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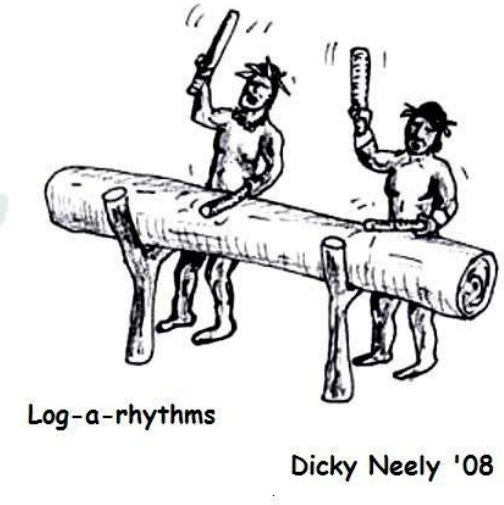
Math 3 Honors Unit 8: Exponential and Logarithmic Functions



Monday	Tuesday	Wednesday	Thursday	Friday
May 6 • Simplify exponential expressions HW: worksheet 8.1	**May 7** • Exponential and logarithmic form • Properties of logs • Change of base HW: worksheet 8.2	**May 8** • Expand and condense logarithms • Solve exponential and logarithmic equations HW: worksheet 8.3	**May 9** • Solve exponential and logarithmic equations HW: worksheet 8.4	**May 10** • Graphs of exponential and logarithmic functions HW: worksheet 8.5
May 13 • QUIZ!! • Growth and decay HW: worksheet 8.6	**May 14** • Compound interest HW: worksheet 8.7	**May 15** • Mixed applications HW: worksheet 8.8	**May 16** • Review HW: finish review	**May 17** • TEST!!

8.1 - Simplifying Exponential Expressions

Simplify each expression.

1. $2x^5y \cdot 3x^2y$

2. $(4x^4y)^2 \cdot 2x^3y^4$

3. $\frac{36x^9y^4}{4x^7y^3}$

4. $\frac{(2xy^5)^3}{2x^3y^8}$

5. $(-5x^6y^2)^2 \cdot (-12x^{12}y^4)$

6. $\frac{6x^{10}y^4}{3x^8y^7}$

7. $6x^{-1}y^5 \cdot 4x^{-4}y^{-2}$

8. $(3x^{-6}y^2)^3 \cdot 2x^{10}y^{-7}$

9. $\frac{(-2xy)^2 \cdot 10x^3y^{11}}{8x^{10}y^4}$

10. $\frac{8x^3}{3x^2y^4} \frac{12xy^7}{} \cdot 15x^2y^3$

8.2 - Exponential & Logarithmic Forms, Properties of Logs, and Change of Base

Write each equation in logarithmic form.

1. $9^2 = 81$

2. $\frac{1}{64} = \left(\frac{1}{4}\right)^3$

3. $10^{-3} = 0.001$

4. $\left(\frac{1}{3}\right)^{-2} = 9$

5. $8^3 = 512$

6. $81 = 243^{\frac{4}{5}}$

Write each equation in exponential form.

7. $log_2 8 = 3$

8. $log_{243} 27 = \frac{3}{5}$

9. $log_5 625 = 4$

10. $log_3 \frac{1}{81} = -4$

11. $2.833 = ln\ 17$

12. $5 = log\ 100,000$

Evaluate each logarithm.

13. $log_5 125$

14. $log_{12} 12$

15. $log_7 7^8$

16. $ln\ 6$

17. $log\ 2$

18. $6^{log_6 7}$

19. $log_{16} 1$

20. $ln\ e^4$

21. $log_8 67$

8.3 - Properties of Logarithms

Expand each logarithm.

1. $log_8 4ab^2$

2. $log_2(cd)^3$

3. $log_3 \frac{7}{v^3}$

4. $log \frac{w^5 x}{yz^9}$

Condense each expression into a single logarithm.

5. $log 3 - log 8$

6. $3log_4 x + log_4 y$

7. $log_5 2 + 6log_5 k - 3log_5 m$

8. $5log_3 x \cdot log_3 y$

9. $4\,(log_3 a + log_3 b)$

10. $2\,(log_9 2 + log_9 x) - 3\,(log_9 3 + log_9 y)$

Solve for x.

11. $log_3 x = 2$

12. $log\,(x + 1) = 3$

13. $log_4(6x + 7) = log_4(2x + 18)$

14. $4^x = 64$

15. $8^x = 2$

16. $9^{2x} = 3$

8.4 - Solve Logarithmic and Exponential Equations

Solve for x. Apply properties as needed.

