Name _____ Date _____

Exponential Growth Functions 8.1 + 8.2

You can model *exponential growth* using the following formula:

$y = C(1 + r)^t$ ← time period

initial amount ↖ ↖ $(1 + r)$ is the growth factor

↖ r = growth rate

Rules for Writing and Evaluating an Exponential Growth Function

1. Identify C, the initial amount. Identify r, the growth rate. Identify t, the time.
2. Plug C, r, and t into the formula for exponential growth.
3. Evaluate the equation; the result is the amount after a certain period of time.

Example

A savings account starts with a balance of $200.00. Interest on the account is 6% each year. What is the balance after 10 years?

Step 1	Identify C; the initial amount. Identify r; the growth rate. Identify t, the time period.	C, the initial amount is $200.00 r, the growth rate or 6% or 0.06. t, the time period is 10 years.
Step 2	Plug C, r, and t into the formula for exponential growth.	$y = 200(1 + 0.06)^{10}$
Step 3	Evaluate the equation; the result is the amount after a certain period of time.	$y = 200(1 + 0.06)^{10} = 200(1.06)^{10}$ $y = 200(1.79) = \$358$

Practice

Solve.

1. A savings account starts with a balance of $500.00. Interest on the account is 10% each year. What is the balance after 5 years?

Identify C; the initial amount. Identify r; the growth rate. Identify t, the time period.	C, the initial amount is _____. r, the growth rate, is 10% or _____. t, the time period is _____ years.
Plug C, r, and t into the formula for exponential growth.	$y =$ _____ $(1 +$ _____$)^{\text{____}}$
Evaluate the equation; the result is the amount after a certain period of time.	$y =$ _____ $(1 +$ _____$)^{\text{____}} =$ _____$(\text{____})^{\text{____}}$ $y =$ _____ $(\text{____}) =$ _____

2. A population of bacteria has a growth rate of 2% per hour. You start with 50 bacteria.

   How many bacteria are there after 20 hours? _____

3. An organism's weight increases at a growth rate of 5% each day. If the initial weight is 0.75 grams, what is the weight after 14 days? _____

Name _____ Date _____

Exponential Decay Functions

You can model *exponential decay* using the following formula:

$y = C(1 - r)^t$ ← time period

initial amount ↗ (1 − *r*) is the decay factor

r = decay rate

Rules for Writing and Evaluating an Exponential Decay Function

1. Identify *C*, the initial amount. Identify *r*, the growth rate. Identify *t*, the time.
2. Plug *C*, *r*, and *t* into the formula for exponential decay.
3. Evaluate the equation; the result is the amount after a certain period of time.

Example

A car was bought for $15,000.00. The value of the car decreases in value by 10% each year. What is the value of the car after 5 years?

Step 1	Identify *C*; the initial amount. Identify *r*; the decay rate. Identify *t*, the time period.	*C*, the initial amount, is $15,000.00. *r*, the decay rate, is 10% or 0.10. *t*, the time period, is 5 years.
Step 2	Plug *C*, *r*, and *t* into the formula for exponential decay.	$y = 15{,}000(1 - 0.10)^5$
Step 3	Evaluate the equation; the result is the amount after a certain period of time.	$y = 15{,}000\ (1 - 0.10)^5$ $= 15{,}000(0.90)^5 = 8{,}857.35$

Practice

1. A copy machine is bought for $2,000. The value of the copier decreases at a rate of 25% each year. What is the value of the copier after 4 years?

Identify *C*; the initial amount. Identify *r*; the decay rate. Identify *t*, the time period.	*C*, the initial amount is _____. *r*, the decay rate, is 25% or _____. *t*, the time period, is _____ years.
Plug *C*, *r*, and *t* into the formula for exponential decay.	$y =$ _____(1 − _____)⁻⁻
Evaluate the equation; the result is the amount after a certain period of time.	$y =$ _____(1 − _____)⁻⁻ = _____ _____⁻⁻ = _____

2. A business has a profit of $50,000. Profits decrease by 2.5% each year. What is the profit in the 10th year? _____

3. A truck is bought for $25,000. The value of the truck decreases at a rate of 10.5% per year. What is the value of the truck after 3 years?, 6 years?, 12 years? _____