MA 121 College Algebra

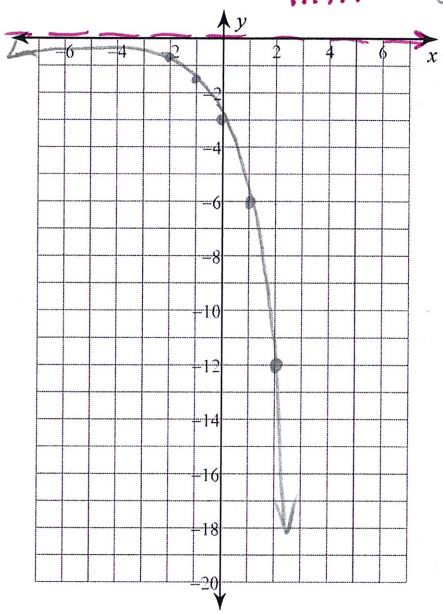
Name Key

Relay Math 4.1 4.3

Period____

Sketch the graph of each function.

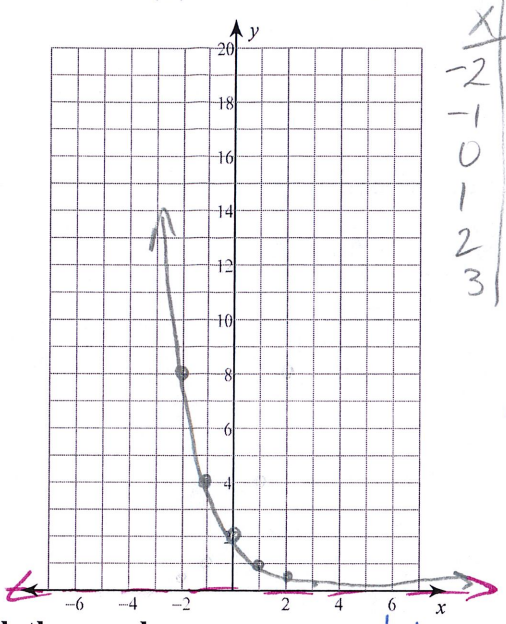
1) $y = -3 \cdot 2^x$ → y-inter $y=0$ H.A. $y=-3\cdot 2^x$



x	y
-2	$-\frac{3}{4}$
-1	$-\frac{3}{2}$
0	-3
1	-6
2	-12

$-3\cdot 2^{-2}$
$-3\cdot 2^{-1}$

2) $y = 2 \cdot \left(\frac{1}{2}\right)^x$ → y-inter → decay $y = 2\left(\frac{1}{2}\right)^x$



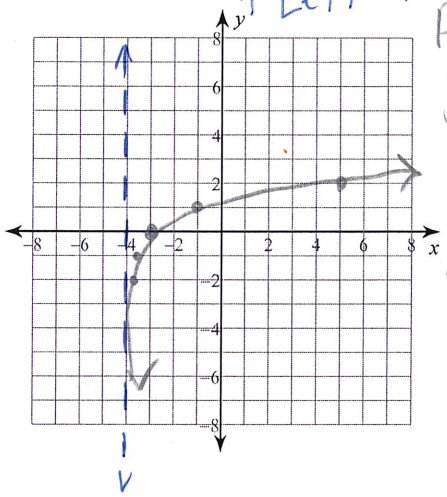
x	y
-2	8
-1	4
0	2
1	1
2	$\frac{1}{2}$
3	$\frac{1}{4}$

$2\cdot\left(\frac{1}{2}\right)^{-2} = 8$
$2\left(\frac{1}{2}\right)^{-1} = 4$
$2\left(\frac{1}{2}\right)^{0} = 2$
$2\left(\frac{1}{2}\right)^{1}$
$2\left(\frac{1}{2}\right)^{2}$
$2\cdot\frac{1}{4}$
$2\left(\frac{1}{2}\right)^{3}$
$\frac{2}{8}$

$y=0$ H.A.

Identify the domain and range of each. Then sketch the graph.

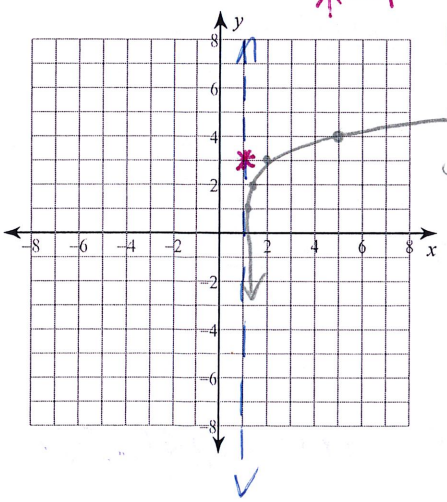
3) $f(x) = \log_3(x+4)$ ← Left 4 V.A $= x = -4$



Parent $y = \log_3 x$ which means $3^y = x$

x	y
$\frac{1}{9}$	-2
$\frac{1}{3}$	-1
1	0
3	1
9	2

4) $f(x) = \log_4(x-1)+3$ ← Right 1 ↑ up 3 V.A $x=1$



Parent $y = \log_4 x$ means $4^y = x$

x	y
$\frac{1}{16}$	-2
$\frac{1}{4}$	-1
1	0
4	1
16	2

Condense each expression to a single logarithm.

