5-Minute Check

Over Lesson 7-5

Standardized Test Practice

You will need your calculator today!!!

A tournament begins with 64 teams. After each round, only $\frac{1}{2}$ of the teams remain. Write an exponential function for the

number of teams remaining after *x* rounds of play. How many teams remain after 3 rounds?

A.
$$y = 64 \left(\frac{1}{2}\right)^{x}$$
; 8 teams

B.
$$y = 64 \left(\frac{1}{2}\right)^{x}$$
; 6 teams

C.
$$y = \frac{1}{2}(8)^x$$
; 12 teams

D.
$$y = 64 \left(\frac{1}{2^2}\right)^x$$
; 4 teams

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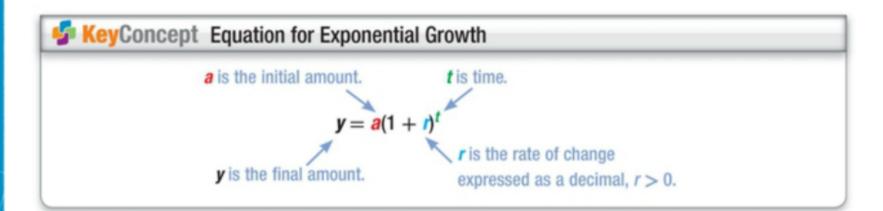
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; 4 teams



Real-World Example 1 | Exponential Growth

A. POPULATION In 2008, the town of Flat Creek had a population of about 280,000 and a growth rate of 0.85% per year. Write an equation to represent the population of Flat Creek since 2008.

The rate 0.85% can be written has 0.0085.

 $y = a(1 + r)^t$ Equation for exponential

growth

 $y = 280,000(1 + 0.0085)^t$ a = 280,000 and r = 0.0085

 $y = 280,000(1.0085)^t$ Simplify.

Answer: An equation to represent the population of Flat Creek is $y = 280,000(1.0085)^t$, where y is the population and t is the number of years since 2008.

Real-World Example 1 | Exponential Growth

B. POPULATION In 2008, the town of Flat Creek had a population of about 280,000 and a growth rate of 0.85% per year. According to the equation, what will be the population of Flat Creek in the year 2018?

In 2018, t will equal 2018 – 2008 or 10.

 $y = 280,000(1.0085)^t$ Equation for population of Flat

Creek

 $y = 280,000(1.0085)^{10}$ t = 10

 $y \approx 304,731$ Use a calculator.

Answer: In 2018, there will be about 304,731 people in Flat Creek.

Real-World Example 1 Check Your Progress

A. POPULATION In 2008, Scioto School District had a student population of about 4500 students, and a growth rate of about 0.15% per year. Write an equation to represent the student population of the Scioto School District since the year 2008.

A.
$$y = 4500(1.0015)$$

B.
$$y = 4500(1.0015)^t$$

C.
$$y = 4500(0.0015)^t$$

D.
$$y = (1.0015)^t$$

Real-World Example 1 Check Your Progress



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KeyConcept Equation for Compound Interest

A is the current amount. $A = P(1 + \frac{r}{n})^{nt}$ is the number of times the interest is compounded each year, and t is time in years.

 \mathbf{P} is the principal or initial amount. \mathbf{r} is the annual interest rate expressed as a decimal, r > 0.

Real-World Example 2

Compound Interest

COLLEGE When Jing May was born, her grandparents invested \$1000 in a fixed rate savings account at a rate of 7% compounded annually. The money will go to Jing May when she turns 18 to help with her college expenses. What amount of money will Jing May receive from the investment?

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

Compound interest equation

$$= 1000 \left(1 + \frac{0.07}{1}\right)^{1(18)}$$

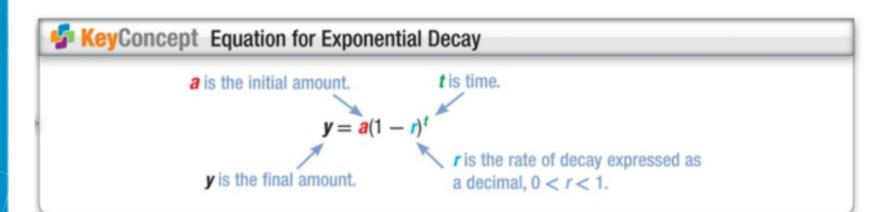
$$= 1000 \left(1 + \frac{0.07}{1}\right)^{1(18)}$$
 $P = 1000, r = 7\% \text{ or } 0.07,$
 $n = 1, \text{ and } t = 18$

Real-World Example 2 Compound Interest

 $= 1000(1.07)^{18}$ Simplify.

≈ 3379.93 Use a calculator.

Answer: She will receive about \$3380.



