Algebra 2 Ch 7 REVIEW Name Key

Target 7-1: I can describe transformations, domain and range, and graph exponential and logarithmic functions.

1. $y = -4\left(\frac{3}{8}\right)^{x+2}$

Parent function: $y = \left(\frac{3}{8}\right)^x$

$a = -4$ meaning v flip, v st by 4

$h = -2$ meaning left 2

$k = 0$ meaning no up/dwn

Domain: $\mathbb{R}$

Range: $y < 0$

2. $y = \frac{3}{4}(5)^{x-3}$

Parent function: $y = 5^x$

$a = 3/4$ meaning v shrink of 3/4

$h = 3$ meaning right 3

$k = 0$ meaning

Domain: $\mathbb{R}$

Range: $y > 0$

3. $y = 5\left(\frac{1}{2}\right)^x - 1$

Parent function: $y = \left(\frac{1}{2}\right)^x$

$a = 5$ meaning v st by 5

$h = 0$ meaning no left/right

$k = -1$ meaning down 1

Domain: $\mathbb{R}$

Range: $y > -1$

4. $y = \frac{1}{2}(3)^{x+4} - 5$

Parent function: $y = 3^x$

$a = 1/2$ meaning shrink by 1/2

$h = -4$ meaning left 4

$k = -5$ meaning down 5

Domain: $\mathbb{R}$

Range: $y > -5$

5. $y = 3\log_2 x + 1$

Parent function: $y = \log_2 x$ $2^y = x$

$a = 3$ meaning v. st by 3

$h = 0$ meaning no left/right

$k = 1$ meaning up 1

Domain: $x > 0$

Range: $\mathbb{R}$

6. $y = 2\log_{\frac{1}{4}}(x-3) + 2$

Parent function: $y = \log_{1/4} x$ $\left(\frac{1}{4}\right)^y = x$

$a = 2$ meaning v st by 2

$h = 3$ meaning right 3

$k = 2$ meaning up 2

Domain: $x > 3$

Range: $\mathbb{R}$

7. $y = \frac{1}{4}\log_8(x+1) - 2$

Parent function: $y = \log_8 x$ $8^y = x$

$a = 1/4$ meaning v shrink by 4

$h = -1$ meaning left 1

$k = -2$ meaning down 2

Domain: $x > -1$

Range: $\mathbb{R}$

8. $y = -\log_2(x-3) + 2$

Parent function: $y = \log_2 x$ $2^y = x$

$a = -1$ meaning v flip

$h = 3$ meaning right 3

$k = 2$ meaning up 2

Domain: $x > 3$

Range: $\mathbb{R}$

T7-2 I can use the properties of exponents to write and solve equations.

Solve each equation.

1. $3^{2x-1} = 3^{x+2}$

$2x-1 = x+2$

$x = 3$

2. $2^{3x} = 4^{x+2}$

$3x = 2x+4$

$x = 4$

3. $3^{2x-1} = \frac{1}{9}$

$2x-1 = -2$

$x = -\frac{1}{2}$

4. $4^{x+1} = 8^{2x+3}$

$2x+2 = 6x+9$

$x = -\frac{7}{4}$

5. $8^{x-2} = \frac{1}{16}$

$3x-6 = -4$

$x = \frac{2}{3}$

6. $25^{2x} = 125^{x+2}$

$x = 6$

7. $9^{x+1} = 27^{x+4}$

3^{2x+2} 3^{3x+12}

$x = -10$

8. $6^x \cdot 36^{2x+4} = 216^{x+4}$

$6^x \cdot 6^{4x+8} = 6^{3x+12}$

$5x+8 = 3x+12$

$2x = 4$

$x = 2$

9. $\left(\frac{1}{64}\right)^{x-2} = 16^{3x+1}$

$x = \frac{4}{9}$

Write an exponential function for the graph that passes through the given points.

10. (0, 4) and (2, 36)

$36 = 4b^2$ $y = 4(3)^x$

11. (0, 6) and (1, 81)

$81 = 6b^1$ $y = 6(13.5)^x$

12. (0, 5) and (6, 320)

$320 = 5b^6$ $y = 5(2)^x$

13. (0, 2) and (5, 486)

$486 = 2b^5$ $y = 2(3)^x$

14. (0, 8) and $\left(3, \frac{27}{8}\right)$

$\frac{27}{8} = 8b^3$ $y = 8\left(\frac{3}{4}\right)^x$

15. (0, 1) and (4, 625)

