

Directions: Solve each equation. Check for extraneous solutions.

1. $\log_3(3x - 11) = \log_3(25 - x)$

$$3x - 11 = 25 - x$$

$$4x = 36$$

$$x = 9$$

2. $\log_7(4n - 7) = \log_7(-3n)$

$$4n - 7 = -3n$$

$$7n = 7$$

$$n = 1$$

no solution

3. $\log_2 75 = \log_2 3 + \log_2(2y - 1)$

$$\log_2 75 = \log_2 3(2y - 1)$$

$$75 = 6y - 3$$

$$78 = 6y$$

$$y = 13$$

4. $2 \cdot \log m = \log 36$

$$\log m^2 = \log 36$$

$$m^2 = 36$$

$$m = \pm 6$$

$$m = 6$$

5. $\log_4 108 - \log_4 9 = \log_4(7a - 9)$

$$\log_4 \frac{108}{9} = \log_4 7a - 9$$

$$12 = 7a - 9$$

$$21 = 7a$$

$$a = 3$$

6. $\frac{1}{3} \cdot \log_5 64 = \log_5 8 + \log_5 p$

$$\log_5 \sqrt[3]{64} = \log_5 8p$$

$$4 = 8p$$

$$p = \frac{1}{2}$$

7. $\log(w^2 + 21) = \log(10w)$

$$w^2 + 21 = 10w$$

$$w^2 - 10w + 21 = 0$$

$$(w - 7)(w - 3) = 0$$

$$w = 7 \text{ or } w = 3$$

8. $\log_2(2x) + \log_2(x - 7) = \log_2(4x)$

$$\log_2 2x(x - 7) = \log_2 4x$$

$$2x^2 - 14x = 4x$$

$$2x^2 - 18x = 0$$

$$2x(x - 9) = 0$$

$$x \neq 0 \text{ or } x = 9$$

9. $\log_4(2m^3 - 14m^2) - \log_4(2m) = \log_4 8$

$$\log_4 \frac{2m^3 - 14m^2}{2m} = \log_4 8$$

$$m^2 - 7m = 8$$

$$m^2 - 7m - 8 = 0$$

$$(m-8)(m+1) = 0$$

$$(m=8) \quad m=-1$$

10. $2 \cdot \log(x-3) = \log 25$

$$\log(x-3)^2 = \log 25$$

$$(x-3)^2 = 25$$

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

$$(x=8) \quad x=-2$$

11. $\log_3(2x-7) = 4$

$$3^4 = 2x-7$$

$$81 = 2x-7$$

$$88 = 2x$$

$$x = 44$$

12. $\log_8(28k-20) + 15 = 18$

$$\log_8 28k-20 = 3$$

$$8^3 = 28k-20$$

$$512 = 28k-20$$

$$532 = 28k$$

$$k = 19$$

12. $\log_9(15-4n) = \frac{1}{2}$

$$\sqrt{9} = 15-4n$$

$$3 = 15-4n$$

$$-12 = -4n$$

$$n = 3$$

14. $\log_2 4 + \log_2(c-9) = 5$

$$\log_2 4(c-9) = 5$$

$$2^5 = 4c-36$$

$$32 = 4c-36$$

$$68 = 4c$$

$$c = 17$$

15. $2 \cdot \log_4 k = 4$

$$\log_4 k^2 = 4$$

$$4^4 = k^2$$

$$256 = k^2$$

$$k = \pm 16$$

$$k = 16$$

16. $\log_8(p^2+15) = 2$

$$8^2 = p^2+15$$

$$64 = p^2+15$$

$$49 = p^2$$

$$p = \pm 7$$