

Name: _____ Algebra ~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ ~~6~~ ~~7~~ ~~8~~ ~~9~~ ~~10~~ ~~11~~ ~~12~~ _____

Exponential Functions Test Review

1. What is the domain of the exponential function $f(x) = 14(0.8)^x$?

\mathbb{R} $(-\infty, \infty)$

2. What is the range of exponential function $y = 120(7)^x$?

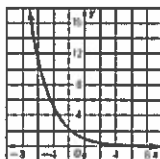
A. $x > 7$

B. all real numbers

C. $y < 0$

D. $y > 0$

3. The graph of $y = \left(\frac{2}{3}\right)^x$ is shown below.



What is the range of the function?

$y > 0$

4. What is the domain of $f(x) = 6(1.8)^x$?

\mathbb{R} $(-\infty, \infty)$

5. The range of the function $y = 725(1.125)^x$ is of the form $y > r$ for some value of r .

a. What is r ?

$y > 0$ so $r = 0$

b. What is a possible scenario for this situation?

The ~~popul~~ population starts at 725 and rises 12.5% each year.

6. How would the domain of the function $y = 4(12)^x$ be affected if the function were changed to $y = 4(24)^x$?

A. It changes from $x \geq 12$ to ≥ 24 .

B. It changes from $x > 12$ to $x > 24$.

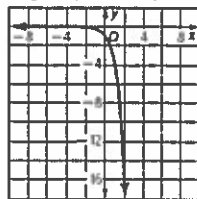
C. It changes from $0 < x < 12$ to $0 < x < 24$.

D. It remains the same.

Domain is always $(-\infty, \infty)$

unless otherwise specified.

7. The graph of $y = -4^x$ is shown below.



What is the range of the function?

$y < 0$

because the negative reflects the graph over the x -axis.

8. How would the range of the function $y = 16(0.75)^x$ be affected if the function were changed to $y = -16(0.75)^x$?

A. It remains the same.

C. It changes from $y < 0$ to $y > 0$.

B. It changes from $y > 16$ to $y < -16$.

D. It changes from $y > 0$ to $y < 0$.

9. A quantity increases by 60% every hour. Which of the following is a possible equation for the quantity?

a. $y = 7(60)^x$
c. $y = 9(0.6)^x$

b. $y = 8(1.6)^x$
d. $y = 10(0.4)^x$

Growth: $y = a(1+.6)^x$

10. Find the rate of each growth or decay in the functions below.

A. $y = 0.7(1.02)^x$

Growth or Decay

Rate: $.02 = 2\%$

B. $y = 4(0.92)^x$

Growth or Decay

Rate: $.08 = 8\%$

C. $y = 2(\frac{5}{4})^x$

Growth or Decay

Rate: $\frac{1}{4} = 25\%$

D. $y = 100(\frac{7}{8})^x$

Growth or Decay

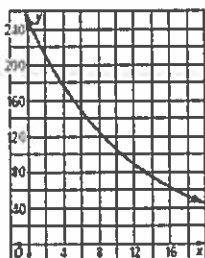
Rate: $\frac{1}{8} = 12.5\%$

$y = ab^x$
Grow if $b > 1$
Decay if $b < 1$

11. George opened a bank account and the balance in his account after t years is given by the equation $A = 1625(1.015)^t$. How much did George put in the bank to start?

$\$1625$

12. The mass of a sample of radioactive iodine in grams is given by $M = 250(0.917)^t$, where t is measured in days, and the graph of its mass is given below.



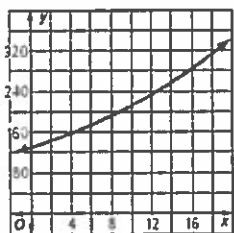
What was the initial mass?

250 grams

13. The number of bacteria in a culture is given by $N = 6000b^t$, where t is time in hours since the first observation. If the culture is growing by 6% each hour, what is the value of b ?

$b = 1 + r$ $b = 1.06$

14. The graph of $A = 130(1.05)^t$ represents the balance of a bank account t years after opening it. Its graph is shown below.



By what percent does the balance increase each year?

- A. 5% B. 1.05%
C. 0.05% D. 30%

$1 + r = 1.05$
 $r = .05 \rightarrow 5\%$

15. A culture starts with 20 bacteria and triples every hour. Write a formula for the number N of bacteria after t hours.

$1 + 2$ 200%

$N = 20(3)^t$

16. The population of a small town can be modeled by the exponential function $P = 14512(1.03)^t$, where t is the number of years after 2005. What is the significance of the value 14,512?

A. There are 14,512 people in the town today.
 B. Each year, the population increases by 14,512.
 C. There are 14,512 people in the town in 2005.
 D. There will never be more than 14,512 people in the town.

