



Problem Solving

The Natural Base, e

Irene reads that the 2004 census of whooping cranes tallied 213 birds at one wildlife refuge in Texas. This number exceeded the 2003 record by 19. If the population of whooping cranes can be modeled using the exponential growth function $P_t = P_0e^{kt}$, the population, P_t , at time t can be found, where P_0 is the initial population and k is the growth factor. Predict the population of whooping cranes over the next few years.

1. What was the size of the population of whooping cranes in 2003? _____
2. Use the population figures for 2003 and 2004 to find the growth factor, k .

3. Complete the table to predict the population of whooping cranes through 2010.

Year	2006	2007	2008	2009	2010
t	3				
Population, P_t					

Choose the letter for the best answer.

4. Irene wants to know when the population of whooping cranes will exceed 1000. Using the 2003 population as P_0 , which year is the best prediction?
 - A 2017
 - B 2019
 - C 2021
 - D 2023
5. Irene wonders how the 2010 whooping crane population would change if the growth factor doubled. Which statement is true?
 - F The population would increase by a factor of e^2 .
 - G The population would increase by a factor of $e^{0.0934}$.
 - H The population would increase by a factor of $e^{(0.0934)(7)}$.
 - J The population would increase by a factor of $7e^2$.
6. How long will it take for an investment in an account paying 6% compounded continuously to double?
 - A 10.2 years
 - B 10.8 years
 - C 11.6 years
 - D 12.4 years
7. Darlene has a sample of a fossil that has 33% of its original carbon-14. Carbon-14 has a half-life of 5730 years. The decay constant for carbon-14 is 1.2×10^{-4} . Find the age of the fossil.
 - F About 7820 years
 - G About 8450 years
 - H About 8980 years
 - J About 9240 years

TEKS 2A.4.A



LESSON

7-6

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$$k = 0.0934$$

3. Complete the table to predict the population of whooping cranes through 2010.

Year	2006	2007	2008	2009	2010
t	3	4	5	6	7
Population, P_t	257	282	309	340	373

Choose the letter for the best answer.

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