1. $log_4 2x + log_4 8 = 3$

2. $5^{3x-1} = 15$

3. $9^{k-5} + 4 = 27$

4. $ln 10x^2 - ln 2x = 2$

5. $log_2(x+2) + log_2(x-5) = 3$

6. $e^{4b-7} = 19$

7. $5^x = 2^{x+2}$

8. $log\ x - log\ (x-2) = 1$

9. $3^{2x+1} = 5^{x+1}$

10. $log_3(x+12) - log_3(x-3) = log_3 6$

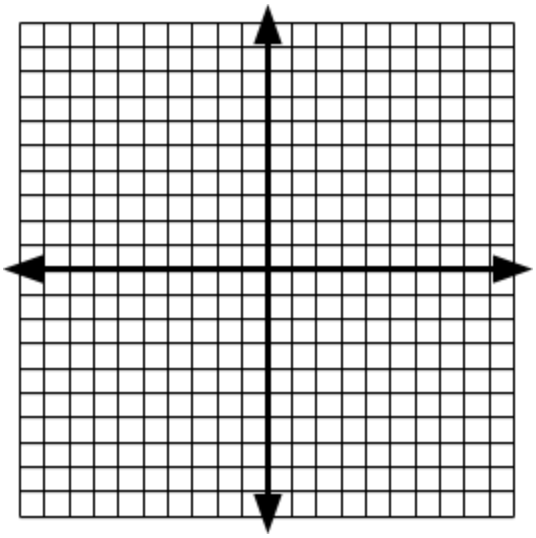
8.5 - Exponential and Logarithmic Graphs

1. Graph the exponential function and its inverse on the grid.

$y = 2^x$ and $y = log_2 x$

x	y
−1	
0	
1	
2	
3	

x	y

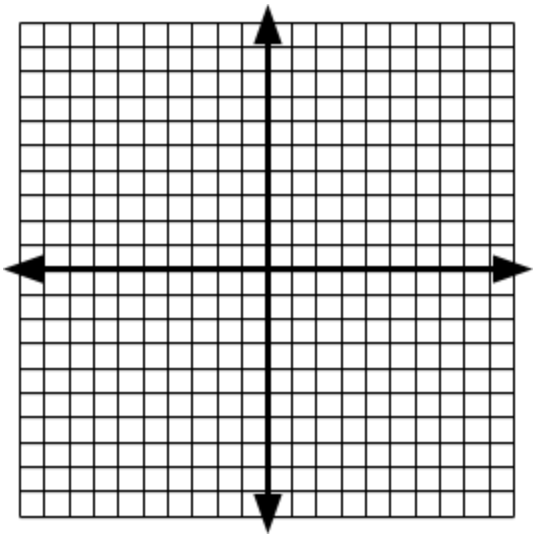


2. Graph the exponential function and its inverse on the grid.

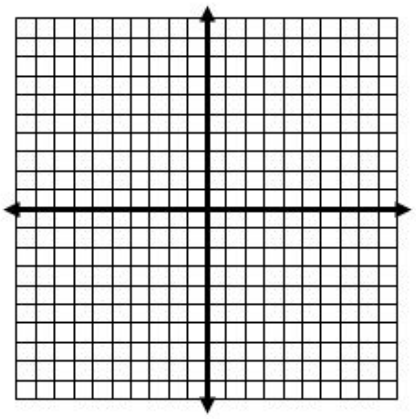
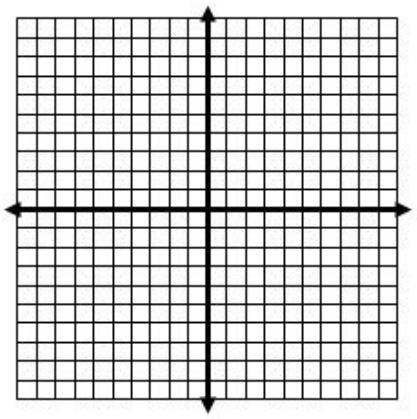
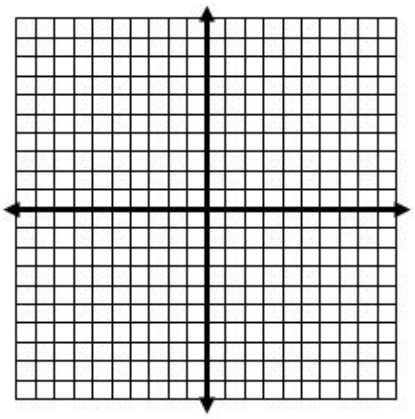
$y = \left(\frac{1}{2}\right)^x$ and $y = log_{\frac{1}{2}} x$

x	y

x	y



Determine the transformations as compared to the base graph, $y = x$. Graph each function on the coordinate planes provided. Determine the domain, range, and asymptotes of each transformation.

