Algebra 2 Name KEY

Chapter 7A Review

Sketch the graph of each function. (see graph paper)

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

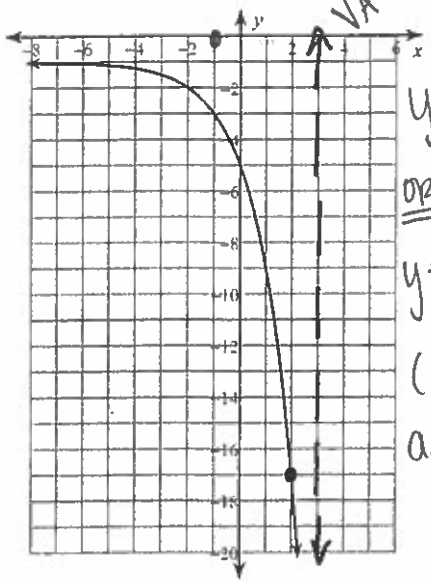
2) $y = -3 \cdot 2^{x-1} + 1$ $y = 3(2)^x$

3) $y = \log_2 (x+3) + 2$ $y = \log_2 x$

4) $y = \log_{\frac{1}{5}} (x+1) - 4$ $y = \log_{\frac{1}{5}} x$

Write an equation for each graph.

5)



VA ⇒ Log

$y = \log(-(x-3)) - 17$

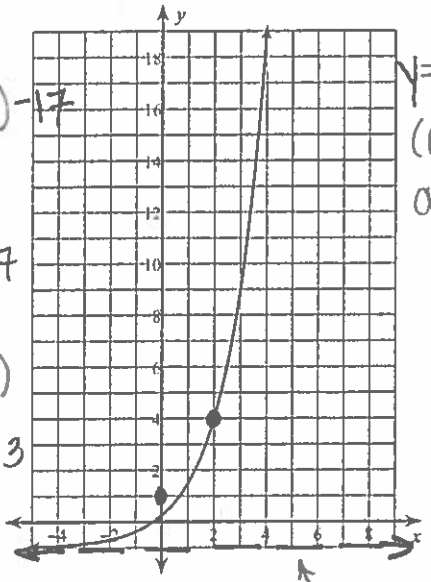
OR

$y = \log(-x+3) - 17$

$(1,0) \rightarrow (2,-17)$

asymptote: $x = 3$

6)



$y = 5e^{x-2} - 1$

$(0,5) \rightarrow (2,4)$

asymptote: $y = -$

HA ⇒ EXP

Evaluate each expression.

7) $\log_3 \frac{1}{243} = -5$

8) $\ln e = 1$

9) $\log_3 243 = 5$

10) $\log_{16} 64 = \frac{3}{2}$ $16^x = 64$, $(4^2)^x = 4^3$, $x = 3/2$

11) $\log_6 -36$ undefined $6^x \neq -36$

12) $\log \frac{1}{1000} = -3$

13) $\log_7 343 = 3$

14) $\log_2 4 = 2$

15) $\log_{36} \frac{1}{216} = -3/2$ $36^x = \frac{1}{216}$, $(6^2)^x = 6^{-3}$, $x = -3/2$

16) $\log_7 \frac{1}{49} = -2$

17) $\log_3 81 = 4$

18) $\log_{16} \frac{1}{4} = -\frac{1}{2}$

Rewrite each equation in exponential form.

19) $\log_{324} 18 = \frac{1}{2}$ $324^{1/2} = 18$

20) $\log_8 64 = 2$ $8^2 = 64$

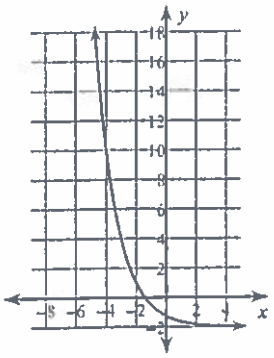
Rewrite each equation in logarithmic form.

