Name: ____________________ Pd: ________

SM3 Unit 3 Solving Notes

3.1 *Solve equations involving absolute value.*

Recall: The <u>absolute value</u> of a number is the distance that number is from ___0___.

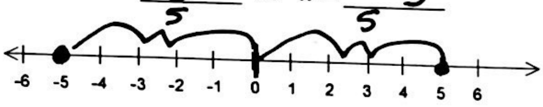
Example 1: Solve the given equation and graph the solution set.

$$|x| = 5$$

Think: What numbers are 5 units from zero? ___5___, ___-5___

So there are two solutions:

$x =$ ___5___ or $x =$ ___-5___



Examples: Solve the given equation.

2) $|x| = \frac{5}{7}$

$x = \frac{5}{7}$ $x = -\frac{5}{7}$

3) $|x-2| = 4$

(We are looking for the values of x where ___x-2___ is 4 units from zero.)

$x-2 = 4$
$+2 \quad +2$
$\boxed{x=6}$

$x-2 = -4$
$+2 \quad +2$
$\boxed{x=-2}$

4) *You Try* $|x+3| = 5$

$x+3 = 5$
$-3 \quad -3$
$\boxed{x=2}$

$x+3 = -5$
$-3 \quad -3$
$\boxed{x=-8}$

5) $|5x-2| = 8$

$5x-2 = 8$
$+2 \quad +2$
$\frac{5x}{5} = \frac{10}{5}$
$\boxed{x=2}$

$5x-2 = -8$
$+2 \quad +2$
$\frac{5x}{5} = \frac{-6}{5}$
$\boxed{x=-\frac{6}{5}}$

* **Note that you can not use distributive property over absolute value, since it will not always produce an equivalent equation:**

Example: Is $-5|3+7|$ equivalent to $|(-5)(3)+(-5)(7)|$?

*How to solve absolute value equations

1) • Isolate the absolute value expression into the form $|ax + b| = c$

2) • Write two equations: ax + b = C or ax + b = −C.

• Solve each equation.

6) Solve: $-4|3x + 1| - 3 = -11$

$+3 \quad +3$

$\frac{\cancel{-4}|3x+1|}{\cancel{-4}} = \frac{-8}{-4}$

$|3x+1| = 2$

$3x+1 = 2$

$-1 \quad -1$

$\frac{3x}{3} = \frac{1}{3}$

$\boxed{x = 1/3}$

$3x+1 = -2$

$-1 \quad -1$

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

$\boxed{x = -1}$

7) *You Try:* $2|4x - 3| + 5 = 7$

$-5 \quad -5$

$\frac{2|4x-3|}{2} = \frac{2}{2}$

$|4x-3| = 1$

$4x - 3 = 1$

$+3 \quad +3$

$4x = 4$

$\boxed{x = 1}$

$4x - 3 = -1$

$+3 \quad +3$

$\frac{4x}{4} = \frac{2}{4}$

$\boxed{x = 1/2}$

**The absolute value of a number is never negative, so when an absolute value expression equals a negative number, there are no solutions. A distance is always positive

8) $\frac{\cancel{-3}|x - 4|}{\cancel{-3}} = \frac{-21}{-3}$ ↙ positive -solutions -

$|x-4| = 7$

$x - 4 = 7$

$+4 \quad +4$

$\boxed{x = 11}$

$x - 4 = -7$

$+4 \quad +4$

$\boxed{x = -3}$

9) $\frac{-6|x + 1|}{-6} = \frac{12}{-6}$

$|x+1| = -2$ ↙ negative when ab. value isolated

no solution

10) $|x| = -10$

never happens

No way absolute value can be negative.

no solution

Absolute value needs to be isolated.

