Exponents

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. An initial population of 505 quail increases at an annual rate of 23%. Write an exponential function to model the quail population.

Simplify the expression.

____ 2. $2k^8 \cdot 3k^3$

____ 3. $(k^2)^4$

Match the table with the function that models the data.

____ 4.

x	*y*
1	4
2	16
3	64
4	256

Find the balance in the account.

____ 5. $2,400 principal earning 2%, compounded annually, after 7 years

____ 6. $3,800 principal earning 2%, compounded quarterly, after 7 years

____ 7. A boat costs $15,500 and decreases in value by 10% per year. How much will the boat be worth after 5 years?

Short Answer

8. José borrows $400 from his brother to fix his car. His brother doesn't like lending José money and so charges him 3% interest per month.
a. Write a rule in the "$y = \ldots$" form that will give the amount of money, *y*, José will owe his brother after *n* months, assuming that he doesn't make any payments.
b. If José has not paid any money to his brother, how much will he owe after 5 months?
c. If he doesn't make any payments, when will José first owe more than $500?

9. Would a linear or an exponential function rule be a better model for the pattern of change relating *x* and *y* in the table below? Explain your reasoning.

x	−10	−5	0	5	10	15
y	0.3	2	10	55	285	1,500

10. Duncan's grandparents put some money into a college savings account when he was born. They intend to let the interest accumulate in the account until he needs to use the money to help pay for college. The rule $y = 3{,}000(1.06^x)$ gives the account balance after *x* years.

a. How much money did they put into the account when Duncan was born? Explain your reasoning.

b. What is the interest rate for this account?

c. Write a *NOW-NEXT* rule that shows how to use the account balance in one year to calculate the balance one year later.

d. How much money will be in the account after 18 years?

e. Describe how the account balance changes over the 18 years that the account is open.

11. Coffee, tea, and some soft drinks contain the drug caffeine. One hour after ingestion, 75% of the original amount of caffeine remains. At the end of each hour after that, 75% of the amount at the beginning of the hour remains. Suppose a person consumes 40 milligrams of caffeine.

a. How much of that 40 milligrams (mg) will remain after 1, 2, and 3 hours?
1 *hour*: _________ 2 *hours*:________ 3 *hours*: ________

b. Write a *NOW-NEXT* rule that shows how to use the amount of caffeine at any time to calculate the amount that will remain one hour later.
NEXT = ____________________

c. Write a rule beginning "*y* = …" that can be used to calculate the amount of caffeine that will remain *x* hours after the initial dose.
y = _____________________

d. How much caffeine would remain after one and a half hours?
Amount of caffeine remaining: = _______________________________

e. Estimate the half-life of caffeine. Justify your answer.
Half-life of caffeine: __________________________