

WORKSHEET 2.12: EVALUATING RATIONAL EXPRESSIONS

Follow the steps below to evaluate expressions:

1. Rewrite the expression by replacing all of the variables with their values.
2. Follow the order of operations.
 - Simplify expressions within grouping symbols first. If there are nested grouping symbols, simplify the innermost first and then work outward.
 - Simplify powers.
 - Multiply and divide in order from left to right.
 - Add and subtract in order from left to right.

EXAMPLEIf $a = \frac{1}{2}$, $b = -\frac{2}{3}$, $c = -\frac{1}{3}$, find $a(b + c)$.

$$a(b + c) = \frac{1}{2} \left(\frac{-2}{3} + \frac{-1}{3} \right) = \frac{1}{2} \left(\frac{-3}{3} \right) = \frac{1}{2}(-1) = -\frac{1}{2}$$

DIRECTIONS: Evaluate each expression if $a = \frac{1}{2}$, $b = -\frac{2}{3}$, $c = \frac{3}{4}$, $d = -\frac{1}{3}$.

1. $a + 2c$

2. $3ac$

3. $4(a + b)$

4. $(a + b)(b - d)$

5. $4a^2$

6. $-b^2$

7. $ad - b$

8. $\frac{a}{c}$

9. $a + b - c - d$

10. $-\frac{ab}{c}$

11. $(cd)^3$

12. $-\frac{2}{d}$



CHALLENGE: $a^2 = \frac{1}{25}$. What values of a would make this statement true? Explain your answer.

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EXAMPLE

If $a = \frac{1}{2}$, $b = -\frac{2}{3}$, $c = -\frac{1}{3}$, find $a(b + c)$.

$$a(b + c) = \frac{1}{2} \left(\frac{-2}{3} + \frac{-1}{3} \right) = \frac{1}{2} \left(\frac{-3}{3} \right) = \frac{1}{2}(-1) = -\frac{1}{2}$$

DIRECTIONS: Evaluate each expression if $a = \frac{1}{2}$, $b = -\frac{2}{3}$, $c = \frac{3}{4}$, $d = -\frac{1}{3}$.

1. $a + 2c$

$$\frac{1}{2} + 2\left(\frac{3}{4}\right)$$

$$2$$

2. $3ac$

$$3\left(\frac{1}{2}\right)\left(\frac{3}{4}\right)$$

$$\frac{1}{8}$$

3. $4(a + b)$

$$4\left(\frac{1}{2} + \left(-\frac{2}{3}\right)\right)$$

$$-\frac{2}{3}$$

4. $(a + b)(b - d)$

$$\left(\frac{1}{2} + \left(-\frac{2}{3}\right)\right)\left(-\frac{2}{3} - \left(-\frac{1}{3}\right)\right)$$

$$\frac{1}{18}$$

5. $4a^2$

$$4\left(\frac{1}{2}\right)^2$$

* ONLY 'a' is squared

$$1$$

6. $-b^2$

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

$$-\frac{4}{9}$$

7. $ad - b$

$$\left(\frac{1}{2}\right)\left(-\frac{1}{3}\right) - \left(-\frac{2}{3}\right)$$

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

8. $\frac{a}{c}$

$$\frac{\frac{1}{2}}{\frac{3}{4}}$$

$$\frac{2}{3}$$

9. $a + b - c - d$

$$\frac{1}{2} + \left(-\frac{2}{3}\right) - \left(\frac{3}{4}\right) - \left(-\frac{1}{3}\right)$$

$$-\frac{7}{12}$$

10. $-\frac{ab}{c}$

$$-\frac{\left(\frac{1}{2}\right)\left(-\frac{2}{3}\right)}{\frac{3}{4}}$$

$$\frac{4}{9}$$

11. $(cd)^3$

$$\left(\frac{3}{4} \cdot -\frac{1}{3}\right)^3$$

$$-\frac{1}{64}$$

12. $-\frac{2}{d}$

$$-\frac{2}{\left(-\frac{1}{3}\right)}$$

$$6$$



CHALLENGE: $a^2 = \frac{1}{25}$. What values of a would make this statement true?

Explain your answer.

$$a = \frac{1}{5} \text{ and } a = -\frac{1}{5} \text{ because } \left(\frac{1}{5}\right)^2 = \frac{1}{25}$$

$$\text{and } \left(-\frac{1}{5}\right)^2 = \frac{1}{25}$$