3.2N – Solving Quadratic Equations

VOCABULARY

Forms of **Quadratic Functions**

Standard Form: $f(x)=ax^2+bx+c$, where $a\neq 0$. Example: $f(x)=4x^2-6x+3$

Vertex Form: $f(x)=a(x-h)^2+k$, where $a\neq 0$. Example: $f(x)=2(x+3)^2+5$

Factored Form: $f(x)=a(x-p)(x-q)$, where $a\neq 0$. Example: $f(x)=(x-4)(x+7)$

A **zero of a function** is a value of the input x that makes the output $f(x)$ equal zero. The zeros of a function are also known as roots, x-intercepts, and solutions of $ax^2+bx+c=0$.

The **Zero Product Property** states that if the product of two quantities equals zero, at least one of the quantities equals zero. If $ab=0$ then $a=0$ or $b=0$.

Finding Zeros (Intercepts) of a Quadratic Function

When a function is in factored form, the Zero Product Property can be used to find the zeros of the function.

Example 1: Find the zeros for $\overset{y}{f(x)} = x^2-11x+24$

$x^2-11x+24=0$	set y or f(x) = 0
$(x-8)(x-3)=0$	Factor
$x-8=0$ or $x-3=0$	Set each factor = 0
$x=8$ or $x=3$	solve for x .
The zeros are $(8,0)$ and $(3,0)$	List answers or write as an ordered pair

Zeros, x int. are same
roots

Example 2: Find the zeros for $f(x) = 4x^2 - 4x - 15$

$0 = 4x^2 - 4x - 15$ Grouping x + $-60 \mid -4$ $-10 \mid 6$	Set equal to 0.
$0 = \underline{4x^2 - 10x} \; \underline{+6x - 15}$ $0 = 2x(2x-5) + 3(2x-5)$ $0 = (2x-5)(2x+3)$	Factor.
$2x+3=0$ $\quad$ $2x-5=0$	Set each factor = 0.
$-3 \;\; -3$ $\quad$ $+5 \;\; +5$ $\frac{2x}{2} = \frac{-3}{2}$ $\quad$ $\frac{2x}{2} = \frac{5}{2}$ $x = -3/2$ $\quad$ $x = \frac{5}{2}$	Solve each factor.
$(-3/2, 0)$ $\quad$ $(5/2, 0)$	List the solutions.

solve for x

Practice: Find the zeros using factoring.

1. $f(x) = -x(x+7)$

$0 = -x(x+7)$

$\frac{-x}{-1} = \frac{0}{-1}$ $\quad \boxed{x=0}$ $\quad$ $x+7=0$ $\quad -7 \; -7$ $\quad \boxed{x=-7}$

2. $f(x) = 2x(x-6)$

$0 = 2x(x-6)$

$\frac{2x}{2} = \frac{0}{2}$ $\quad \boxed{x=0}$ $\quad$ $x-6=0$ $\quad +6 \; +6$ $\quad \boxed{x=6}$

3. $f(x) = (x+13)(x-4)$

$0 = (x+13)(x-4)$

$x+13=0$ $\quad -13 \; -13$ $\quad \boxed{x=-13}$ $\quad$ $x-4=0$ $\quad +4 \; +4$ $\quad \boxed{x=4}$

4. $f(x) = (x-21)(x+3)$

$0 = (x-21)(x-3)$

$x-21=0$ $\quad \boxed{x=21}$ $\quad$ $x-3=0$ $\quad \boxed{x=3}$

5. $f(x) = x^2 - 7x + 6$

x +

$6 \mid -7$

$-6 \mid -1$

$0 = x^2 - 7x + 6$

$0 = (x-6)(x-1)$

$x-6=0$ $\quad \boxed{x=6}$ $\quad$ $x-1=0$ $\quad \boxed{x=1}$

6. $f(x) = x^2 - x - 2$

x +

$-2 \mid -1$

$-2 \mid 1$

$0 = x^2 - x - 2$

$0 = (x-2)(x+1)$

$x-2=0$ $\quad \boxed{x=2}$ $\quad$ $x+1=0$ $\quad \boxed{x=-1}$

7. $f(x) = x^2 + 8x + 12$

Short cut

8. $f(x) = x^2 + 10x - 24$

Short cut

9. $f(x) = 4x^2 - 12x$

$0 = 4x^2 - 12x$ GCF

$0 = 4x(x-3)$

$\frac{4x}{4} = \frac{0}{4}$ $\quad \boxed{x=0}$ $\quad$ $x-3=0$ $\quad +3 \; +3$ $\quad \boxed{x=3}$

10. $f(x) = 9x^2 - 25$ DIF OF SQ.

