

$$A = P b^t$$

$t \leftarrow$ time
 $b \leftarrow$ change
 $P \leftarrow$ start
 $A \leftarrow$ end

GUIDED NOTES: Exponential Growth and Decay

EX1. Suppose 20 rabbits are taken to an island. The rabbit population then triples every year. How many rabbits would there be after 2 years?

$$A = 20(3)^2$$

$$A = 180 \text{ rabbits}$$

EX2. The value of an iPad decreases at 35% per year. If the starting price of the iPad is \$500, how much will the iPad be worth after 5 years?

$$1 - .35 = b$$

$$A = 500(1 - .35)^5$$

$$A = \$58.01$$

When can you buy the iPad for \$5?

$$5 = 500(1 - .35)^t$$

$$0.01 = .65^t$$

$$\log_{.65} 0.01 = t$$

$$t = 10.69 \text{ years}$$

EX3. The number of bacteria in a culture is doubling every hour. After 8 hours, there are 15,360 bacteria. How many were originally in the culture?

$$15,360 = P(2)^8$$

$$15,360 = \frac{P \cdot 256}{256}$$

$$P = 60 \text{ bacteria}$$

EX4. The city of Robertstopia was founded with 20 residents. The number of residents increases by 15% each year. How many residents will live in Robertstopia after 10 years?

$$A = 20(1 + .15)^{10}$$

$$A = 80.91 \rightarrow 81 \text{ residents}$$

How many years will pass before Robertstopia has 250 residents?

$$250 = 20(1 + .15)^t$$

$$12.5 = 1.15^t$$

$$\log_{1.15} 12.5 = t$$

$$t = 18.07 \text{ years}$$