Last day's work:

pp. 160-162 #1 – 5, 7, 9, 13 [17]

4cd, 7

$y = -$

$y = 7$

p. 161 #4c,d

4. Given $f(x) = 7 - 2(x-1)^2$, $x \geq 1$, determine
   a) $f(3)$ b) $f^{-1}(x)$ c) $f^{-1}(5)$ d) $f^{-1}(2a+7)$

$x = 7 - 2(y-1)^2 \; ; y \geq 1$

$x - 7 = -2(y-1)^2 \; ; y \geq 1$

$\frac{x-7}{-2} = (y-1)^2 \quad ; y \geq 1$

$+\sqrt{\frac{x-7}{-2}} + 1 = y \quad ; y \geq 1$

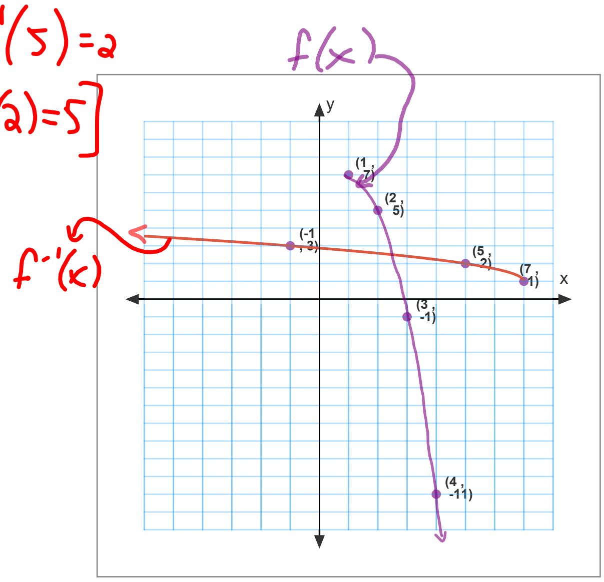
$\therefore f^{-1}(x) = +\sqrt{\frac{x-7}{-2}} + 1 \quad ; y \geq 1$

or $f^{-1}(x) = 1 + \sqrt{\frac{x-7}{-2}}$

$= 1 + \sqrt{\frac{7-x}{2}}$ etc.

$f^{-1}(5) = 2$

$[\because f(2) = 5]$



d) $f^{-1}(2a+7)$

$= 1 + \sqrt{\frac{(2a+7)-7}{-2}}$

$= 1 + \sqrt{\frac{2a}{-2}}$

$= 1 + \sqrt{-a} \quad [\therefore a \leq 0]$

$$y = \sqrt{\frac{x-7}{-2}} + 1$$

p. 161 #7

7. Given $f(x) = -(x+1)^2 - 3$ for $x \geq -1$, determine the equation for $f^{-1}(x)$. Graph the function and its inverse on the same axes.

$$y = -(x+1)^2 - 3$$

$f(x) = -(x+1)^2 - 3 \quad ; x \geq -1$

$x = -(y+1)^2 - 3 \; ; y \geq -1$

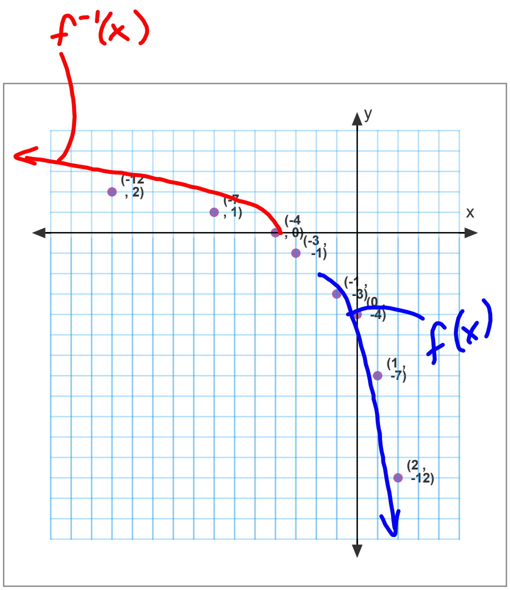
$x + 3 = -(y+1)^2$

$-(x+3) = (y+1)^2$

$+\sqrt{-(x+3)} = y + 1$

$\therefore y = +\sqrt{-(x+3)} - 1 \; ; y \geq -1$

or $f^{-1}(x) = +\sqrt{-(x+3)} - 1$



Today's Learning Goal(s):

By the end of the class, I will be able to:

a) simplify a radical.
b) multiply, add and subtract radical expressions.

3.4 Operations with Radicals

Date: Mar. 19/18

Recall: When working with radicals all answers must be in lowest terms.
Look for factors of the radicand that are perfect squares!

