

SM1 Chapter 6A Practice Test (6.0-6.4)

Exponential Functions

Name _____

Period _____ Date _____

Evaluate each function for the given value.

1) $f(x) = 3 \cdot 2^x$ for $x = -2$

$\frac{3}{4}$

2) $f(x) = 3^x + 1$ for $x = 0$

2

3) $f(x) = \left(\frac{1}{3}\right)^x$ for $x = 3$

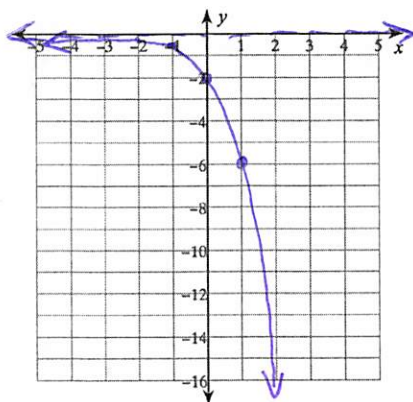
$\frac{1}{27}$

4) $f(x) = \left(\frac{1}{2}\right)^x$ for $x = -3$

8

Sketch the Graph of the function and then state the Horizontal Asymptote, Domain and Range.

5) $y = -2(3)^x$



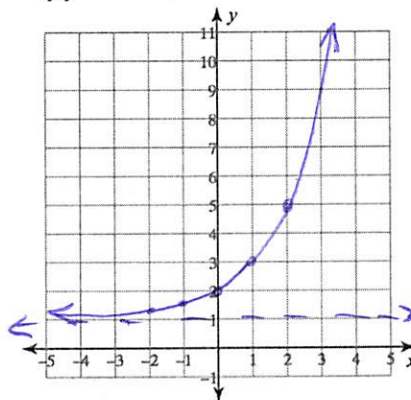
x	y
-2	-0.22 $(-\frac{2}{9})$
-1	-0.66 $(-\frac{2}{3})$
0	-2
1	-6
2	-18

Asymptote: $y = 0$

Domain: $(-\infty, \infty)$ or all real #s

Range: $(-\infty, 0)$ or $y < 0$

6) $y = 2^x + 1$



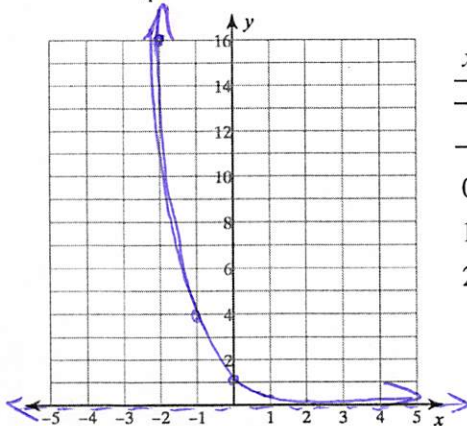
x	y
-2	1.25 $(1\frac{1}{4})$
-1	1.5 $(1\frac{1}{2})$
0	2
1	3
2	5

Asymptote: $y = 1$

Domain: $(-\infty, \infty)$ or all real #s

Range: $(1, \infty)$ or $y > 1$

7) $y = \frac{1}{4}^x$



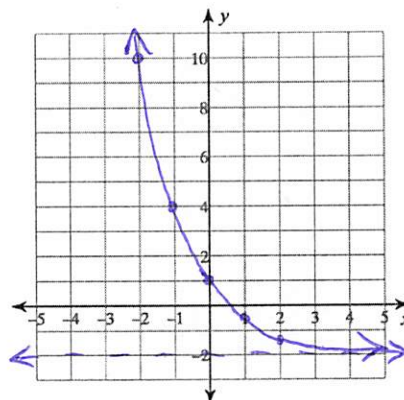
x	y
-2	16
-1	4
0	1
1	0.25 $(\frac{1}{4})$
2	0.0625 $(\frac{1}{16})$

Asymptote: $y = 0$

Domain: $(-\infty, \infty)$ or all real #s

Range: $(0, \infty)$ or $y > 0$

8) $y = 3\left(\frac{1}{2}\right)^x - 2$



x	y
-2	10
-1	4
0	1
1	-0.5
2	-1.25

Asymptote: $y = -2$

Domain: $(-\infty, \infty)$ or all real #s

Range: $(-2, \infty)$ or $y > -2$

Determine whether each of the following represents an exponential function.

If it is an exponential function, state whether it is exponential growth or decay. Explain.

9)

x	-1	0	1	2
y	1	4	7	11

Not exponential,
no constant ratio

10)

x	1	2	3	4
y	9	3	1	$\frac{1}{3}$

yes - exponential decay,
constant ratio is $\frac{1}{3}$ (less than 1)
it's decreasing

11)

x	7	8	9	10
y	5	10	20	40

yes - exponential growth,
y-values are increasing
by a constant ratio

Write each formula. (Use your notes)

(Use initial amount a , rate r , time t , principle P , and number of times compounded in a year n)

12) Exponential Growth:

$$y = a(1+r)^t$$

13) Exponential Decay:

$$y = a(1-r)^t$$

14) Compound Interest:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

For problems 15-18, determine whether the function represents *exponential growth* or *decay* (Circle one) and then identify the initial amount (a) and percent rate of change.