21) $9^1 = 9$ $\log_9 9 = 1$

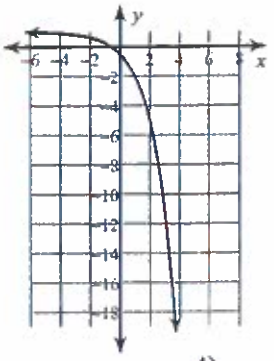
22) $8^2 = 64$ $\log_8 64 = 2$

Answers to Chapter 7A Review

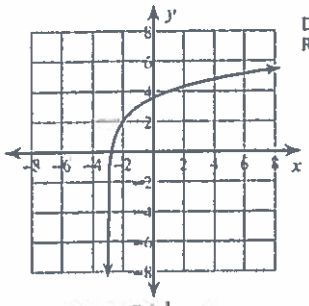
1)



2)

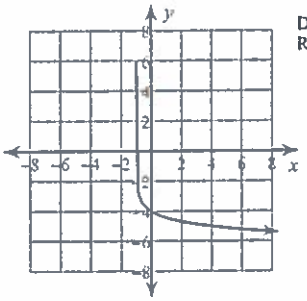


3)



Domain: $x > -3$
Range: All reals

4)



Domain: $x > -1$
Range: All reals

5) $y = \ln(3-x) - 17$

6) $y = 5e^{x-2} - 1$

7) -5

8) 1

9) 5

10) $\frac{3}{2}$

11) Undefined

12) -3

13) 3

14) 2

15) $-\frac{3}{2}$

16) -2

17) 4

18) $-\frac{1}{2}$

19) $324^{\frac{1}{2}} = 18$

20) $8^2 = 64$

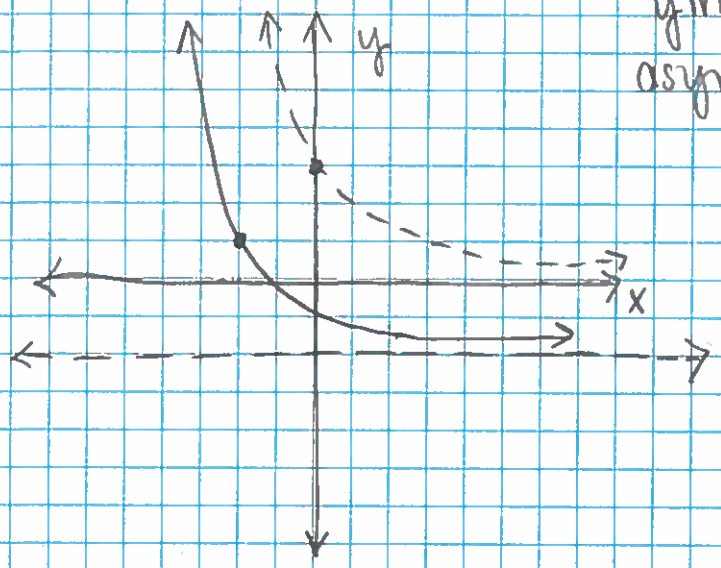
21) $\log_9 9 = 1$

22) $\log_8 64 = 2$

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

y int: $(0,3) \to (-2,1)$

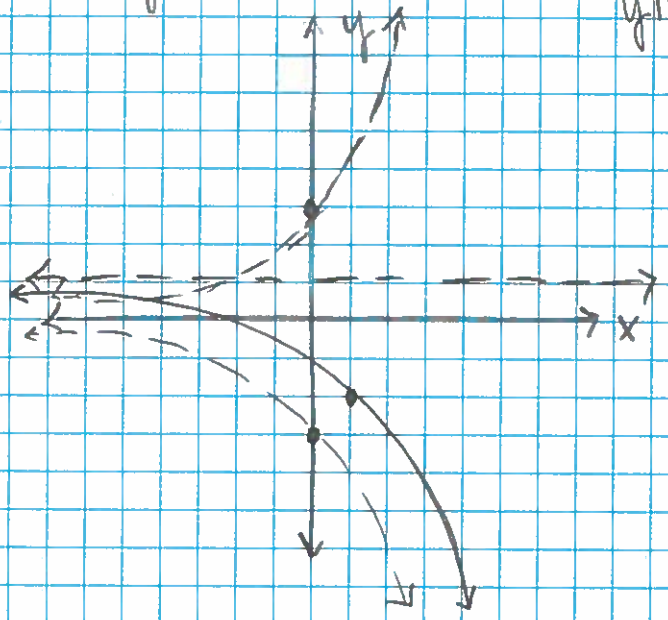
asymptote: $y = -2$



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

y int: $(0,-3) \to (1,-2)$

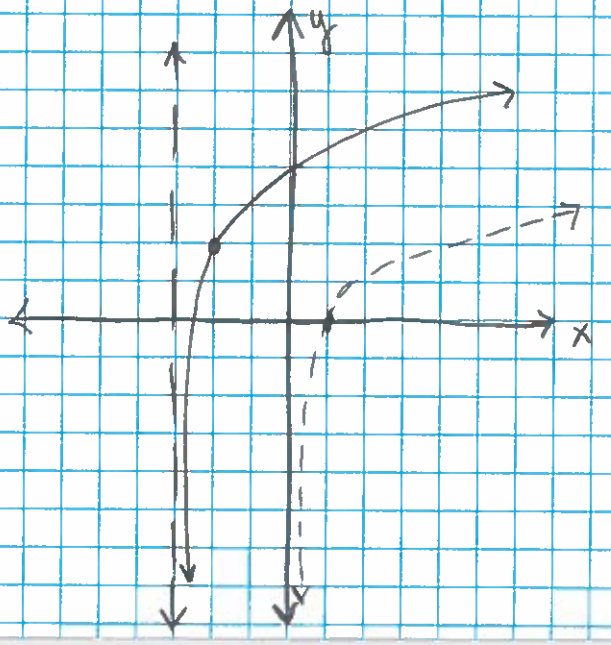
asymptote: $y = 1$



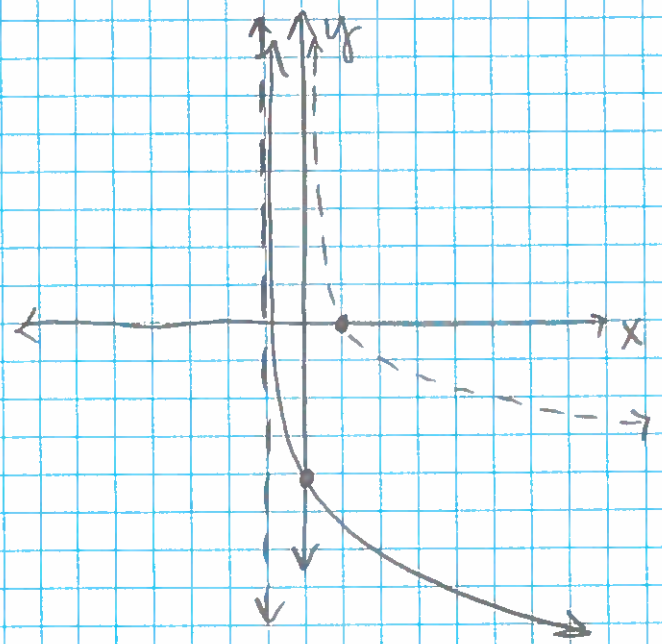
3) $y = \log_2(x+3) + 2$

x int: $(1,0) \to (-2,2)$

asymptote: $x = -3$



4) $y = \log_{\frac{1}{5}}(x+1) - 4$



xint: $(1,0) \rightarrow (0,-4)$

asymptote: $x = -1$

Chapter 7A Review Part 2

23. Growing up, you lived in a tiny country village. When you left for college in 2012, the population was 840. When you returned one year later, the population was 882.

$882 = 840(1+r)^1$

$1.05 = 1+r$

$r = 0.05$

a) What is the percent increase in population? 5%.

b) Write an exponential equation to represent the population. Define your variables.

$y = 840(1.05)^x$

x → # of years since 2012

y → population

c) What will the population by in 2020? 1241 people

$y = 840(1.05)^8$

d) When will the population reach 2400?

$2400 = 840(1.05)^x$ (y_2, y_1)

$x = 21.517085\ldots$

$\approx$ 22 yrs → 2034

24. Mildred plans to put her graduation money into an account and leave it there for 4 years while she goes to college. She receives $750 in graduation money that she puts into an account earning 4.25% compounded semi-annually. How much will be in her account at the end of 4 yrs?

$A = 750\left(1 + \frac{.0425}{2}\right)^{(2)(4)} = \$887.40$

$A = 750(1.02125)^8$

25. How long will it take $4000 to triple if it is invested at 5% compounded continuously? $12000 = 4000e^{(.05)t}$

→ 12000

$t = 21.972246\ldots$

$\approx$ 22 yrs.

