## Problems for Gateway #3:  Solving Exponential Equations

**1.** The value of $x$ that solves the equation:

$$3 \cdot 2^x = 17$$

is:

**(a)** $\quad x = \dfrac{\log(3)}{\log(2)}$                      **(b)** $\quad x = \dfrac{\log\left(\frac{17}{3}\right)}{\log(2)}$

**(c)** $\quad x = \dfrac{\log(2)}{\log(17)}$                      **(d)** $\quad x = \dfrac{\log(17)}{\log(2)}$

**(e)** $\quad x = \dfrac{\log(17) + \log(3)}{2}$

**2.** The value of $x$ that solves the equation:

$$9^{2x} = 11$$

is:

**(a)** $\quad x = \log(11) - \log(9)$             **(b)** $\quad x = \dfrac{\log(11)}{\log(9)}$

**(c)** $\quad x = \dfrac{\log\left(\frac{9}{2}\right)}{\log(11)}$                   **(d)** $\quad x = \dfrac{\log(11)}{2 \cdot \log(9)}$

**(e)** $\quad x = \dfrac{\log\left(\frac{11}{9}\right)}{\log(2)}$

**3.** The value of $x$ that solves the equation:

$$4 \cdot 7^x = 3$$

is:

**(a)** $\quad x = \dfrac{\log(3) - \log(7)}{4}$           **(b)** $\quad x = \dfrac{\log\left(\frac{4}{7}\right)}{\log(3)}$

**(c)** $\quad x = \dfrac{\log\left(\frac{3}{4}\right)}{\log(7)}$                   **(d)** $\quad x = \dfrac{\log(7)}{\log(4)}$

**(e)** $\quad x = \dfrac{\log(4)}{\log(3)}$

**4.** The value of $x$ that solves the equation:

$$7 \cdot 4^x = 3$$

is:

(a) $x = \dfrac{\log\left(\frac{7}{3}\right)}{4}$

(b) $x = \dfrac{\log(7) - \log(3)}{4}$

(c) $x = \dfrac{\log\left(\frac{4}{7}\right)}{\log(3)}$

(d) $x = \dfrac{\log(3)}{\log(4)}$

(e) $x = \dfrac{\log\left(\frac{3}{7}\right)}{\log(4)}$

**5.** The value of $x$ that solves the equation:

$$9 \cdot 2^x = 7$$

is:

(a) $x = \dfrac{\log\left(\frac{7}{9}\right)}{\log(2)}$

(b) $x = \dfrac{\log(7)}{\log(2)}$

(c) $x = \dfrac{\log(9)}{\log(2)}$

(d) $x = \dfrac{\log(7) - \log(9)}{2}$

(e) $x = \dfrac{\log\left(\frac{9}{7}\right)}{\log(2)}$

**6.** The value of $x$ that solves the equation:

$$4 \cdot 3^{2x} = 6$$

is:

(a) $x = \dfrac{3 \cdot \log(4)}{\log(6)}$

(b) $x = \dfrac{2 \cdot \log\left(\frac{6}{4}\right)}{\log(3)}$

(c) $x = \dfrac{\log\left(\frac{6}{4}\right)}{2 \cdot \log(3)}$

(d) $x = \dfrac{\log\left(\frac{3}{2}\right)}{\log\left(\frac{6}{4}\right)}$

(e) $x = \dfrac{\log\left(\frac{6}{4}\right) - \log(3)}{2}$

**7.** The value of $x$ that solves the equation:

$$2 \cdot 7^{\frac{1}{2}x} = 9$$

is:

**(a)** $x = \dfrac{\log(7)}{2 \cdot \log(2)}$

**(b)** $x = \dfrac{2 \cdot \log\left(\frac{9}{2}\right)}{\log(7)}$

**(c)** $x = \dfrac{2 \cdot \log(9)}{\log(7)}$

**(d)** $x = \dfrac{\log(9) - \log(7)}{\log(2)} - \dfrac{1}{2}$

**(e)** $x = \dfrac{\log\left(\frac{9}{2}\right)}{\log(2)} - \log(7)$

**8.** The value of $x$ that solves the equation:

$$3 \cdot 6^{\frac{1}{2}x} = 8$$

is:

**(a)** $x = \dfrac{2 \cdot \log\left(\frac{8}{3}\right)}{\log(6)}$

**(b)** $x = \dfrac{\log(8)}{\log(6)} - 2 \cdot \log(3)$

**(c)** $x = \dfrac{2 \cdot \log(8)}{\log(3)}$

**(d)** $x = \dfrac{\log\left(\frac{6}{8}\right)}{\log(2)}$

**(e)** $x = \dfrac{\log(6)}{3 \cdot \log(8)}$

**9.** The value of $x$ that solves the equation:

$$5 \cdot 5^{\frac{1}{3}x} = 7$$

is:

**(a)** $x = \dfrac{\log(1)}{\log(7)}$

**(b)** $x = \dfrac{3 \cdot \log(7)}{\log(5)}$

**(c)** $x = \dfrac{2 \cdot \log(5) - \log(7)}{3}$

**(d)** $x = \dfrac{3 \cdot \log\left(\frac{7}{5}\right)}{\log(5)}$

**(e)** $x = \dfrac{\log(21)}{\log(25)}$

**10.** The value of $x$ that solves the equation:

$$8 \cdot 3^{7x} = 7$$

is:

**(a)** $x = \dfrac{\log\left(\frac{8}{7}\right)}{\log(21)}$           **(b)** $x = \dfrac{3 \cdot \log(7)}{\log(8)}$

**(c)** $x = \dfrac{\log(56)}{\log(21)}$           **(d)** $x = \dfrac{7 \cdot \log(8)}{3 \cdot \log(7)}$

**(e)** $x = \dfrac{\log\left(\frac{7}{8}\right)}{7 \cdot \log(3)}$

**ANSWERS:**

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|----|----|----|-----|----|----|----|----|
| **1.** | B | **2.** | D | **3.** | C | **4.** | E |
| **5.** | A | **6.** | C | **7.** | B | **8.** | A |
| **9.** | D | **10.** | E | | | | |