Prerequisite Tutorial 4 *Equations & Inequalities*

YT means "Your Turn."
Full solutions area at the end of this tutorial.

Linear and Rational Equations

Linear Equations in One Variable

1. Solve (a) $2x-3(2x+2)=1-5(4x+3)$ (b) $0.6x-1.3=0.2(5x-8)$ (c) $\frac{2}{3}x-\frac{5}{6}x-3=\frac{1}{2}x-5$

What's my 1st move?

1st move: Distribute

$2x-6x-6=1-20x-15$

$-4x-6=-20x-14$

$16x=-8$

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

Solution: $\{-\frac{1}{2}\}$

1st move: M! both sides by 10

$10[0.6x-1.3]=10[0.2(5x-8)]$

$6x-13=2(5x-8)$

$6x-13=10x-16$

$-4x=-3$

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

Solution: $\{\frac{3}{4}\}$

1st move: M! both sides by the LCD, 6

$6[\frac{2}{3}x-\frac{5}{6}x-3]=6[\frac{1}{2}x-5]$

$4x-5x-18=3x-30$

$-x=3x-12$

$-4x=-12$

$x=3$

Solution: $\{3\}$

YT#1: Solve $\frac{2}{3}(x-1)+2=\frac{1}{6}x-\frac{1}{2}$

Rational Equations

A rational equation is an equation in which a variable appears in the denominator of a fraction. We must restrict the values of the variable to avoid division by zero!

2. Solve (a) $\frac{9}{4}-\frac{1}{2x}=\frac{4}{x}$ restrictions: $x\neq 0$ (b) $\frac{1}{y-1}+\frac{y+1}{y^2+2y-3}=\frac{1}{y+3}$ restrictions: $y\neq 1,-3$

What's my move?

1st move: M! both sides by LCD, $4x$

$4x\left[\frac{9}{4}-\frac{1}{2x}\right]=4x\left[\frac{4}{x}\right]$

$9x-2=16$

$9x=18$

$x=2$

Solution: $\{2\}$

Step 1: F! denominators: $\frac{1}{y-1}+\frac{y}{(y+3)(y-1)}=\frac{1}{y+3}$

Step 2: M! both sides by the LCD:
$(y-1)(y+3)(\frac{1}{y-1}+\frac{y}{(y+3)(y-1)})=(\frac{1}{y+3})(y-1)(y+3)$

Step 3: Distribute and R! $y+3+y=y-1$

Solve for y: $y=4$ Solution: $\{4\}$

(c) $\frac{u-3}{u-6}=\frac{u+3}{u+2}-1$ restriction(s): $u\neq 6,-2$

Step 1: M! both sides by the LCD:
$(u-6)(u+2)(\frac{u-3}{u-6})=(\frac{u+3}{u+2}-1)(u-6)(u+2)$

Step 2: Distribute and R! $(u+2)(u-3)=(u+3)(u-6)-(u-6)(u+2)$

Step 3: Solve for u: $u^2-u-6=u^2-3u-18-(u^2-4u-12)$

$-u-6+3u+18=-u^2+4u+12$

$u^2-2u=0$

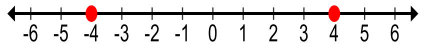
$u(u-2)=0 \Rightarrow u=0,2$

YT#2: Solve (a) $\frac{2}{x+1}-\frac{x}{x^2-x-2}=\frac{3}{x-2}$

(b) $6+\frac{5}{y-2}=-\frac{2}{y-1}$

Absolute Value Equations

Example: $|x| = 4$



If $k > 0$, then $|u| = k$ is equivalent to $u = k$ or $u = -k$.

3. Solve (a) $2|x-4|+1=7$

Step 1: ISOLATE the absolute value:
$|x-4| = 3$

Step 2: INSIDE must be 3 or -3:
$x-4=3 \quad or \quad x-4=-3$

Step 3: Solve for *x:*
$x=7 \quad or \quad x=1$

Solution: {7, 1}

(b) $|3x-1| = |x+5|$

Step 1: One abs value ISOLATED, so now...
$|3x-1| = |x+5|$

Step 2: INSIDE of L must equal $\pm$ INSIDE of R:
$3x-1 = x+5 \quad or \quad 3x-1 = -(x+5)$

Step 3: Solve for *x:*
$x=3 \quad or \quad x=-1$

Solution: {3, -1}

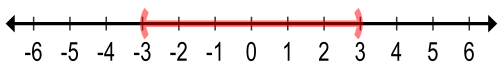
(c) $|x+2| = -3$

SOLUTION?

