A.A.9: Exponential Functions 1: Analyze and solve verbal problems that involve exponential growth and decay

1 Mr. Smith invested $2,500 in a savings account that earns 3% interest compounded annually. He made no additional deposits or withdrawals. Which expression can be used to determine the number of dollars in this account at the end of 4 years?

1) $2500(1+0.03)^4$
2) $2500(1+0.3)^4$
3) $2500(1+0.04)^3$
4) $2500(1+0.4)^3$

2 The current population of a town is 10,000. If the population, P, increases by 20% each year, which equation could be used to find the population after t years?

1) $P = 10,000(0.2)^t$
2) $P = 10,000(0.8)^t$
3) $P = 10,000(1.2)^t$
4) $P = 10,000(1.8)^t$

3 The current student population of the Brentwood Student Center is 2,000. The enrollment at the center increases at a rate of 4% each year. To the *nearest whole number*, what will the student population be closest to in 3 years'?

1) 2,240
2) 2,250
3) 5,488
4) 6,240

4 Cassandra bought an antique dresser for $500. If the value of her dresser increases 6% annually, what will be the value of Cassandra's dresser at the end of 3 years to the *nearest dollar*?

1) $415
2) $590
3) $596
4) $770

5 Sheba opened a retirement account with $36,500. Her account grew at a rate of 7% per year compounded annually. She made no deposits or withdrawals on the account. At the end of 20 years, what was the account worth, to the *nearest dollar*?

1) $87,600
2) $130,786
3) $141,243
4) $1,483,444,463

6 The value, y, of a $15,000 investment over x years is represented by the equation $y = 15000(1.2)^{\frac{x}{3}}$. What is the profit (interest) on a 6-year investment?

1) $6,600
2) $10,799
3) $21,600
4) $25,799

7 Kirsten invested $1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

8 Adrianne invested $2000 in an account at a 3.5% interest rate compounded annually. She made no deposits or withdrawals on the account for 4 years. Determine, to the *nearest dollar*, the balance in the account after the 4 years.

9 A bank is advertising that new customers can open a savings account with a $3\frac{3}{4}\%$ interest rate compounded annually. Robert invests $5,000 in an account at this rate. If he makes no additional deposits or withdrawals on his account, find the amount of money he will have, to the *nearest cent*, after three years.

10 The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams, t, that remained in the tournament after r rounds?

1) $t = 64(r)^{0.5}$
2) $t = 64(-0.5)^r$
3) $t = 64(1.5)^r$
4) $t = 64(0.5)^r$

11 Kathy plans to purchase a car that depreciates (loses value) at a rate of 14% per year. The initial cost of the car is \$21,000. Which equation represents the value, v, of the car after 3 years?

1) $v = 21,000(0.14)^3$
2) $v = 21,000(0.86)^3$
3) $v = 21,000(1.14)^3$
4) $v = 21,000(0.86)(3)$

12 A car depreciates (loses value) at a rate of 4.5% annually. Greg purchased a car for \$12,500. Which equation can be used to determine the value of the car, V, after 5 years?

1) $V = 12,500(0.55)^5$
2) $V = 12,500(0.955)^5$
3) $V = 12,500(1.045)^5$
4) $V = 12,500(1.45)^5$

13 Daniel's Print Shop purchased a new printer for \$35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?

1) \$33,250.00
2) \$30,008.13
3) \$28,507.72
4) \$27,082.33

14 The value of a car purchased for \$20,000 decreases at a rate of 12% per year. What will be the value of the car after 3 years?

1) \$12,800.00
2) \$13,629.44
3) \$17,600.00
4) \$28,098.56

15 In a science fiction novel, the main character found a mysterious rock that decreased in size each day. The table below shows the part of the rock that remained at noon on successive days.

Day	Fractional Part of the Rock Remaining
1	1
2	$\frac{1}{2}$
3	$\frac{1}{4}$
4	$\frac{1}{8}$

Which fractional part of the rock will remain at noon on day 7?

1) $\frac{1}{128}$
2) $\frac{1}{64}$
3) $\frac{1}{14}$
4) $\frac{1}{12}$

16 The Booster Club raised \$30,000 for a sports fund. No more money will be placed into the fund. Each year the fund will decrease by 5%. Determine the amount of money, to the *nearest cent*, that will be left in the sports fund after 4 years.

17 Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?

1) exponential growth and 12%
2) exponential growth and 88%
3) exponential decay and 12%
4) exponential decay and 88%

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Answer Section

1 ANS: 1 REF: 011202ia
2 ANS: 3 REF: 011310ia
3 ANS: 2
$2000(1 + 0.04)^3 \approx 2249$

REF: 081124ia
4 ANS: 3
$500(1 + 0.06)^3 \approx 596$

REF: 080929ia
5 ANS: 3
$36500(1.07)^{20} \approx 141243$

REF: 081422ia
6 ANS: 1
$15000(1.2)^{\frac{6}{3}} = 21,600.\ 21,600 - 15,000 = 6,600$

REF: 061030ia
7 ANS:
$1000(1.03)^5 \approx 1159.27$

REF: 011433ia
8 ANS:
$A = P(1 + R)^t = 2000(1 + 0.035)^4 \approx 2295$

REF: 081333ia
9 ANS:
5,583.86. $A = P(1 + R)^t = 5000(1 + 0.0375)^3 \approx 5583.86$

REF: 060935ia
10 ANS: 4 REF: 010908ia
11 ANS: 2 REF: 060830ia
12 ANS: 2 REF: 061229ia
13 ANS: 3
$35000(1 - 0.05)^4 \approx 28507.72$

REF: fall0719ia

14 ANS: 2
$20000(.88)^3 = 13629.44$

REF: 061124ia

15 ANS: 2
$R = 0.5^{d-1}$

REF: 011006ia

16 ANS:
24,435.19. $30000(.95)^4 \approx 24435.19$

REF: 011138ia

17 ANS: 3 REF: 081211ia