}{49} \div \frac{1}{49}$$

$$\frac{1}{49} \cdot \frac{49}{1}$$

$$\boxed{1}$$

Evaluating Algebraic Expressions with Rational Numbers

Evaluate when $a = \frac{1}{4}$, $b = 9$ and $c = -0.5$.

4. $a - b + c$

$$\begin{aligned} &\frac{1}{4} - 9 + (-0.5) \\ &.25 - 9 - 0.5 \\ &-8.75 - 0.5 \end{aligned}$$

$$\boxed{\begin{array}{c} -9.25 \\ \text{or} \\ -9\frac{1}{4} \end{array}}$$

5. $-a^2 + c \div -\frac{1}{8}$

$$\begin{aligned} &-(\frac{1}{4})^2 + (-0.5) \div -\frac{1}{8} \\ &-\frac{1}{16} - \frac{1}{2} \div -\frac{1}{8} \\ &-\frac{1}{16} - \frac{1}{2} \cdot -\frac{8}{1} \end{aligned}$$

$$-\frac{1}{16} + 4$$

$$\boxed{3\frac{15}{16}}$$

6. $bc^2 - a$

$$\begin{aligned} &9(-0.5)^2 - \frac{1}{4} \\ &9(0.25) - .25 \\ &2.25 - .25 \end{aligned}$$

$$\boxed{2}$$

7. $-2a^2 \div \frac{1}{3}b - c^3$

$$\begin{aligned} &-2(\frac{1}{4})^2 \div \frac{1}{3}(9) - (-0.5)^3 \\ &-2(\frac{1}{16}) \div \frac{1}{3}(9) - (-\frac{1}{2})^3 \\ &-\frac{1}{8} \div \frac{1}{3}(9) + \frac{1}{8} \\ &-\frac{1}{8} \cdot \frac{3}{1}(9) + \frac{1}{8} \\ &-\frac{3}{8}(9) + \frac{1}{8} \\ &-\frac{27}{8} + \frac{1}{8} \\ &-\frac{26}{8} \rightarrow \boxed{-3\frac{1}{4}} \end{aligned}$$