$0 = 9x^2 - 25$

$a = 3x \quad b = 5$

$0 = (3x+5)(3x-5)$

$3x+5=0$ $\quad 3x = -5$ $\quad \boxed{x = -5/3}$

$3x-5=0$ $\quad +5 \; +5$ $\quad 3x = 5$ $\quad \boxed{x = 5/3}$

11. $f(x) = 5x^2 - 4x - 12$ Grouping

x +

$-60 \mid -4$

$-10 \mid 6$

$0 = 5x^2 - 4x - 12$

$0 = \underline{5x^2 - 10x} \; \underline{+6x - 12}$

$0 = 5x(x-2) + 6(x-2)$

$0 = (5x+6)(x-2)$

$5x+6=0$ $\quad 5x = -6$ $\quad \boxed{x = -6/5}$ $\quad$ $x-2=0$ $\quad \boxed{x=2}$

12. $f(x) = 3x^2 + 17x + 10$ Grouping

If a quadratic does not factor (it is **<u>PRIME!</u>**) you may use the **QUADRATIC FORMULA** to directly find the zeros.

The Quadratic Formula

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

Example 3: Use the Quadratic Formula to Solve: $2x^2 - 14x - 13 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Find a, b, c
$= \frac{-(-14) \pm \sqrt{(-14)^2 - 4(2)(-13)}}{2(2)}$	Plug in a, b, c into quadratic formula
$= \frac{14 \pm \sqrt{196 + 104}}{4}$	Simplify under root
$= \frac{14 \pm \sqrt{300}}{4}$	
$= \frac{14 \pm 10\sqrt{3}}{4}$	simplify radical

