Name: Date:

UNIT 1 • RELATIONSHIPS BETWEEN QUANTITIES

Lesson 2: Creating Equations and Inequalities in One Variable

Practice 1.2.3: Creating Exponential Equations

Use what you know about linear and exponential equations to complete problems 1 and 2.

1. Determine whether each scenario can be modeled by a linear or an exponential equation.

   a. The price of a loaf of bread increases by \$0.25 each week.

   linear

   b. Each week, a loaf of bread costs twice as much as it did the week before.

   exponential

2. Determine whether each scenario can be modeled by a linear or an exponential equation.

   a. 10 people leave a football game every minute after the third quarter.

   linear

   b. $\frac{1}{4}$ of the people leave a football game every minute after the third quarter.

   exponential

For problems 3–10, write an equation to model each scenario. Then use the equation to solve the problem.

3. A population of insects doubles every month. If there are 100 insects to start with, how many will there be after 7 months?

   $y = ab^x$

   $= 100 \cdot 2^7 = 12,800$ insects.

4. A type of bacteria in a Petri dish doubles every hour. If there were 1,073,741,824 bacteria after 24 hours, how many were there to start with?

   $y = ab^x \Rightarrow 1,073,741,824 = a \cdot 2^{24}$

   $\frac{1,073,741,824}{16,777,216} = \frac{16,777,216a}{16,777,216}$

   $64 = a$ bacteria

continued

 Which eqn?

5. A stock loses half its value every week. If the stock was worth $125 starting out, what is it worth after 4 weeks at this rate of decline?

decay $y = a(1-r)^t$ $y = ab^t$ ~~125~~ = $y = 125(1-.5)^4$ $y = \$7.81$

6. A computer depreciates (loses its value) at a rate of $\frac{1}{2}$ the original value every 2 years. If the computer now costs $75 after 6 years, how much did it cost when you bought it new?

decay $y = a(1-r)^t$ $75 = a(1-.5)^3$ Follow order of ops! $a = \$600$

7. A new car depreciates as soon as you drive it out of the parking lot. A certain car depreciates to half its original value in 4 years. If you bought a car 8 years ago and it is now worth $5,000, how much did you pay for the car originally?

decay $y = a(1-r)^t$ $5000 = a(1-.50)^2$ $\frac{5000}{0.25} = \frac{0.25a}{0.25}$ $\$20,000 = a$

8. The number of dandelions growing on your lawn triples every 3 days. If your lawn started out with 15 dandelions, how many dandelions would you have after 3 weeks?

~~growing~~ original $y = ab^x$ $y = 15 \cdot 3^7$ $y = 32,805$

9. The population of a town is increasing by 2% each year. The current population is 12,000. How many people will there be in 4 years?

growing $y = a(1+r)^t$ $= 12000(1+0.02)^4$ $=$ Ans: 12,989.19 $\approx 12,990$

10. The population of New York City doubles during the workday. At the end of the workday, the population decreases by half. If the population in New York City is roughly 4,000,000 people before rush hour, and the morning rush hour lasts 3 hours, what would be the population if the rush-hour growth rate continued for 12 hours instead of 3? People leave the city for home at the same rate as they come into the city. What would be the population if the decay rate continued for 12 hours at the end of the day when everyone goes home?

HW ans. $\boxed{10/28/15}$

from 10/27/15

①

m min	b \$ (bill)
0	20 ← constant ③
1	20.05
2	20.10
3	20.15
4	20.20
5	20.25
6	20.30
7	20.35
8	20.40
9	20.45
10	20.50

+0.05 +0.05 +0.05 Rate of change ④

bill = b

min = m

② $b = 0.05m + 20$

\$ \$ \$

⑤ $b = 0.05m + 20$

$b = 0.05(45) + 20$

$b = \$22.25$

Rules of Graphing

① Must be done on graph paper.

② Use a straight edge

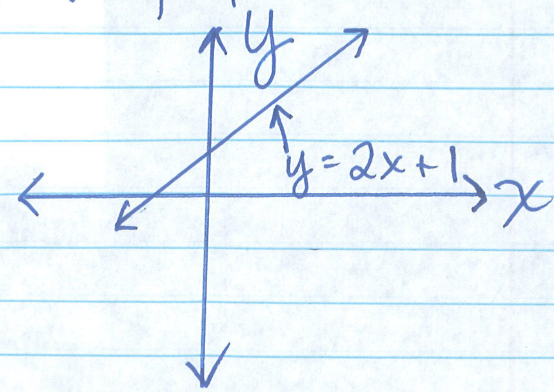
③ label axis

x axis

y axis

④ label data graphed

$y = 2x+1$



pencils

x	y
0	−10
1	−9.50
2	−9
3	−8.50
4	−8
5	−7.50
6	−7

− \$10
\$0.50 for ea. pencil

$y = 0.5x - 10$