3. $y = log\ x\ - 6$	4. $y = \ - log(x + 2)$	5. $y = \frac{1}{2} log\ x$
Transformations:	Transformations:	Transformations:
Asymptote:	Asymptote:	Asymptote:
Domain:	Domain:	Domain:
Range:	Range:	Range:
		

Solve for x.

6. $2^{x+1} = 3^{8x-3}$

7. $log_8(x + 3) + log_8(2x - 7) = log_8 2x + log_8(x + 1)$

8. $ln\ (2x - 4) - ln\ 3 = 6$

9. $4^{3x} = 3^{x+9}$

8.6 - Growth and Decay

1. A house that costs $200,000 will appreciate in value by 3% each year. Find the value of the house at the end of ten years.

2. The most recent virus that is making people ill is a fast multiplying one. On the first day, only 2 virus "bugs" are present. Each day after, the amount of "bugs" triples. Find the amount of "bugs" present by the 5th day.

3. Tobias left a half-eaten banana under his bed. That night, two gnats came to visit the banana. Each night after, there were four times as many gnats. On what night will there be 120 gnats in his room?

4. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 15%. How long until you have 10mg of caffeine in your system?

5. The foundation of your house has about 1,200 termites. The termites grow at a rate of about 2.4% per day. How long until the number of termites has doubled?

6. Ian's new Mercedes cost him $75,000. From the moment he drives if off the lot, it will depreciate in by 20% each year. When will the car with worth $50,000?

7. In 1985, there were 285 cell phone subscribers in the small town of Centerville. The number of subscribers increased by 75% per year after 1985. How many cell phone subscribers were in Centerville in 1994?

8. You have inherited land that was purchased in 1960. The value of the land increased by approximately 5% per year. What amount was the land purchased for if it is worth $360,000 in the year 2011?

8.7- Compound Interest

1. How long does it take $1425 to triple if it is invested at 4% interest compounded quarterly?

2. At what interest rate compounded continuously would you have to invest $350 to have $800 available in 5 years?

3. What amount must be invested at 5% interest compounded monthly to have $6000 available in 10 years?

4. At what interest rate compounded monthly would you have to invest $1300 to double your money in 7 years?

5. Emmet deposits $650 in a savings account with 8% interest compounded quarterly. Maggie deposits the same amount in another savings account with 8.2% interest compounded semiannually. If both Emmet and Maggie leave their money in the accounts for 2 years, which account will have the greater final balance?

6. Hugo deposits $200 in a savings account with 0.3% interest compounded quarterly. Grace deposits the same amount in another savings account with 0.3% interest compounded semiannually. If both Hugo and Grace leave their money in the accounts for 3 years, which account will have the greater final balance?

8.8 - Mixed Applications of Exponents and Logarithms

1. The half-life of Cesium-137 is 30.2 years. If the initial mass of the sample is 15kg, how much will remain after 151 years?

2. Myerstopia has a population of 6000 people. After 10 years, the population has increased exponentially to 7183 people. How many people will be living in Myerstopia after 23 years?

3. A loaf of bread that currently sells for $3.60 sold for $3.10 six years ago. At what rate has the cost of the loaf of bread increased each year?

4. A diamond ring currently work $3000 increases in value by 8% each year. What is the value of the ring in 50 years?

5. Carbon-14 has a half-life of 5700 years. Find the age of a sample at which 22% of the radioactive nuclei originally present have decayed.

6. A population of 100 rabbits are living on an island. After one year, the rabbit population has increased exponentially to 500 rabbits. What will the population be after another 6 months?

7. Carbon-14 has a half-life of 5700 years. Consider a sample of fossilized wood that when alive would have contained 24g of C-14. It now contains 1.5g. How old is the sample?

8. The half-life of a radioactive element is 133 days, but your sample will not be useful to you after 65% of the radioactive nuclei originally present have disintegrated. About how many days can you use the sample?