Ex.1: Simplify

Entire radical

a) $\sqrt{50}$

$= \sqrt{25}\sqrt{2}$

$= 5\sqrt{2}$

Mixed radical

b) $5\sqrt{45}$

$= 5\sqrt{9}\sqrt{5}$

$= 5(3)\sqrt{5}$

$= 15\sqrt{5}$

Ex.2: Compare

$4\sqrt{5}$ and $3\sqrt{10}$

$= \sqrt{16}\sqrt{5}$ $\quad = \sqrt{9}\sqrt{10}$

$= \sqrt{80}$ $\quad = \sqrt{90}$

$\because \sqrt{80} < \sqrt{90}$

$\therefore 4\sqrt{5} < 3\sqrt{10}$

Ex.3: Simplify

a) $\sqrt{6}\times\sqrt{3}$

$= \sqrt{6\times 3}$

$= \sqrt{18}$

$= \sqrt{9}\sqrt{2}$

$= 3\sqrt{2}$

b) $\left(-2\sqrt{7}\right)\left(3\sqrt{7}\right)$

$= (-2\times 3)(\sqrt{7}\cdot\sqrt{7})$

$= -6\sqrt{49}$

$= -6(7)$

$= -42$

Note: Many rules are similar to algebra:

Ex.4: Simplify

	radicals	algebra
a)	$\sqrt{2}+\sqrt{2}+\sqrt{2}$ $= 3\sqrt{2}$	$x+x+x$ $= 3x$
b)	$2\sqrt{3}+5\sqrt{3}$ $= 7\sqrt{3}$	$2x+5x$ $= 7x$
c)	$2\sqrt{3}+3\sqrt{7}$ can not be simplified	$2x+3y$

Summarizing some rules

$\sqrt{a}+\sqrt{a}$
$= 2\sqrt{a}$

$\sqrt{a}\times\sqrt{a}$
$= \sqrt{a^2}$
$= a$

$\sqrt{\frac{a}{b}}$
$= \frac{\sqrt{a}}{\sqrt{b}}$

$\sqrt{a}\times\sqrt{b}$
$= \sqrt{ab}$

Ex.5: Simplify

a) $3\left(4-\sqrt{6}\right)$

$= 12 - 3\sqrt{6}$

b) $\left(2-3\sqrt{5}\right)\left(6+\sqrt{5}\right)$

$= 12 + 2\sqrt{5} - 18\sqrt{5} - 3\sqrt{25}$

$= 12 - 16\sqrt{5} - 3(5)$

$= 12 - 15 - 16\sqrt{5}$

$= -3 - 16\sqrt{5}$

c) $\sqrt{\frac{2}{9}}$

$= \frac{\sqrt{2}}{\sqrt{9}}$

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

d) $\sqrt{50}+\sqrt{27}-\sqrt{72}+2\sqrt{12}$

$= \sqrt{25}\sqrt{2} + \sqrt{9}\sqrt{3} - \sqrt{36}\sqrt{2} + 2\sqrt{4}\sqrt{3}$

$= 5\sqrt{2} + 3\sqrt{3} - 6\sqrt{2} + 2(2)\sqrt{3}$

$= 5\sqrt{2} + 3\sqrt{3} - 6\sqrt{2} + 4\sqrt{3}$

$= -\sqrt{2} + 7\sqrt{3}$

$\sqrt{72}$

$= \sqrt{4}\sqrt{18}$

$= 2\sqrt{18}$

$\sqrt{9}\sqrt{8}$

$= 3\sqrt{8}$

Note: The textbook gives answers with the denominator rationalized.
This means that there is not a radical sign in the denominator.
In order to accomplish this, just multiply by an equivalent of 1.

Ex.6: Simplify

a) $\frac{\sqrt{7}}{\sqrt{3}}$

$= \frac{\sqrt{7}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{\sqrt{21}}{3}$

You Try: Simplify

b) $\frac{2\sqrt{3}}{\sqrt{20}}$

$= \frac{2\sqrt{3}}{\sqrt{4}\sqrt{5}}$

$= \frac{\cancel{2}\sqrt{3}}{\cancel{2}\sqrt{5}}$

$= \frac{\sqrt{3}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{\sqrt{15}}{5}$

c) $\frac{3\sqrt{2}}{2\sqrt{27}}$

$= \frac{3\sqrt{2}}{2\sqrt{9}\sqrt{3}}$

$= \frac{\cancel{3}\sqrt{2}}{2(\cancel{3})\sqrt{3}}$

$= \frac{\sqrt{2}}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{\sqrt{6}}{2(3)}$

$= \frac{\sqrt{6}}{6}$

d)

d₁) $\frac{\sqrt{6}}{2\sqrt{18}}$

$= \frac{\sqrt{6}}{2\sqrt{9}\sqrt{2}}$ → $\frac{\sqrt{3}}{2(3)}$

$= \frac{\sqrt{6}}{2(3)\sqrt{2}}$

$= \frac{\sqrt{6}}{6\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{\sqrt{12}}{6(2)}$

$= \frac{\sqrt{12}}{12}$

$= \frac{\sqrt{4}\sqrt{3}}{12}$

$= \frac{\overset{1}{\cancel{2}}\sqrt{3}}{\cancel{12}\,6}$

$= \frac{\sqrt{3}}{6}$

d₂) $\frac{\overset{1}{\cancel{\sqrt{6}}}}{2\cancel{\sqrt{18}}\,\sqrt{3}}$

$\frac{\sqrt{18}}{\sqrt{6}} = \sqrt{3}$

$= \frac{1}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{\sqrt{3}}{2(3)}$

$= \frac{\sqrt{3}}{6}$

Today's Homework Practice includes:

pp. 167-168 #(1 –7)ace, 8–10, 12 [15–17]