GSE Algebra I | Unit 6 – Exponential Functions | 6.5 – Review with Notes

Name: _____ Date: _____

Use the following to review for you test. Work the Practice Problems on a separate sheet of paper.

What you need to know & be able to do	Things to remember	Problem	Problem
Arithmetic Sequences	• Recursive $a_n = a_{n-1} + d$ • Gives the First Term • Adding or Subtracting to get to the next term • $a_n = a_1 + d(n-1)$ same ↔ $a_n = a_1 + (n-1)d$	1. Write the explicit and recursive rules for the following sequence -5, 2, 9, 16, … 2−(−5)=7, 9−2=7, 16−9=7 $a_n = -5 + 7(n-1)$ $a_n = -5 + 7n - 7$ $a_n = 7n - 12$ Explicit Recursive $a_n = a_{n-1} + 7$ 2. Find the 10th term $a_{10} = 7(10) - 12 = 58$	3. Write the explicit rule for the following sequence -15, -13, -11, -9, … −13−(−15)=2, −11−(−13)=2, −9−(−11)=2 $a_n = -15 + 2(n-1)$ $a_n = -15 + 2n - 2$ $a_n = 2n - 17$ 4. 7 is the ____th term of the sequence $7 = 2n - 17$ $+17 \quad +17$ $\frac{24}{2} = \frac{2n}{2}$ $n = 12$
Geometic Sequences	• Recursive $a_n = a_{n-1} \cdot R$ • Gives the First Term • Multiplying or Dividing to get to the next term • $a_n = a_1 (r)^{n-1}$ (start at 1) • $y = ab^x$ (start at 0)	5. Write the explicit and recursive rules for the following sequence 3, 6, 12, 24, 48, … $R = \frac{6}{3} = \frac{12}{6} = \frac{24}{12} = \frac{48}{24} = 2$ Explicit $a_n = 3(2)^{n-1}$ Recursive $a_n = a_{n-1} \cdot R$ 6. Find the 15th term $a_{15} = 3(2)^{15-1} = 49152$	7. Hillgrove has 324 kids that show up to try out for baseball on the first day. If a third get cut each day, write a sequence for the scenario. 0 | C_1 324 | 108 $a_n = 108\left(\frac{1}{3}\right)^{n-1}$ 8. How many cuts will it take for there to be 12 kids remaining? 3 cuts
Solving Exponential Equations	• Must have SAME base • Set exponents = (don't forget to distribute) • Solve for x	9. $5^{3x+1} = 5^{x-9}$ $3x + 1 = x - 9$ $-x \quad -x$ $2x + 1 = -9$ $-1 \quad -1$ $2x = -10$ $x = -5$ 11. $4^{3x} = 8^{x+1}$ $(2^2)^{3x} = (2^3)^{x+1}$ $2^{6x} = 2^{3x+3}$ $6x = 3x + 3$ $-3x \quad -3x$ $3x = 3$ $x = 1$	10. $3^{x-8} = 9^x$ $3^{x-8} = (3^2)^x$ $x - 8 = 2x$ $-x \quad -x$ $x = -8$ 12. $4^{4x+8} = \left(\frac{1}{4}\right)^{x-18}$ $4^{4x+8} = (4^{-1})^{x-18}$ $4^{4x+8} = 4^{-x+18}$ $4x + 8 = -x + 18$ $+x \quad +x$ $5x + 8 = 18$ $-8 \quad -8$ $5x = 10$ $x = 2$

Could also use exponential $y = 324\left(\frac{1}{3}\right)^x$ ✓ $y = ab^x$

Characteristics of Functions

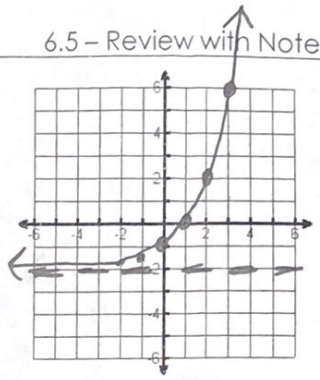
$f(x) = a(b)^{x-h} + k$

- Locate the asymptote (k)
- Use your calculator to find 5 good points
- Sketch

13. Graph the funtion $f(x) = 2^x - 2$

Asymptote: $y = -2$

Remember to be a horizontal line must be y= some #



Exponential Models (Geometric / Exponential)

Start at 1

$y = 8(4)^{n-1}$

Gives the Starting Value

- $y = ab^x$

Starts at 0

14. Write an equation for the chart.

x	0	1	2	3
y	2	8	32	128

$y = 2(4)^x$

If the table represents a bee population and a bee house only holds 10,000 bees, how many days will it be before they need another house?

After day 6

15. The temperature in Georgia has been crazy! Today it was a high of 80 and every hour the temperature was 80% of the previous amount. Write an equation to represent the temperature.

Already gave you decay factor

$y = 80(.8)^x$

What will the temperature be 5 hours later?

26.214°

R

Growth Rate = .032

(1+R) OR (1-R)

Growth Factor = 1.032

Growth and Decay Models

- Growth: $y = P(1+r)^x$
- Decay: $y = P(1-r)^x$
- Factor: whole parentheses
- Rate: Percent

16. The population for Powder Springs in 2000 was 25,000. Since then, the population has grown at a rate of 3.2% each year. Write an equation to represent the population of Powder Springs since 2000.

$y = 25000(1+.032)^t$

According to the equation, what will the population be in the year 2016? $t = 16$

$y = 25000(1.032)^{16} \approx 41,382$

17. Mr. Gossett is a machinist. He bought some new machinery for about $125,000. If the machinery depreciates at the rate of 15% per year, what is the value of the machinery at the end of 10 years?

$y = 125,000(1-.15)^t$

$y = 125,000(.85)^t$

$y = 125,000(.85)^{10}$

24,609.30

decay Rate = .15
decay factor = .85

Compound Interest

- $A = P\left(1+\frac{r}{n}\right)^{nt}$
- Annually = 1
- Biannually = 2
- Quarterly = 4
- Monthly = 12
- Weekly = 52
- Daily = 365

18. $20,000 is invested at a rate of 3% and is compounded annually. $n = 1$

Equation: $A = 20,000\left(1+\frac{.03}{1}\right)^{1t}$

How much money will there be in the account after 8 years?

$A = 20,000\left(1+\frac{.03}{1}\right)^{1(8)}$

$A = 25,335.40$

19. $27,000 is invested at a rate of 3.75% and is compounded quarterly. $n = 4$

Equation: $A = 27000\left(1+\frac{.0375}{4}\right)^{4t}$

How much money will there be in 3 years?

$= 27000\left(1+\frac{.0375}{4}\right)^{4 \cdot 3}$

$= 30,199.12$