Practice: **Find the zeros using the Quadratic formula.**

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

1. $f(x)=x^2+10x-20$

$0 = x^2+10x-20$

$a=1$
$b=10$
$c=-20$

$$x = \frac{-10 \pm \sqrt{\overset{\text{pos.}\ 100+80}{100-4(1)(-20)}}}{2(1)}$$

$$x = \frac{-10 \pm \sqrt{180}}{2}$$

$$x = \frac{\overset{\div 2}{-10} \pm \overset{\div 2}{6\sqrt{5}}}{2 \div 2}$$

$$\boxed{x = -5 \pm 3\sqrt{5}}$$

180
18 10
③ 6 ②⑤
②③

$\sqrt{\cancel{2}\cdot\cancel{2}\cdot\cancel{3}\cdot\cancel{3}\cdot 5}$

$2\cdot 3\sqrt{5}$

$6\sqrt{5}$

2. $f(x)=x^2-24x+1$

$0 = x^2-24x+1$

$a=1$ $b=-24$ $c=1$

$$x = \frac{24 \pm \sqrt{\overset{576-4}{576-4(1)(1)}}}{2(1)}$$

$$x = \frac{24 \pm \sqrt{572}}{2}$$

$$x = \frac{\overset{\div 2}{24} \pm \overset{\div 2}{2\sqrt{143}}}{2 \div 2}$$

$$\boxed{x = 12 \pm \sqrt{143}}$$

572
② 286
② 143
⑪⑬

$\sqrt{\cancel{2}\cdot\cancel{2}\cdot 11\cdot 13}$

$2\sqrt{143}$

3. $f(x)=5x^2-20x-9$

4. $f(x)=-2x^2+16x+26$

divide by -2

$$\frac{0}{-2} = \frac{-2x^2+16x+26}{-2}$$

$0 = x^2-8x-13$

$a=1$ $b=-8$ $c=-13$

$$x = \frac{8 \pm \sqrt{\overset{64+52}{64-4(1)(-13)}}}{2(1)}$$

$$x = \frac{8 \pm \sqrt{116}}{2}$$

$$x = \frac{\overset{\div 2}{8} \pm \overset{\div 2}{2\sqrt{29}}}{2 \div 2}$$

$$\boxed{x = 4 \pm \sqrt{29}}$$

116
② 58
②㉙

$\sqrt{\cancel{2}\cdot\cancel{2}\cdot 29}$

$2\sqrt{29}$

5. $f(x)=x^2+8x+10$

$0 = x^2+8x+10$

$a=1$
$b=8$
$c=10$

$$x = \frac{-8 \pm \sqrt{\overset{64-40}{64-4(1)(10)}}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{24}}{2}$$

$$x = \frac{\overset{\div 2}{-8} \pm \overset{\div 2}{2\sqrt{6}}}{2 \div 2}$$

$$\boxed{x = -4 \pm \sqrt{6}}$$

24
8 ③
4 ②
②②

$\sqrt{\cancel{2}\cdot\cancel{2}\cdot 2\cdot 3}$

6. $f(x)=-x^2-2x-9$

$0 = -x^2-2x-9$

$a=-1$
$b=-2$
$c=-9$

$$x = \frac{2 \pm \sqrt{\overset{4-36}{4-4(-1)(-9)}}}{2(-1)}$$

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

32
8 4
4 2 2 2
2 2

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

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

$$x = \frac{\overset{\div -1}{1} \pm \overset{\div -1}{2i\sqrt{2}}}{-1 \div -1}$$

$$\boxed{x = -1 \pm 2i\sqrt{2}}$$

$\sqrt{\cancel{2}\cdot\cancel{2}\cdot\cancel{2}\cdot\cancel{2}\cdot 2}$

$2\cdot 2\sqrt{2}$

$4\sqrt{2}$

3.3N – Solving Radical Equations in One Variable

VOCABULARY

A **radical equation** is an equation that has a variable in a radicand or a variable with a rational exponent (i.e, $\sqrt{2x+3}=4$ or $(4x-1)^{1/3}=1$). The **radicand** is the expression under the radical sign. The **index** is the small number outside of the radical sign.

Solving Radical Equations

To solve a radical equation:

- ① isolate the radical on one side of the equation
- ② raise each side to the power of the index
- ③ simplify
- * ④ check solutions in the original equation to eliminate any extraneous solutions

Example 1:

Solve $4+\sqrt{3x+10}=9$.

$4+\sqrt{3x+10}=9$	
$\sqrt[2]{3x+10}=5$	Isolate the radical term by subtracting 4 from each side.
$\left(\sqrt{3x+10}\right)^2=5^2$ $3x+10=25$	Square each side of the equation.
$3x=15$ $\boxed{x=5}$	Solve for *x*.
$4+\sqrt{3\cdot5+10}\overset{?}{=}9$ $4+\sqrt{15+10}\overset{?}{=}9$ $4+\sqrt{25}\overset{?}{=}9$ $4+5\overset{?}{=}9$ $9=9$ ✓	Check the solution in the original equation.

Example 2:

Solve $\sqrt{x+9}-7=x$.

$\sqrt{x+9}-7=x$	
$\sqrt{x+9}=x+7$	Isolate the radical term by adding 7 to each side.
$\left(\sqrt{x+9}\right)^2=(x+7)^2$ $(x+7)(x+7)$ $x+9=x^2+14x+49$	Square each side of the equation. Remember that $(x+7)^2=(x+7)(x+7)$.
$0=x^2+13x+40$ $0=(x+5)(x+8)$ $x+5=0$ $x+8=0$ $\boxed{x=-5}$ $x=-8$ ← extraneous solution	Solve for x.

check it

$\sqrt{-5+9}-7=-5$ $\sqrt{4}-7=-5$ $2-7=-5$ ✓ $-5=-5$	Check the solution in the original equation.
$\sqrt{-8+9}-7=-8$ $1-7=-8$ $-6\neq-8$	

Solve each Radical Equation.

