

STATION 1

Sketch a graph of each of the following.

Create a table, label the asymptote and three points.

1. $y = 2 \cdot 3^x - 4$

2. $y = 4 \cdot \frac{1}{2}^{-x} + 2$

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

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

$$(29) x \log_8 2 - C \log_8 y$$

$$(32) \log_3 9 + 2 \log_3 x$$

$$2 + 2 \log_3 x$$

$$(30) \log_3 2 - \log_3 4$$

$$(33) \log_4 2 + 2 \log_4 y + \log_4 z$$

$$\frac{1}{2} + 2 \log_4 y + \log_4 z$$

$$(31) \log_A B + d \log_A C$$

$$(34) 2 \log_B A - \log_B C$$

$$(35) \log_B \frac{A^2}{C^d A} = \log_B \frac{A}{C^d}$$

$$(36) -2 \log_B A + 2 \log_B C + 3 \log_B B$$

$$-2 \log_B A + 2 \log_B C + 3$$

$$\log_B \left(\frac{C^2}{A^2} \right) + 3$$

STATION 2

Solve each of the following exponential equations:

5. $4^x + 3 = 55$

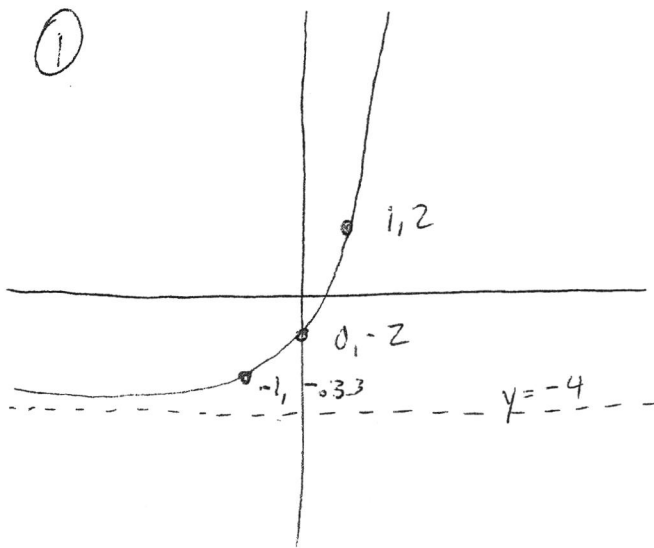
6. $96 = 3^x \cdot 8$

7. $10^{2x-4} = 533$

8. $4e^x + 5 = 72$

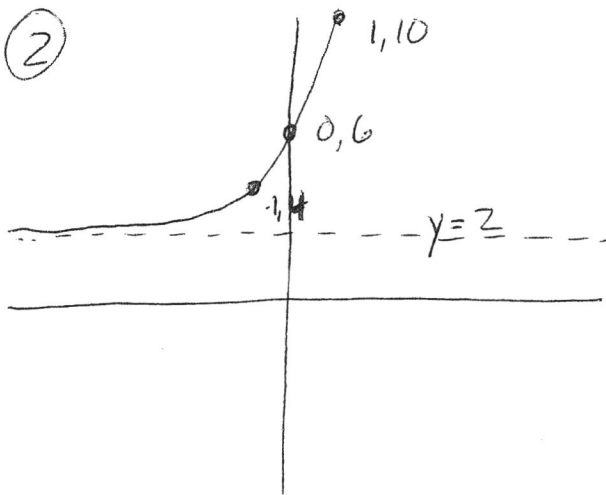
9. $3^x = 20$

①



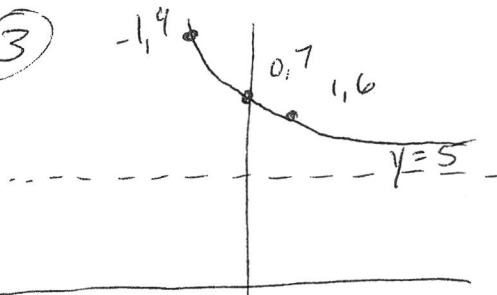
x	y
-1	-3.3
0	-2
1	2

②



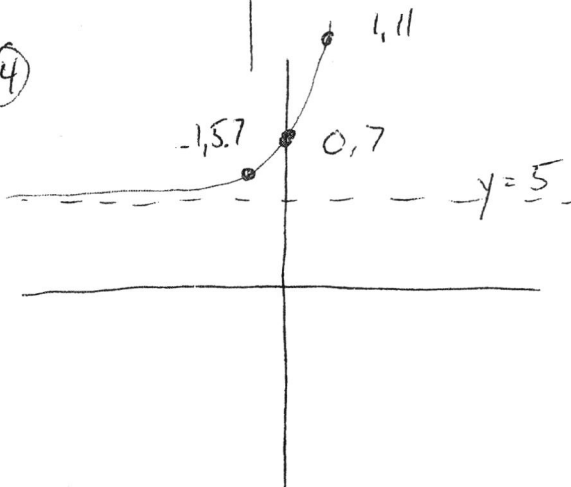
x	y
-1	4
0	6
1	10

③



x	y
-1	4
0	7
1	6

④



x	y
-1	5.7
0	7
1	11

STATION 3

Solve each of the following logarithmic equations

10. $\log_3(5x + 2) = \log_3(8x - 7)$

11. $2\log_8 x = 4$

12. $\log_2 0.25 = x$

13. $\ln x = 4$

14. $\ln(10) = \ln x + \ln(x - 3)$

$$⑤ \quad 4^x + 3 = 55$$

$$4^x = 52$$

$$x \log_4 4 = \log_4 52$$

$$x = \log_4 52$$

$$x = \frac{\log 52}{\log 4} \approx \boxed{2.850}$$

$$⑥ \quad 96 = 3^x \cdot 8$$

$$12 = 3^x$$

$$\log_3 12 = x / \log_3 3$$

$$\log_3 12 = x \rightarrow \frac{\log 12}{\log 3} \approx \boxed{2.262}$$

$$⑦ \quad 10^{2x-4} = 533$$

$$-(4) \quad \log 10 = \log 533$$

$$2x - 4 = \log 533$$

$$2x - 4 = 2.727$$

$$x = \boxed{3.363}$$