Real-World Example 3 Exponential Decay

A. CHARITY During an economic recession, a charitable organization found that its donations dropped by 1.1% per year. Before the recession, its donations were \$390,000. Write an equation to represent the charity's donations since the beginning of the recession.

 $y = a(1 - r)^t$ Equation for exponential

decay

 $y = 390,000(1 - 0.011)^t$ a = 390,000 and r = 1.1%

or 0.011

 $y = 390,000(0.989)^t$ Simplify.

Answer: $y = 390,000(0.989)^t$

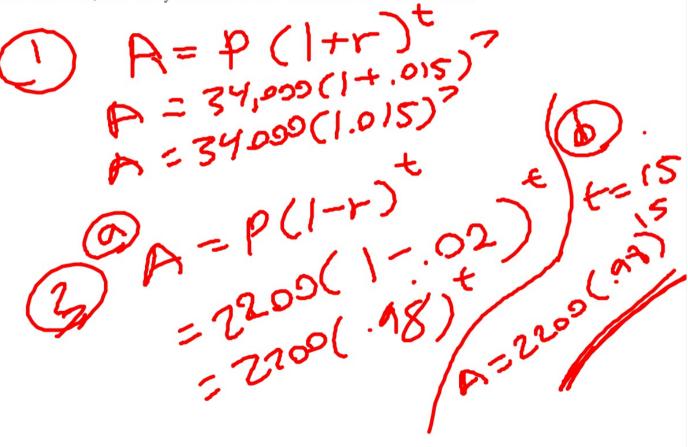
Check Your Understanding



= Step-by-Step Solutions begin on page R13.



- SALARY Ms. Acosta received a job as a teacher with a starting salary of \$34,000.
 According to her contract, she will receive a 1.5% increase in her salary every year.
 How much will Ms. Acosta earn in 7 years? about \$37,734.73
- Example 2 2. MONEY Paul invested \$400 into an account with a 5.5% interest rate compounded monthly. How much will Paul's investment be worth in 8 years? about \$620.46
- **Example 3 3. ENROLLMENT** In 2000, 2200 students attended Polaris High School. The enrollment has been declining 2% annually. $y = 2200(0.98)^t$
 - **a.** Write an equation for the enrollment of Polaris High School t years after 2000.
 - b. If this trend continues, how many students will be enrolled in 2015? about 1624



Check Your Understanding





- Example 1
- SALARY Ms. Acosta received a job as a teacher with a starting salary of \$34,008.
 According to her contract, she will receive a 1.5% increase in her salary every year.
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Practice and Problem Solving

Extra Practice is on page R7.

Example 1

- MEMBERSHIPS The Work-Out Gym sold 550 memberships in 2001. Since then the number of memberships sold has increased 3% annually.
 - a. Write an equation for the number of memberships sold at Work-Out Gym t years after 2001. y = 550(1.03)^t
 - b. If this trend continues, predict how many memberships the gym will sell in 2020. about 964
- 5. COMPUTERS The number of people who own computers has increased 23.2% annually since 1990. If half a million people owned a computer in 1990, predict how many people will own a computer in 2015. about 92,095,349
- 6. COINS Camilo purchased a rare coin from a dealer for \$300. The value of the coin increases 5% each year. Determine the value of the coin in 5 years. about \$382.88

Example 2

- 9. Sample answer:
 No; she will have about \$199.94 in the account in 4 years.
- 7 INVESTMENTS Theo invested \$6600 at an interest rate of 4.5% compounded monthly. Determine the value of his investment in 4 years. about \$7898.97
 - 8. COMPOUND INTEREST Paige invested \$1200 at an interest rate of 5.75% compounded quarterly. Determine the value of her investment \$1200 at an interest rate of 5.75% compounded quarterly. Determine the value of her investment \$1200 at an interest rate of 5.75% compounded quarterly. Determine the value of her investment \$1200 at an interest rate of 5.75% compounded quarterly.
 - 9. CSS PRECISION Brooke is saving money for a trip to the Bahamas that costs \$295.99. She puts \$150 into a savings account that pays 7.25% interest compounded quarterly. Will she have enough money in the account after 4 years? Explain.

Example 3

10. INVESTMENTS Jin's investment of \$4500 has been losing its value at a rate of 2.5% each year. What will his investment be worth in 5 years? about \$3964.93

- POPULATION In the years from 2010 to 2015, the population of the District of Columbia is expected decrease about 0.9% annually. In 2010, the population was about 530,000. What is the population of the District of Columbia expected to be in 2015? about 506,575
- 12. CARS Leonardo purchases a car for \$18,995. The car depreciates at a rate of 18% annually. After 6 years, Manuel offers to buy the car for \$4500. Should Leonardo sell the car? Explain. Sample answer: No; the car is worth about \$5774.61.