1. $\sqrt{x-2}+5=8$

$-5 \quad -5$

$\left(\sqrt{x-2}\right)^2=3^2$

$x-2=9$

$+2 \quad +2$

$\boxed{x=11}$

check

$\sqrt{11-2}+5=8$

$\sqrt{9}+5=8$

$3+5=8$

$8=8$

2. $\sqrt[3]{x-2}+1=4$

$-1 \quad -1$

$\left(\sqrt[3]{x-2}\right)^3=3^3$

$x-2=27$

$+2 \quad +2$

$\boxed{x=29}$

check

$\sqrt[3]{\cancel{29-2}}+1=4$

27

$3+1=4$

✓ $4=4$

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

$+5 \quad +5$

$\frac{\cancel{2}\sqrt{x+4}}{\cancel{2}}=\frac{2}{2}$

$\left(\sqrt{x+4}\right)^2=1^2$

$x+4=1$

$-4 \quad -4$

$\boxed{x=-3}$

check

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

$2-5=-3$

✓ $-3=-3$

7. $3\sqrt{x}-4=11$

$+4 \quad +4$

$\frac{3\sqrt{x}}{3}=\frac{15}{3}$

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

$x=25$

$3\cdot\sqrt{25}-4=11$

$3\cdot5-4=11$

$15-4=11$

✓ $11=11$

8. $\sqrt[5]{x+3}+7=5$

$-7 \quad -7$

$\left(\sqrt[5]{x+3}\right)^5=(-2)^5$

$x+3=-32$

$-3 \quad -3$

$x=-35$

$\sqrt[5]{-35+3}+7=5$

$\sqrt[5]{-32}+7=5$

$-2+7=5$

✓ $5=5$

9. $\sqrt{3x+4}+6=13$

10. $\sqrt[4]{x+5}-7=-5$

$+7 \quad +7$

$(\sqrt[4]{x+5})^4 = 2^4$

$x+5 = 16$

$-5 \quad -5$

$\boxed{x=11}$

check

$\sqrt[4]{\cancel{11+5}\,16} - 7 = -5$

$2-7=-5$

$\checkmark -5=-5$

11. $\sqrt{x+3}-2=4$

you try

12. $-5\sqrt[3]{x}-9=11$

$+9 \quad +9$

$\frac{-5\sqrt[3]{x}}{-5} = \frac{20}{-5}$

$(\sqrt[3]{x})^3 = (-4)^3$

$x=-64$

$-5\sqrt[3]{-64}-9=11$

(-4)

