15.1 Equations containing Radicals

$\sqrt{x}=5$

$(\sqrt{x})^2=(5)^2$

$x=25$

$\sqrt{x}+1=6$

$(\sqrt{x}+1)^2=36$

$(\sqrt{x}+1)(\sqrt{x}+1)=36$

$x+\sqrt{x}+\sqrt{x}+1=36$

$x+2\sqrt{x}+1=36$

not helpful

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$\sqrt{x}+1=6$

$\sqrt{x}=5$

$(\sqrt{x})^2=25$

$x=25$

$\sqrt{4x+12}+7=1$

$\sqrt{4x+12}=-6$ square

$4x+12=36$

$4x=24$

$x=6$ ✗

no solution

$\sqrt{4(6)+12}+7=1$

$\sqrt{36}+7=1$

$6+7=1$

$13=1$ ✗

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$\sqrt{6a}=2\sqrt{3}$

$6a=4\cdot3$

$a=\frac{12}{6}$

$a=2$

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

$\sqrt{12}=2\sqrt{3}$

$\sqrt{4\cdot3}=2\sqrt{3}$

$2\sqrt{3}=2\sqrt{3}$ ✓

$x+1=\sqrt{17-4x}$

$(x+1)^2=17-4x$

$(x+1)(x+1)=17-4x$

$x^2+x+x+1=17-4x$

$x^2+2x+1=17-4x$

$x^2+6x-16=0$

$(x+8)(x-2)=0$

$x+8=0$ $\quad x-2=0$

$x=-8$ $\quad x=2$

Jul 27-3:04 PM

15.2 solving $x^2=a$

$y^2=28$

$\sqrt{y^2}=\pm\sqrt{28}$ ⟸ +, −

$y=\sqrt{4}\sqrt{7}$

$y=2\sqrt{7}$

$y=\pm2\sqrt{7}$

$(-2\sqrt{7})^2=28$

$4\cdot7=28$

$28=28$ ✓

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$(x-2)^2=18$

$\sqrt{(x-2)^2}=\sqrt{18}$ ..... $\sqrt{9}\sqrt{2}=3\sqrt{2}$

$x-2=\pm\sqrt{18}$

$x-2=\pm3\sqrt{2}$

$x=2\pm3\sqrt{2}$

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

$x=2-3\sqrt{2}$

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#31 #25

$(x-4)^2=8$

$\sqrt{(x-4)^2}=\sqrt{8}$

$x-4=\pm2\sqrt{2}$

$x=4\pm2\sqrt{2}$

#32

$(b-8)^2=48$

$b-8=\pm\sqrt{48}$

$b-8=\pm4\sqrt{3}$

$b=8\pm4\sqrt{3}$

$\sqrt{48}$ $\sqrt{16\cdot3}$ $4\sqrt{3}$

$\sqrt{16\cdot8}$

$\sqrt{16}\sqrt{4\sqrt{2}}$

$\sqrt{16}\,2\sqrt{2}$

$2\sqrt{12}$

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

$2\cdot2\sqrt{3}$

$4\sqrt{3}$

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15.3 completing the square

Remember:

$(a + b)^2 = a^2 + 2ab + b^2$

$(a - b)^2 = a^2 - 2ab + b^2$

$(x+5)^2 = (x+5)(x+5)$

$x^2+5x+5x+25$

$x^2 + 2(5x)+25$

$x^2 + 10x+25$

Prob: $x^2+10x = 8$

$x^2+10x+25 = 8+25$

$(x+5)^2 = 33$

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$x^2+10x = 8$

$x^2+2(5x)+25 = 8+25$

5^2

$x^2+10x+25$

$x^2+2(5x)+5^2$

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ex3

$x^2-8x+3=0$

$x^2-8x = -3$

$x^2-2(4x)+16 = -3+16$

4^2

$x^2-8x+16 = 13$

$(x-4)^2 = 13$

$x-4 = \pm\sqrt{13}$

$x = 4 \pm \sqrt{13}$

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ex4 $2y^2+5y+3=0$

$\frac{2y^2+5y}{2} = \frac{-3}{2}$

$y^2+\frac{5}{2}y = -\frac{3}{2}$

$y^2+2\left(\frac{5}{4}y\right) = -\frac{3}{2}$

$\left(\frac{5}{4}\right)^2$

$y^2+2\left(\frac{5}{4}y\right)+\frac{25}{16} = -\frac{3}{2}+\frac{25}{16}$

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$y^2+2\left(\frac{5}{4}y\right)+\frac{25}{16} = -\frac{3}{2}+\frac{25}{16}$

