

## Study Guide: Exponents and Logs

### Short Answer

**Graph the exponential function.**

1.  $y = 4^x$
2.  $y = 4(2)^x$
3.  $y = 3(1.9)^x$
4. Write an exponential function  $y = ab^x$  for a graph that includes (1, 15) and (0, 6).
5. Graph  $y = -5\left(\frac{1}{7}\right)^x$ .
6. Suppose you invest \$1600 at an annual interest rate of 4.6% compounded continuously. How much will you have in the account after 4 years?
7. How much money invested at 5% compounded continuously for 3 years will yield \$820?

**Write the equation in logarithmic form.**

8.  $6^4 = 1,296$
9.  $125^{\frac{4}{3}} = 625$

**Evaluate the logarithm.**

10.  $\log_5 \frac{1}{625}$
11.  $\log_3 243$
12.  $\log 0.01$
13. Write the equation  $\log_{32} 8 = \frac{3}{5}$  in exponential form.

**Write the expression as a single logarithm.**

14.  $5\log_b q + 2\log_b y$
15.  $\log_3 4 - \log_3 2$

16.  $4 \log x - 6 \log (x + 2)$

**Expand the logarithmic expression.**

17.  $\log_7 \frac{72}{2}$

18.  $\log_3 11p^3$

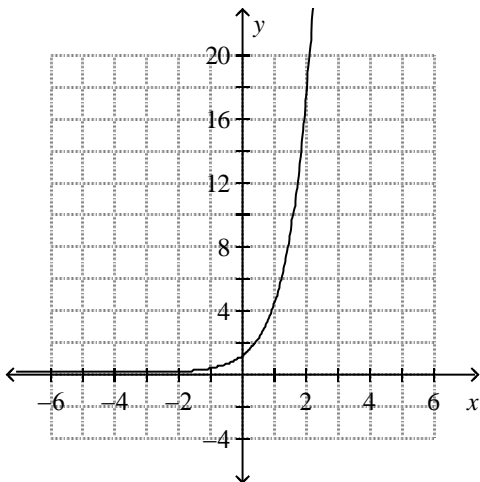
19.  $\log_b \sqrt{\frac{57}{74}}$

# Study Guide: Exponents and Logs

## Answer Section

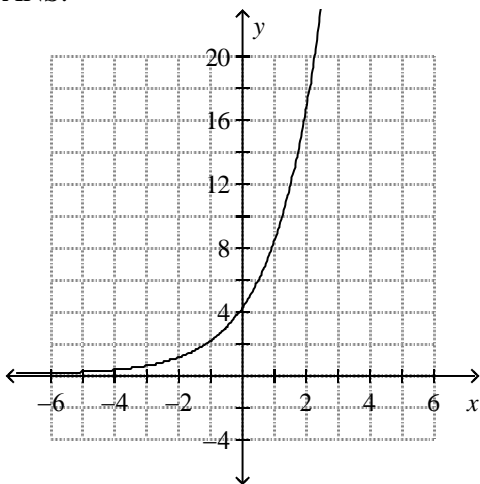
### SHORT ANSWER

1. ANS:



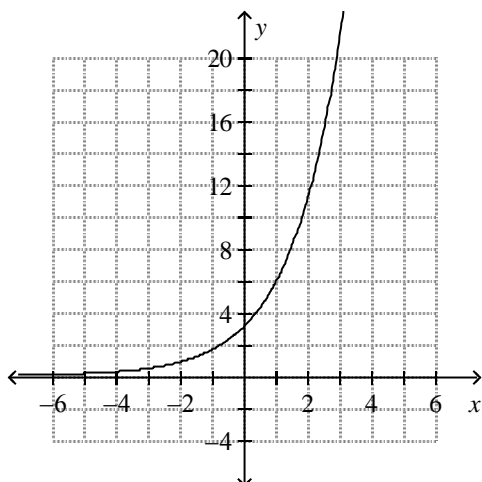
DIF: L1 REF: 8-1 Exploring Exponential Models OBJ: 8-1.1 Exponential Growth  
STO: AL 3, AL 3b TOP: 8-1 Example 1 KEY: exponential function, graphing  
MSC: NAEP A2h, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI,  
IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.15,  
TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56