No solution!
How can abs value = something negative?

Absolute Value Inequalities

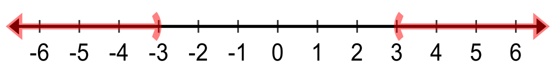
Example: $|x| < 3$



$|x| < 3$ means "the distance *x* lies from zero is less than 3.

If *k* is a real number, *k* > 0, then $|u| < k$ is equivalent to $-k < u < k$ (also holds for $\leq$)

Example: $|x| > 3$



$|x| > 3$ means "the distance *x* lies from zero is less than 3.

If *k* is a real number, *k* > 0, then $|u| > k$ is equivalent to $u < -k$ or $u > k$ (also holds for $\geq$)

4. Solve (a) $|2x+5|+2 \leq 11$

Step 1: ISOLATE absolute value:
$|2x+5| \leq 9$

Step 2: Quantity INSIDE is WITHIN 9 of 0 –
Distance Q lies from o is LESS than 9:

$-9 \leq 2x+5 \leq 9$

Step 3: Solve for *x:* $-14 \leq 2x \leq 4$

$-7 \leq x \leq 2$

Interval Notation: [-7, 2]

(b) $5|2x+3|-1 > 9$

ISOLATE absolute value:
$|2x+3| > 2$

Quantity INSIDE is MORE than 2 from 0 –
Distance Q lies from 0 is MORE than 2:

$2x+3 < -2 \quad or \quad 2x+3 > +2$

Solve for *x:*

$x < -\frac{5}{2} \quad or \quad x > -\frac{1}{2}$

Interval Notation:

$(-\infty, -\frac{5}{2}) \cup (\frac{1}{2}, \infty)$

(c) $|2x+1| \geq 0$

SOLUTION?

ANY value of *x* will make the statement TRUE because ABS VALUE is NEVER negative!

Sol'n: $(-\infty, \infty)$

(d) $|6-5x| < -4$

SOLUTION?

Absolute value can NOT be negative, so there is no solution!

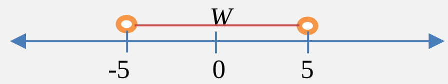
Sol'n: $\emptyset$

YT#3 Solve (a) $2|5-2x|-3 > 5$ (b) $\left|-\frac{2}{3}(x+4)-2\right| + 2 \leq 6$

5. ***Concept Check***

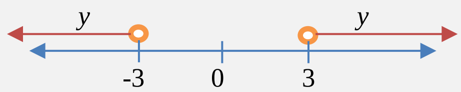
(a) Consider the statement $|W| < 5$. Write a statement in words that explains what it means, and then draw a graph and solve.

"The distance that W lies from 0 is less than 5."



Sol'n: $-5 < W < 5$

(b) Consider the statement $y < -3$ *or* $y > 3$. Draw a graph that represents this statement and then write it as an equivalent absolute value statement.



Absolute value statement: $|y| > 3$

YT#4 (a) Consider the statement $-6 < Q < 6$.
1) Draw a graph that represents this statement. 2) Write it as an equivalent absolute value statement.

(b) Consider the statement $|x| > 4$.
1) Write a statement in words that explains what it means. 2) Draw a graph. 3) Solve using inequality notation.

Quadratic Equations

Solve Quadratic Equations by Using the

Zero Product Property: If $mn = 0$, then $m = 0$ or $n = 0$

Square Root Property: If $x^2 = k$, then $x = \pm\sqrt{k}$

What's my 1st move?

6. Solve (a) $x(2x+1) = 15$

Can I set each factor = 0? **NO!**

Must have ZERO on right side!

$$2x^2 + x = 15$$
$$2x^2 + x - 15 = 0$$
$$(2x - \quad)(x - \quad) = 0$$
$$(2x-5)(x+3) = 0$$
$$2x - 5 = 0 \quad or \quad x + 3 = 0$$
$$x = \frac{5}{2} \quad or \quad x = -3$$
$$\{\frac{5}{2}, -3\}$$

(b) $24x^2 = 8x$

Can I divide both sides by x? **NO!**

***x = 0* is a solution that we would LOSE**

You never want to divide both sides of an EQ by a variable quantity if you can help it!

$$24x^2 - 8x = 0$$
$$8x(3x-1) = 0$$
$$8x = 0 \quad or \quad 3x - 1 = 0$$
$$x = 0 \quad or \quad x = \frac{1}{3}$$
$$\{0, \frac{1}{3}\}$$

(c) $2(x+7)^2 - 16 = 0$

What's my best move?