$\left(y+\frac{5}{4}\right)^2 = -\frac{24}{16}+\frac{25}{16} = \frac{1}{16}$

$y+\frac{5}{4} = \pm\sqrt{\frac{1}{16}}$

$y+\frac{5}{4} = \pm\frac{1}{4}$

$y = \pm\frac{1}{4}-\frac{5}{4}$

$y = +\frac{1}{4}-\frac{5}{4} = -\frac{4}{4} = -1$

$y = -\frac{1}{4}-\frac{5}{4} = -\frac{6}{4} = -\frac{3}{2}$

$-1, -\frac{3}{2}$

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#2 pg 434 $a^2+4a = -3$

$a^2+2(2a) = -3$

$a^2+2(2a)+4 = -3+4$

$(a+2)^2 = 1$

$a+2 = \pm\sqrt{1}$

$a+2 = \pm 1$

$a = -2 \pm 1$

$a = -3, -1$

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#3) $b^2-2b=24$

$b^2-2(1b)=24$

$b^2-2(1b)+1^2=24+1^2$

$(b-1)^2=25$

$b-1=\pm\sqrt{25}$

$b-1=\pm5$

$b=+1\pm5$

$b=6,-4$

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sidebar

$x^2+2(2x)+4=-3+4$

$a^2+2ab+b^2$

$x^2+2\cdot x\cdot 2+2^2$

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#8) $p^2-6p=-5$

$p^2-2(3p)=-5$

$p^2-2(3p)+3^2=-5+3^2$

$a^2-2ab+b^2$

$(p-3)^2=4$

$p-3=\pm\sqrt{4}$

$p-3=\pm2$

$p=3\pm2$

$p=5,1$

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#10) $x^2-4x-21=0$ $(x-7)(x+3)=0$

$x^2-2(2x)=21$ $x=7, x=-3$

$b=2$

$x^2-2(2x)+2^2=21+2^2$

$(x-2)^2=25$

$x-2=\pm\sqrt{25}$

$x=2\pm5$

$x=7,-5$

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15.4 The Quadratic Formula!!

see the derivation on page 435

$ax^2+bx+c=0$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

2nd degree = 2 solutions

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ex1) $x^2-7x+10=0$ $x=2,5$

$ax^2+bx+c=0$

$a=1$

$b=-7$

$c=10$

$$x=\frac{-(-7)\pm\sqrt{(-7)^2-4(1)(10)}}{2(1)}$$

$$x=\frac{7\pm\sqrt{49-40}}{2}$$

$$x=\frac{7\pm\sqrt{9}}{2}$$

$$x=\frac{7\pm3}{2}$$

$x=5,2$

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ex2 $x^2-1=x$ $a=1$ $b=-1$ $c=-1$

$x^2-x-1=0$

$x=\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(-1)}}{2(1)}$

$x=\frac{1\pm\sqrt{1+4}}{2}$

$x=\frac{1\pm\sqrt{5}}{2}$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

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p437 #2 $x^2-5x+6=0$

$a=1$ $b=-5$ $c=+6$

$x=\frac{-(-5)\pm\sqrt{(-5)^2-4(1)(6)}}{2(1)}$

$x=\frac{5\pm\sqrt{25-24}}{2}$

$x=\frac{5\pm\sqrt{1}}{2}$

$x=\frac{5\pm1}{2}=\frac{6}{2},\frac{4}{2}=3,2$

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15.5 Area problems

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15.6 Wet Mixture problems

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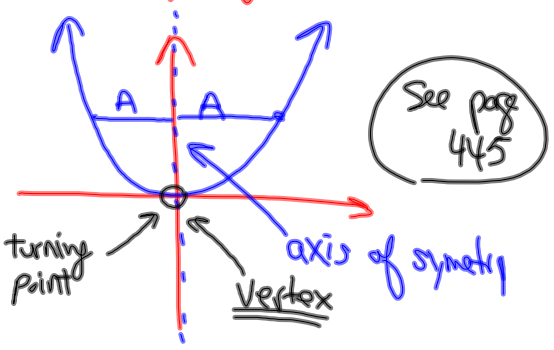
15.7 The Parabola!!

graph of a quadratic equation



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ex1 $y=x^2-6x+8$

- not solving for x
- we are graphing a function

$y=f(x)$

$f(x)=x^2-6x+8$

graph crosses X-axis when $y=0$

$0=x^2-6x+8$

$0=(x-2)(x-4)$

$x=2,4$

$(2,0)$

$(4,0)$

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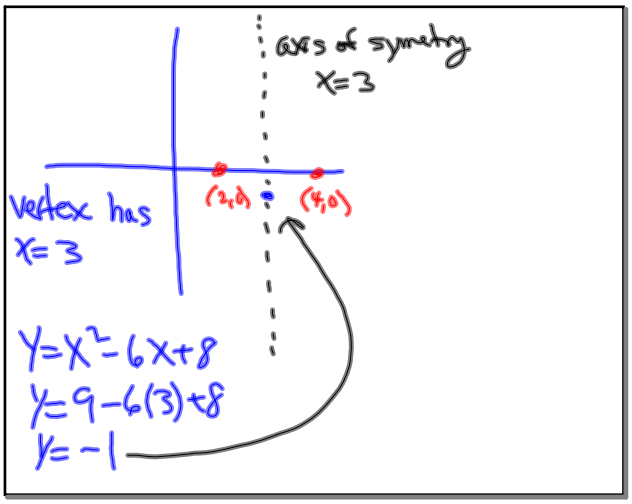

