

Exponential and Logarithmic Functions Review

Answer key Final answers only. Try first, then check.

CORE SKILLS

- K1**
- a) $a = 80, b = \frac{1}{4}$
 - b) Decay; $D = (-\infty, \infty), R = (0, \infty)$; asymptote $y = 0$
 - c) $f(-2) = 1280; f\left(\frac{1}{2}\right) = 40$

- K2**
- a) $g(x) = -3(2)^{2(x-3)} + 4; a = -3, k = 2, d = 3, c = 4$
 - b) $y = 4; D = (-\infty, \infty), R = (-\infty, 4)$
 - c) $(4, -8)$; y -intercept $\frac{253}{64} \approx 3.95$

- K3**
- a) $x = 5$
 - b) $x = -\frac{7}{4}$
 - c) $x = 3$

- K4**
- a) $-5; \frac{2}{3}, \frac{1}{2}$
 - b) $x = 5; x = \frac{1}{36}$
 - c) $b = 3; y = 3^x; D = (-\infty, \infty), R = (0, \infty)$

- K5**
- a) 2; 3
 - b) $\log \frac{x^2 \sqrt{y}}{z^3}$
 - c) 2; 3

REAL WORLD

- A1**
- a) $N(t) = 500(2)^{3t}$
 - b) 2 048 000 bacteria
 - c) After about 7.0 h; $N(24) \approx 2.4 \times 10^{24}$, far more than the dish can hold, so the model is valid only for about the first 7 hours: growth must level off.
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- A2**
- a) 60 dB
 - b) $10^{3.6} \approx 3981$ times (about 4000 times)
 - c) $96 + 10 \log 2 \approx 99.0$ dB, not 192 dB
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- A3**
- a) ≈ 32.4 °C
 - b) $t = \frac{12 \log(3/7)}{\log 0.5} \approx 14.7$ minutes
 - c) Never: $(0.5)^{t/12} = -\frac{2}{70}$ has no solution. The tea approaches room temperature, 20 °C (the asymptote), and cannot cool below it.

THINK IT THROUGH

- T1**
- a) $y = -\log_2(x + 3) + 1$
 - b) e.g. $y = \log(5 - x)$, which is $y = \log(-(x - 5))$
 - c) $a = 2, d = -2, c = 3; y = 2 \log_3(x + 2) + 3$
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- T2**
- a) $x = 6$ works: $\log_2 8 + \log_2 2 = 3 + 1 = 4$. $x = -4$ fails: $\log_2(-2)$ is undefined, so it is extraneous.
 - b) Original: $(4, \infty)$. Combined: $(-\infty, -2) \cup (4, \infty)$. The product law widened the domain, so the combined equation accepts $x = -4$.
 - c) At $x = 6$: left side 4, right side $\log_2 10 \approx 3.32$. True only at $x = 2 + \sqrt{10}$.

BOSS LEVEL

- Boss**
- a) 2
 - b) 6
 - c) $x = 16$
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