Home: 92
p375 44-85

Date: 3/31
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## Bell Work

Directions: Please factor the following.



1. $200x^2-18$

$2(100x^2-9)$

$2(10x+3)(10x-3)$

2. $4x^2-36x+81$

$(2x-9)(2x-9)$

3. $2x^2-x-36$

$(2x-9)(x+4)$

4. $x^4-16$

$(x^2-4)(x^2+4)$

$(x+2)(x-2)(x^2+4)$

## Objectives

1. The students will solve log equations that have a base of 10.

2. The students will find the missing variable in equations written in logarithmic form.

## Fill in the blanks

$7^3$ $3^2$ $5^1$

1. A positive whole number base with a positive whole number exponent will yield a positive whole number "to get".

$7^{-3}$

2. A positive whole number base with a negative whole number exponent will yield a positive fraction "to get".

3. A positive whole number base with a postive fraction ~~whole~~ number exponent will yield a root "to get".

$7^{1/2}$ $\sqrt{7}$

| Exponent | Base 1 | Base 2 | Base 3 | Base 4 | Base 5 | Base 6 | Base 7 |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 1 | 4 | 9 | 16 | 25 | 36 | 49 |
| 3 | 1 | 8 | 27 | 64 | 125 | 216 | 343 |
| 4 | 1 | 16 | 81 | 256 | 625 | 1296 | 2401 |
| 5 | 1 | 32 | 243 | 1024 | 3125 | 7776 | 16807 |
| 6 | 1 | 64 | 729 | 4096 | 15625 | 46656 | 117649 |

$\log_7 16807 = 5$

| Exponent | Base 1 | Base 2 | Base 3 | Base 4 | Base 5 | Base 6 | Base 7 |
|---|---|---|---|---|---|---|---|
| -1 | $\frac{1}{1}$ | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{4}$ | $\frac{1}{5}$ | $\frac{1}{6}$ | $\frac{1}{7}$ |
| -2 | $\frac{1}{1}$ | $\frac{1}{4}$ | $\frac{1}{9}$ | $\frac{1}{16}$ | $\frac{1}{25}$ | $\frac{1}{36}$ | $\frac{1}{49}$ |
| -3 | $\frac{1}{1}$ | $\frac{1}{8}$ | $\frac{1}{27}$ | $\frac{1}{64}$ | $\frac{1}{125}$ | $\frac{1}{216}$ | $\frac{1}{343}$ |
| -4 | $\frac{1}{1}$ | $\frac{1}{16}$ | $\frac{1}{81}$ | $\frac{1}{256}$ | $\frac{1}{625}$ | $\frac{1}{1296}$ | $\frac{1}{2401}$ |
| -5 | $\frac{1}{1}$ | $\frac{1}{32}$ | $\frac{1}{243}$ | $\frac{1}{1024}$ | $\frac{1}{3125}$ | $\frac{1}{7776}$ | $\frac{1}{16807}$ |
| -6 | $\frac{1}{1}$ | $\frac{1}{64}$ | $\frac{1}{729}$ | $\frac{1}{4096}$ | $\frac{1}{15625}$ | $\frac{1}{46656}$ | $\frac{1}{117649}$ |

$\log_5 \frac{1}{25} = -2$.

| Exponent | Base 1 | Base 4 | Base 9 | Base 16 | Base 25 | Base 36 | Base 49 |
|---|---|---|---|---|---|---|---|
| $\sqrt{\ }$ 1/2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | $\log_{36} 6 = 1/2$ |
| $\sqrt[3]{\ }$ | Base 1 | Base 8 | Base 27 | Base 64 | Base 125 | Base 216 | Base 343 |
| $\sqrt[3]{\ }$ 1/3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | $\log_{343} 7 = 1/3$ |

$81^{1/3}$

## Solving Log Equations with Base 10

What undoes a variable in the exponent?

Taking the log of both sides.

$10^x=40$

$\log_{10} 10^x = \log_{10} 40$

$x = \log_{10} 40$

$x \approx 1.602$

$10^x=.78$

$\log_{10} 10^x = \log_{10} .78$

$x = \log_{10} .78$

$x \approx -.108$

## Good Strategies When Working with Logs

| | Given | Do |
|---|---|---|
| 1. Writing the expression in exponential form | $\log_2 8 = x$ | $2^x = 8$ $\boxed{3}$ |
| 2. Referring to your Log/Base Charts | $\log_{343} 7 =$ | $343^x = 7$ <br> $x = 1/3$ |
| 3. Use your calculator for base 10 problems. | $\log_{10} 390$ | $10^x = 390$ <br> $\log_{10} 10^x = \log_{10} 390$ <br> $x = \log_{10} 390$ <br> $x \approx 2.591$ |

## HW Problems

**Solve each equation for *x*. Round your answers to the nearest hundredth.**

**44.** $10^x = 31$

**45.** $10^x = 12$

**46.** $10^x = 7210$

**47.** $10^x = 3588$

**48.** $10^x = 1.498$

**49.** $10^x = 1.89$

**50.** $10^x = 0.0054$

**51.** $10^x = 0.035$

**52.** $10^x = \frac{3}{49}$

**53.** $10^x = \frac{1}{1085}$

**54.** $10^x = \sqrt{7.4}$

**55.** $10^x = \frac{1}{\sqrt{500}}$

**Find the value of *v* in each equation.**

**56.** $v = \log_{10} 1000$

**57.** $v = \log_4 64$

**58.** $v = \log_7 343$

**59.** $v = \log_{17} 289$

**60.** $v = \log_3 3$

**61.** $v = \log_7 7$

**62.** $v = \log_{10} 0.001$

**63.** $v = \log_{10} 0.01$

**64.** $v = \log_2 \frac{1}{4}$

**65.** $v = \log_{10} \frac{1}{100}$

**66.** $v = \log_4 1$

**67.** $v = \log_9 1$

**68.** $3 = \log_6 v$

**69.** $2 = \log_7 v$

**70.** $1 = \log_5 v$

**71.** $1 = \log_3 v$

**72.** $\frac{1}{2} = \log_9 v$

**73.** $\frac{1}{3} = \log_8 v$

**74.** $-2 = \log_6 v$

**75.** $-3 = \log_4 v$

**76.** $0 = \log_{13} v$

**77.** $0 = \log_2 v$

**78.** $\log_v 16 = 2$

**79.** $\log_v 125 = 3$

**80.** $\log_v 9 = \frac{1}{2}$

**81.** $\log_v 4 = \frac{1}{3}$

**82.** $\log_v \frac{1}{16} = -4$

**83.** $\log_v \frac{1}{8} = -3$

**84.** $\log_v 216 = 3$

**85.** $\log_v 243 = 5$

**Part Three**

Directions: Please solve the following using the indicated method. Give exact ans
only.

$x(x+2)$

$:+3)^2 = 32$ Extract the roots

$x+3=\pm\sqrt{32}$

$\sqrt{32}$

$\sqrt{16\cdot 2}$

$4\sqrt{2}$

$x+3=\pm 4\sqrt{2}$

$x=-3\pm 4\sqrt{2}$

2. $x^2+2x=15$ Zero-product property

$x^2+2x-15=0$

$(x+5)(x-3)=0$

$x+5=0 \quad x-3=0$

$x=-5 \quad ? \quad x=3$

**Part Four**

Directions: Determine the roots of the following functions. Give exact answers or