

A.SSE.B.3: Modeling Exponential Functions 1

- 1 A computer application generates a sequence of musical notes using the function $f(n) = 6(16)^n$, where n is the number of the note in the sequence and $f(n)$ is the note frequency in hertz. Which function will generate the same note sequence as $f(n)$?
- 1) $g(n) = 12(2)^{4n}$
 - 2) $h(n) = 6(2)^{4n}$
 - 3) $p(n) = 12(4)^{2n}$
 - 4) $k(n) = 6(8)^{2n}$
- 2 Mario's \$15,000 car depreciates in value at a rate of 19% per year. The value, V , after t years can be modeled by the function $V = 15,000(0.81)^t$. Which function is equivalent to the original function?
- 1) $V = 15,000(0.9)^{9t}$
 - 2) $V = 15,000(0.9)^{2t}$
 - 3) $V = 15,000(0.9)^{\frac{t}{9}}$
 - 4) $V = 15,000(0.9)^{\frac{t}{2}}$
- 3 The growth of a certain organism can be modeled by $C(t) = 10(1.029)^{24t}$, where $C(t)$ is the total number of cells after t hours. Which function is approximately equivalent to $C(t)$?
- 1) $C(t) = 240(.083)^{24t}$
 - 2) $C(t) = 10(.083)^t$
 - 3) $C(t) = 10(1.986)^t$
 - 4) $C(t) = 240(1.986)^{\frac{t}{24}}$
- 4 Miriam and Jessica are growing bacteria in a laboratory. Miriam uses the growth function $f(t) = n^{2t}$ while Jessica uses the function $g(t) = n^{4t}$, where n represents the initial number of bacteria and t is the time, in hours. If Miriam starts with 16 bacteria, how many bacteria should Jessica start with to achieve the same growth over time?
- 1) 32
 - 2) 16
 - 3) 8
 - 4) 4
- 5 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \cdot 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$. Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks. Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

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Answer Section

1 ANS: 2 REF: 011714ai

2 ANS: 2

$$V = 15,000(0.81)^t = 15,000((0.9)^2)^t = 15,000(0.9)^{2t}$$

REF: 081716ai

3 ANS: 3

$$C(t) = 10(1.029)^{24t} = 10(1.029^{24})^t \approx 10(1.986)^t$$

REF: 061614ai

4 ANS: 4

$$16^{2t} = n^{4t}$$

$$(16^2)^t = (n^4)^t$$

$$((4^2)^2)^t = ((n^2)^2)^t$$

REF: 011519ai

5 ANS:

$$f(5) = (8) \cdot 2^5 = 256 \quad f(t) = g(t)$$

$$g(5) = 2^{5+3} = 256 \quad (8) \cdot 2^t = 2^{t+3}$$

$$2^3 \cdot 2^t = 2^{t+3}$$

$$2^{t+3} = 2^{t+3}$$

REF: 011632ai