

F.IF.B.4: Evaluating Exponential Expressions

- 1 Five thousand dollars is invested at an interest rate of 3.5% compounded quarterly. No money is deposited or withdrawn from the account. Using the formula below, determine, to the *nearest cent*, how much this investment will be worth in 18 years.

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

A = amount

P = principal

r = interest rate

n = number of times the interest rate
compounded annually

t = time in years

- 2 The formula to determine continuously compounded interest is $A = Pe^{rt}$, where A is the amount of money in the account, P is the initial investment, r is the interest rate, and t is the time, in years. Which equation could be used to determine the value of an account with an \$18,000 initial investment, at an interest rate of 1.25% for 24 months?
- 1) $A = 18,000e^{1.25 \cdot 2}$
 - 2) $A = 18,000e^{1.25 \cdot 24}$
 - 3) $A = 18,000e^{0.0125 \cdot 2}$
 - 4) $A = 18,000e^{0.0125 \cdot 24}$
- 3 The amount of money in an account can be determined by the formula $A = Pe^{rt}$, where P is the initial investment, r is the annual interest rate, and t is the number of years the money was invested. What is the value of a \$5000 investment after 18 years, if it was invested at 4% interest compounded continuously?
- 1) \$9367.30
 - 2) \$9869.39
 - 3) \$10,129.08
 - 4) \$10,272.17

- 4 Evaluate $e^{x \ln y}$ when $x = 3$ and $y = 2$.
- 5 The formula for continuously compounded interest is $A = Pe^{rt}$, where A is the amount of money in the account, P is the initial investment, r is the interest rate, and t is the time in years. Using the formula, determine, to the *nearest dollar*, the amount in the account after 8 years if \$750 is invested at an annual rate of 3%.
- 6 Matt places \$1,200 in an investment account earning an annual rate of 6.5%, compounded continuously. Using the formula $V = Pe^{rt}$, where V is the value of the account in t years, P is the principal initially invested, e is the base of a natural logarithm, and r is the rate of interest, determine the amount of money, to the *nearest cent*, that Matt will have in the account after 10 years.
- 7 Emma's parents deposited \$5000 into a bank account during her freshman year. The account pays 5% interest compounded continuously using the formula $A = Pe^{rt}$, where A is the total amount accrued, P is the principal, r is the annual interest rate, and t is time, in years. Determine, to the *nearest dollar*, the amount in the account 4 years later.
- 8 The number of bacteria that grow in a petri dish is approximated by the function $G(t) = 500e^{0.216t}$, where t is time, in minutes. Use this model to approximate, to the *nearest integer*, the number of bacteria present after one half-hour.

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Answer Section

1 ANS:

$$A = 5000 \left(1 + \frac{.035}{4} \right)^{4 \cdot 18} \approx 9362.36$$

REF: 061629a2

2 ANS: 3 REF: 061416a2

3 ANS: 4

$$A = 5000e^{(.04)(18)} \approx 10272.17$$

REF: 011607a2

4 ANS:

$$e^{3 \ln 2} = e^{\ln 2^3} = e^{\ln 8} = 8$$

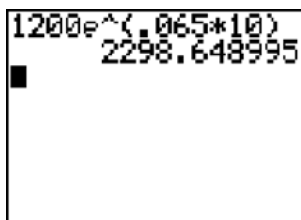
REF: 061131a2

5 ANS:

$$A = 750e^{(.03)(8)} \approx 953$$

REF: 061229a2

6 ANS:



Handwritten calculation showing the exponential expression $1200e^{(.065 \cdot 10)}$ and its approximate value 2298.648995 .

2,298.65.

REF: fall0932a2

7 ANS:

$$A = 5000e^{0.05 \cdot 4} \approx 6107$$

REF: 081629a2

8 ANS:

$$G(30) = 500e^{0.216(30)} \approx 325,985$$

REF: 011728a2