BECA / Dr. Huson / 11.1 IB Math SL
3 May 2018
Classwork: Exponential functions Name:

1. The function $p(t) = 110e^{0.03922t}$ models the population of a city, in millions, t years after 2010.

   (a) Initially, as of 2010, what is the population in millions.

   (b) What is the rate that the population increases continuously, per year?

   (c) Express the population as a function with the form $p(t) = Ab^t$, where A and b are real numbers.

2. For a given time, x, in seconds, an electric current, y, can be represented by $y = 2.7^{-.10x}$.

   (a) Simplify the expression to eliminate the coefficient in the exponent.

   (b) Is the electric current increasing or decreasing? Justify your answer.

   (c) Is the current in the original equation, above, exponential growth or decay? Why?

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3. Iridium-192 is an isotope of iridium and has a half-life of 73.83 days. If a laboratory experiment begins with 100 grams of Iridium-192, the number of grams, A, of Iridium-192 present after t days would be

$$A = 100\left(\frac{1}{2}\right)^{\frac{t}{73.83}}$$

   (a) Simplify the equation to eliminate the fraction in the exponent.

   (b) After one day, how much isotope is present?

   (c) As a percentage, how much does the mass of the isotope change each day?

4. A bank account earns interest at a continuous interest rate of 5% per year. The initial deposit is \$225.

   (a) Express the balance in the account as a function in the form $P(t) = P_0 \cdot e^{rt}$

   (b) Convert the function to one without a coefficient in the exponent.

   (c) What is the interest rate expressed as a simple, annual rate?

5. Judith puts \$5000 into an investment account with interest compounded continuously. What is the approximate annual rate is needed for the account to grow to \$9110 after 30 years?

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Homework

6. Write $\sqrt[3]{x}^2$ as a single term with a rational exponent.

7. Write $\sqrt{a^2} \div a^3$ as an expression with positive, integer exponents.

8. If $n = \sqrt{a^3}$ and $m = a$, where $a > 0$, express $\frac{n}{m}$ as

   (a) a radical with positive, integer exponents

   (b) an expression with a fractional exponent

9. What is the expression $6xi^3(-4xi + 5)$ is equivalent to?

10. Simplify the expression $(3k - 2i)^2$, where i is the imaginary unit.

11. Nicole tried to find the product of $(2 + 4i)$ and $(3 - i)$, and her work is shown below.
    $(2 + 4i)(3 - i)$
    $= 6 - 2i + 12i - 4i^2$
    $= 6 + 10i - 4i^2$
    $= 6 + 10i - 4(1)$
    $= 6 + 10i - 4$
    $= 2 + 10i$
    Identify the error in the process shown and determine the correct product of $(2 + 4i)$ and $(3 - i)$.

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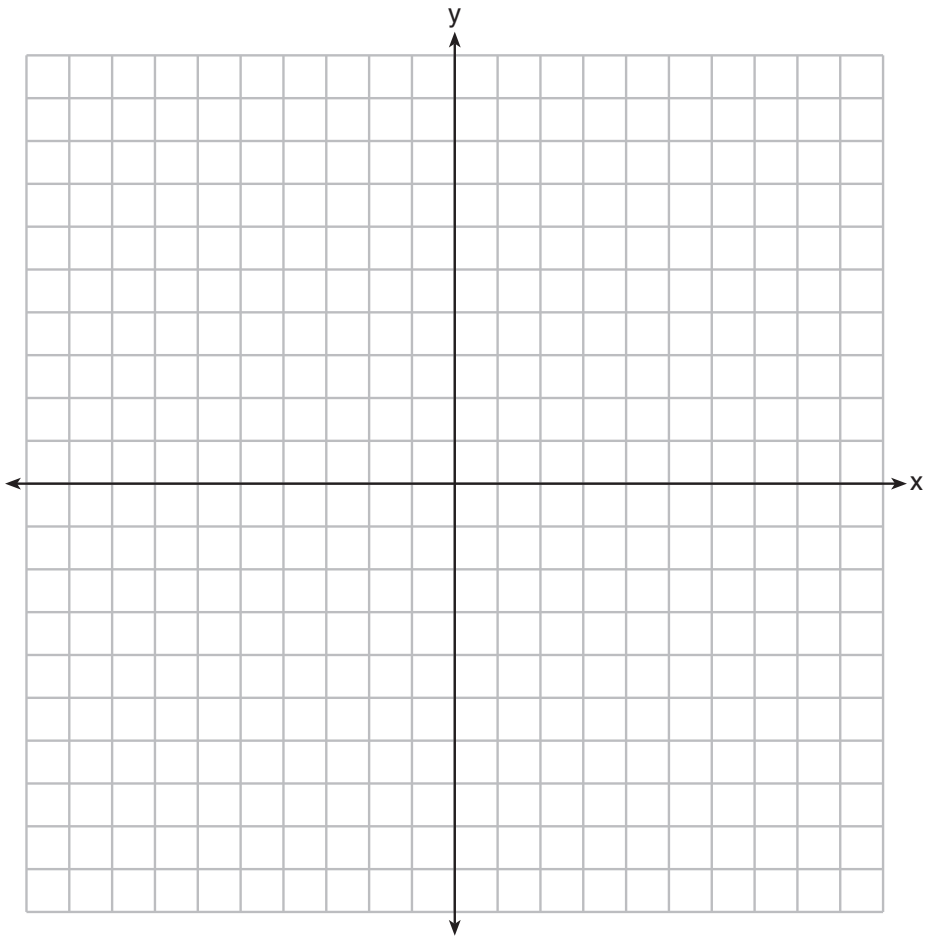
12. Graph the function $f(x) = x^3 - 9x + 2$.

    (a) Write down the y-intercept.

    (b) Mark the x-intercepts on the graph as ordered pairs, rounding to the nearest hundredth.



13. Judith puts \$1000 into an investment account with interest compounded continuously. What is the approximate annual rate is needed for the account to grow to \$1529.59 after 10 years?