



Math Virtual Learning

Calculus AB

Challenge Problems

May 22, 2020



Calculus AB
Lesson: May 22, 2020

Objective/Learning Target:

Students will work on math challenge problems.

Warm-Up: Brain Teaser

Two 2s can be combined in many ways to express different numbers. Here are some!

$$2-2=0$$

$$2/2 = 1$$

$$.2 + 2 = 2.2$$

$$(2^2)! = 24 \text{ (4! means } 4 \times 3 \times 2 \times 1 \text{) (2}^2 \text{ is 2 to the power of 2)}$$

****CHALLENGE!****

Can you write an expression that has the value of exactly 5, using:

- * two, and only two, 2s, and
- * any mathematical symbols or operations?

You may not use any other numbers. The symbols used would be known by most high school maths students.

(Go to the next slide for a hint)

Hint:

These operations or symbols are used, in some order:

- * exponent (index or power)
- * a minus (-) sign
- * brackets
- * square root
- * a decimal point

(Go to the next slide for the answer)

Answer:

The square root of point 2 to the power of minus 2.

$\text{sqrt} ((.2)^{-2})$

$.2^{-2}$ is the same as $1/0.04$, i.e. 25

[Point 2 is usually written as 0.2, but .2 is also correct.]

Challenge Problem:

DERIVATIVE POWER RULE

Directions: Use the digits 1 to 9, at most one time each, to fill in the boxes to create a true derivative statement.

$$\frac{d}{dx} \left(\frac{\square}{\square} x^{\square} \right) = \frac{\square}{\square} x^{\square}$$

(Go to the next slide for a hint)

Hint:

What is true about the relationship between a function's degree and its derivative?

What values in the coefficient could work with the exponent to not reuse any numbers?

(Go to the next slide for the answer)

Answer:

There are multiple answers (at least 12) to the problem. Below are a few examples.

1. $d/dx(1/8)x^6 = (3/4)x^5$

2. $d/dx(2/3)x^9 = (6/1)x^8$

3. $d/dx(1/6)x^8 = (4/3)x^7$

Extension: What numbers would not work as exponents?