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

A = amount after t years
P = principal invested
R = annual interest rate
n = number of compounding periods each year.

An investment account pays 5.4% annual interest compounded quarterly. If $4000 is placed in this account, find the balance after 8 years.

Understand

Find the balance of the account after 8 years.

Plan

Use the compound interest formula.

$P = 4000$, $r = 0.054$, $n = 4$, and $t = 8$

Solve

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

$= 4000\left(1+\frac{0.054}{4}\right)^{4\cdot 8}$ $P = 4000$, $r = 0.054$, $n = 4$, and $t = 8$

≈ 6143.56 Use a calculator.

Answer: The balance in the account after 8 years will be $6143.56.

Jan 29-12:10 PM

Real-World Example 2 Write an Exponential Function

$y = ab^x$ → initial amount

A. POPULATION **In 2010, the population of Phoenix was 1,445,632. By 2015, it was estimated at 1,563,025. Write an exponential function that could be used to model the population of Phoenix. Write *x* in terms of the numbers of years since 2010.**

(0, 1,445632) (5, 1,563,025)

At the beginning of the timeline in 2010, *x* is 0 and the population is 1,445,632. Thus, the *y*-intercept, and the value of *a*, is 1,445,632.

When *x* = 5, the population is 1,563,025. Substitute these values into an exponential function to determine the value of *b*.

Real-World Example 2 Write an Exponential Function

$(x_1, y_1)(x_2, y_2)$

$y = ab^x$	Exponential function
$\underbrace{1{,}563{,}025}_{y_2} = \underbrace{1{,}445{,}632}_{y_1} \bullet b^5$	Replace *x* with 5, *y* with 1,563,025, and *a* with 1,445,632.
$1.0812 \approx b^5$	Divide each side by 1,445,632.
$\sqrt[5]{1.0812} = b$	Take the 5th root of each side.
$1.0157 \approx b$	Use a calculator.

Answer: An equation that models the number of years is $y = 1{,}445{,}632(1.0157)^x$.

Jan 29-1:41 PM

Write an exponential function for the graph that passes through the points (0, 3) and (4, 81).

$a = 3 \quad y = a(b)^x$

$\frac{81}{3} = \frac{3(b)^4}{3}$

$\sqrt[4]{27} = \sqrt[4]{b^4}$

$2.28 = b$

$y = 3(2.28)^x$

Jan 29-1:03 PM