26. Find the inverse of $y = \frac{4-3x}{2} - 1$, if it exists.

$x = \frac{4-3y}{2} - 1$ → $x+1 = \frac{4-3y}{2}$

$2x+2 = 4-3y$

$2x-2 = -3y$

$y = \frac{2x-2}{-3}$

"y^{-1}"

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

OR

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

Solutions:

23. a) 5% increase

b) $y = 840(1.05)^x$ x = # of years since 2012

y = # of people (population)

c) 1241 people

d) 22 years…2034 (or July of 2033)

24. $887.40

25. 21.972 years…22 years

26. $y^{-1} = \frac{2-2x}{3}$

Review Problems

I. After reaching a peak of 1.4 μg/mL, the concentration of medication in a person's bloodstream decreases exponentially. Suppose the medication loses 18% of its concentration every hour. Round growth rate to the nearest hundredth.

a. Write an exponential equation to model the given situation. Please describe what the variables represent.

b. Find the time when half of the peak concentration of the medication remains.

c. Find the time when the concentration is less than 0.4 μg/mL.

d. What is the concentration after a full week?

II. Since 1980, the number of computers in an unnamed high school has been growing exponentially. There were 423 computers in 1995 and there were 520 in 1996. Round growth rate to the nearest hundredth.

a. Write an exponential equation to model the given situation. Please describe what the variables represent.

b. According to the model, how many computers are there today in the school?

c. According to the model, when will there be 100,000 computers in the school?

According to the model, when did the school get its first computer?

KEY

Review Problems

1. After reaching a peak of 1.4 µg/mL, the concentration of medication in a person's bloodstream decreases exponentially. Suppose the medication loses 18% of its concentration every hour. Round growth rate to the nearest hundredth.

a. Write an exponential equation to model the given situation. Please describe what the variables represent.

$y = 1.4(1-0.18)^x$

$y = 1.4(0.82)^x$

$x \rightarrow$ # of hours since meds taken

$y \rightarrow$ concentration in bloodstream

b. Find the time when half of the peak concentration of the medication remains.

$y = 0.7$ $\quad 0.7 = 1.4(0.82)^x$ $\quad x \approx 4$ ... 4 hours

($0.7 = y_2$, $1.4(0.82)^x = y_1$)

c. Find the time when the concentration is less than 0.4 µg/mL.

$y = 0.4$ $\quad 0.4 = 1.4(0.82)^x$ $\quad x \approx 7$ ... 7 hours

($0.4 = y_2$, $1.4(0.82)^x = y_1$)

d. What is the concentration after a full week?

$7(24) = 168$ hours

$y = 1.4(0.82)^{168} \approx 4.64E-15$... close to zero

very little is left

II. Since 1980, the number of computers in an unnamed high school has been growing exponentially. There were 423 computers in 1995 and there were 520 in 1996. Round growth rate to the nearest hundredth.

a. Write an exponential equation to model the given situation. Please describe what the variables represent.

$520 = 423(1+r)^1$

$1.23 = 1+r$

$r = 0.23 \rightarrow 23\%$

$y = 423(1.23)^x$

$y =$ # of computers

$x =$ # of yrs since 1995

b. According to the model, how many computers are there today in the school?

$y = 423(1.23)^{23}$ $\quad x = 23$

$y \approx 49{,}449$ computers

c. According to the model, when will there be 100,000 computers in the school?

$100{,}000 = 423(1.23)^x$ $\quad x \approx 26.5$ (27)

($100{,}000 = y_2$, $423(1.23)^x = y_1$) $\quad \rightarrow 2022$

According to the model, when did the school get its first computer?

$1 = 423(1.23)^x$ $\quad x \approx -29$

($1 = y_2$, $423(1.23)^x = y_1$) $\quad \rightarrow 1966$

Algebra 2

Name KEY ID:

Assignment

Date _____ Period ____

Evaluate each expression.

