6.1 Exponential Growth & Decay

Obj: 1. Determine the multiplier for growth/decay.
2. Write & evaluate exponential expressions.

1 bacteria doubles every hour

$1 \xrightarrow{\cdot 2} 2 \xrightarrow{\cdot 2} 4 \xrightarrow{\cdot 2} 8 \xrightarrow{\cdot 2}$

exponential expression: $1 \cdot 2^x$

initial population — multiplier

Feb 6-10:37 AM

The US population in 1990 was 248,718,301 and is projected to grow at a rate of 8% per decade. Predict the population in 2010 and 2025.

.08

multiplier: $1 + .08 = 1.08$

$248{,}718{,}301 \cdot 1.08^x$

2010: $248718301(1.08)^2 = 290105026$

2025: $248718301(1.08)^{3.5} = 325604866$

Feb 6-11:06 AM

Find the multiplier:

a. 6% decay

.06

1 − .06

= .94

b .04% growth

.0004

1 + .0004

1.0004

c. 2.6% decay

1 − .026

.974

Feb 6-11:13 AM

The pop. of Brazil in 1996 was 162,661,000. It was projected to grow at a rate of 7.7% per decade. Find pop. in 2016 & 2020.

.077

multiplier: 1 + .077 = 1.077

$162661000 \cdot (1.077^x)$

2016: $162661000(1.077^2) = 188675211$

2020: $162661000(1.077^{2.4}) = 194357420$

Feb 6-11:17 AM

Caffeine is eliminated at a rate of 15% per hr. It peaks at 30 mg. Predict the amount left after 1 hr and 4 hrs (round to the nearest tenth).

.15

multiplier: $1 - .15 = .85$

$30(.85)^x$

1 hr: $30(.85)^1 = 25.5$

4 hrs: $30(.85)^4 = 15.7$

Feb 6-11:24 AM

A vitamin is eliminated at a rate of 20% per hr. It peaks at 300 mg. Predict the amount left after 2 hrs & 7 hrs.

multiplier: $1 - .2 = .8$

$300(.8^x)$

$300(.8)^2 = 192$

$300(.8)^7 = 62.9$

Feb 6-11:28 AM