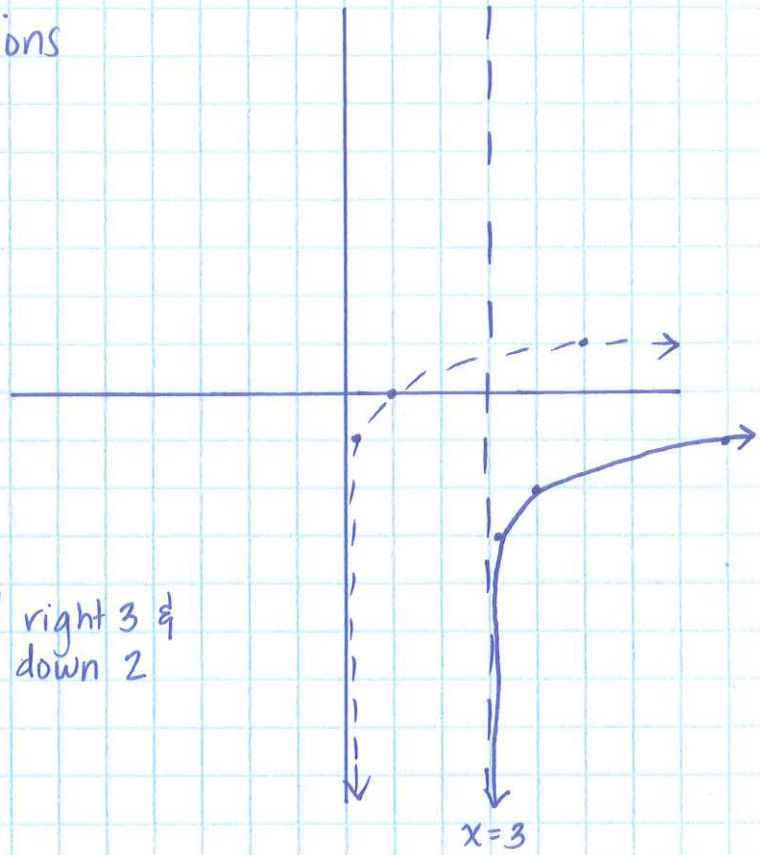
Unit 4 Test Review Solutions

1.

x	y
$\frac{1}{5}$	-1
1	0
5	1

Parent: $\log_5 x$



D: $(3, \infty)$
R: $(-\infty, \infty)$
Asymptote: $x=3$
Description: Shifted right 3 & down 2

2.

x_1	-1	0	1	2	3
y_1	$\frac{1}{3}$	1	3	9	27

} exponential (×3)

$$y_1 = 1 \cdot 3^x$$

x	-1	0	1	2	3
y_2	-3	0	3	6	9

} linear (+3)

$$y_2 = 3x$$

3. $y = \log_3 5 = \frac{\log 5}{\log 3}$

$= 3^y = 5$

$= \frac{1}{\log_5 3}$

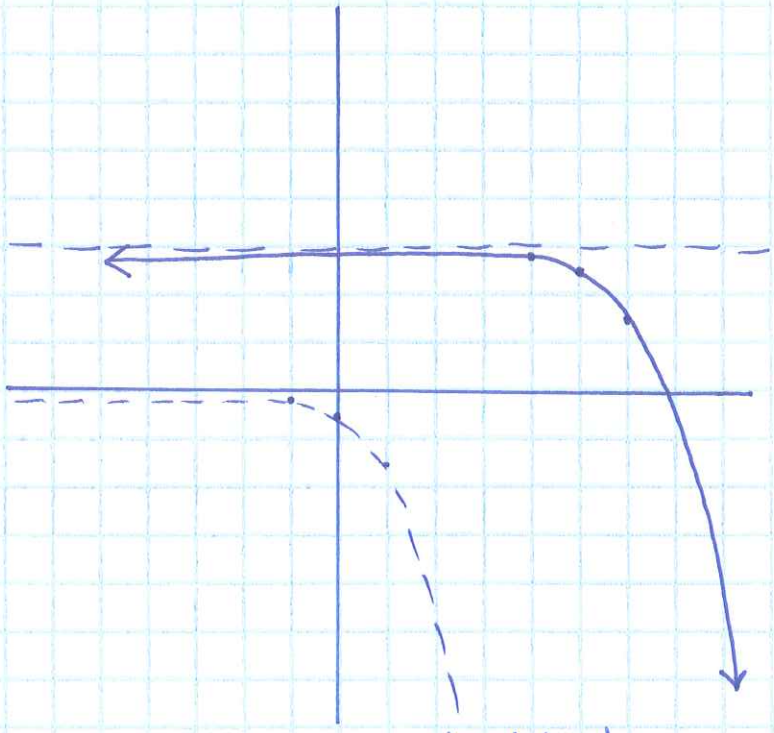
4. $\log(2x^3y^{-2}) = \log 2 + \log x^3 + \log y^{-2}$

