# Today's Learning Goal(s):

Date: Mar 9/20

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

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

Last day's work:

pp. 160-162 #1 – 5, 7, 9, 13 [17]

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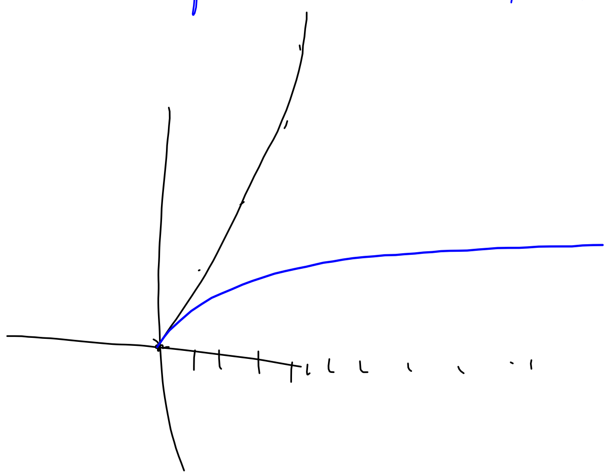
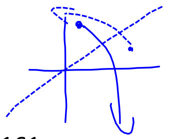
**1.** Each set of ordered pairs defines a parabola. Graph the relation and its inverse.

a) $\{(0, 0), (1, 3), (2, 12), (3, 27)\}$

b) $\{(-3, -4), (-2, 1), (-1, 4), (0, 5), (1, 4), (2, 1), (3, -4)\}$

inverse points: $\{(0,0), (3,1), (12,2), (27,3)\}$





$= -2(x-1)^2 + 7$

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

$x = 7 - 2(y-1)^2$

$x - 7 = -2(y-1)^2$

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

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

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

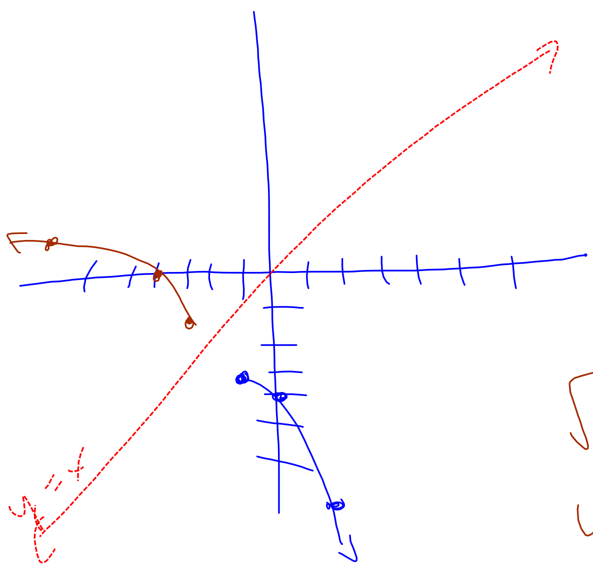
$\therefore f^{-1}(x) = +\sqrt{\frac{x-7}{-2}} + 1$

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

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

$= \sqrt{-a} + 1, \quad a \leq 0$

**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.




$f(x)$: vertex $(-1, -3)$

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

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

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

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

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

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pp. 160-162 #1 – 5, 7, 9, 13 [17]

