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### Unit 4 Test Review

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**Simplify.**

1)  $(6x^3y^2)^2$

2)  $\frac{12y^{-4}}{3y^{-5}}$

3)  $\frac{(3x^{-1})^{-2}}{(3x^2)^{-2}}$

4)  $\left(\frac{6xy^{11}z^9}{48x^6yz^{-7}}\right)^0$

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**Solve:**

5)  $3^{3x} = 81$

6)  $\left(\frac{1}{32}\right) = 4^{2x}$

7)  $5^{6x-1} = 1$

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**Evaluate each expression as a fraction (when necessary) for the given value of x.**

8)  $2^{x+1}$  for  $x = -3$

9)  $12(0.5)^x$  for  $x = 2$

10)  $6(.25)^{2x}$  for  $x = -2$

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**Find the next three terms in each geometric sequence.**

11)  $-5, 15, -45, 135, -405, \underline{\hspace{2cm}}, \underline{\hspace{2cm}}, \underline{\hspace{2cm}}$

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**Tell whether the sequence is geometric. If yes, write the explicit and recursive formula.**

12)  $100, 50, 25, \frac{25}{2}, \frac{25}{4}, \dots$

13)  $1, 3, 5, 7, \dots$

14)  $-6, -2, -\frac{2}{3}, -\frac{2}{9}, \dots$

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**Determine whether the function is growth or decay. Increasing or Decreasing?**

15)  $y = -4^x$

16)  $y = 2(0.23)^x$

17)  $y = -6(1.8)^x$

**Set up an equation and solve for each.**

**18)** The doctor told you that the antibiotic he gave you would kill half the bacteria every 8 hours. If you had 4 billion bacteria in your body, how many would you have in a week?

**19)** A lab sample contains 30 bacteria that doubles every 90 minutes. Predict the number of bacteria after 6 hours.

**20)** A physician gives a patient 500 milligrams of an antibiotic that is eliminated from the bloodstream at a rate of 8% per hour. Predict the number of milligrams left after 4 hours.

**21)** A civil service employee will receive a 2.5% raise each year. If his current salary is \$24,500. What will his salary be in 4 years?

**22)** A piece of farm equipment depreciates 9% per year. If the current value of the equipment is \$30,000, how long will it be before it depreciates to \$18,000?

**23)** If you invest \$30,000 at 5.3% annual interest, how much money will you have in 4 years if the interest is compounded monthly?

**Graph the following and tell the characteristics:**

**24)**  $y = -2^x + 3$

Transformations: \_\_\_\_\_

Asymptote: \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

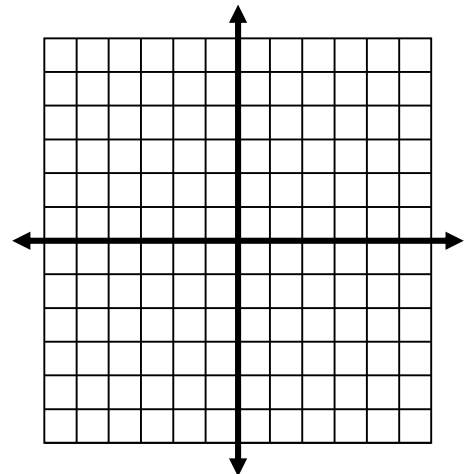
Increasing or Decreasing? \_\_\_\_\_

x-intercept: \_\_\_\_\_

y-intercept: \_\_\_\_\_

End Behavior: As  $x \rightarrow$  \_\_\_\_\_,  $f(x) \rightarrow$  \_\_\_\_\_

As  $x \rightarrow$  \_\_\_\_\_,  $f(x) \rightarrow$  \_\_\_\_\_



25)  $y = -3^{x-1} + 2$

Transformations: \_\_\_\_\_

Asymptote: \_\_\_\_\_

Domain: \_\_\_\_\_

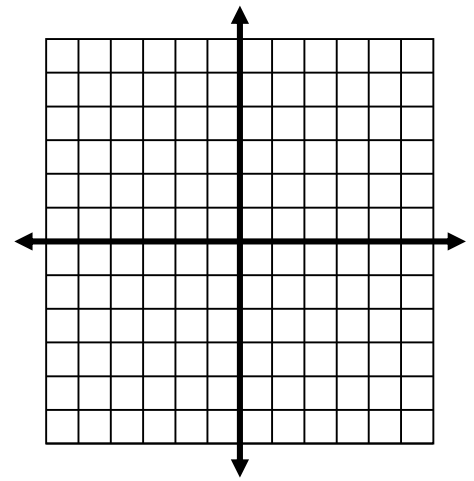
Range: \_\_\_\_\_

Increasing or Decreasing? \_\_\_\_\_

x-intercept: \_\_\_\_\_

y-intercept: \_\_\_\_\_

End Behavior: As  $x \rightarrow \text{_____}$ ,  $f(x) \rightarrow \text{_____}$   
 As  $x \rightarrow \text{_____}$ ,  $f(x) \rightarrow \text{_____}$



26) Find the characteristics of each function.

x	f(x)
0	5
1	15
2	45
3	135

a. Equation: \_\_\_\_\_  
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_  
 x-intercept: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_  
 Inc. or Dec.: \_\_\_\_\_  
 R.o.C. from  $x=0$  to  $x=4$  \_\_\_\_\_

b. Equation:  $g(x)=150(0.5)^x$   
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_  
 x-intercept: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_  
 Inc. or Dec.: \_\_\_\_\_  
 R.o.C. from  $x=0$  to  $x=4$  \_\_\_\_\_

27) Using the equations and characteristics from #26, answer the following questions.

Characteristic of F(x)	<, >, or =	Characteristic of G(x)
y-intercept of F(x) = _____		y-intercept of G(x) = _____
F(4) = _____		G(4) = _____
RoC of F(x) from [0, 4] = _____		RoC of G(x) from [0, 4] = _____