5) $2\log_5 11 - 5\log_5 3$ Subtract means division

$\log_5 11^2 - \log_5 3^5$

$\log_5 \frac{121}{243}$

$\log_5\left(\frac{11^2}{3^5}\right)$

6) $6\log_5 x + 18\log_5 y$

$\log_5 x^6 + \log_5 y^{18}$

$\log_5(x^6 y^{18})$

7) $4\log_3 x + 3\log_3 y$ + Multiply

$\log_3 x^4 + \log_3 y^3$

$\log_3(x^4 y^3)$

8) $\log_3 11 + \log_3 12 + 2\log_3 7$

$\log_3 11 + \log_3 12 + \log_3 7^2$

$\log_3 11\cdot 12\cdot 49$ or $\log_3(132\cdot 7^2) = \log_3 6468$

Expand each logarithm.

9) $\log_4 (x^5 \cdot y)^4$

$4 \cdot \log_4 x^5 y$

$4(\log_4 x^5 + \log_4 y)$

$4(5\log_4 x + \log_4 y)$

$20\log_4 x + 4\log_4 y$

10) $\log_5 (ab^2)^4$

$4(\log_5 a + 2\log_5 b)$

$4\log_5 a + 8\log_5 b$

11) $\log_3 (u^6 v^4)$

$6\log_3 u + 4\log_3 v$

12) $\log_2 \sqrt[3]{u \cdot v \cdot w}$

$\log_2 (uvw)^{\frac{1}{3}}$

$\frac{1}{3}(\log_2 u + \log_2 v + \log_2 w)$ or $\frac{\log_2 u}{3} + \frac{\log_2 v}{3} + \frac{\log_2 w}{3}$

Evaluate each expression.

13) $\log_7 1$ this means

$7^{\square} = 1$

$\boxed{0}$

14) $\log_5 25$

$5^{\square} = 25$

$\boxed{2}$

15) $\log_2 \frac{1}{64}$

$2^{\square} = \frac{1}{64}$

$\boxed{-6}$

16) $\log_7 343$

$7^{\square} = 343$

$\boxed{3}$

17) $\log_7 343$

$7^{\square} = 343$

$\boxed{3}$

18) $\log_6 -\frac{1}{36}$

$6^{\square} = -\frac{1}{36}$

Undefined

$6^{\square}$ = will never be negative

19) $\log_3 \frac{1}{81}$

$3^{\square} = \frac{1}{81}$

$\boxed{-4}$

20) $\log_6 36$

$6^{\square} = 36$

$\boxed{2}$

Solve each equation. this and that said the Cat

21) $\log_9 (2p+4) = \log_9 (5p-8)$

$\log_9 (\text{this}) = \log_9 (\text{that})$

this = that

$2p+4 = 5p-8$

$-2p \quad +8 \quad -2p \quad +8$

$12 = 3p$

$\boxed{p = 4}$

22) $\log_{19} (3a+7) = \log_{19} (5a+10)$

$\log_{19} (3a+7) = \log_{19} (5a+10)$

$3a+7 = 5a+10$

$-3a \quad -10 \quad -3a \quad -10$

$-3 = 2a$

$\boxed{a = \frac{-3}{2}}$

23) $4^{2n} = 16$

$2n = 2$

$\boxed{n = 1}$

$4^{\square} = 16$

$4^{\square} = 4^2$

24) $6^{-2m} = 6^{2m-3}$

$6^{-2m} = 6^{2m-3}$

$-2m = 2m-3$

$-2m \quad -2m$

$-4m = -3$

$\boxed{m = \frac{3}{4}}$

Key

Station #8

Use the compound interest formulas to solve Exercises 10–11.

10. Suppose that you have $5000 to invest. Which investment yields the greater return over 5 years: 5.5% compounded semiannually or 5.25% compounded monthly?

11. Suppose that you have $14,000 to invest. Which investment yields the greater return over 10 years: 7% compounded monthly or 6.85% compounded continuously?

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

$A = 5000\left(1 + \frac{.055}{2}\right)^{5 \cdot 2}$

$A = \$6558.26$

$A = 5000\left(1 + \frac{.0525}{12}\right)^{12 \cdot 5}$

$A = \$6497.16$

Monthly

$A = 14000\left(1 + \frac{.07}{12}\right)^{12 \cdot 10}$

$A = \$28,135.26$

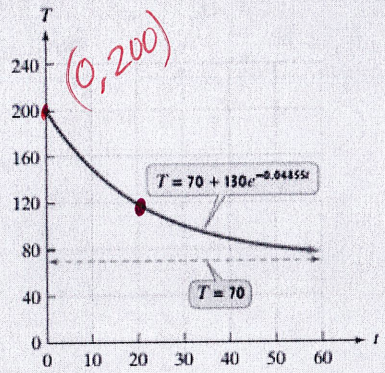
Continuously

$A = 14000e^{.0685 \cdot 10}$

$A = 27,772.81$

Higher interest rate is always good.

12. A cup of coffee is taken out of a microwave oven and placed in a room. The temperature, T, in degrees Fahrenheit, of the coffee after t minutes is modeled by the function $T = 70 + 130e^{-0.04855t}$. The graph of the function is shown in the figure.



Use the graph to answer each of the following questions. 200° F y-intercept $t = 0$

a. What was the temperature of the coffee when it was first taken out of the microwave?

b. What is a reasonable estimate of the temperature of the coffee after 20 minutes? Use your calculator to verify this estimate. (20, 119°)

c. What is the limit of the temperature to which the coffee will cool? What does this tell you about the temperature of the room?

70° the room is at so the coffee will not go below that temperature.

$X \to \infty \to 70°$