**9.** For $-2 < x < 3$ and $f(x) = 3x^2 - 6x$, determine

**a)** the domain and range of $f(x)$

**b)** the equation of $f^{-1}(x)$ if $f(x)$ is further restricted to $1 < x < 3$

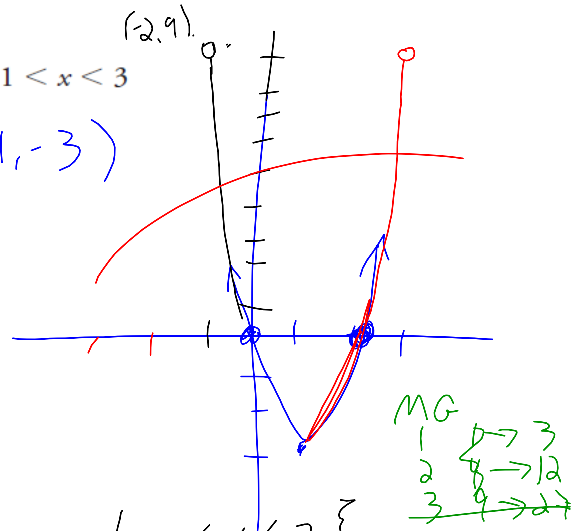
a) $f(x) = 3x^2 - 6x$

$= 3(x^2 - 2x)$

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

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

$\therefore v(1, -3)$




$D_f: \{x \in \mathbb{R} \mid -2 < x < 3\}$

$R_f: \{y \in \mathbb{R} \mid -3 \le y < 9\}$

b) $1 < x < 3$

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

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

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

$\pm\sqrt{\frac{x+3}{3}} = y - 1$

$\pm\sqrt{\frac{x+3}{3}} + 1 = y$

But $\because 1 < x < 3$

$\therefore$ only $+\sqrt{\frac{x+3}{3}} + 1 = y$

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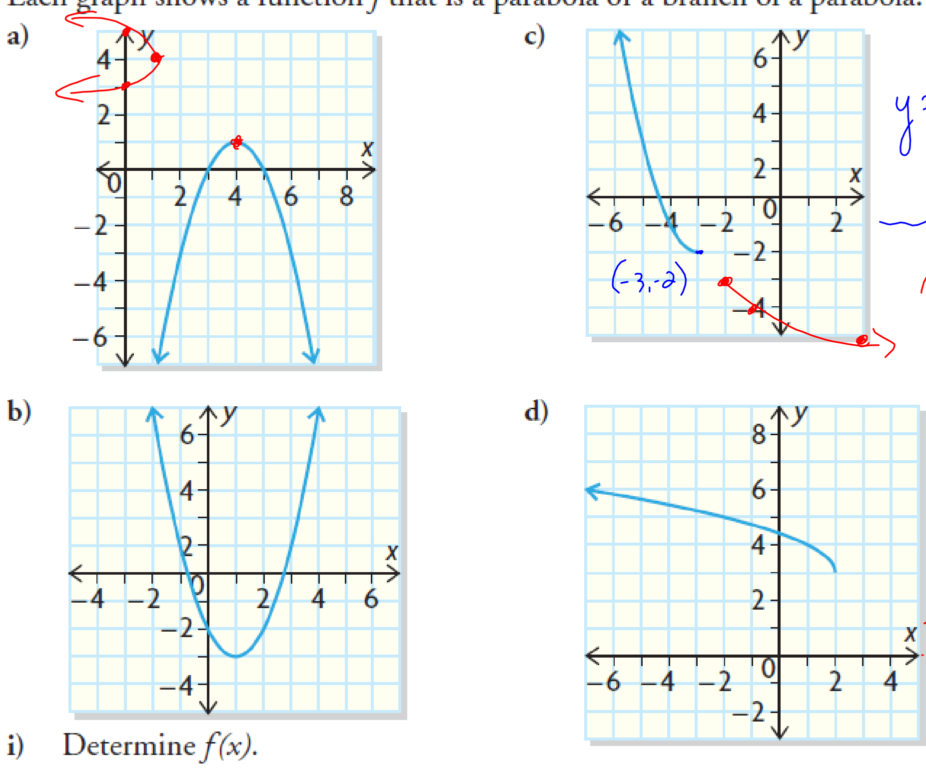
**13.** Each graph shows a function $f$ that is a parabola or a branch of a parabola.