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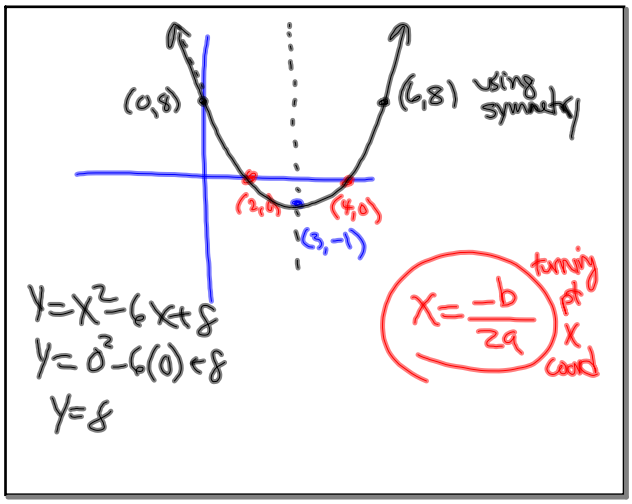

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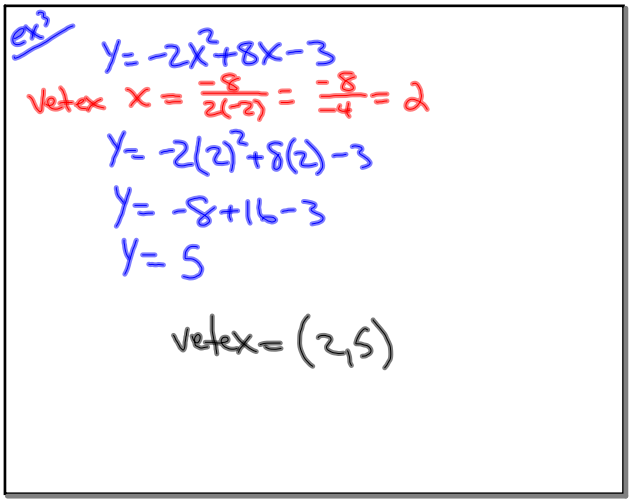

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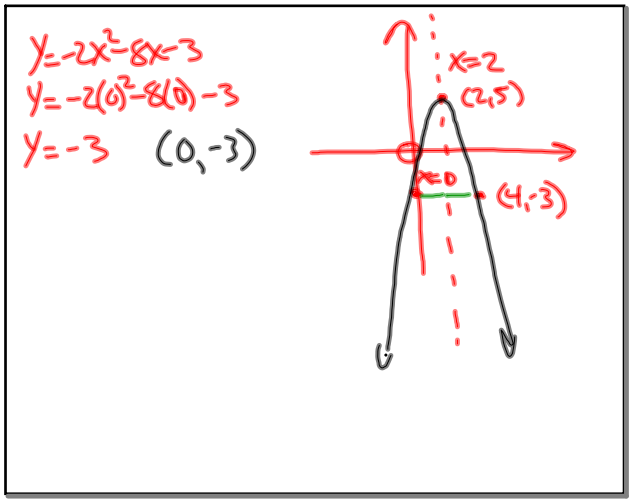

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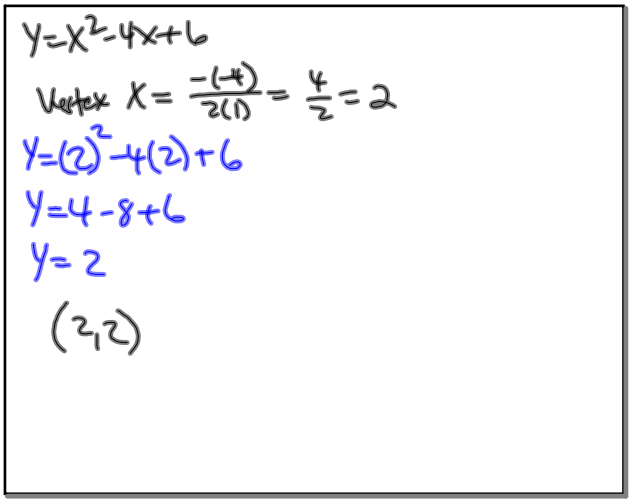

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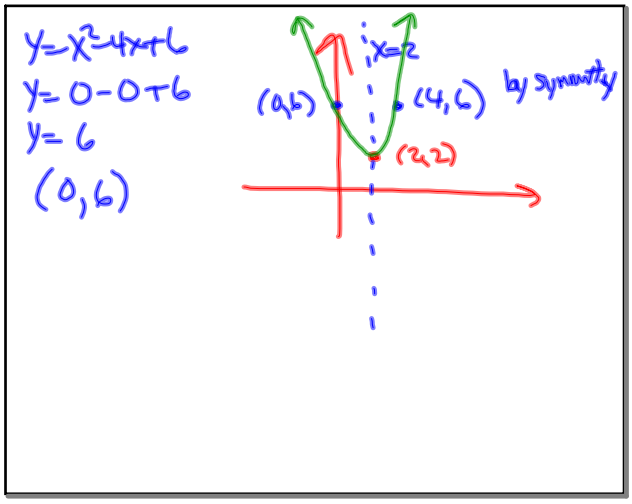

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Homework page 450:
#'s
2,5,9,13,15,18,21,23

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