Algebra 1 Bellwork Friday, April 8, 2016

1. The deer population in a rural area has been decreasing 3.06% each year. In 2011 the deer population was estimated to be 8,400.

a) Model this situation with an exponential equation.

b) Find the deer population in 2005.

2. The number of bacteria cells doubles every 12 minutes. At 10:00 am there 70 cells.

a) Model this situation with an exponential equation.

b) Find the number of bacteria cells at 2:00 pm.

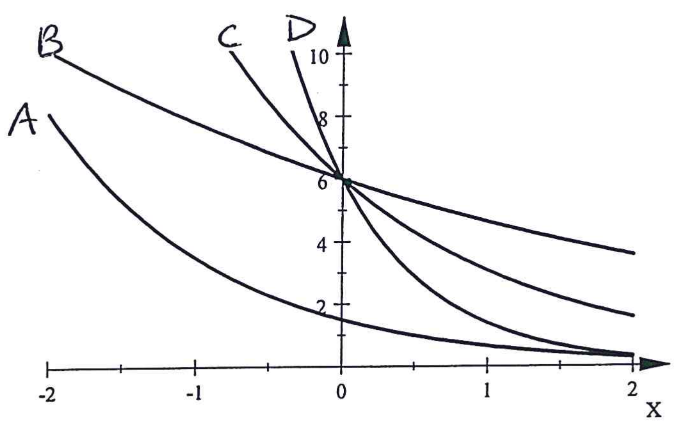
3. The half-life of a radioactive substance is 40 mintues. At 5:00pm there was 200 grams of this substance.

a) Model this situation with an exponential equation.

b) Find the amount of radioactive substance remaining at 7:30 pm. Round to the nearest hundredth.

Match each exponential equation to its graph.

4. $y = 6(0.77)^x$ 5. $y = 1.5(0.43)^x$ 6. $y = 6(0.51)^x$ 7. $y = 6(0.23)^x$



8. Evaluate for $P = -9$ $Q = -6$ $R = 12$ Give answer as a fraction in reduced form (no decimals)

$3P^{-2}Q^{2}R^{-1}$

9. Simplify. Make sure your answers don't have any exponents that are zero or negative.

a)

$\left(\dfrac{4^{-2}a^{5}b^{-7}c}{6a^{-2}b^{-3}c^{5}}\right)^{-2}$

b)

$(4m^{3}n^{-2})^{3}(2^{-1}m^{-5}n^{3})^{2}$

Answers

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1. The deer population in a rural area has been decreasing 3.06% each year. In 2011 the deer population was estimated to be 8,400.

$100 - 3.06 = 96.94\%$

$b = .9694$

a) Model this situation with an exponential equation.

$y = 8400(.9694)^x$

b) Find the deer population in 2005.

$x = 2005 - 2011 = -6$ $\quad y = 8400(.9694)^{-6} = \boxed{10{,}122}$

2. The number of bacteria cells doubles every 12 minutes. At 10:00 am there 70 cells.

a) Model this situation with an exponential equation. $y = 70(2)^x$

b) Find the number of bacteria cells at 2:00 pm.

x: 10:00am to 2:00pm = 4 hrs × 60 = 240 min ÷ 12 = 20 doubling periods

$y = 70(2)^{20} = \boxed{73{,}400{,}320 \text{ cells}}$

3. The half-life of a radioactive substance is 40 mintues. At 5:00pm there was 200 grams of this substance.

a) Model this situation with an exponential equation. $y = 200(.5)^x$

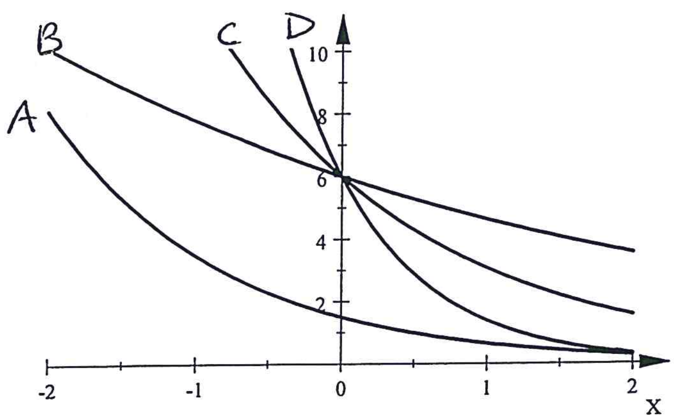
b) Find the amount of radioactive substance remaining at 7:30 pm. Round to the nearest hundredth.

x: 5:00pm to 7:30pm = 2.5 hrs × 60 = 150 min ÷ 40 3.75 half-lives

$y = 200(.5)^{3.75} = \boxed{14.87\text{ g}}$

Match each exponential equation to its graph.

4. $y = 6(0.77)^x$ 5. $y = 1.5(0.43)^x$ 6. $y = 6(0.51)^x$ 7. $y = 6(0.23)^x$



4. B
5. A
6. C
7. D

8. Evaluate for $P = -9$ $Q = -6$ $R = 12$ Give answer as a fraction in reduced form (no decimals)

$3P^{-2}Q^2R^{-1}$

$= \dfrac{3Q^2}{P^2R} = \dfrac{3(-6)^2}{(-9)^2(12)} = \dfrac{3 \cdot 36}{81 \cdot 12} = \dfrac{3 \cdot 3}{81} = \dfrac{9}{81} = \boxed{\dfrac{1}{9}}$

9. Simplify. Make sure your answers don't have any exponents that are zero or negative.

a)

$\left(\dfrac{4^{-2}a^5b^{-7}c}{6a^{-2}b^{-3}c^5}\right)^{-2} = \left(\dfrac{a^7}{4^2b^4c^4 6}\right)^{-2}$

$= \left(\dfrac{16b^4c^4 6}{a^7}\right)^2$

$= \dfrac{256b^8c^8 36}{a^{14}} = \boxed{\dfrac{9216b^8c^8}{a^{14}}}$

b)

$(4m^3n^{-2})^3(2^{-1}m^{-5}n^3)^2 = (64m^9n^{-6})(2^{-2}m^{-10}n^6)$

$= 64 \cdot 2^{-2} \cdot m^{-1}n^0$

$= \dfrac{64}{4m} = \boxed{\dfrac{16}{m}}$