2. ANS:



DIF: L1 REF: 8-1 Exploring Exponential Models OBJ: 8-1.1 Exponential Growth  
STO: AL 3, AL 3b TOP: 8-1 Example 1 KEY: exponential function, graphing  
MSC: NAEP A2h, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI,  
IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.15,  
TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56

3. ANS:

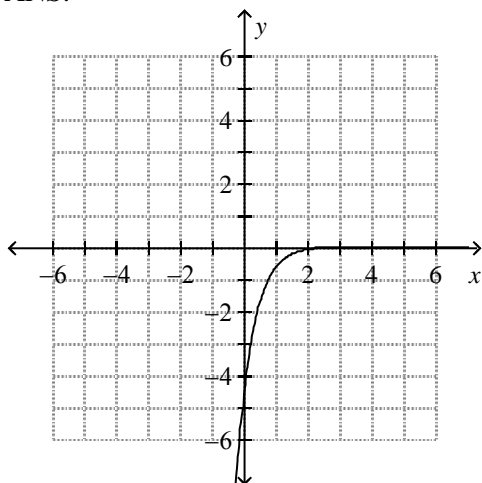


DIF: L2 REF: 8-1 Exploring Exponential Models OBJ: 8-1.1 Exponential Growth  
 STO: AL 3, AL 3b TOP: 8-1 Example 1 KEY: exponential function, graphing  
 MSC: NAEP A2h, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI,  
 IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.15,  
 TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56

4. ANS:  
 $y = 6(2.5)^x$

DIF: L1 REF: 8-1 Exploring Exponential Models OBJ: 8-1.1 Exponential Growth  
 STO: AL 3, AL 3b TOP: 8-1 Example 3 KEY: exponential function, growth factor  
 MSC: NAEP A2h, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI,  
 IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.15,  
 TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56

5. ANS:



DIF: L1 REF: 8-2 Properties of Exponential Functions  
 OBJ: 8-2.1 Comparing Graphs STO: AL 3, AL 3b, AL 6c  
 TOP: 8-2 Example 1 KEY: exponential function, graphing  
 MSC: NAEP A1e, NAEP A1h, CAT5.LV21/22.45, CAT5.LV21/22.50, CAT5.LV21/22.53,  
 IT.LV17/18.AM, IT.LV17/18.DI, IT.LV17/18.DP, IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.NS,  
 S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.15, TV.LV21/22.17,

TV.LV21/22.47, TV.LV21/22.52, TV.LVALG.56

6. ANS:  
\$1,923.23

DIF: L1 REF: 8-2 Properties of Exponential Functions  
OBJ: 8-2.2 The Number e STO: AL 3, AL 3b, AL 6c  
TOP: 8-2 Example 5  
KEY: exponential function,exponential growth,interest rates,problem solving,the number e,compounding continuously,percent  
MSC: NAEP A1e, NAEP A1h, CAT5.LV21/22.45, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI, IT.LV17/18.DP, IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.15, TV.LV21/22.17, TV.LV21/22.47, TV.LV21/22.52, TV.LVALG.56

7. ANS:  
\$705.78

DIF: L2 REF: 8-2 Properties of Exponential Functions  
OBJ: 8-2.2 The Number e STO: AL 3, AL 3b, AL 6c  
KEY: exponential function,exponential growth,interest rates,percent,problem solving,the number e,compounding continuously  
MSC: NAEP A1e, NAEP A1h, CAT5.LV21/22.45, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI, IT.LV17/18.DP, IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.15, TV.LV21/22.17, TV.LV21/22.47, TV.LV21/22.52, TV.LVALG.56

8. ANS:  
 $\log_6 1,296 = 4$

DIF: L1 REF: 8-3 Logarithmic Functions as Inverses  
OBJ: 8-3.1 Writing and Evaluating Logarithmic Expressions STO: AL 3, AL 3b, AL 6c  
TOP: 8-3 Example 2 KEY: logarithm,logarithmic form  
MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56