$20-9=11$

$\checkmark 11=11$

16. $\sqrt{3x+7}+1=x$

$-1 \quad -1$ rewrite and Fact

$(\sqrt{3x+7})^2 = (x-1)^2$

$3x+7=(x-1)(x-1)$

$\cancel{3x}+\cancel{7} = x^2-x-x+1$

$-3x-7 \qquad -3x-7$

$0=x^2-5x-6$ ← short cut

x +

-6 | -5

-6 | 1

$0=(x-6)(x+1)$

$x-6=0 \qquad x+1=0$

$\boxed{x=6}$

$\boxed{x=-1 \text{ extraneous}}$

~~17. $\sqrt[3]{3x+4}+1=2$~~

Check it

$\sqrt{3\cdot 6+7}+1=6$

$\sqrt{25}+1=6$

$5+1=6$

$\checkmark 6=6$

$\sqrt{3(-1)+7}+1=-1$

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

$2+1=-1$

$3 \neq -1$

18. $\sqrt[3]{6x+9}+8=5$

19. $2\sqrt[3]{x}+6=-4$

* 20. $(\sqrt{11x+3})^2=(2x)^2$

$11x+3=4x^2$

$-4x \;\; +3 \qquad -11x-3$

Grouping

$0=4x^2-11x-3$

x +

-12 | -11

-12 | 1

$0=\underline{4x^2-12x}\,\underline{+1x-3}$

$0=4x(x-3)+1(x-3)$

$0=(4x+1)(x-3)$

$4x+1=0 \qquad x-3=0$

$-1 \quad -1 \qquad +3 \quad +3$

$\frac{4x}{4}=\frac{-1}{4} \qquad \boxed{x=3}$

$\boxed{x=-1/4}$ ← extraneous

~~21. $3\sqrt[5]{x+6}-7=-4$~~

check it

$\sqrt{11(-.25)+3}=2(-.25)$

$.5 = -.5$

$\sqrt{11(3)+3}=2(3)$

$33+3 = 6$

$\sqrt{36}$

$\checkmark 6=6$

22. $\sqrt[3]{21x+55}-2=8$

\# 23. $\sqrt{x+7}=x-5$

24. $\sqrt[3]{x+3}-8=-6$

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4 .4N – Solving Rational Equations in One Variable

A. Review –

1. Simplify the following and fill in the blank:

a) $\frac{10}{0} \div =$ Error Does Not Exist DNE b) $\frac{0}{10} \div = 0$

c) Anything divided by zero is Does Not Exist DNE.
zero on bottom/denominator

d) The denominator (bottom) of a fraction **can't** equal zero.

2. State the restrictions for each rational equation:

a) $\frac{5}{x+4} = 2$

$x+4 \neq 0$
$-4 \quad -4$
$\boxed{x \neq -4}$

b) $\frac{4x}{8x-3} = \frac{7}{x}$

$\boxed{x \neq 0}$

$8x-3 \neq 0$
$+3 \quad +3$
$\frac{8x}{8} \neq \frac{3}{8}$
$\boxed{x \neq \frac{3}{8}}$

c) $\frac{5x-2}{5} = \frac{2x}{5}$

$\boxed{\text{No Restrictions}}$

d) $\frac{x-2}{x^2} = \frac{1}{2x}$

$\boxed{x \neq 0}$

$\sqrt{\cancel{x^2}} \neq \sqrt{0}$
$x \neq 0$

$\frac{2x}{2} \neq \frac{0}{2}$
$\boxed{x \neq 0}$

e) $\frac{x+9}{x^2+6x+8} = \frac{4x+1}{x-6}$

Factor First before State restrictions

$(x+4)(x+2)$
$\boxed{x \neq -4 \quad x \neq -2}$

$x-6 \neq 0$
$+6 \quad +6$
$\boxed{x \neq 6}$

* Like Test

$\frac{7x+4}{x^2+3x} = \frac{1}{x}$

$\boxed{x \neq 0}$

GCF
$x(x+3)$
$x \neq 0$
$\boxed{x \neq -3}$

B. Review - Solve for a variable:

1. $x+5=0$
$-5 \quad -5$
$\boxed{x=-5}$

2. $3x-2=0$
$+2 \quad +2$
$\frac{3x}{3} = \frac{2}{3}$
$\boxed{x = 2/3}$

3. $\sqrt{\cancel{x^2}} = \sqrt{0}$
$\boxed{x=0}$

4. $\frac{-4x}{-4} = \frac{0}{-4}$
$\boxed{x=0}$

5. $x^2+9x=10$

$x \quad +$
$-10 \mid 9$
$10 \mid -1$

$x^2+9x-10=0$
$(x+10)(x-1)=0$

$x+10=0$
$-10 \quad -10$
$\boxed{x=-10}$

$x-1=0$
$+1 \quad +1$
$\boxed{x=1}$

6. $3x^2-3x=0$
GCF

$3x(x-1)=0$

$\frac{3x}{3} = \frac{0}{3}$
$\boxed{x=0}$

$\boxed{x=1}$

C. Solve for a variable.

Hint: Multiply by the common denominator to simplify the problem.

