Math Virtual Learning

Calculus AB

Challenge Problems

May 21, 2020

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Lesson: May 21, 2020

Objective/Learning Target:

Students will work on math challenge problems.

Warm-Up:Brain Teaser

Diophantus was a Greek mathematician who lived in the third century. He was one of the first mathematicians to use algebraic symbols.

Most of what is known about Diophantus's life comes from an algebraic riddle from around the early sixth century. The riddle states:

Diophantus's youth lasted one sixth of his life. He grew a beard after one twelfth more. After one seventh more of his life, he married. 5 years later, he and his wife had a son. The son lived exactly one half as long as his father, and Diophantus died four years after his son.

How many years did Diophantus live?

(Go to the next slide for a hint)

Hint:

Think of his age as "x" and create an equation.

Answer:

The riddle, the "facts" of which may or may not be true, results in the following equation:

$$x/6 + x/12 + x/7 + 5 + x/2 + 4 = x$$

where x is Diophantus's age at the time of his death.

Therefore, Diophantus lived exactly 84 years.

Challenge Problem:

DERIVATIVE OF E

Directions: Using the digits 1-6, at most one time each, create an exponential function of base e whose derivative at x = 3 is 2.

$$y = e^{(\Box x - \Box)}$$

(Go to the next slide for a hint)

Hint:

What is the process for finding the derivative?

What will make e^x 'disappear'?

(Go to the next slide for the answer)

Answer:

$$y = e^{(2x-6)}$$