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

Name Schlansky
Mr. Schlansky

Date _____
Algebra II

# *Finding Exponential Rate*

1. A bank account opened up 3 years ago with an initial balance of $12000 now has a balance of $12824. Find the annual growth rate, to the *nearest tenth of a percent*.

$A = 12824$
$P = 12,000$
$r = r$
$t = 3$

$\frac{12824}{12,000} = \frac{12,000(1+r)^3}{12,000}$

$\sqrt[3]{1.068..} = \sqrt[3]{(1+r)^3}$

$1.022.. = 1+r$
$-1 \quad -1$

$.022 = r$

$2.2\% = r$

2. Jack bought a new car in 2010 for $16100. In 2018, the car is now worth $6125. What is the annual rate of decrease to the *nearest percent*?

$A = 6125$
$P = 16100$
$r = r$
$t = 8$

$\frac{6125}{16100} = \frac{16100(1-r)^8}{16100}$

$\sqrt[8]{.38..} = \sqrt[8]{(1-r)^8}$

$.8862.. = 1-r$
$-1 \quad -1$

$\frac{-.11379..}{-1} = \frac{-r}{-1}$

$.11379 = r$

$11\% = r$

3. A collectible toy was bought 15 years ago for $5 and is now worth $42. Find the annual growth rate to the *nearest tenth of a percent*.

$A = 42$
$P = 5$
$r = r$
$t = 15$

$\frac{42}{5} = \frac{5(1+r)^{15}}{5}$

$\sqrt[15]{8.4} = \sqrt[15]{(1+r)^{15}}$

$1.152.. = 1+r$
$-1$

$.152.. = r$

$15.2\%$

4. A colony of 120 timberwolves increased to 245 over a 6 year span. Assuming exponential growth, what was the annual growth rate to the *nearest percent*?

$A = 245$
$P = 120$
$r = r$
$t = 6$

$\frac{245}{120} = \frac{120(1+r)^6}{120}$

$\sqrt[6]{2.0416..} = \sqrt[6]{(1+r)^6}$

$1.126.. = 1+r$
$-1$

$.126.. = r$

$13\%$

5. The principal value of a loan is $424,100. If there is $110,000 remaining on the loan after 19 years, what was the annual rate of decrease to the *nearest tenth of a percent*?

$A = 110{,}000$
$P = 424{,}100$
$r = r$
$t = 19$

$110{,}000 = 424{,}100(1-r)^{19}$
$\frac{424{,}100}{424{,}100} \quad \frac{424{,}100}{424{,}100}$
$\sqrt[19]{.259\ldots} = \sqrt[19]{(1-r)^{19}}$
$.9314\ldots = 1-r$
$-1 \quad -1$
$-.06856 = -r$
$\frac{-.06856}{-1} = \frac{-r}{-1}$
$.06856 = r$
$6.9\% = r$

6. An endangered species has dropped from 937 animals to 375 animals over the past 8 years. What is the annual rate of decrease rounded to the *nearest percent*?

$A = 375$
$P = 937$
$r = r$
$t = 8$

$375 = 937(1-r)^8$
$\frac{937}{937} \quad \frac{937}{937}$
$\sqrt[8]{.4002\ldots} = \sqrt[8]{(1-r)^8}$
$.8918\ldots = 1-r$
$-1 \quad -1$
$-.10816\ldots = -r$
$\frac{-.10816\ldots}{-1} = \frac{-r}{-1}$
$.10816 = r$
$11\% = r$

7. A house purchased 5 years ago for $100,000 was just sold for $135,000. Assuming exponential growth, approximate the annual growth rate, to the *nearest percent*.

$A = 135{,}000$
$P = 100{,}000$
$r = r$
$t = 5$

$135{,}000 = 100{,}000(1+r)^5$
$\frac{100{,}000}{100{,}000} \quad \frac{100{,}000}{100{,}000}$
$\sqrt[5]{1.35} = \sqrt[5]{(1+r)^5}$
$1.068\ldots = 1+r$
$-1 \quad -1$
$.068\ldots = r$
$6\% = r$

8. Over the past 4 years, the value of a stock increased from $1200 to $2300. What is the ~~*monthly*~~ annual growth rate, rounded to the *nearest tenth of a percent*?

$A = 2300$
$P = 1200$
$r = r$
$t = 4$

$2300 = 1200(1+r)^4$
$\frac{1200}{1200} \quad \frac{1200}{1200}$
$\sqrt[4]{1.916\ldots} = \sqrt[4]{(1+r)^4}$
$1.176\ldots = 1+r$
$-1 \quad -1$
$.176\ldots = r$
$17.7\% = r$