Module 3 Invest. 6-8 Test Review **Algebra 2** **Review Review Review Review Review**

SHOW ALL WORK!

Rewrite the following in exponential form.

1. $\log_{15}\left(\frac{1}{225}\right)=-2$ $\boxed{15^{-2}=\frac{1}{225}}$

2. $\log_3(x)=y$ $\boxed{3^y=x}$

Rewrite the following in logarithmic form.

3. $6^3=216$ $\boxed{\log_6(216)=3}$

4. $12^x=y$ $\boxed{\log_{12}(y)=x}$

Condense or rewrite the following as a single logarithm. Simplify, if possible.

5. $\log_6 c+\log_6 c+\log_6 c+\log_6 c$

$= \log_6(c\cdot c\cdot c\cdot c)$

$= \log_6(c^4)$

$= 4\log_6(c)$

6. $\log_2 10+3\log_2 5+\frac{1}{2}\log_2 25$

$= \log_2 10+\log_2 5^3+\log_2 25^{\frac{1}{2}}$

$= \log_2(10)+\log_2(125)+\log_2(5)$

$= \log_2(10\cdot 125\cdot 5)$

$= \boxed{\log_2(6250)}$

7. $\frac{1}{2}\log 9-\log 4$

$= \log 9^{\frac{1}{2}}-\log 4$

$= \log 3-\log 4$

$= \boxed{\log\left(\frac{3}{4}\right)}$

8. $\log_5 250-\log_5 2$

$= \log_5\left(\frac{250}{2}\right)$

$= \log_5(125)$

$= \log_5 5^3$

$= 3\log_5 5$

$= \boxed{3}$

9. $\ln(200)-\ln(10)-\ln(5)$

$= \ln\left(\frac{200}{10}\right)-\ln(5)$

$= \ln(20)-\ln(5)$

$= \ln\left(\frac{20}{5}\right)$

$= \boxed{\ln(4)}$

Expand the following.

11. $\log_3\left(\frac{x^2}{a\cdot b}\right)$

$= \log_3(x^2)-\log_3(a)-\log_3(b)$

$= \boxed{2\log_3(x)-\log_3(a)-\log_3(b)}$

12. $\ln(2\cdot 5^4)$

$= \ln(2)+\ln(5^4)$

$= \boxed{\ln(2)+4\ln(5)}$

13. $\log_2\left(\frac{7c}{d}\right)$

$= \log_2(7c)-\log_2(d)$

$= \boxed{\log_2(7)+\log_2(c)-\log_2(d)}$

Evaluate each of the logarithms.

14. $\log_2\left(\frac{1}{8}\right) = -3$ 15. $\log_6(36) = 2$ 16. $\log_2(8) = 3$ 17. $\log_7\left(\frac{1}{49}\right) = -2$ 18. $\log(1000) = 3$

$\frac{\log\left(\frac{1}{8}\right)}{\log(2)}$ $\frac{\log(36)}{\log(6)}$ $\frac{\log(8)}{\log(2)}$ $\frac{\log\left(\frac{1}{49}\right)}{\log(7)}$

Complete each table of values and graph on the next page.

19. $f(x) = 8^x$

x	f(x)
-2	$\frac{1}{64} = 0.016$
-1	$\frac{1}{8} = 0.125$
0	1
2/3	4
1	8
2	64

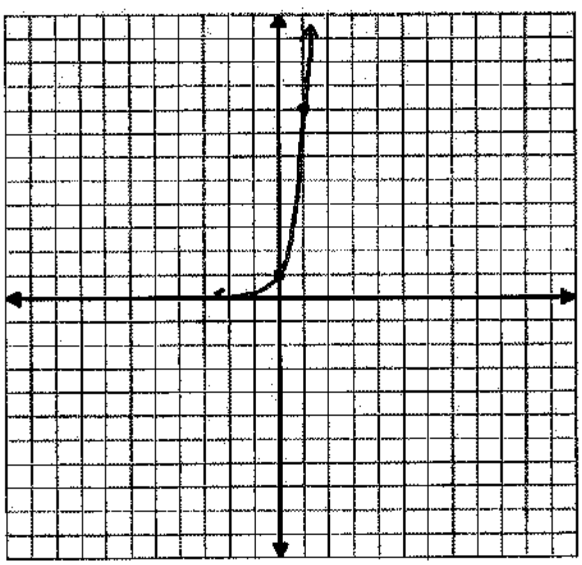
$8^{\frac{2}{3}} = 8 \wedge (2 \div 3) = 4$