$$⑧ \quad 4e^x + 5 = 72$$

$$4e^x = 67$$

$$e^x = 16.75$$

$$\ln e^x = \ln 16.75$$

$$x = \ln 16.75$$

$$x = \boxed{2.818}$$

$$⑨ \quad 3^x = 20$$

$$\log_3 3^x = \log_3 20$$

$$x = \log_3 20$$

$$x = \frac{\log 20}{\log 3} \approx \boxed{2.72}$$

STATION 4

Answer each of the following

15. The population of bacteria in Mr. B's refrigerator grows continuously at a rate of 8% per day. If there are 5,000 bacterium in his fridge today, how many will there be in 6 days?
16. The rabbit population of the River Grove grows at a rate of 10% per year. If the current population is 7,500 rabbits, how many will there be in 15 years? (Round to the nearest whole rabbit)
17. If you invest \$1,200 at 3.2% interest for 7 years, how much money will you have if...
- a) interest is calculated once per year?
 - b) interest is compounded monthly?
 - c) interest is compounded daily?
 - d) interest is compounded continuously?
18. A \$100,000 helicopter depreciates at a rate of 22% per year.
- a) How much will it be worth in 5 years?
 - b) How many years before it is worth only \$500?

$$\textcircled{10} \log_3(5x+2) = \log_3(8x-7)$$

$$5x+2 = 8x-7$$

$$2 = 3x-7$$

$$9 = 3x$$

$$\boxed{3 = x}$$

$$\textcircled{11} 2 \log_8 x = 4$$

$$\log_8 x = 2$$

$$8^2 = x$$

$$\boxed{64 = x}$$

$$\textcircled{12} \log_2 25 = x$$

$$2^x = 25$$

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

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

$$\textcircled{13} \ln x = 4$$

$$e^4 = x$$

$$\boxed{54.598} = x$$

$$\textcircled{14} \ln 10 = \ln x + \ln(x-3)$$

$$\ln 10 = \ln x(x-3)$$

$$\ln 10 = \ln x^2 - 3x$$

$$10 = x^2 - 3x$$

$$x^2 - 3x - 10 = 0$$

$$(x-5)(x+2) = 0$$

$$\boxed{5} \quad \cancel{-2}$$

STATION 5

Growth or decay

Identify if each of the following is growth or decay.

