Solutions => Exercise 7

1. $\{(-1,5), (0,12), (1,18)\}$

Inverse: $\{(5,-1), (12,0), (18,1)\}$

2. $\{(2,9), (4,16), (6,16), (15,19)\}$

Inverse: $\{(9,2), (16,4), (16,6), (19,15)\}$

3. $y = x + 4$

Inverse: $x = y + 4$

Solve for y: $x - 4 = y$ or $y = x - 4$

4. $y = 7x + 15$

Inverse: $x = 7y + 15$

Solve for y: $\frac{x - 15}{7} = \frac{7y}{7}$

$\frac{x - 15}{7} = y$

5. $y = \frac{2}{5}x + 7$

Inverse: $x = \frac{2}{5}y + 7$

Solve for y: $x - 7 = \frac{2}{5}y$

$\frac{5}{2}(x-7) = y$

$\frac{5}{2}x - \frac{35}{2} = y$ OR $\frac{5x-35}{2} = y$

6. Inverse Functions

7. Not Inverse Function

8. Inverse Functions.

9. Inverse Functions.

10.

Exponential Form	Logarithmic Form
$125 = 5^3$	$3 = \log_5 125$
$8 = 2^3$	$3 = \log_2 8$
$\left(\frac{1}{49}\right) = 7^{-2}$	$-2 = \log_7 \left(\frac{1}{49}\right)$
$12^{-1} = \left(\frac{1}{12}\right)$	$-1 = \log_{12}\left(\frac{1}{12}\right)$
$16^{\frac{1}{2}} = 4$	$\left(\frac{1}{2}\right) = \log_{16} 4$
$45^{\circ} = 1$	$0 = \log_{45} 1$
$64^{-\frac{1}{3}} = \frac{1}{4}$	$\left(-\frac{1}{3}\right) = \log_{64} \frac{1}{4}$

11. $\Rightarrow \log 1000$ "SAME AS" $\log_{10} 1000$

$\log_{10} 1000$

$x = \log_{10} 1000$

$10^x = 1000$

$10^x = 10^3$

$x = 3$

12. $\log_3 27$

$x = \log_3 27$

$3^x = 27$

$3^x = 3^3$

$x = 3$

13. $\log_5 625$

$x = \log_5 625$

$5^x = 625$

$5^x = 5^4$

$x = 4$

14. $\log_{121} 1$

$x = \log_{121} 1$

$121^x = 1$

$121^x = 121^0$

$x = 0$

15. $\log_5\left(\frac{1}{25}\right)$

$x = \log_5\left(\frac{1}{25}\right)$

$5^x = \frac{1}{25}$

$5^x = \frac{1}{5^2}$

$5^x = 5^{-2}$

$x = -2$

16. $\log_5 5$

$x = \log_5 5$

$5^x = 5$

$5^x = 5^1$

$x = 1$

17. $\log_2\left(\frac{1}{8}\right)$

$x = \log_2\left(\frac{1}{8}\right)$

$2^x = \frac{1}{8}$

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

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

$x = -3$

18. $\log_{\frac{1}{5}}(125)$

$x = \log_{\frac{1}{5}}(125)$

$\left(\frac{1}{5}\right)^x = 125$

$(5^{-1})^x = (5^3)$

$5^{-1x} = 5^3$

$\frac{-1x}{-1} = \frac{3}{-1}$

$x = -3$

19. $\log_{\frac{1}{3}}\left(\frac{1}{81}\right)$

$x = \log_{\frac{1}{3}}\left(\frac{1}{81}\right)$

$\left(\frac{1}{3}\right)^x = \frac{1}{81}$

$\left(\frac{1}{3}\right)^x = \frac{1}{3^4}$

$(3^{-1})^x = (3^{-4})$

$3^{-1x} = 3^{-4}$

$\frac{-1x}{-1} = \frac{-4}{-1}$

$x = 4$

20. $\log_3 x = 4$ ← Logarithmic Form

$3^4 = x$ ← Exponential Form

$81 = x$

21. $\log_5 x = -2$

$5^{-2} = x$

$\frac{1}{5^2} = x$

$\frac{1}{25} = x$

22. $\log_x 81 = \frac{4}{3}$

$x^{\frac{4}{3}} = 81$

$\left(x^{\frac{4}{3}}\right)^{\frac{3}{4}} = 81^{\frac{3}{4}}$

$x = 81^{\frac{3}{4}}$

$x = \left(\sqrt[4]{81}\right)^3$

$x = (3)^3$

$x = 27$

23. $\log_x 36 = \frac{2}{5}$

$x^{\frac{2}{5}} = 36$

$\left(x^{\frac{2}{5}}\right)^{\frac{5}{2}} = 36^{\frac{5}{2}}$

$x = 36^{\frac{5}{2}}$

$x = \left(\sqrt{36}\right)^5$

$x = (6)^5$

$x = 7776$

24. $\log_x \left(\frac{81}{16}\right) = \frac{4}{5}$

$x^{\frac{4}{5}} = \frac{81}{16}$

$\left(x^{\frac{4}{5}}\right)^{\frac{5}{4}} = \left(\frac{81}{16}\right)^{\frac{5}{4}}$

$x = \left(\frac{81}{16}\right)^{\frac{5}{4}}$

$x = \left(\sqrt[4]{\frac{81}{16}}\right)^5$

$x = \left(\frac{3}{2}\right)^5$

$x = \frac{243}{32}$

25. $\log_x\left(\frac{1}{25}\right) = -2$

$x^{-2} = \frac{1}{25}$

$(x^{-2})^{-1/2} = \left(\frac{1}{25}\right)^{-1/2}$

$x = \left(\frac{1}{25}\right)^{-1/2}$

$x = (25)^{1/2}$

$x = \left(\sqrt{25}\right)^1$

$x = (5)^1$

$x = 5$

26. $\log_x\left(\frac{32}{243}\right) = \frac{5}{2}$

$x^{\frac{5}{2}} = \frac{32}{243}$

$\left(x^{\frac{5}{2}}\right)^{\frac{2}{5}} = \left(\frac{32}{243}\right)^{\frac{2}{5}}$

$x = \left(\frac{32}{243}\right)^{\frac{2}{5}}$

$x = \left(\sqrt[5]{\frac{32}{243}}\right)^2$

$x = \left(\frac{2}{3}\right)^2$

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