

**STATION 1****DO NOT WRITE ON  
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Solve each of the following equations for x.

1.  $3^{x+2} = 27^{x-2}$

2.  $9^{x-4} = 148$

3.  $\log_8(3x + 2) = \log_8(5x - 8)$

4.  $0.5 = \log_{16}(3x - 2)$

5.  $\log_4(2x) + \log_4(x - 4) = 3$



#16  $2x+4 = 4x-6$   
 $\downarrow$   
 $x=5$

#17  $4^{x-1} = 8^{x-4}$   
 $\log_2 4^{x-1} = \log_2 8^{x-4}$   
 $(x-1) \log_2 4 = (x-4) \log_2 8$   
 $(x-1) \cdot 2 = (x-4) \cdot 3$   
 $\downarrow$   
 $x=10$

$\rightarrow$  OR  $\log 4^{x-1} = \log 8^{x-4}$   
 $(x-1) \log 4 = (x-4) \log 8$   
 $(x-1) \cdot 0.602 = (x-4) \cdot 0.903$   
 $\downarrow$   
 $x=10$

#18  $\log(2x-6) + \log(5x) = 2$   
 $\log 10x^2 - 30x = 2$

$$10^2 = 10x^2 - 30x$$

$$100 = 10x^2 - 30x$$

$$0 = 10x^2 - 30x + 100$$

$$0 = x^2 - 3x - 10$$

$$0 = (x-5)(x+2)$$

$$5 \quad -2$$

#19  $2^5 = 3x+2$   
 $32 = 3x+2$   
 $\downarrow$   
 $x=10$

#20  $5^{2x} = 350$

$$\log_5 350 = 2x$$

$$3.640 = 2x$$

$$1.820 = x$$



## **STATION 2**

Solve each of the following equations for  $x$ .

6.  $8 = \log_3(5x + 6)$

7.  $\log_2(6x + 5) = \log_2(3x + 8)$

8.  $2^{2x+2} = 16^{x-2}$

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9.  $3^{5x} = 12,317$

10.  $\log_6(3x) + \log_6(x + 1) = 2$



$$\textcircled{\#1} \quad 3^{x+2} = 27^{x-2}$$

OR

$$\textcircled{\#1} \quad 3^{x+2} = 27^{x-2}$$

$$\log_3 3^{x+2} = \log_3 27^{x-2}$$

$$\log 3^{x+2} = \log 27^{x-2}$$

$$(x+2) \log_3 3 = (x-2) \log_3 27$$

$$(x+2) \log_3 = (x-2) \log 27$$

$$(x+2) \cdot 1 = (x-2) \cdot 3$$

$$(x+2) \cdot 477 = (x-2) \cdot 1.431$$

$$x+2 = 3x-6$$

$$\begin{array}{r} .477x + .954 = 1.431x - 2.862 \\ -.477x \quad \quad \quad -.477x \\ \hline .954 = .954x - 2.862 \end{array}$$

$$\begin{array}{c} \downarrow \\ x=4 \end{array}$$

$$.954 = .954x - 2.862$$

$$+ 2.862 \quad \quad \quad + 2.862$$

$$3.816 = .954x$$

$$4 = x$$

$$\textcircled{\#2} \quad 9^{x-4} = 148$$

$$\textcircled{\#3} \quad \log_8 (3x+2) = \log_8 (5x-8)$$

$$\log_9 148 = x-4$$

$$2.274 = x-4$$

$$6.274 = x$$

$$3x+2 = 5x-8$$

$$\begin{array}{c} \downarrow \\ x=5 \end{array}$$

$$\textcircled{\#4} \quad 16^{.5} = 3x-2$$

$$\textcircled{\#5} \quad \log_4 (2x) + \log_4 (x-4) = 3$$

$$4 = 3x-2$$

$$\log_4 (2x^2 - 8x) = 3$$

$$\begin{array}{c} \downarrow \\ x=2 \end{array}$$

$$4^3 = 2x^2 - 8x$$

$$64 = 2x^2 - 8x$$

$$0 = 2x^2 - 8x - 64$$

$$0 = x^2 - 4x - 32$$

$$0 = (x-8)(x+4)$$

8

~~-4~~



## **STATION 3**

Solve each of the following equations for  $x$ .

11.  $20 = 3^{x+1}$

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12.  $\log_7(4x + 3) = \log_7(5x - 26)$

13.  $27^x = 9^{x+2}$

14.  $3 = \log_3(x - 2) + \log_3(9x)$

15.  $\log_6(4x + 100) = 4$



#6

$$3^8 = 5^x + 6$$

$$6561 = 5^x + 6$$

$$x = 1311$$

#9

$$3^{5^x} = 12,317$$

$$\log_3 12,317 = 5^x$$

$$8.573 = 5^x$$

$$1.715 \approx x$$

#7

$$6^x + 5 = 3^x + 8$$

$$x = 1$$

#8

$$2^{2x+2} = 16^{x-2}$$

$$\log_2 2^{2x+2} = \log_2 16^{x-2}$$

$$(2x+2) \log_2 2 = (x-2) \log_2 16$$

$$(2x+2) \cdot 1 = (x-2) \cdot 4$$

$$2x+2 = 4x-8$$

$$x = 5$$

#10

$$\log_6 3^x + \log_6 x + 1 = 2$$

$$\log_6 (3^x + 3x) = 2$$

$$6^2 = 3^x + 3x$$

$$36 = 3^x + 3x$$

$$0 = 3^x + 3x - 36$$

$$0 = x^2 + x - 12$$

$$0 = (x+4)(x-3)$$

$$x = 3$$



## **STATION 4**

Solve each of the following equations for x.

16.  $\ln(2x + 4) = \ln(4x - 6)$

17.  $4^{x-1} = 8^{x-4}$

18.  $2 = \log(2x - 6) + \log(5x)$

19.  $\log_2(3x + 2) = 5$

20.  $5^{2x} = 350$



#11

$$\log_3 20 = x+1$$

$$2.727 = x+1$$

$$1.727 = x$$

#12

$$4x+3 = 5x-26$$



$$29 = x$$

#13

$$27^x = 9^{x+2}$$

OR

$$\log 27^x = \log 9^{x+2}$$

$$\log_3 27^x = \log_3 9^{x+2}$$

$$(x) \log 27 = (x+2) \log 9$$

$$x \cdot 1.431 = (x+2) \cdot .954$$

$$(x) \log_3 27 = (x+2) \log_3 9$$



$$x = 4$$

$$x \cdot 3 = (x+2) \cdot 2$$

$$3x = 2x+4$$

$$x = 4$$

#14

$$\log_3 (x-2) + \log_3 (9x) = 3$$

$$\log_3 (9x^2 - 18x) = 3$$

$$3^3 = 9x^2 - 18x$$

$$27 = 9x^2 - 18x$$

$$0 = 9x^2 - 18x - 27$$

$$0 = x^2 - 2x - 3$$

$$0 = (x-3)(x+1)$$

$$3 \rightarrow x$$

#15

$$6^4 = 4x+100$$

$$1296 = 4x+100$$

$$1196 = 4x$$

$$299 = x$$