20. $g(x) = \log_8(x)$

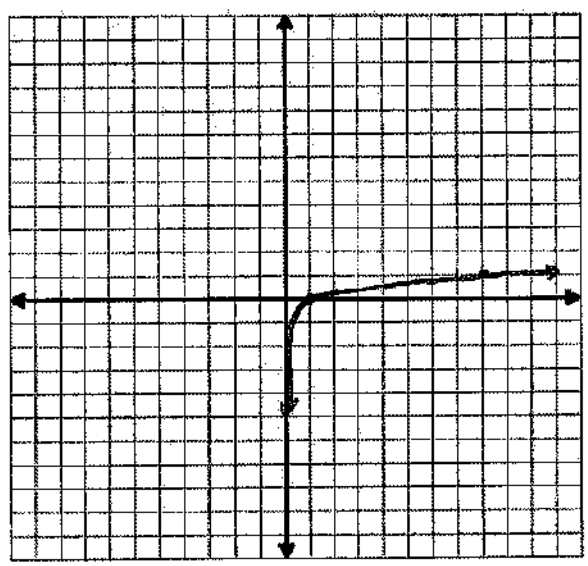
x	g(x)
$0.016 = \frac{1}{64}$	-2
$0.125 = \frac{1}{8}$	-1
1	0
4	2/3
8	1
64	2

swa

19.



20.



21. Use the properties of logarithms to rewrite $\frac{1}{3}\log_4 8 + 7\log_4 2$ as a single logarithm. Then evaluate the value of the resulting expression.

$= \frac{1}{3}\log_4 8 + 7\log_4 2$

$= \log_4 8^{\frac{1}{3}} + \log_4 2^7$

$= \log_4 2 + \log_4 128$

$= \log_4(2 \cdot 128)$

$= \boxed{\log_4(256)}$

$= \frac{\log(256)}{\log(4)} = \boxed{4}$

Part 2

SHOW ALL WORK!

Solve the following equations. Use logarithms and show all work algebraically! Round your final answer to the thousandths.

22. $8^n = 500$

$\log_8 500 = n$

$\frac{\log(500)}{\log(8)} = n$

$\boxed{2.989 = n}$

23. $\frac{2(3)^x}{2} = \frac{17}{2}$

$3^x = 8.5$

$\log_3 8.5 = x$

$\frac{\log(8.5)}{\log(3)} = x$

$\boxed{1.948 = x}$

24. $\frac{1{,}000}{781} = \frac{781(1.056)^t}{781}$

$1.28 = 1.056^t$

$t = \log_{1.056} 1.28$

$t = \frac{\log(1.28)}{\log(1.056)}$

$\boxed{t = 4.531}$

Evaluate each of the following logarithms. Use your calculator and round your final answer to the thousandths.

25. $\log_4(67) = \frac{\log(67)}{\log(4)} = \boxed{3.033}$

26. $\log_7(123) = \frac{\log(123)}{\log(7)} = \boxed{2.473}$

27. $\log(400) = \boxed{2.602}$

28. $\ln(14) = \boxed{2.639}$

29. The population of Chandler AZ increased from 176,585 people in 2004 to 211,902 people in 2014.

$\boxed{\text{factor} = \frac{\text{later data}}{\text{earlier data}}}$ $\boxed{f(x) = a \cdot b^x}$ a: Initial value b: factor

a. Define an exponential function that models the town's population as a function of the number of years since 2004. Be sure to define your variables.

10 year growth factor $= \frac{211902}{176585} = 1.2$

1 year growth factor $1.2^{\frac{1}{10}} = 1.018$

$f(x) = 176585(1.018)^x$

x: # of years since 2004

b. What is the annual growth factor and the annual percent change? Round your final answers to the thousandths.

annual growth factor: $\boxed{1.018}$

$\boxed{\text{factor} = 1 + \text{percent change}}$

$1.018 = 1 + \text{percent change}$
$-1 \quad -1$

$0.018 = \text{percent change}$

$\boxed{1.8\%} = \text{percent change}$

c. Use your function to predict the city's population in 2025. Round your final answer to the nearest whole number.

$2025 - 2004 = 21$

$x = 21$

$f(x) = 176585(1.018)^x$

$f(21) = 176585(1.018)^{21}$

$= \boxed{256837}$

d. According to your function, when will the population be 290,000? Use logarithms and solve algebraically. Round your final answer to the thousandths.

$f(x) = 176585(1.018)^x$

$\frac{290000}{176585} = \frac{176585(1.018)^x}{176585}$

$1.642 = (1.018)^x$

$x = \log_{1.018}(1.642)$

$x = \frac{\log(1.642)}{\log(1.018)}$

$x = 27.798$

$2004 + 27.798 = \boxed{2031.798}$