

Solving Exponential Equations – Homework

MHF 4U

1. Solve each of the following by matching the base:

(a) $5^x = 3125$	(b) $7^y = 343$	(c) $1024 = 2^x$
(d) $(-2)^x = -128$	(e) $-2^x = -32$	(f) $2^{2x-5} = 1$
(g) $2^{-x} = 256$	(h) $6^{3y+1} = 1$	(i) $27^x = 9^{2x-1}$
(j) $4^{3x-2} = 64$	(k) $2^{-4x} = 32$	(l) $5^{2x-3} + 1 = 2$
(m) $8^{3x-2} = 16^{x+1}$	(n) $2(3^{x-2}) = 54$	(o) $4^{x-2} + 1 = 9$
(p) $2(5^{x-3}) = 50$	(q) $5(4^{3x-5}) = 40$	(r) $63(3^{4-3x}) = 7$

2. Solve each of the following (not able to match the base):

(a) $10^{2x} = 495$	(b) $10^{3x} = 0.473$	(c) $10^{-x} = 31.46$
(d) $7^x = 35.72$	(e) $(0.6)^{4x} = 0.734$	(f) $(3.482)^{-x} = 0.0764$
(g) $12^{2x-3} = 144$	(h) $7^{x+9} = 56$	(i) $5^{3x+4} = 25$
(j) $10^{2x+1} = 95$	(k) $6^{x+5} = 71.4$	(l) $3^{5-2x} = 875$
(m) $2 \times 3^x = 7 \times 5^x$	(n) $12^x = 4 \times 8^{2x}$	(o) $4.6 \times 1.06^{2x+3} = 5 \times 3^x$
(p) $2.67 \times 7.38^x = 9.36^{5x-2}$	(q) $12 \times 6^{2x-1} = 11^{x+3}$	(r) $7 \times 0.43^{2x} = 9 \times 6^{-x}$

Answers:

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|----------|--------------|--------------|-------------------|
| 1. (a) 5 | 2. (a) 1.347 | 3. (a) 1.892 | 3. Evaluate : |
| (b) 3 | (b) -0.1084 | (b) 2.477 | (a) $\log_5 21$ |
| (c) 10 | (c) -1.4978 | (c) 0.656 | (b) $\log_7 124$ |
| (d) 7 | (d) 1.8376 | (d) 1.116 | (c) $\log_6 3.24$ |
| (e) 5 | (e) 0.1513 | | (d) $\log_4 4.7$ |
| (f) 5/2 | (f) 2.0614 | | |
| (g) -8 | (g) 2.5 | | |
| (h) -1/3 | (h) -6.93 | | |
| (i) 2 | (i) -2/3 | | |
| (j) 5/3 | (j) 0.4889 | | |
| (k) -5/4 | (k) -2.6178 | | |
| (l) 3/2 | (l) -0.5831 | | |
| (m) 2 | (m) -2.45 | | |
| (n) 5 | (n) -0.83 | | |
| (o) 7/2 | (o) 0.09 | | |
| (p) 5 | (p) 0.59 | | |
| (q) 13/6 | (q) 5.5 | | |
| (r) 2 | (r) 2.4 | | |

4. Prove:

$$(a) \frac{1}{\log_5 a} + \frac{1}{\log_3 a} = \frac{1}{\log_{15} a}$$

$$(b) \frac{1}{\log_8 a} - \frac{1}{\log_2 a} = \frac{1}{\log_4 a}$$

$$(c) \frac{2}{\log_6 a} = \frac{1}{\log_{36} a}$$

$$(d) \frac{2}{\log_8 a} - \frac{4}{\log_2 a} = \frac{1}{\log_4 a}$$

5. Solve each of the following exponential equations:

$$(a) \frac{8^{2x}}{4^{x-1}} = 2^{x+1}$$

$$(b) 8^{2x} (4^{2x}) = 2^{x+1}$$

$$(c) \frac{(9^{2x-1})(3^{3x})^2}{(27^{x+2})^3} = 81^3$$

$$(d) 8^{\frac{1}{4}} \times \left(\frac{1}{4}\right)^{\frac{x}{2}} = 16^{\frac{3}{4}}$$

6. Solve each of the following exponential equations:

$$(a) 5^{x^2-5x} = 5^{4-2x}$$

$$(b) 3^{x^2+5} = 3^{20-2x}$$

$$(c) 2^{3x^2+4x} = 2^{2x^2+x-2}$$

Answers:

5. (a) $-1/3$ (b) $1/9$ (c) 32 (d) $-9/4$

6. (a) $4, -1$ (b) $-5, 3$ (c) $-2, -1$

A “Log a Rhythm”