Add 16, divide by 2, then SQUARE ROOT both sides!

$$2(x+7)^2 = 16$$
$$(x+7)^2 = 8$$
$$x + 7 = \pm\sqrt{8}$$
$$x + 7 = \pm 2\sqrt{2}$$
$$x = -7 \pm 2\sqrt{2}$$
$$\{7 \pm 2\sqrt{2}\}$$

YT#5: Solve (a) $(x-3)(2x+1) = 3$ (b) $2(x-3)^2 - 40 = 0$

Quadratic Formula: For $ax^2 + bx + c = 0$ where $a \neq 0$, the solutions are

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

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7. Solve $3x^2 - 2x = 4$

$$3x^2 - 2x - 4 = 0$$
$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-4)}}{2(3)}$$
$$x = \frac{2 \pm \sqrt{4+48}}{6}$$
$$x = \frac{2 \pm \sqrt{52}}{6}$$
$$x = \frac{2 \pm \sqrt{4(13)}}{6}$$
$$x = \frac{2 \pm 2\sqrt{13}}{6}$$
$$x = \frac{1 \pm \sqrt{13}}{3}$$

YT#6: Solve $3x^2 - 4x - 2 = 0$

Solve Equations for a Specified Variable

8. Solve $3x + 4a = \frac{2px+1}{2a}$ for x.

What's the overall idea here?

Overall goal: "Free" the x's so we can isolate the x terms, make the two x's "become 1, and solve for x.

Step 1: M! both sides by $2a$ $\quad 2a(3x + 4a) = 2a(\frac{2px+1}{2a})$

Step 2: Distribute $\quad 6ax + 8a^2 = 2px + 1$

Step 3: Isolate x terms $\quad 6ax - 2px = 1 - 8a^2$

Step 4: F! out the x: $\quad x(6a - 2p) = 1 - 8a^2$

Step 5: Divide: $\quad x = \frac{1-8a^2}{6a-2p}$

YT#7: Solve
(a) $4a^2 - b^2 = 8$ for a.
(b) $y = \frac{6x+1}{3x-5}$ for x.

More Equations

9. Solve (a) $(u-3)^3 + 88 = 0$

Step 1: ISOLATE u-term: $(u-3)^3 = -88$

Step 2: Cube root both sides: $u - 3 = \sqrt[3]{-88}$

Step 3: Add 3 to both sides and simplify radical:

$$u = 3 + \sqrt[3]{-8(11)}$$
$$u = 3 - 2\sqrt[3]{11}$$

(b) $\sqrt[4]{2u+15} + 3 = 5$

Step 1: ISOLATE u-term: $\sqrt[4]{2u+15} = 2$

Step 2: Raise both sides to 4th power: $2u + 15 = 16$

Step 3: Subtract 15, divide by 2: $2u = 1$

$$u = \frac{1}{2}$$

Must CHECK b/c we raised both sides to an EVEN power!
It works.

9. Solve (a) $8x^3 + 4x^2 - 50x - 25 = 0$

Group terms: $\quad (8x^3 + 4x^2) - (50x + 25) = 0$

F! out GCF: $\quad 4x^2(2x + 1) - 25(2x + 1) = 0$
F! out GCF: $\quad (2x + 1)[4x^2 - 25] = 0$

$2x + 1 = 0 \quad or \quad 4x^2 - 25 = 0$

$2x = -1 \quad or \quad 4x^2 = 25$
$x = -\frac{1}{2} \quad or \quad x^2 = \frac{25}{4}$
$x = \pm\frac{5}{2}$

$$\{-\frac{1}{2}, \pm\frac{5}{2}\}$$

(b) $27 - 8x^3 = 0$

Recognize as $A^3 - B^3$: $\quad 27 - 8x^3 = (3)^3 - (2x)^3$

$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$: $A = 3, B = 2x$

$27 - 8x^3 = (3 - 2x)(9 + 6x + 4x^2) = 0$

$3x - 2 = 0 \quad or \quad 9 + 6x + 4x^2 = 0$
$x = \frac{2}{3} \quad or \quad 9 + 6x + 4x^2 = 0$

$$x = -\frac{6\pm\sqrt{-108}}{8}$$
$$x = -\frac{6\pm\sqrt{-36(3)}}{8}$$
$$x = -\frac{6\pm6i\sqrt{3}}{8}$$
$$x = -\frac{3\pm3i\sqrt{3}}{4}$$

YT#8: Solve (a) $-4\sqrt[3]{2x-5} + 6 = 14$
(b) $98x^3 - 49x^2 - 8x + 4 = 0$
(c) $2x^3 - 128 = 0$ (Hint: divide both sides by 2 1st!)

