Linear and exponential growth

12 grams (g) of a chemical are added to a metal. The amount A, in grams, of the chemical remaining during a reaction with a metal plate decreases by $0.5\,\text{g}$ per second. If instead the plate were dissolved, the amount $\hat{A}$, in grams, of chemical remaining would decrease by half of itself every 4 seconds. How many grams greater is A than $\hat{A}$ after 12 seconds?

w	1	2	4	8	16	32
C	30	60	120	240	480	960

Laxman recently started a restaurant 32 weeks ago. The table above shows the number of customers, C, during the w^{th} week. Which of the following correctly explains the growth of C with respect to w?

(A) The number of customers per week grew linearly because the number of customers per week increased by approximately 30 every week.

(B) The number of customers per week grew linearly because the number of customers per week increased by approximately 100 percent every week.

(C) The number of customers per week grew exponentially because the number of customers per week increased by approximately 30 every week.

(D) The number of customers per week grew exponentially because the number of customers per week increased by approximately 100 percent every week.

An old computer program which computes the n^{th} Fibonacci number takes 0.05 microseconds (μs) to compute the 1^{st} number. After this, each number takes twice as long as the previous number to compute. A computer engineer designs a new program which takes $0.8\ \mu\text{s}$ to compute the 1^{st} Fibonacci number. After this, each number takes $0.6\ \mu\text{s}$ longer than the previous number to compute. How much longer in microseconds does it take the old program to compute the 8^{th} Fibonacci number compared to the new program?

(A) 0.8

(B) 1.4

(C) 5.0

(D) 6.4

Linear and exponential growth

$$s = 320 + 115t$$

The equation above approximates the relationship wildlife veterinarians found between the amount t of cortisol (a stress hormone), in micrograms per deciliter $\left(\frac{\mu g}{dl}\right)$, in a wild harbor seal's tears to the amount s of cortisol, in $\frac{\mu g}{dl}$, in the seal's serum. Which of the following statements best describes the relationship between the amount of cortisol in a seal's tears and serum?

A. It is linear because there is an $11.5\ \frac{\mu g}{dl}$ increase in s for every $0.1\frac{\mu g}{dl}$ increase in t.

B. It is linear because there is a $32\ \frac{\mu g}{dl}$ increase in s for every $0.1\frac{\mu g}{dl}$ increase in t.

C. It is exponential because there is a 15% increase in s for every $0.01\frac{\mu g}{dl}$ increase in t.

D. It is exponential because there is a 220% increase in s for every $0.01\frac{\mu g}{dl}$ increase in t.

$$r = 35.7 + 1.37t$$

The equation above relates the urbanization rate r, as a percent, in a particular country to the number of years t since 2000. Which of the following statements best describes the relationship between the years since 2000 and the urbanization rate?

A. It is linear because the urbanization rate increases by 35.7 each year.

B. It is linear because the urbanization rate increases by 1.37 each year.

C. It is exponential because the urbanization rate increases by 37% each year.

D. It is exponential because the urbanization rate increases by a factor of 35.7 each year.