$625 = 1b^4$ $y = 5^x$

16. $\left(\frac{9}{27}\right)^{6x-1} = \left(\frac{27}{9}\right)^{-x+6}$

$\left(\frac{27}{9}\right)^{-6x+1} = \left(\frac{27}{9}\right)^{-x+6}$

$-6x+1 = -x+6$

$-5 = 5x$

$\boxed{x = -1}$

17. $3^x = 3\sqrt{3}$

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

$3^x = 3^{1.5}$

$\boxed{x = 1.5}$

18. $4^{2x} = 16\sqrt[3]{4}$

$4^{2x} = 4^2 \cdot 4^{\frac{1}{3}}$

$4^{2x} = 4^{\frac{7}{3}}$

$\frac{1}{2} \cdot 2x = \frac{7}{3} \cdot \frac{1}{2}$

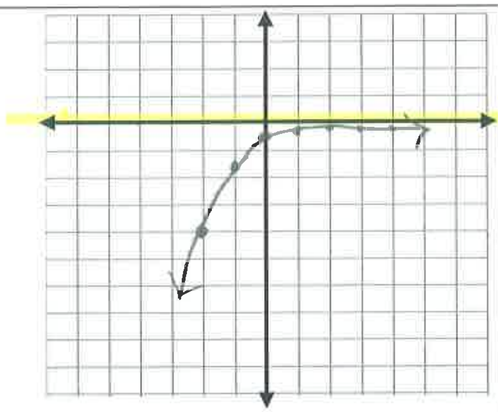
$\boxed{x = \frac{7}{6}}$

$2 + \frac{1}{3}$

$\frac{6}{3} + \frac{1}{3} = \frac{7}{3}$

KEY

1.



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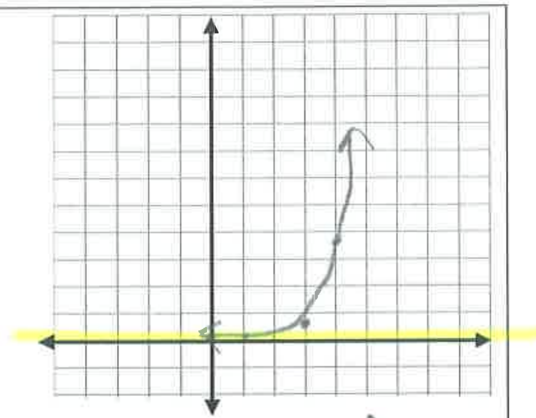

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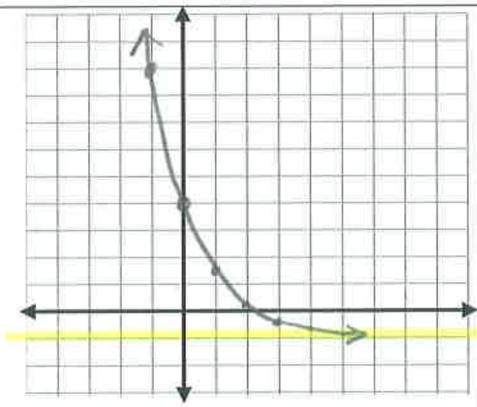

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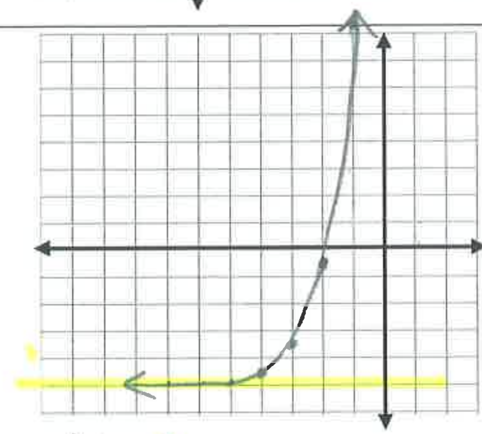


5.

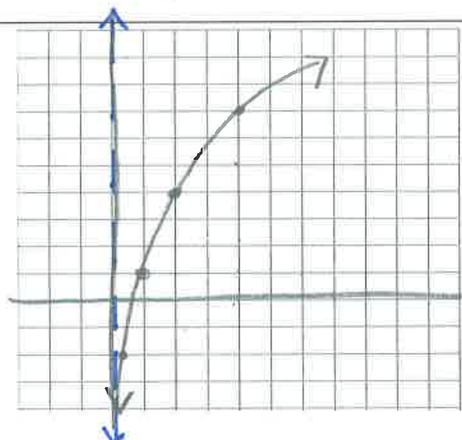
$y=2^x$

-1	1/2
0	1
1	2
2	4

$x=2^y$

1/2	-1
1	0
2	1
4	2

1/2	-2
1	1
2	4
4	7



6.

