

Do Now: 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*?

$$A = 500$$

$$r = 6\% \rightarrow .06$$

$$t = 3$$

$$\boxed{\$596}$$

$$y = A(1+r)^t$$

$$y = 500(1+.06)^3$$

$$y = 500(1.06)^3$$

$$y = 595.508$$

AIM: HOW DO WE SOLVE EXPONENTIAL WORD PROBLEMS?-DAY 2

1. The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.6)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.6 and 300 represent.

$$y = A(1-r)^t$$

$$p(t) = 300(.6)^t$$

$$y = b^x$$

↓

$$0 < b < 1$$

decay

300 represents the initial amount

The chemical is decaying at a 40% rate $r = .4$ $r = 40\%$

$$1 - r = .6$$

$$\frac{-1}{-1} = \frac{-.4}{-1}$$

$$r = .4$$

$$r = 40\%$$

2. Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30,000(0.78)^x$, where x is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?

1) It decreases 78% per year.

2) It decreases 22% per year.

3) It increases 78% per year.

4) It increases 22% per year.

$1 - .78 = .22$

b-value = .78

$b < 1$

decay

3. The equation $A = 1300(1.02)^t$ is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?

1) 0.02% decay

2) 0.02% growth

3) 2% decay

4) 2% growth

$1.02 - 1 = .02$

b-value = 1.02

$b > 1$ Growth

.02

4. 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) $t = 64(r)^{0.5}$

$A = 64$

2) $t = 64(-0.5)^r$

$r = 50\% \rightarrow .5$

3) $t = 64(1.5)^r$

$64(1-.5)^r$

4) $t = 64(0.5)^r$

$64(.5)^r$

5. 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) $V = 12,500(0.55)^5$

$A = 12,500$

2) $V = 12,500(0.955)^5$

$r = 4.5\% \rightarrow .045$

3) $V = 12,500(1.045)^5$

$(1 + .045)$

4) $V = 12,500(1.45)^5$

(0.955)

6. A used car was purchased in July 1999 for \$11,900. If the car depreciates 13% of its value each year, what is the value of the car, to the nearest hundred dollars, in July 2002?

$A = 11,900$

$Y = A(1 - r)^t$

$r = 13\% \rightarrow .13$

$Y = 11,900(1 - .13)^3$

$t = 3$

$Y = 11,900(.87)^3$

$Y = 7836.1857$

$\$7,800$

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

$x = 6$

$Y = 15000(1.2)^6$

$Y = 15000(1.2)^6$

$Y = 21,600$

$21,600 - 15,000 = \$6,600$

8. 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.

$A = 5,000$

$Y = A(1 + r)^t$

$r = 3\frac{3}{4}\% \rightarrow 3.75\%$

$Y = 5000(1 + .0375)^3$

$.0375$

$Y = 5000(1.0375)^3$

$t = 3$

$Y = 5583.857422$

$\$5,583.86$