Evaluate the function when $t=4$. Round answers to the nearest thousandth.

15) $y = 3(0.4)^t$

16) $y = 18(1.3)^t$

17) $y = 41(1.07)^t$

18) $y = (0.97)^t$

Growth or Decay?

$a =$ 3

% rate 60%

Evaluate: 0.077

Growth or Decay?

$a =$ 18

% rate 30%

Evaluate: 51.410

Growth or Decay?

$a =$ 41

% rate 7%

Evaluate: 53.743

Growth or Decay?

$a =$ 1

% rate 3%

Evaluate: 0.885

For problems 19-21, write a function for the situation given. Then use it to answer the question in part b.

19) Due to an unfortunate zombie apocalypse, a population of 200,000 decreases by 7.5% each year.

a.) Write a function that represents this situation:

$$y = 200000(0.925)^t$$

b.) What will the population be after 6 years?

(assuming no one figures out how to cure zombies)

About 125,279 or 125,280 people

20) A newborn baby dragon weighs 5 pounds and increases its weight by 25% every month until it's fully grown.

a.) Write a function that represents this situation:

$$y = 5(1.25)^t$$

b.) What will the dragon's weight be after 11 months?

About 58.2 pounds

21) Mr. Tibbs invested \$6,700 in an account that earns an interest rate of 5.7% compounded quarterly.

a.) Write a function that represents the balance after t years:

b.) How much money will he have after 10 years?

$$\left(1 + \frac{0.057}{4}\right)$$

↓

$$A = 6700(1.01425)^{4t}$$

\$11,799.82

Determine whether the following are *linear* or *exponential*. (Circle one) Then write the function for each. (Hint: When writing the function, use the form $y = mx + b$ for linear and $y = a(b)^x$ for exponential) (#22-25)

22) $(-2, -4), (-1, -1), (0, 2), (1, 5), (2, 8)$

23)

x	-2	-1	0	1
y	0.25	1	4	16

Linear or Exponential?

Function (equation): $y = 3x + 2$

Linear or Exponential?

Function (equation): $y = 4(4)^x$

24)

x	-2	-1	0	1
y	4	1	-2	-5

25) $(-2, 25), (-1, 5), (0, 1), (1, \frac{1}{5}), (2, \frac{1}{25})$

Linear or Exponential?

Function (equation): $y = -3x - 2$

Linear or Exponential?

Function (equation): $y = (\frac{1}{5})^x$ or $y = (0.2)^x$
or $y = 1(\frac{1}{5})^x$

26) Two organizations are collecting donations for a cause. The table shows the numbers of donations collected by Organization A. The graph shows the numbers of donations collected by Organization B.

a.) Compare the organizations by calculating and interpreting the average rates of change from hour 1 to hour 4. Organization A:

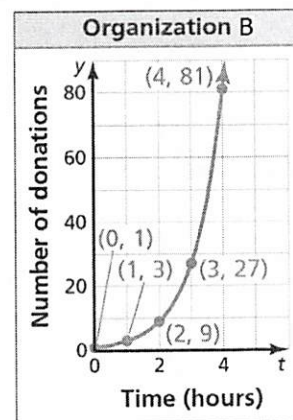
4 donations per hour

Organization B:

26 donations per hour

b.) Predict which organization will have more donations after 24 hours. Explain.

Organization A	
Time (hours), t	Number of donations, y
0	0
1	4
2	8
3	12
4	16
5	20
6	24



Organization B. They are receiving donations at a much higher rate than organization A.

Solve each equation for x.

$$27) 2^{x+1} = 2^5$$

$$x = 4$$

$$28) 3^x = 27$$

$$x = 3$$

$$29) \frac{1}{49} = 7^x$$

$$x = -2$$

Simplify the expression. Your answer should contain only positive exponents.

$$30) a^5 \cdot a^7$$

$$a^{12}$$

$$31) \frac{(n^4)^3}{n^8}$$

$$n^4$$

$$32) \left(\frac{3}{x}\right)^2$$

$$\frac{3^2}{x^2} \text{ or } \frac{9}{x^2}$$

$$33) -3x^2y^4 \cdot 5x^5y$$

$$-15x^7y^5$$

$$34) (2n^5)^3$$

$$2^3n^{15}$$

or

$$8n^{15}$$

$$35) \frac{42a^8c}{6a^5}$$

$$7a^3c$$

$$36) 6x^{-3}$$

$$\frac{6}{x^3}$$

$$37) (5x^3)^0 \cdot 2x$$

$$2x$$

$$38) \frac{24a^2b^{-7}}{8a^{-4}}$$

$$\frac{3a^6}{b^7}$$