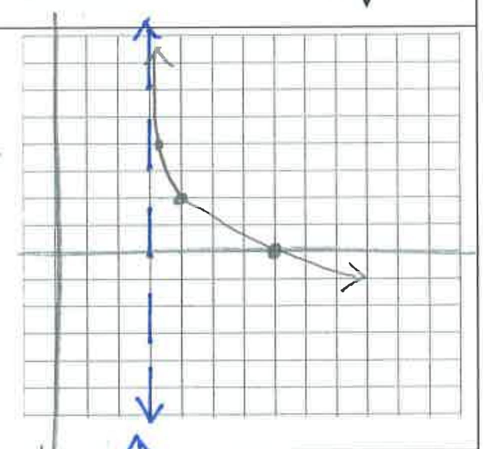
$y=(\frac{1}{4})^x$

-1	4
0	1
1	1/4

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

4	-1
1	0
1/4	1

7	0
4	2
3.25	4



7.

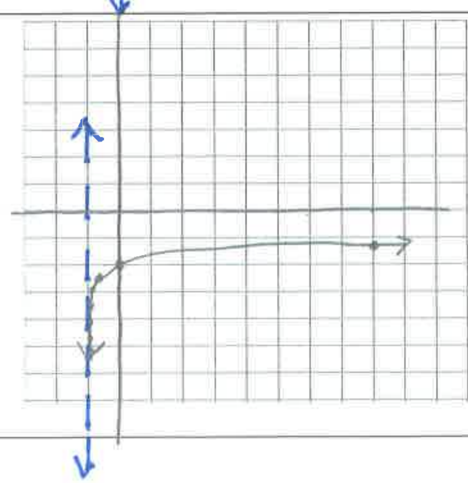
$y=8^x$

-1	1/8
0	1
1	8

$x=8^y$

1/8	-1
1	0
8	1

-.875	-2.25
0	-2
7	-1.75



8.

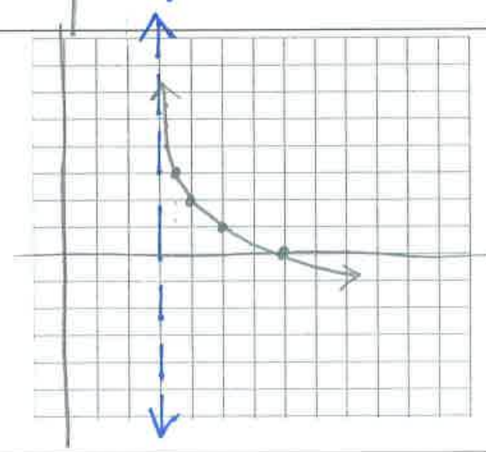
$y=2^x$

-1	1/2
0	1
1	2
2	4

$x=2^y$

1/2	-1
1	0
2	1
4	2

3.5	3
4	2
5	1
7	0



T7-3 I can use the properties of logarithms to write and solve equations.

Solve each equation. Check your solutions.