19. $y = 17 \cdot 0.2^{x+3}$

20. $y = 2 \cdot 1.7^{x-3}$

21. $y = 7 \cdot 0.02^{-x}$

22. $y = 3 \cdot \frac{1}{4}^x$

23. $y = 4 \cdot \frac{1}{3}^{-x}$

Evaluate each of the following:

24. $\log_{25} 125$

25. $\log_4 \frac{1}{16}$

Find the inverse

26. $y = \log_4 x$

27. $y = \log_{10}(3x + 2)$

28. $y = \log_e(5 - 2x)$

$$(15) P e^{rt} \rightarrow 5,000 e^{.08 \cdot 6} = 8,080.372 \text{ bacterium}$$

$$(16) 7,500 (1+.1)^{15} = 31,329.36 \text{ rabbits}$$

$$(17) a) 1,200 (1+.032)^7 = 1496.025$$

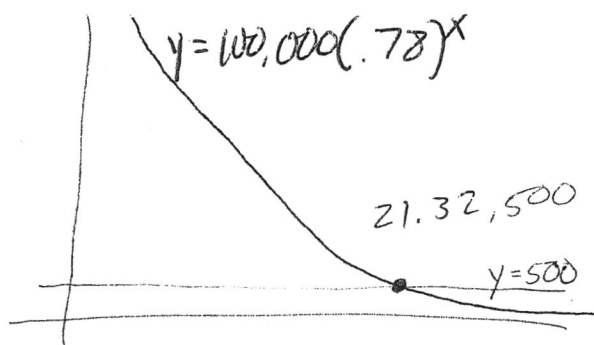
$$\$1,496.03$$

$$b) 1,200 \left(1 + \frac{.032}{12}\right)^{12 \cdot 7} = \$1,500.84$$

$$c) 1,200 \left(1 + \frac{.032}{365}\right)^{7 \cdot 365} = \$1,501.27$$

$$d) 1,200 e^{.032 \cdot 7} = \$1,501.29$$

$$(18) 100,000 (.78)^5 = \$28,871.74$$



21 years.

STATION 6

EXPAND

$$29. \log_8 \frac{2^x}{y^c}$$

$$30. \log_3 \frac{2}{A}$$

$$31. \log_A BC^d$$

$$32. \log_3 9x^2$$

$$33. \log_4 2y^2z$$

$$34. \log_B \frac{A^2}{C}$$

Condense:

$$35. 2\log_B A - d\log_B C - \log_B A$$

$$36. -2(\log_B A - \log_B C) + 3\log_B B$$

$$(19) .02 < 1 \rightarrow \text{Decay}$$

$$(20) 1.7 > 1 \rightarrow \text{Growth}$$

$$(21) .02^{-x} = \frac{2}{100}^{-x} = \frac{100}{2} = 50 > 1 \rightarrow \text{Growth}$$

$$(22) \frac{1}{4} < 1 \rightarrow \text{Decay}$$

$$(23) \frac{1}{3}^{-x} = \frac{3}{1}^x > 1 \rightarrow \text{growth}$$

$$(24) \text{Log}_{25} 125$$

$$\begin{array}{l} \text{Log}_{25} 125 \quad \swarrow \quad \searrow \\ \frac{\text{Log } 125}{\text{Log } 25} \quad \text{or} \quad \text{Log}_{25} 125 = x \\ 25^x = 125 \\ x \log 25 = \log 125 \\ x = \frac{\text{Log } 125}{\text{Log } 25} \end{array}$$

$$\frac{3}{2}$$

$$(25) \text{Log}_4 \frac{1}{16}$$

$$(4^2 = 16) \text{ so } \dots$$

$$-2$$

$$(26) y = \log_4 x$$

$$x = \log_4 y$$

$$4^x = y$$

$$(27) y = \log_{10} (3x+2)$$

$$x = \log_{10} (3y+2)$$

$$10^x = 3y+2$$

$$10^x - 2 = 3y$$

$$\frac{10^x - 2}{3} = y$$

$$(28) y = \log_e (5 - 2x)$$

$$x = \log_e (5 - 2y)$$

$$e^x = 5 - 2y$$

$$e^x - 5 = -2y$$

$$\frac{-e^x + 5}{2} = y$$