7.1 $x^2 - \frac{5}{2}x + c$

$\left(\frac{-5}{2}\right)^2$; $c = \frac{25}{4}$

$x^2 - 5x + \frac{25}{4}$

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

$-2x^2-3x+c$

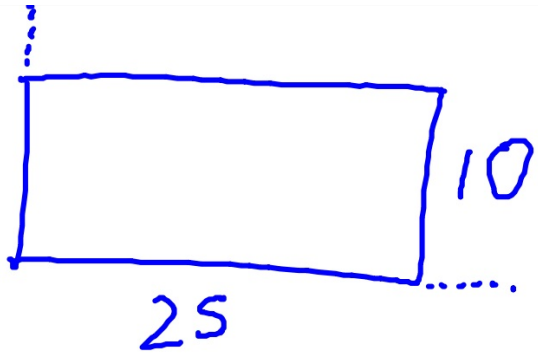
16.) $D = 41$

$b^2-4ac = 41$

$(-3)^2-4(-2)(c) = 41$

10.) $\frac{2}{2+\sqrt{3}} \frac{(2-\sqrt{3})}{(2-\sqrt{3})} = \frac{4-2\sqrt{3}}{1}$

18.)



$$(25+x)(10+x) = 1000$$

$$x^2 + 35x - 750 = 0$$

$$(x-15)\cancel{(x+50)} = 0$$

$$x = 15 \text{ ft.}$$

14.) $\frac{i}{2+i} \cdot \frac{(2-i)}{(2-i)} = \frac{2i - i^2}{5}$

$4+1$

$= \frac{2i+1}{5}$

$= \frac{2}{5}i + \frac{1}{5}$

31.) $10^{\log_{10} 8} = 8$

33.) $\log_3 81^x = \log_3 3^{4x}$

$= 4x \cdot \log_3 3$

$4x$

39.) $\ln 40 + 2\ln\frac{1}{2} + \ln x$

$\ln 40 + \ln\frac{1}{4} + \ln x$

$\ln\left(40 \cdot \frac{1}{4} \cdot x\right)$

$\ln(10x)$

35) $\log x^2 + \log 11$

$\log(11x^2)$

$\log_2 5x = \log_2 5 + \log_2 x$

13.) $\log \frac{1}{4} = \log 1 - \log 4$

$= 0 - (.602)$

$= -.602$

4.5 Properties of Logarithms - Cont.

$\ln e = 1$
$\ln 1 = 0$

REVIEW - Evaluate.

a) $\log_5 125 = 3$

b) $\log_{27} 3 = 1/3$

c) $\ln e^8 = 8$

d) $\log 1000 = 3$

e) $\log_5 1 = 0$

f) $\log_4\left(\frac{1}{8}\right) = -\frac{3}{2}$

g) $7^{\log_7 15} = 15$

$4^x = \frac{1}{8} = 2^{2x} = 2^{-3}$

ex: Between which two consecutive integers does each value lie?

a) $\log_2 7$

$$\log_2 4 < \log_2 7 < \log_2 8$$

$$2 < \log_2 7 < 3$$

b) $\log 5$

$$\log_{10} 1 < \log_{10} 5 < \log_{10} 10$$

$$0 < \log_{10} 5 < 1$$

REVIEW - Expand.

a) $\log_3 \sqrt{x^2 + y^2}$ $= \frac{1}{2}\log_3(x^2+y^2)$

b) $\ln\left(\frac{x^5}{10y^4z^3}\right)$ $= 5\ln x - \ln 10 - 4\ln y - 3\ln z$

REVIEW - Condense.

a) $3\ln x - 5\ln(y+z) + 4\ln 2$

$\ln x^3 - \ln(y+z)^5 + \ln 16$

$\ln\left(\frac{16x^3}{(y+z)^5}\right)$

b) $\log_3 a - 4\log_5 b$

$\log_3 a - \log_5 b^4$

ex: Evaluate.

a) $\log_3 54 - \log_3 2 = \log_3 27 = 3$

b) $\log_4\left(\frac{32}{3}\right) + \log_4\left(\frac{3}{4}\right) = \log_4\left(\frac{32}{3} \cdot \frac{3}{4}\right)$

$= \log_4 8 = \frac{3}{2} \qquad 4^{3/2} = 8$

ex: Evaluate.

c) $9^{(\log_9 20 - \log_9 4)}$

$$9^{\log_9 5} = 5$$

d) $9^{\log_3 5}$

$$(3^2)^{\log_3 5} = 3^{2\log_3 5} = 3^{\log_3 25} = 25$$

e) $2^{\log_2 15 + \log_4 9}$

ex: Let

$$x = \log 2 \qquad y = \log 3 \qquad z = \log 7$$

Rewrite each expression in terms of x, y and z.

a) $\log 14 = \log 7 + \log 2 = z + x$

$\log(7 \cdot 2)$

ex: Let $\log 10 = 1$

$x = \log 2$ $\quad$ $y = \log 3$ $\quad$ $z = \log 7$

Rewrite each expression in terms of x, y and z.

b) $\log 243$

$\log 3^5$

$5 \log 3$

$5y$

c) $\log 30$

$\log(10 \cdot 3)$

$\log 10 + \log 3$

$1 + y$

d) $\log 5$

$\log \frac{10}{2}$

$\log 10 - \log 2$

$1 - x$

ex: Let

$$\log_2 3 \approx 1.585 \qquad \log_2 5 \approx 2.322$$

$\log_2 4 = 2$

Approximate each expression.

a) $\log_2 15$

$\log_2(3 \cdot 5)$

$\log_2 3 + \log_2 5$

$1.585 + 2.322$

3.907

b) $\log_2 20$

$\log_2(4 \cdot 5)$

$\log_2 4 + \log_2 5$

$2 + 2.322$

4.322

Change of Base Formula (not condensing!)

$$\log_b x = \frac{\log x}{\log b} = \frac{\ln x}{\ln b}$$

bases must match!

$$\frac{\log_3 x}{\log_3 b}$$

It is best to use ln or log (because of the functions on the calculator)

ex: Rewrite using common or natural logarithms.
Then evaluate on your calculator.

a) $\log_2 11 = \frac{\log 11}{\log 2} = 3.459$

$\frac{\ln 11}{\ln 2}$

b) $\log_3 25 = 2.930$

$\log_3 81$

4

ex: Evaluate.

a) $\dfrac{\ln 8}{\ln 2}$

$$\log \frac{a}{b} = \log a - \log b$$

b) $\dfrac{\log 64}{\log 2}$

c) $\dfrac{\log_2 5}{\log_2 125} = \left(\dfrac{\log 5}{\log 2}\right) \div \left(\dfrac{\log 125}{\log 2}\right)$

$$\frac{\log 5 \cdot \cancel{\log 2}}{\cancel{\log 2} \cdot \log 125} = \frac{1}{3}$$

4.5 Extra Practice WKST

*See printout.