Solving Radical Equations

Step 1 Isolate the radical. If an equation has more than one radical, choose one of the radicals to isolate.

Step 2 Raise each side of the equation to a power that will "undo" the radical

Step 3 Solve the resulting equation. If the equation still has a radical, repeat steps 1 and 2.

Step 4 Check the potential solutions in the original equation and write the solution set.

In solving radical equations, extraneous solutions potentially arise when both sides of the equation are raised to an even power. Therefore, an equation with only odd-indexed roots will not have extraneous solutions.

10. Solve (a) $\sqrt{1-2x}-\sqrt{1-x}=2$

Step 1: Isolate radical: $\sqrt{1-2x}=2+\sqrt{1-x}$

Step 2: Square both sides: $\left(\sqrt{1-2x}\right)^2=\left(2+\sqrt{1-x}\right)^2$

Square out & S! $1-2x=(2+\sqrt{1-x})(2+\sqrt{1-x})$

$$1-2x=4+2\sqrt{1-x}+2\sqrt{1-x}+1-x$$
$$-2x=4-x+4\sqrt{1-x}$$

Step 3: Isolate radical: $-4\sqrt{1-x}=4+x$

Step 4: Square both sides: $\left[-4\sqrt{1-x}\right]^2=(4+x)^2$

$$16(1-x)=16+8x+x^2$$
$$16-16x=16+8x+x^2$$
$$0=x^2+24x$$
$$0=x(x+24)$$
$x=0$ or -24

Step 5: CHECK!

put in ORIGINAL EQ – $x=0$ doesn't work! Solution: {-24}

(b) $x^{2/3}=4$

Step 1: ISOLATE radical: done

Step 2: Square root both sides: $\sqrt{x^{2/3}}=\pm\sqrt{4}$

$$x^{1/3}=\pm 2$$

Step 3: Cube both sides: $\left(x^{1/3}\right)^3=(\pm 2)^3$

$$x=\pm 8$$

(c) $(x+1)^{\frac{2}{5}}=9$

Step 1: ISOLATE radical: already is isolated

Step 2: Raise both sides to 5th power: $\left[(x+1)^{\frac{2}{5}}\right]^5=9^5$

$$(x+1)^2=9^5$$

Step 3: Square root both sides:
$$x+1=\pm\sqrt{9^2 9^2 9}$$
$$x+1=\pm 9(9)(3)$$
$$x=-1\pm 243$$
$$x=242,-244$$

CHECK answers because of squaring both sides! 242 does not work. Solution: $x=-244$.

YT#9: Solve (a) $\sqrt{k-2}=\sqrt{2k+3}-2$ (b) $(2x-1)^{3/2}-3=122$

YOUR TURN solutions start on the next page

YT solutions

Linear Equations and Rational Equations

YT#1: Solve $\frac{2}{3}(x-1)+2=\frac{1}{6}x-\frac{1}{2}$

1st move: M! both sides by the LCD, 6

$$6\left[\frac{2}{3}(x-1)+2\right]=\left[\frac{1}{6}x-\frac{1}{2}\right]6$$

$$6\cdot\frac{2}{3}(x-1)+6\cdot 2=6\cdot\frac{1}{6}x-6\cdot\frac{1}{2}$$
$$4(x-1)+12=x-3$$
$$4x-4=x-15$$
$$3x=-11$$
$$x=-\frac{11}{3}$$

Solution: $\{-\frac{11}{3}\}$

YT#2: Solve (a) $\frac{2}{x+1}-\frac{x}{x^2-x-2}=\frac{3}{x-2}$

Step 1: F! denominators: $\frac{2}{x+1}-\frac{x}{(x-2)(x+1)}=\frac{3}{x-2}$

Step 2: M! both sides by the LCD:
$(x-2)(x+1)(\frac{2}{x+1}-\frac{x}{(x-2)(x+1)})=(\frac{3}{x-2})(x-2)(x+1)$