1. $\log_5 4 + \log_5 2x = \log_5 24$

$8x = 24$

$\boxed{x = 3}$

2. $3 \log_4 6 - \log_4 8 = \log_4 x$

$\frac{6^3}{8} = x$ $\boxed{x = 27}$

3. $\frac{1}{2} \log_6 25 + \log_6 x = \log_6 20$

$\log_6 25^{1/2} + \log_6 x = \log_6 20$

$\sqrt{25}\, x = 20$ $\boxed{x = 4}$

$5x = 20$

4. $\log_2 4 - \log_2 (x + 3) = \log_2 8$

$\frac{4}{x+3} = 8$

$4 = 8(x+3)$

$4 = 8x + 24$

$\frac{-20}{8} = \frac{8x}{8}$

$\boxed{x = -\frac{5}{2}}$

5. $\log_6 2x - \log_6 3 = \log_6 (x - 1)$

$3\ \frac{2x}{3} = (x-1)3$ $\boxed{x = 3}$

$2x = 3x - 3$

6. $\log_8 48 - \log_8 w = \log_8 4$

$\log_8 \frac{48}{w} = \log_8 4$

$w\ \frac{48}{w} = 4\ w$

$48 = 4w$

$\boxed{w = 12}$

7. $\log_2 x - 3 \log_2 5 = 2 \log_2 10$

$\log_2 \frac{x}{5^3} = \log_2 10^2$

$5^3 \frac{x}{5^3} = 10^2 \cdot 5^3$

$\boxed{x = 12500}$

8. $3 \log_2 x - 2 \log_2 5x = 2$

$\log_2 x^3 - \log_2 (5x)^2 = 2$

$\log_2 \frac{x^3}{25x^2} = 2$

$\log_2 \frac{x}{25} = 2$

$2^2 = \frac{x}{25}$

$\boxed{100 = x}$

9. $\log_7 n = \frac{2}{3} \log_7 8$

$n = 8^{2/3}$

$n = 4$

10. $\log_{10} u = \frac{3}{2} \log_{10} 4$

$u = 4^{3/2}$

$u = 8$

11. $3 \log_5 (x^2 + 9) - 6 = 0$

$3\log_5 (x^2+9) = 6$

$\log_5 (x^2+9) = 2$

$5^2 = x^2 + 9$

$25 = x^2 + 9$

$0 = x^2 - 16$

$\boxed{x = \pm 4}$

12. $\log_{10} 4 + \log_{10} w = 2$

$\log_{10} 4w = 2$

$10^2 = 4w$

$100 = 4w$

$\boxed{w = 25}$

13. $\log_9 (3u + 14) - \log_9 5 = \log_9 2u$

$\log_9 \frac{(3u+14)}{5} = \log_9 2u$

$\frac{3u+14}{5} = 2u$ $3u + 14 = 10u$

$\boxed{u = 2}$

14. $4 \log_2 x + \log_2 5 = \log_2 405$

$\log_2 x^4 + \log_2 5 = \log_2 405$

$5x^4 = 405$

$x^4 = 81$

$\boxed{x = 3}$

15. $\log_{10} (b + 3) + \log_{10} b = \log_{10} 4$

$\log_{10} (b+3)b = \log_{10} 4$

$(b+3)b = 4$

$b^2 + 3b = 4$

$b^2 + 3b - 4 = 0$

$\boxed{b = 1}$

16. $\log_2 d = 5 \log_2 2 - \log_2 8$

$\log_2 d = \log_2 2^5 - \log_2 8$

$\frac{2^5}{8} = d$

$\boxed{d = 4}$

17. $\log_{10} (3m - 5) + \log_{10} m = \log_{10} 2$

$(3m-5)m = 2$

$3m^2 - 5m - 2 = 0$

18. $\log_7 x + 2 \log_7 x - \log_7 3 = \log_7 72$

$\log_7 x + \log_7 x^2 - \log_7 3 = \log_7 72$

$\frac{x^3}{3} = 72$

$x^3 = 216$

$\boxed{x = 6}$

T7-4: I can use exponential and logarithmic equations to solve real world scenarios.

1. The population of an animal species introduced into an area sometimes increases rapidly at first and then more slowly over time. A logarithmic function models this kind of growth. Suppose that a population of N deer in an area t months after the deer are introduced is given by the equation:

$$N = 450 \log(4t + 2)$$

Use this model to predict the deer population after…

a. 3 months?	b. 6 months?	c. 2 years = 24
515	636	896

According to this model, how long will it take for the deer population to reach 800? Round up to the nearest month.

$800 = 450\log(4t+2)$

$\frac{800}{450} = \log_{10}(4t+2)$

$10^{800/450} = 4t + 2$

$t \approx 15$ months

2. Write an exponential equation for an element with a rate of decay of ~~37%~~ 17% per day if the sample starts with 6,000 atoms.

a. Equation: $y = 6000(1 - .17)^t$

b. How much would remain after 3 weeks?

3wks = 21 days $t = 21$

$\boxed{\text{119 atoms left}}$

3. Suppose you invest $5000 in a savings account that earns 8% interest compounded quarterly.

a) Write an exponential equation to model this situation.

$y = 5000\left(1 + \frac{.08}{4}\right)^{4t}$

b) How long will it take to triple your money?

$3 = 1.02^{4t}$

$\log_{1.02} 3 = 4t$

$t \approx 13.87$ years

4. Larry's consulting firm began with 23 customers. After 7 years, he now has 393 customers. Write an exponential equation describing the company's growth.

(0, 23) (7, 393)

$393 = 23b^7$

a. Equation: $y = 23(1.5)^t$

b. If it keeps growing at this rate how many customers will he have in 15 years?

10,071 customers

c. If it keeps growing at this rate, how long until he has 1500 customers?

$1500 = 23(1.5)^t$

$65.21 = 1.5^t$

$\log_{1.5} 65.21 = t$

$t \approx 10$ years

To be completely ready for the exam you will need to be proficient on the Target 7-4 WS given as Homework!