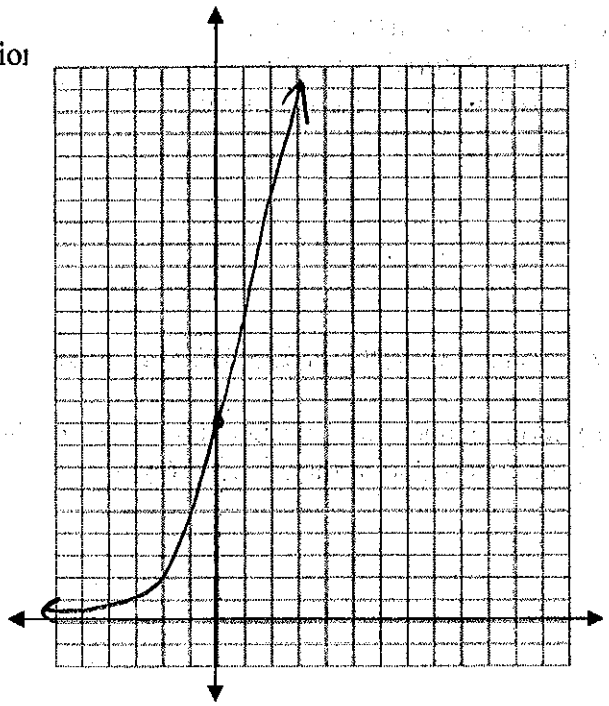
Math 3 – Unit 2 Test Review Name Key Date

1. Graph the function $y = 3^{x+2}$ and answer the following questio



Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

y - int: $(0, 9)$

Asymptote: $y = 0$

End Behavior:

As $x \to -\infty, y \to$ 0

As $x \to \infty, y \to$ ∞

2. Answer the following questions for the function: $y = -\frac{1}{2}(4)^{x+2} - 3$.

Parent Function: $y = 4^x$ Growth or Decay? Growth $(4>1)$

Transformations:

1. reflection over x-axis
2. V.C. by $\frac{1}{2}$
3. left 2
4. down 3

Evaluate each logarithm.

3. $log_3 10$ 4. $log_2 \frac{5}{10}$

3. 2.096
4. -1

Convert to logarithmic form.

5. $3^x = 21$ $\log_3 21 = x$

6. $5^{x+1} = 10$ $\log_5 10 = x+1$

5. $\log_3 21 = x$
6. $\log_5(10) = x+1$

Convert to exponential form.

7. $log_{10}(x-2) = 3$ $10^3 = x-2$

8. $log_2 4 = x$

7. $10^3 = x-2$
8. $2^x = 4$

9. The population of sea lions in the North Pole can be modeled by the equation $y = 32(0.71)^t$. Find:
a) the initial population and
b) the rate of **decay** (as a percent)

9. a) 32

b) 29%

1.00
−.71
.29

10. A new car that sells for $25,000 **depreciates** 3.5% each year.

a) Write a function that models the value of the car.
b) Find the value of the car after 6 years.

10. a). $y = 25{,}000(.965)^t$

b) $20,188.49

$A = P(1-r)^t$
$y = 25{,}000(.965)^6$
$= \$20{,}188.49$

11. Jason invests $1000 in an account that pays 4% interest **compounded monthly**. How much interest will be accumulated after 3 years?

11. $127.27

$A = P(1+\frac{r}{n})^{nt}$
$= 1000(1+\frac{.04}{12})^{12(3)}$
$= \$1127.27$

1127.27
−1000.00

12. In 1999, Grandma Jo invested $5,000 in a savings account, for your college tuition. It pays 4.5% interest **compounded weekly**, what will the value of the fund be in 2021?

12. $13,450.41

$A = P(1+\frac{r}{n})^{nt}$
$= 5000(1+\frac{.045}{52})^{52 \cdot 22}$
$= \$13,450.41$

13. The population of China is rapidly **increasing** at a rate of 5.2% each year. If the population in 1800 was 120,000, in what year will the population reach 250,000?

13. 1814 or 1815

$A = P(1+r)^t$
$\frac{250{,}000}{120{,}000} = \frac{120{,}000}{120{,}000}(1+.052)^t$
$\frac{25}{12} = 1.052^t$

$\log_B A = E$
$\log_{1.052} \frac{25}{12} = t$
$t \approx 14.48$
$+ 1800$
1814 or 1815

Use exponential regression to write an exponential function for this situation.

14. Jean invested $380 in stocks. Over the next 5 years, the value of her investment grew, as shown in the accompanying table. Write the exponential regression equation for this set of data, rounding all values to the hundredths place.

14. $y = 379.92(1.04)^x$

Years Since Investment (x)	Value of Stock, in Dollars (y)
0	380
1	395
2	411
3	427
4	445
5	462

Stat → Edit

Stat → Calc → #0

Write each expression as a single logarithm. (CONDENSE)

15. $4 \log x - 2 \log y$

15. $\log \frac{x^4}{y^2}$

Rule # 2 & #3

16. $3 \log_b 5 + 2 \log_b 3$

16. $\log_b (1125)$

Rule #1 & #3

$\log_b (5^3 \cdot 3^2)$

↑ * simplify inside Parentheses when possible

Expand each logarithm completely.

17. $\log_4 10a^2$

17. $\log_4 10 + 2\log_4 a$

18. $\log_3 \frac{2}{x^3}$

18. $\log_3 2 - 3\log_3 x$

19-23: Solve each equation for x. Round to the nearest hundredth. SHOW YOUR WORK.

19. Solve $6^{3x} = 36^{x+5}$.

19. $x = 10$

$6^{3x} = (6^2)^{x+5}$

$6^{3x} = 6^{2x+10}$

* drop bases

$3x = 2x + 10$

$\boxed{x = 10}$

20. Solve: $25^x = 125^{x+2}$

20. $x = -6$

$(5^2)^x = (5^3)^{x+2}$

$5^{2x} = 5^{3x+6}$

$2x = 3x + 6$

$-3x \quad -3x$

$-x = 6$

$\boxed{x = -6}$

21. Solve: $\ln x = 5$. $\ln \leftrightarrow e^{\square}$ raise both sides from "e"

21. $x = 148.41$

$e^{\ln x} = e^5$

$\boxed{x = e^5}$ ← exact answer

22. Solve: $e^{x+5} = 20$ $\ln \leftrightarrow e^{\square}$ take "ln" of both sides

22. $x = -2.00$

$\ln e^{x+5} = \ln 20$

$x + 5 = \ln 20$

$\boxed{x = \ln(20) - 5}$ ← exact answer

23. Solve $\ln 3 + \ln(x - 1) = \ln 18$: $\ln \leftrightarrow e^{\square}$ & Rule #1

23. $x = 7$

$\ln 3(x-1) = \ln 18$

$e^{\ln 3(x-1)} = e^{\ln 18}$

$3(x-1) = 18$

$3x - 3 = 18$

$3x = 21$

$\boxed{x = 7}$

24. $3\ln 2 + \ln x = \ln 16$ $\ln \leftrightarrow e^{\square}$ & Rule #1

24. $x = 2$

$\ln(2^3 \cdot x) = \ln 16$

$\ln(8x) = \ln 16$

$e^{\ln(8x)} = e^{\ln 16}$

$8x = 16$

$\boxed{x = 2}$

25. Solve $\log_3(9x) = 2$. $\log \leftrightarrow$ exponential

25. $x = 1$

$\log_B A = E$

* write in exponential form

$3^2 = 9x$

$9 = 9x$

$\boxed{x = 1}$