Step 3: Distribute and R! $2(x-2)-x=3(x+1)$

Solve for x: $2x-4-x=3x+3$
$$-2x=7$$
$$x=-\frac{7}{2}$$

Solution: $\{-\frac{7}{2}\}$

YT#2: Solve (b) $6+\frac{5}{y-2}=-\frac{2}{y-1}$

Step 1: M! both sides by the LCD: $(y-2)(y-1)\left[6+\frac{5}{y-2}\right]=[-\frac{2}{y-1}](y-2)(y-1)$

Step 2: Distribute and R! $6(y-2)(y-1)+5(y-1)=-2(y-2)$

Step 3: Solve for y: $6(y^2-3y+2)+5y-5=-2y+4$
$$6y^2-18y+12+7y-9=0$$
$$6y^2-11y+3=0$$
$$(3y-1)(2y-3)=0$$

$$3y-1=0 \quad or \quad 2y-3=0$$

$$y=\frac{1}{3},\frac{3}{2}$$

YT#3 Solve (a) $2|5-2x|-3>5$ (b) $\left|-\frac{2}{3}(x+4)-2\right|+2\leq 6$

Step 1: ISOLATE absolute value: $2|5-2x|>8$

$|5-2x|>4$

Step 2: Think of the inside of the absolute value as a quantity Q.
Then talk it out in words – how far away from zero is Q?

Q is MORE THAN 4 units from zero, so...to the LEFT of -4 or to the RIGHT of 4.

Step 3: Make appropriate inequality statement w/o absolute value:

$5-2x<-4 \quad or \quad 5-2x>4$

Step 4: Solve, and write answer in interval notation.

$-2x<-9 \quad or \quad -2x>-1$

$x>\frac{9}{2} \quad or \quad x<\frac{1}{2}$

$\left(-\infty,\frac{1}{2}\right)\cup\left(\frac{9}{2},\infty\right)$

Step 1: ISOLATE absolute value: $\left|-\frac{2}{3}(x+4)-2\right|\leq 4$

Step 2: Think of the inside of the absolute value as a quantity Q.
Then talk it out in words – how far away from zero is Q?

Q is LESS THAN or equal to 4 units from zero, so... BETWEEN -4 and 4.

Step 3: Make appropriate inequality statement w/o absolute value:

$-4\leq-\frac{2}{3}(x+4)-2\leq 4$

Step 4: Solve, and write answer in interval notation.

$-2\leq-\frac{2}{3}(x+4)\leq 6$

$-6\leq-2(x+4)\leq 18$

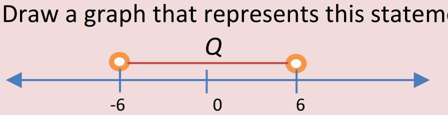
$3\geq x+4\geq -9$

$-1\geq x\geq -13$

[-13, -1]

YT#4 (a) Consider the statement $-6<Q<6$.

1) Draw a graph that represents this statement.



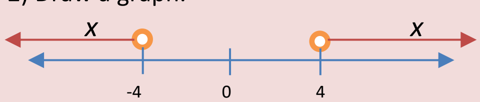
2) Write it as an equivalent absolute value statement.

$|Q|<6$

(b) Consider the statement $|x|>4$.

1) Explains what it means. Answer: x is more than 4 units of 0, or x lies beyond 6 units from 0.

2) Draw a graph.



3) Solve using inequality notation.

$x<-4 \quad or \quad x>4$

Quadratic Equations

YT#5: Solve (a) $(x-3)(2x+1)=3$ (b) $2(x-3)^2-40=0$

Can I set each factor = 0? **NO!** ***3?*** **NO!**
Must have ZERO on right side!

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

$2x^2-5x-3=3$

$2x^2-5x-6=0$

$(2x- \quad)(x- \quad)=0$

It doesn't factor, so…

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

$x=\frac{5\pm\sqrt{25+48}}{4}$ $\quad x=\frac{5\pm\sqrt{73}}{4}$

What's my best move? **Add 40, divide by 2, then *square root* both sides!**

$2(x-3)^2=40$

$(x-3)^2=20$

$x-3=\pm\sqrt{20}$

$x-3=\pm2\sqrt{5}$

$x=3\pm2\sqrt{5}$

$\{3\pm2\sqrt{5}\}$

YT#6 Solve $3x^2-4x-2=0$

$3x^2-4x-2=0$

$x=\frac{4\pm\sqrt{(-4)^2-4(3)(-2)}}{2(3)}$

$x=\frac{4\pm\sqrt{16+24}}{6}$

$x=\frac{4\pm\sqrt{40}}{6}$

$x=\frac{4\pm\sqrt{4(10)}}{6}$

$x=\frac{4\pm2\sqrt{10}}{6}$

$x=\frac{2\pm\sqrt{10}}{3}$

YT#7: Solve (a) $4a^2 - b^2 = 8$ for a.