17. An investor buys a stock worth \$60. For four consecutive years, the stock grows at a rate of approximately 3% per year. What is the stock worth after 4 years to the nearest cent?

$$60(1+.03)^4 = \$67.53$$

18. Bismuth-210 is an isotope and it decays by about 13% each day. A sample initially has a mass of 150 mg. Write a formula for the amount A after t days.

$$A = 150(1-.13)^t$$

$$A = 150(.87)^t$$

19. Use the table below to find an equation for $f(x)$. Assume that $f(x)$ is an exponential function.

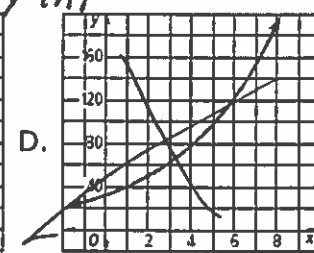
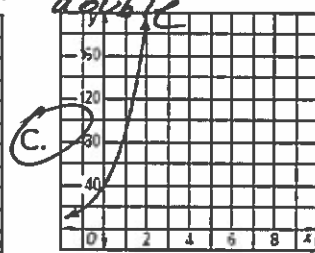
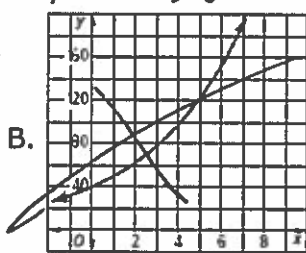
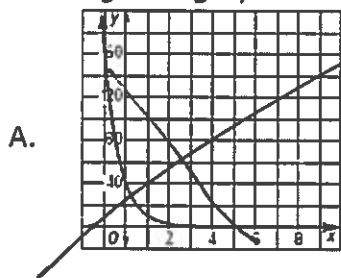
x	y=f(x)
0	100
1	80
2	64
3	51.2

Geo sequence
 $r = \frac{80}{100} = \frac{4}{5}$ a. Equation: $f(x) = 100\left(\frac{4}{5}\right)^x$

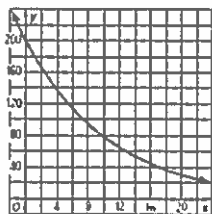
$\frac{64}{80} = \frac{4}{5} = r$ b. What would the value of $f(x)$ be when $x = 7$?

$$100\left(\frac{4}{5}\right)^7 = 20.97152$$

20. Choose the graph that best represent the function whose initial value is 40 and it is growing by 125% per year. $125\% \Rightarrow \text{more than double}$



21. The graph of $y = 200(0.91)^x$ below models the amount y of a drug x hours after it is injected into a patient. What is the y -intercept?

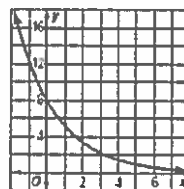


initial amount
 200

$(0, 200)$

22. The graph of the exponential function $y = 8(0.65)^x$ is shown below.

a. What is the equation of the horizontal asymptote?



$y = 0$

b. How would the y -intercept change if the equation was $y = 12(0.65)^x$?

y -int would be $(0, 12)$

23. Of all the users of the web service Twitter, Lady Gaga (@ladygaga) has the most followers. At the start of year 2010, she had 3,200,000 followers. Her number of followers has been steadily increasing by 8% each month.

- a. Let $f(x)$ stand for how many followers @ladygaga has, x months after the start of year 2010. Write a function formula for $f(x)$.

$$f(x) = 3200000(1.08)^x$$

- b. How many followers did @ladygaga have at the start of 2011?

$$3200000(1.08)^{12} = 8,058,144$$

24. In the exponential equation $y = ab^x$, what value of b will represent a growth rate of 1.6%?

$$b = 1 + r = 1 + .016 = 1.016$$

25. Use the table below to find $f(x)$. Assume that $f(x)$ is an exponential function.

x	$y = f(x)$
0	800
1	400
2	200
3	100

A. $f(x) = 400 \times \left(\frac{1}{2}\right)^x$

B. $f(x) = 800 \times 2^x$

C. $f(x) = 800 \left(\frac{1}{2}\right)^x$

D. $f(x) = 100 \times 2^x$

26. What is the equation of the horizontal asymptote for the function $f(x) = 45(1.1)^x$?

A. $y = 49.5$

B. $y = 45$

C. $y = 1.1$

D. $y = 0$

Always

27. Carmen wants to go on a cruise with her husband. She puts \$2000 in a savings account that earns 3.75% interest compounded quarterly. If the cruise costs \$4500, when will they have enough money to go?

~ 22 years. * You will not have to solve for t . You might have to solve for r *

28. Suppose the population of a town is 2,700 and is growing 4% each year. Write an equation to model the population growth, then predict the population after 12 years.

$$y = 2700(1 + .04)^t = y = 2700(1.04)^{12} = 4322$$

29. Find the missing term in the sequence 3, 21, 147, 1029, 7203, 50421.

$$r = \frac{21}{3} = 7 \times 7$$

30. Find a formula for the n th term of the sequence that begins 5, 25, 125, 625, 3125, Assume the first term corresponds to $n=1$.

$$a_1 = 5$$

$$r = 5$$

$$a_n = a_1 r^{n-1}$$

$$a_n = 5(5)^{n-1}$$