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

$x \leq -3$

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

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

$\pm\sqrt{x+2} = y + 3$

$\pm\sqrt{x+2} - 3 = y$

$\therefore y = -\sqrt{x+2} - 3$

i) Determine $f(x)$.

ii) Graph $f^{-1}$.

iii) State restrictions on the domain or range of $f$ to make its inverse a function.

iv) Determine the equation(s) for $f^{-1}$.

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**17.** You are given the relation $x = 4 - 4y + y^2$.

a) Graph the relation.

b) Determine the domain and range of the relation.

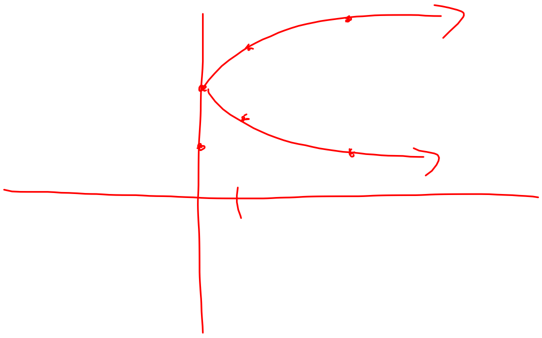
c) Determine the equation of the inverse.

d) Is the inverse a function? Explain.

$x = 4 - 4y + y^2$

$= y^2 - 4y + 4$

$x = (y-2)^2$



if $y = (x-2)^2$

## 3.4 Operations with Radicals

Date: Mar. 9/20

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 $3\sqrt{10}$

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

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

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

Ex.3: Simplify

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

$=\sqrt{6\times3}$

$=\sqrt{18}$

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

$=3\sqrt{2}$

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

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

$=-6\sqrt{49}$

$=-6(7)$

$=-42$

Note: Many rules are similar to algebra:

Ex.4: Simplify

| | radicals | algebra |
|---|---|---|
| a) | $\sqrt{2}+\sqrt{2}+\sqrt{2}$ | $x+x+x$ |
| | $=3\sqrt{2}$ | $=3x$ |
| b) | $2\sqrt{3}+5\sqrt{3}$ | $2x+5x$ |
| | $=7\sqrt{3}$ | $=7x$ |
| c) | $2\sqrt{3}+3\sqrt{7}$ | $2x+3y$ |

Does Not Simplify

Not "like" radicals.

Not "like" terms

*Summarizing some rules*

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

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

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

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

Ex.5: Simplify

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

$=12-3\sqrt{6}$

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

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

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

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

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

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

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

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

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

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

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

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

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

$\sqrt{72}$

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

$=3\sqrt{8}$

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

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

$=6\sqrt{2}$

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

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

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

b₂) $\frac{2\sqrt{3}}{\sqrt{20}}$

$= \frac{2\sqrt{3}}{\sqrt{20}} \times \frac{\sqrt{20}}{\sqrt{20}}$

$= \frac{2\sqrt{60}}{20}$

$=$

You Try: Simplify

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

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

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

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

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

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

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

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

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

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

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

d₁) $\frac{\sqrt{6}}{2\sqrt{18}}$

$= \frac{\sqrt{6}}{2\sqrt{9}\sqrt{2}}$

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

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

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

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

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

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

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

$2\sqrt{6}$
$= \sqrt{4}\sqrt{6}$
$= \sqrt{24}$

$6\sqrt{2}$
$= \sqrt{36}\sqrt{2}$
$= \sqrt{72}$

d₂) $\frac{\sqrt{6}}{2\sqrt{18}}$

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

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

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

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

$\frac{1\sqrt{6}}{6\sqrt{2}}$

$= \frac{1}{6}\sqrt{\frac{6}{2}}$

$= \frac{1}{6}\sqrt{3}$

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

**Are there any Assigned Questions you would like to see on the board?**

Last day's work: pp. 160-162 #1 – 5, 7, 9, 13 [17]

Today's Assigned Practice includes:

pp. 167-168 #(1 –7)ace, 8–10, 12 [15–17] clipboard(2).galleryitem

clipboard(3).galleryitem