9. ANS:  
 $\log_{125} 625 = \frac{4}{3}$

DIF: L2 REF: 8-3 Logarithmic Functions as Inverses  
OBJ: 8-3.1 Writing and Evaluating Logarithmic Expressions STO: AL 3, AL 3b, AL 6c  
TOP: 8-3 Example 2 KEY: logarithmic form,logarithm  
MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56

10. ANS:  
-4

DIF: L2 REF: 8-3 Logarithmic Functions as Inverses  
OBJ: 8-3.1 Writing and Evaluating Logarithmic Expressions STO: AL 3, AL 3b, AL 6c  
TOP: 8-3 Example 3 KEY: evaluating logarithms  
MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM,

IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56

11. ANS:  
5

DIF: L1 REF: 8-3 Logarithmic Functions as Inverses  
OBJ: 8-3.1 Writing and Evaluating Logarithmic Expressions STO: AL 3, AL 3b, AL 6c  
TOP: 8-3 Example 3 KEY: evaluating logarithms  
MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56

12. ANS:  
-2

DIF: L2 REF: 8-3 Logarithmic Functions as Inverses  
OBJ: 8-3.1 Writing and Evaluating Logarithmic Expressions STO: AL 3, AL 3b, AL 6c  
TOP: 8-3 Example 4 KEY: evaluating logarithms  
MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56

13. ANS:

$$32^{\frac{3}{5}} = 8$$

DIF: L2 REF: 8-3 Logarithmic Functions as Inverses  
OBJ: 8-3.1 Writing and Evaluating Logarithmic Expressions STO: AL 3, AL 3b, AL 6c  
TOP: 8-3 Example 3 KEY: logarithmic form, logarithm, exponential form  
MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56

14. ANS:

$$\log_a(q^5y^2)$$

DIF: L2 REF: 8-4 Properties of Logarithms  
OBJ: 8-4.1 Using the Properties of Logarithms STO: AL 7  
TOP: 8-4 Example 2  
KEY: properties of logarithms, logarithm, Product Property of Logarithms, Power Property of Logarithms  
MSC: NAEP A2e, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

15. ANS:

$$\log_3 2$$

DIF: L1 REF: 8-4 Properties of Logarithms  
OBJ: 8-4.1 Using the Properties of Logarithms STO: AL 7  
TOP: 8-4 Example 2  
KEY: properties of logarithms, simplifying a logarithm, Quotient Property of Logarithms  
MSC: NAEP A2e, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

16. ANS:

none of these

DIF: L1 REF: 8-4 Properties of Logarithms  
OBJ: 8-4.1 Using the Properties of Logarithms STO: AL 7  
TOP: 8-4 Example 2 KEY: properties of logarithms,simplifying a logarithm  
MSC: NAEP A2e, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM,  
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

17. ANS:  
 $\log_7 8 - \log_7 2$

DIF: L1 REF: 8-4 Properties of Logarithms  
OBJ: 8-4.1 Using the Properties of Logarithms STO: AL 7  
TOP: 8-4 Example 3  
KEY: properties of logarithms,expanding logarithms,Quotient Property of Logarithms  
MSC: NAEP A2e, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM,  
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

18. ANS:  
 $\log_3 11 + 3 \log_3 2$

DIF: L1 REF: 8-4 Properties of Logarithms  
OBJ: 8-4.1 Using the Properties of Logarithms STO: AL 7  
TOP: 8-4 Example 3  
KEY: properties of logarithms,expanding logarithms,Product Property of Logarithms,Power Property of  
Logarithms  
MSC: NAEP A2e, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM,  
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

19. ANS:  
 $\frac{1}{2} \log_8 57 - \frac{1}{2} \log_8 74$

DIF: L2 REF: 8-4 Properties of Logarithms  
OBJ: 8-4.1 Using the Properties of Logarithms STO: AL 7  
KEY: properties of logarithms,expanding logarithms,Power Property of Logarithms,Quotient Property of  
Logarithms  
MSC: NAEP A2e, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM,  
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53