

Order of Operations & Defining New Rules



Warm-Up!

Try these problems before watching the lesson.

1. What is the value of $4 \times (50 + 7)$?
2. What common fraction is equivalent to $1\frac{1}{2} + \frac{6}{5} - 0.25$?
3. What is $0 \cdot 1 + \frac{0}{1} + 0^1 + 1^0$?
4. What is the value of $(10 - 5)^2 + 12 \div 4$?
5. What is the value of $9(\frac{1}{3} + 2 - \frac{2}{3})$?
6. What is the value of $100 - \frac{10}{0.1}$?



The Problems

Take a look at the following problems and follow along as they are explained in the video.

7. Define the operation $a \# b = a^2 + b$. What is the value of $(2 \# 1) \# (2 \# 1)$?
8. If $a \star b = a + b - 1$, what is the value of $5 \star 5 \star 5 \star 5 \star 5$?
9. If $a \blacklozenge b$ is defined as $a \cdot b + 3$, what is the absolute difference between $(10 \blacklozenge 11) \blacklozenge 12$ and $10 \blacklozenge (11 \blacklozenge 12)$?



Piece It Together

Use the skills you practiced in the warm-up and strategies from the video to solve the following problems.

10. What is the value of $(x + \frac{1}{x})^2$, if $x = \sqrt{\frac{5}{8}}$? Express your answer as a common fraction.
11. If $x \triangle y = x + y - |x - y|$, what is the value of $(3 \triangle 4) - (2 \triangle 1)$?
12. If $a \text{ ⌘ } b = \frac{ab}{a+b}$ and $a \text{ ⌘ } 4 = 3$, what is the value of a ?
13. Joanna forms an arithmetic expression using each of $\frac{1}{10}$, $3\frac{1}{2}$ and $2\frac{4}{5}$ exactly once and using each of the two operators $+$ and \div exactly once with as many sets of parentheses as she wishes. What is the absolute difference between the greatest and least possible values of Joanna's expression? Express your answer as a mixed number.



Optional Extension

To extend your understanding and have a little fun with math, try the following activities.

Create a rule for $a \text{ ☺ } b$ that always equals 1 no matter what two numbers are used for a and b . Get creative! Make more than one! See which of your friends came up with the most complex but successful rule!

Come up with a rule that is challenging to solve. Switch with your friends and see if you can stump them! Note: agree with your friends on a maximum number of steps or operators.