1) $\log_{64} 4 = 1/3$

2) $\log_{32} 2 = 1/5$

3) $\log_2 4 = 2$

4) $\log_4 \frac{1}{16} = -2$

5) $\log_{\frac{1}{2}} \frac{1}{2} = 1$

6) $\log_3 9 = 2$

7) $\log_3 \frac{1}{9} = -2$

8) $\log_5 -125$ undefined

9) $\log_7 49 = 2$

10) $\log_6 216 = 3$

11) $\log_{216} 6 = \frac{1}{3}$

12) $\log_{36} 6 = 1/2$

13) $\log_3 \frac{1}{81} = -4$

14) $\log_2 -16$ undefined

15) $\log_7 -\frac{1}{49}$ undefined

16) $\log_{216} 36 = 2/3$

$6^{3x} = 6^2$

17) $\log_{25} 5 = 1/2$

18) $\log_{16} \frac{1}{4} = -1/2$

19) $\log_5 5 = 1$

20) $\log_2 \frac{1}{2} = -1$

21) $\log_5 \frac{1}{25} = -2$

22) $\log_{81} 3 = 1/4$

23) $\log_4 64 = 3$

24) $\log_5 125 = 3$

25) $\log_2 \frac{1}{8} = -3$

26) $\log_3 \frac{1}{243} = -5$

27) $\log_2 -\frac{1}{64}$ undefined

28) $\log_7 \frac{1}{49} = -2$

29) $\log_7 343 = 3$

30) $\log_8 -\frac{1}{2}$ undefined

31) $\log_2 16 = 4$

32) $\log_3 27 = 3$

33) $\log_6 36 = 2$

34) $\log_2 32 = 5$

35) $\log_{36} \frac{1}{6} = -1/2$

36) $\log_9 3 = 1/2$

37) $\log_3 243 = 5$

38) $\log_2 -\frac{1}{16}$ undefined

39) $\log_6 -216$ undefined

40) $\log_7 \frac{1}{343} = -3$

41) $\log_{49} 7 = 1/2$

42) $\log_1 7$ undefined

43) $\log_6 \frac{1}{216} = -3$

44) $\log_{16} 4 = 1/2$

45) $\log_{\frac{1}{4}} -\frac{1}{64}$ undefined

46) $\log_{64} \frac{1}{2} = -1/6$

47) $\log_4 \frac{1}{64} = -3$

48) $\log_4 -\frac{1}{4}$ undefined

49) $\log_5 \frac{1}{125} = -3$

50) $\log_3 81 = 4$

Additional Review:

p. 521, # 8-11 (just write EQ)

p. 553, # 14, 15, 17

p. 555, # 17-27

p. 521,

8) $f(x) = x + 2.1$

$y = x + 2.1$

$x = y + 2.1$

$y^{-1} = x - 2.1$

$f^{-1}(x)$

9) $f(x) = \frac{3}{4} - x$

$y = \frac{3}{4} - x$

$x = \frac{3}{4} - y$

$x - \frac{3}{4} = -y$

$y^{-1} = -x + \frac{3}{4}$

10) $f(x) = 5x + 4$

$y = 5x + 4$

$x = 5y + 4$

$x - 4 = 5y$

$\frac{x-4}{5} = y^{-1}$

$y^{-1} = \frac{x-4}{5} = \frac{1}{5}x - \frac{4}{5}$

11) $f(x) = 0.4\left(\frac{x}{2} + 1.5\right)$

$y = 0.4\left(\frac{x}{2} + 1.5\right)$

$x = 0.4\left(\frac{y}{2} + 1.5\right)$ $\quad \uparrow 2/5$

$\frac{5}{2}x = \frac{y}{2} + \frac{3}{2}$

$\frac{5}{2}x - \frac{3}{2} = \frac{y}{2}$

$5x - 3 = y^{-1}$

p. 553,

14) $\ln e^2 \Rightarrow e^? = e^2$? = 2

15) $\ln e^{\frac{x}{2}} \Rightarrow e^? = e^{x/2}$? = $x/2$

17) $\ln e^{b+5} \Rightarrow e^? = e^{b+5}$? = $b+5$

p. 555,

17) $\log_3 243 = 5$ 18) $\log_9 1 = 0$

19) $\log_{\frac{1}{3}} 27 = -3$ 20) $2^4 = 16$ 21) $10^1 = 10$

22) $0.6^2 = 0.36$ 23) $7^x = 49$, $x = 2$ 24) $0.5^x = 0.$, $\left(\frac{1}{2}\right)^x = \frac{1}{4}$, $x = 2$

25) $12^x = \frac{1}{12}$, $x = -1$ 26) $10^x = 0.01$, $10^x = \frac{1}{100}$, $x = -2$ 27) $2^x = 1$, $x = 0$