

Name:
Algebra 2

Date:

**All types of Log Equations
(including type with logs on both sides of =)**

Solve the following equations. You should only need your calculators for the **'ed ones. Don't forget to check for extraneous solutions.

a. $\log x = \log 15$

b. $\log_{1/2} x - 2\log_{1/2} 3 = 2$

c. $\log_3 2x - \log_3 5 = 2\log_3 8$

d. $\log_4 x + \log_4 (x - 6) = 2$

e. $2\log_3 3x = 3$

f. $\log_4 2x - (\log_4 3 + \log_4 5) = 0$

g. $3\log x = 2 + \log 2$

h. $\log_5 2x = \log_5 7 + 2\log_5 3$

i. $2\ln x = \ln 16$

j. $\log_{16} (x - 3) = 0.5 - \log_{16} x$

k. $2^x - 1 = 7$

l. **$2^x - 1 = 17$**

m. **$2^{x-5} = 17$**

n. $\log_3 x + \log_3 (x^2 + 3x - 3) = 2$

o. $\frac{1}{3}\log(x - 3) = \log 6 - \log 3$

p. **$5 \cdot 1.09^x = 7.8$**

q. $2\log x - 3\log 2 = 2 - \log 5$

r. $\frac{1}{2}\log_6 x - \log_6 2 = 2\log_6 3$

s. $\log_8 3 + \frac{1}{2}\log_8 x = \log_8 (x + 2)$

t. **$1.18^x - 3 = 2.5$**

u. $2\log_5 3x - 3\log_5 2 = 2\log_5 3$

v. $\log_3 2x + \log_3 5 = -2$

w. $27^x \cdot 3^{x^2} = \frac{1}{9}$

x. $\log_4 2x + 2\log_4 3 = -\log_4 5$

y. **$(x + 2)^5 = 37$**

Solve the following word problems. Calculators are OK, but **you should not use calc-intersect**; use logarithms instead.

2. The population of some town is 12,500. It has been growing at 4% per year and expected to continue to grow at this rate.
- What was its population 6 years ago?
 - What do you expect its population to be in 15 years?
 - When will its population reach 19,000?
 - When was its population 7,500?
 - How many years will it take its population to triple?
 - Instead of growing at 4% per year going forward, it grew faster. Its population reached 17,000 in 6 years. What was its annual growth rate?
3. How long will it take an investment to double in value if it increases by 15% per year?
4. Value of a car is best modeled by an exponential function because it falls by approximately the same percentage amount each year. A new car is worth \$25,000. Seven years later it is worth \$8,800.
- By what percentage did the car's value fall each year?
 - How old is the car when its value is \$2000?

Answers

- 1a. 15 b. $\frac{9}{4}$ c. 160 d. 8 e. $\sqrt{3}$ f. 7.5 g. $\sqrt[3]{200}$
h. 31.5 i. 4 (not -4) j. 4 k. 3 l. 4.17 m. 9.09
n. $\sqrt{3}$ ($-\sqrt{3}$ & -3 are extran) o. 11 p. 5.16 q. $4\sqrt{10}$ r. 324 s. 1, 4
t. 10.30 u. $2\sqrt{2}$ v. $\frac{1}{90}$ w. -1, -2 x. $\frac{1}{90}$ again y. 0.059
- 2a. 9879 b. 22512 c. 10.68 yrs d. 13.02 yrs ago e. 28.01 f. 5.26%
3. 4.96 yrs
- 4a. 13.9% b. 16.9 years