$4a^2 = b^2 + 8$

$a^2 = \frac{b^2+8}{4}$

$a = \pm\frac{\sqrt{b^2+8}}{2}$

YT#7: Solve (b) $y = \frac{6x+1}{3x-5}$ for x.

Step 1: M! both sides by LCD: $y(3x-5) = (\frac{6x+1}{3x-5})(3x-5)$

Step 2: Distribute: $3xy - 5y = 6x + 1$

Step 3: Isolate x terms: $3xy - 6x = 5y + 1$

Step 4: F! out x: $x(3y-6) = 5y + 1$

Step 5: Divide: $x = \frac{5y+1}{3y-6}$

More Equations

YT#8: Solve (a) $-4\sqrt[3]{2x-5} + 6 = 1$

Step 1: ISOLATE u-term: $-4\sqrt[3]{2x-5} = -5$

$\sqrt[3]{2x-5} = \frac{5}{4}$

Step 2: Raise both sides to 3rd power: $2x - 5 = \frac{125}{64}$

Step 3: Subtract 15, divide by 2: $2x = \frac{125}{64} + \frac{5(64)}{64}$

$2x = \frac{125}{64} + \frac{320}{64}$

$2x = \frac{445}{64}$

$x = \frac{445}{128}$

No need to CHECK b/c we raised both sides to an ODD power!

YT#8: Solve (b) $98x^3 - 49x^2 - 8x + 4 = 0$

Group terms: $(98x^3 - 49x^2) - (8x - 4) = 0$

F! out GCF: $49x^2(2x-1) - 4(2x-1) = 0$

F! out GCF: $(2x-1)[49x^2 - 4] = 0$

$2x - 1 = 0 \quad or \quad 49x^2 - 4 = 0$

$2x = 1 \quad or \quad 49x^2 = 4$

$x = \frac{1}{2} \quad or \quad x^2 = \frac{4}{49}$

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

$\{\frac{1}{2}, \pm\frac{2}{7}\}$

YT#8: Solve (c) $2x^3 - 128 = 0$
(Hint: divide both sides by 2 1st!)

$2x^3 - 128 = 0$

$x^3 - 64 = 0$

Recognize as $A^3 - B^3$: $x^3 - 64 = (x)^3 - (4)^3$

$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$: $A = x, B = 4$

$x^3 - 64 = (x-4)(x^2 + 4x + 16) = 0$

$x - 4 = 0 \quad or \quad x^2 + 4x + 16 = 0$

$x = 4$

$x = \frac{-4\pm\sqrt{16-48}}{2}$

$x = \frac{-4\pm\sqrt{-32}}{2}$

$x = \frac{-4\pm\sqrt{-16(2)}}{2}$

$x = \frac{-4\pm 4i\sqrt{2}}{2}$

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

YT#9 Solve (a) $\sqrt{k-2} = \sqrt{2k+3} - 2$ (b) $(2x-1)^{3/2} - 3 = 122$ (NO CALCULATOR!!)

(a)

Step 1: Isolate radical: already done

Step 2: Square both sides: $\sqrt{k-2}^2 = \left(\sqrt{2k+3} - 2\right)^2$

Square out & S! $k - 2 = 2k + 3 - 4\sqrt{2k+3} + 4$

Step 3: Isolate radical: $4\sqrt{2k+3} = k + 9$

Step 4: Square both sides: $\left[4\sqrt{2k+3}\right]^2 = (k+9)^2$

$$16(2k+3) = k^2 + 18k + 81$$

$$32k + 48 = k^2 + 18k + 81$$

$$0 = k^2 - 14k + 33$$

$$0 = (k-11)(k-3)$$

k = 11 or 3

Step 5: CHECK! put in ORIGINAL EQ – BOTH work

Solution: {11, 3}

(b)

Step 1: ISOLATE radical: $(2x-1)^{3/2} = 125$

Step 2: Cube both sides: $[(2x-1)^{3/2}]^{\frac{1}{3}} = 125^{\frac{1}{3}}$

$$(2x-1)^{1/2} = 5$$

Step 3: Square both sides: $2x - 1 = 25$

$$2x = 26$$

$$x = 13$$