$= \log 2 + 3\log x - 2\log y$

5. $y = -\frac{1}{2} \cdot 3^{x-5} + 3$

x	y
-1	$\frac{1}{3} \cdot -\frac{1}{2} = -\frac{1}{6}$
0	$1 \cdot -\frac{1}{2} = -\frac{1}{2}$
1	$3 \cdot -\frac{1}{2} = -\frac{3}{2}$

D: $(-\infty, \infty)$
R: $(-\infty, 3)$
Asymptote: $y = 3$



shrunk by $\frac{1}{2}$
reflected over x-axis
right 5
up 3

6. $8^{4x} = 4$

$2^{3(4x)} = 2^2$

$12x = 2$

$x = 1/6$

7. $\frac{1}{5} \cdot 25^{3x-3} = 125$

$25^{3x-3} = 625$

$25^{3x-3} = 25^2$

$3x - 3 = 2$

$3x = 5$

$x = 5/3$

8. $4^{-2x} \cdot 64^{2x} = 4$

$4^{-2x} \cdot 4^{3(2x)} = 4$

$4^{4x} = 4^1$

$4x = 1$

$x = 1/4$

9. $\log(3x+12) = 6$

$10^{\log(3x+12)} = 10^6$

$3x + 12 = 1{,}000{,}000$

$3x = 999{,}988$

$x = 333329.33$

10. $-7 \cdot 11^{-2v-4} + 5 = -25$

$-7 \cdot 11^{-2v-4} = -30$

$11^{-2v-4} = 4.286$

$\log_{11} 11^{-2v-4} = \log_{11} 4.286$

$-2v - 4 = .6069$

$-2v = 4.6069$

$v = -2.3035$

11. $5 \cdot 13^{8-5k} + 9 = 73$

$5 \cdot 13^{8-5k} = 64$

$13^{8-5k} = 12.8$

$\log_{13} 13^{8-5k} = \log_{13} 12.8$

$8 - 5k = 0.994$

$-5k = -7.006$

$k = 1.4012$

12. $\log_{13}(x^2+26) = \log_{13}(12x-1)$

$x^2 + 26 = 12x - 1$

$x^2 - 12x + 27 = 0$

$(x-9)(x-3) = 0$

✓ $x = 9$ ✓ $x = 3$

13. $-10 - 3\log(3a-7) = -13$

$-3\log(3a-7) = -3$

$\log(3a-7) = 1$

$10^{\log(3a-7)} = 10^1$

$3a - 7 = 10$

$3a = 17$

✓ $a = 17/3$

14. $\log_7(x+19) + \log_7(x+8) = \log_7 80$

$\log_7(x+19)(x+8) = \log_7 80$

$x^2 + 27x + 152 = 80$

$x^2 + 27x + 72 = 0$

$(x+3)(x+24) = 0$

✓ $x = -3$ ~~$x = -24$~~ extraneous

15. $\log_5 4 - \log_5(6-2x) = 2$

$\log_5 \frac{4}{6-2x} = 2$

$5^{\log_5 \left(\frac{4}{6-2x}\right)} = 5^2$

$\frac{4}{6-2x} = 25$

$4 = 150 - 50x$ ✓ $x = 2.92$

$-146 = -50x$

16. $\log_6 2 + \log_6(4x^2-6) = 1$

$\log_6(8x^2-12) = 1$

$6^{\log_6(8x^2-12)} = 6^1$

$8x^2 - 12 = 6$

$8x^2 - 18 = 0$

$8x^2 = 18$

$x^2 = 9/4$

$x = \pm \frac{3}{2}$ ✓

both work!

17. Skip!!

18.

0	1	2	
48	32.5	22	

# of bounces
height (inches)

a) $y = 48 \cdot (.677)^x$

b) $y = 48(.677)^4$
$= 10.08$ inches

19. $75,000(1+.125)^x$
$75,000(1.125)^{30} = \$2,568,247.87$

20. $29,000(1-.12)^x$
$29,000(0.88)^7 = \$11,851.59$

21. a) exponential $(\times 2)$

$$y = \frac{1}{4}(2)^x$$

b) neither

c) linear (-4)

$$y = -4x + 7$$