Stephen and Jordyn

Exponential and Logarithmic Functions
Practice Test Answers
knowledge

1. $m = s^j$ 2. $F = \log_{57} R$

3.

a) $\log_3 729 = 6$ b) $\log_7 16807 = 5$ c) $\log_2 8 = 3$

d) $\log_{997} 1 = \emptyset$ e) $\log_5 125 = 3$ f) $\log_3(-9) = \text{DNE}$

* Can't Log a negative number *

4.

a) $\log_3(81) + \log_3(9)$

$= \log_3(81 \cdot 9)$
$= \log_3(729)$
$= 6$

b) $\log_4 1024 - \log_4 64$

$= \log_4\left(\frac{1024}{64}\right)$
$= \log_4(16)$
$= 2$

c) $\log_2 32 + \log_2 8 - \log_2 4$

$= \log_2\left(\frac{32 \cdot 8}{4}\right)$
$= \log_2(64)$
$= 6$

d) $\log_5 125 + \log_5 25 - \log_5 5$

$= \log_5\left(\frac{125 \cdot 25}{1}\right)$
$= \log_5(3125)$
$= 5$

e) $\log_8 \sqrt[3]{512}$

$= \log_8 (512)^{\frac{1}{3}}$

$= \frac{1}{3} \log_8 512$

$= \frac{1}{3}(3)$

$= \frac{3}{3}$

$= 1$

f) $\log_9 \sqrt{6561}$

$= \log_9 (6561)^{\frac{1}{2}}$

$= \frac{1}{2} \log_9 6561$

$= \frac{1}{2}(4)$

$= \frac{4}{2}$

$= 2$

Communication

1. Logarithmic functions would best represent the number of zombie infested people in an area. This is the case because the infection rates would start slow, then increase rapidly and finally level out.

2. $g(x) = 2\log\left(\frac{1}{4}(x-3)\right) + 4$

- vertical stretch by factor of 2
- horizontal stretch by factor of 4
- horizontal translation 3 units to the right
- vertical translation 4 units up

Exponential and Logarithmic Functions
Thinking / Inquiry (Answers)

1. a) Let V represent gold value
Let t represent time (in years)
$V(t) = 1000 \times 1.005^t$

b) $V(18) = 1000 \times 1.005^{(17)}$
$V(17) = 1088.5\$$

∴ the gold (1kg) would be worth 1088.50$ US today

c) $V(t) = [(15)(1000)] \times 1.005^t$
$V(t) = 15000 \times 1.005^t$
$V(30) = 15000 \times 1.005^{(30)}$
$V(30) = 17421\$$

∴ 15 kg in 2030 would be worth 17421$

2. a) $t = -(\log(\frac{T-45}{70}) \div \log(1.1))$

$t = -(\log(\frac{(65)-45}{70}) \div \log(1.1))$

$t = 4.25$ min

∴ it takes 4.25 min. to cool from 65°C

b) $3 = -(\log(\frac{T-45}{30}) \div \log(1.1))$
$-3 = \log(\frac{T-45}{30})$
$-0.124 = \log(\frac{T-45}{30})$
$10^{-0.124} = \frac{T-45}{30}$
$T = 67.5°C$

∴ the temperature was 67.5°C if it took 3min

c) $330 - 273$

$= 57°C$

$t = -(\log(\frac{(57)-45}{30}) \div \log(0.1))$

$t = 9.6$ min

$\therefore$ it takes 9.6 min to cool from 330°C

Exponential and Logarithmic Application (Answers)

1. a) $\log_5(8a+3) + \log_5(a-4) = 8$

$\log_5(8a^2 + 3a - 32a - 12) = 8$

$8a^2 - 29a - 12 = 5^8$

$8a^2 - 29a - 390637 = 0$

$= \frac{29 \pm \sqrt{(-29)^2 - 4(8)(-390637)}}{2(8)}$

$= \frac{29 \pm \sqrt{12501225}}{16}$

$= \frac{29 + 3535.7}{16}$ or $\frac{29 - 3535.7}{16}$

$= (222.8)$ $= -219.32$

not possible

$\therefore a = 222.8$

b) $\log_j(s+4) - \log_j(5s) = \log_j(s-6)$

$\log_j(s+4) - \log_j(5s) - \log_j(s-6) = 0$

$\log_j\left(\frac{(s+4)(s-6)}{5s}\right) = 0$

$\log_j\left(\frac{s^2 - 2s - 24}{5s}\right) = 0$

$\frac{s^2 - 2s - 24}{5s} = j^0 = 1$

$$\frac{s^2 - 2s - 24}{5s} = 1$$

$$s^2 - 2s - 24 = 5s$$

$$s^2 - 7s - 24 = 0$$

$$= \frac{7 \pm \sqrt{-7^2 - 4(1)(-24)}}{2(1)}$$

$$= \frac{7 \pm \sqrt{145}}{2}$$

$$= \frac{7 + 12.04}{2} \quad \text{or} \quad \frac{7 - 12.04}{2}$$

$$= 9.52 \quad \text{or} \quad -2.52$$

↑ not possible

$\therefore s = 9.52$

2. $B_A(t) = B_B(t)$

$$1000 \times 1.05^t = 5090 \times 1.003^t$$

$$\left(\frac{1.05}{1.003}\right)^t = \frac{5000}{1000}$$

$$1.047^t = 5$$

$$t \log 1.047 = \log 5$$

$$t = \frac{\log 5}{\log 1.047}$$

$$t = 35.04$$

$\therefore$ Bacteria A and B are equal after 35 hours