Logarithms — Finding the logarithm

Name: _____ Date: _____

Work out each logarithm.

1. $\log_{10} \frac{1}{100} = -2$

$10^2 = 100$
$10^{-2} = 1/100$
$= -2$

2. $\log_2 \frac{1}{4} =$ _____

3. $\log_3 243 =$ _____

4. $\log_2 \frac{1}{32} =$ _____

5. $\log_2 8192 =$ _____

6. $\log_6 46656 =$ _____

7. $\log_4 \frac{1}{256} =$ _____

8. $\log_5 15625 =$ _____

9. $\log_2 256 =$ _____

10. $\log_7 \frac{1}{2401} =$ _____

Logarithms — Finding the number

Name: _____ Date: _____

Find the missing number in each logarithm.

1. $\log_2 \underline{4} = 2$

   $2^2 = 4$

2. $\log_7 \_\_\_\_ = 3$

3. $\log_{10} \_\_\_\_ = 4$

4. $\log_2 \_\_\_\_ = 14$

5. $\log_3 \_\_\_\_ = 6$

6. $\log_2 \_\_\_\_ = 7$

7. $\log_9 \_\_\_\_ = 2$

8. $\log_3 \_\_\_\_ = 2$

9. $\log_7 \_\_\_\_ = 4$

10. $\log_9 \_\_\_\_ = 5$

Log laws — The product law

Name: _____ Date: _____

Write each sum as one logarithm.

1 $\log_5 2 + \log_5 11 = \log_5 22$

$\log_5 m + \log_5 n = \log_5 (m \times n)$
$2 \times 11 = 22$
$= \log_5 22$

2 $\log_3 7 + \log_3 11 = \log_3$ ____

3 $\log_{10} 6 + \log_{10} 10 = \log_{10}$ ____

4 $\log_3 3 + \log_3 5 = \log_3$ ____

5 $\log_5 2 + \log_5 6 = \log_5$ ____

6 $\log_2 6 + \log_2 11 = \log_2$ ____

7 $\log_2 4 + \log_2 6 = \log_2$ ____

8 $\log_{10} 4 + \log_{10} 5 = \log_{10}$ ____

9 $\log_{10} 11 + \log_{10} 11 = \log_{10}$ ____

10 $\log_2 5 + \log_2 7 = \log_2$ ____

Log laws — The quotient law

Name: _____ Date: _____

Write each difference as one logarithm.

1 $\log_3 21 - \log_3 3 = \log_3 \underline{7}$

$\log_3 m - \log_3 n = \log_3 (m \div n)$
$21 \div 3 = 7$
$= \log_3 7$

2 $\log_5 90 - \log_5 9 = \log_5 \_\_\_\_$

3 $\log_3 36 - \log_3 12 = \log_3 \_\_\_\_$

4 $\log_{10} 22 - \log_{10} 11 = \log_{10} \_\_\_\_$

5 $\log_{10} 64 - \log_{10} 8 = \log_{10} \_\_\_\_$

6 $\log_2 33 - \log_2 3 = \log_2 \_\_\_\_$

7 $\log_{10} 40 - \log_{10} 10 = \log_{10} \_\_\_\_$

8 $\log_{10} 108 - \log_{10} 9 = \log_{10} \_\_\_\_$

9 $\log_5 32 - \log_5 4 = \log_5 \_\_\_\_$

10 $\log_{10} 48 - \log_{10} 4 = \log_{10} \_\_\_\_$

Log laws — The power law

Name: _____ Date: _____

Write each of these as one logarithm.

1 $4 \log_5 3 = \log_5 81$

$k \log_5 m = \log_5 (m^k)$

$3^4 = 81$

$= \log_5 81$

2 $2 \log_3 7 = \log_3$ ____

3 $2 \log_5 8 = \log_5$ ____

4 $2 \log_3 12 = \log_3$ ____

5 $2 \log_3 6 = \log_3$ ____

6 $2 \log_2 6 = \log_2$ ____

7 $3 \log_{10} 3 = \log_{10}$ ____

8 $2 \log_3 2 = \log_3$ ____

9 $2 \log_{10} 2 = \log_{10}$ ____

10 $3 \log_3 2 = \log_3$ ____

Power Pack · Logarithms — Answer key

The logarithm

1. $\log_{10} 1/100 = -2$
2. $\log_2 1/4 = -2$
3. $\log_3 243 = 5$
4. $\log_2 1/32 = -5$
5. $\log_2 8192 = 13$
6. $\log_6 46656 = 6$
7. $\log_4 1/256 = -4$
8. $\log_5 15625 = 6$
9. $\log_2 256 = 8$
10. $\log_7 1/2401 = -4$

The number

1. $\log_2 4 = 2$
2. $\log_7 343 = 3$
3. $\log_{10} 10000 = 4$
4. $\log_2 16384 = 14$
5. $\log_3 729 = 6$
6. $\log_2 128 = 7$
7. $\log_9 81 = 2$
8. $\log_3 9 = 2$
9. $\log_7 2401 = 4$
10. $\log_9 59049 = 5$

A sum → a product

1. $\log_5 2 + \log_5 11 = \log_5 22$
2. $\log_3 7 + \log_3 11 = \log_3 77$
3. $\log_{10} 6 + \log_{10} 10 = \log_{10} 60$
4. $\log_3 3 + \log_3 5 = \log_3 15$
5. $\log_5 2 + \log_5 6 = \log_5 12$
6. $\log_2 6 + \log_2 11 = \log_2 66$
7. $\log_2 4 + \log_2 6 = \log_2 24$
8. $\log_{10} 4 + \log_{10} 5 = \log_{10} 20$
9. $\log_{10} 11 + \log_{10} 11 = \log_{10} 121$
10. $\log_2 5 + \log_2 7 = \log_2 35$

A difference → a quotient

1. $\log_3 21 - \log_3 3 = \log_3 7$
2. $\log_5 90 - \log_5 9 = \log_5 10$
3. $\log_3 36 - \log_3 12 = \log_3 3$, and that is 1
4. $\log_{10} 22 - \log_{10} 11 = \log_{10} 2$
5. $\log_{10} 64 - \log_{10} 8 = \log_{10} 8$
6. $\log_2 33 - \log_2 3 = \log_2 11$
7. $\log_{10} 40 - \log_{10} 10 = \log_{10} 4$
8. $\log_{10} 108 - \log_{10} 9 = \log_{10} 12$
9. $\log_5 32 - \log_5 4 = \log_5 8$
10. $\log_{10} 48 - \log_{10} 4 = \log_{10} 12$

A multiple → a power

1. $4 \log_5 3 = \log_5 81$
2. $2 \log_3 7 = \log_3 49$
3. $2 \log_5 8 = \log_5 64$
4. $2 \log_3 12 = \log_3 144$
5. $2 \log_3 6 = \log_3 36$
6. $2 \log_2 6 = \log_2 36$
7. $3 \log_{10} 3 = \log_{10} 27$
8. $2 \log_3 2 = \log_3 4$
9. $2 \log_{10} 2 = \log_{10} 4$
10. $3 \log_3 2 = \log_3 8$