7. $15\left(\frac{x}{\cancel{15}}-8\right)=-9 \cdot 15$

$x-120=-135$

$+120 \quad +120$

$\boxed{x=-15}$

8. $\cancel{9} \cdot \frac{3+x}{\cancel{9}}=1 \cdot 9$

$3+x=9$

$-3 \quad -3$

$\boxed{x=6}$

9. $3\left(-2+\frac{8}{\cancel{3}}x\right)=-\frac{26}{\cancel{3}} \cdot \cancel{3}$

$-6+8x=-26$

$+6 \quad +6$

$\frac{\cancel{8}x}{\cancel{8}}=\frac{-20}{8}=\boxed{\frac{-5}{2}}$

10. $21\left(-\frac{4}{\cancel{3}}-n\right)=-\frac{67}{\cancel{21}} \cdot \cancel{21}$

$-28-21n=-67$

$+28 \quad +28$

$\frac{-21n}{-21}=\frac{+39}{+21}$

$\boxed{n=\frac{13}{7}}$

11. $24\left(\frac{m}{2}+\frac{2}{6}\right)=-\frac{7}{24} \cdot 24$

12. $90\left(-\frac{3}{2}-\frac{x}{5}\right)=-\frac{17}{\cancel{18}} \cdot \cancel{90}$

$-13\cancel{5}-18x=-85$

$+\cancel{1}35 \quad +135$

$\frac{-1\cancel{8}x}{-18}=\frac{50}{-18}$

$\boxed{x=\frac{25}{-9}}$

D. State the restrictions. Solve the equation algebraically. Identify the extraneous solutions. Show work!

1. $5x \cdot 1-\frac{1}{5x}=\frac{4}{5x}$

$\frac{5x \neq 0}{5 \quad 5}$

$\boxed{x \neq 0}$

$\frac{5x}{5x}-\frac{1}{5x}=\frac{4}{5x}$

$5x-1=4$

$+1 \quad +1$

$\frac{5x}{5}=\frac{5}{5}$

$\boxed{x=1}$

2. $(n-1)\,4+\frac{6}{n-1}=\frac{1}{n-1}$

$\boxed{n \neq 1}$

$\frac{4n-4}{n-1}+\frac{6}{n-1}=\frac{1}{n-1}$

$4n-4+6=1$

$4n+2=1$

$-2 \quad -2$

$\frac{4n}{4}=\frac{-1}{4}$

$\boxed{n=-\frac{1}{4}}$

3. $\frac{x \cdot 1}{x(x+3)}+\frac{x+2}{x^2+3x}=\frac{1}{x}\frac{(x+3)}{(x+3)}$

$\boxed{x \neq 0} \quad \boxed{x \neq -3}$

LCD: $x(x+3)$

$\frac{x}{x(x+3)}+\frac{x+2}{x(x+3)}=\frac{x+3}{x(x+3)}$

$x+x+2=x+3$

$2x+2=x+3$

$-x \quad -x$

$\boxed{x=1}$

4. $\frac{6}{a+7}+\frac{a+3}{a^2+7a}=\frac{a+6}{a^2+7a}$

5. $\frac{(x+5)\,2}{(x+5)\,x-3}+\frac{6\,(x-3)}{x+5\,(x-3)}=\frac{2}{x^2+2x-15}$

LCD: $(x-3)(x+5)$

$x^2+2x-15$: $\frac{x \quad +5}{x \quad -3}$ $5 \cdot -3$

$(x-3)(x+5)$

$\boxed{x \neq 3, -5}$

$\frac{2x+10}{(x+5)(x-3)}+\frac{6x-18}{(x+5)(x-3)}=\frac{2}{(x-3)(x+5)}$

$2x+10+6x-18=2$

$8x-8=2$

$+8 \quad +8$

$\frac{8x}{8}=\frac{10}{8}$

$\boxed{x=\frac{5}{4}}$

6. $\frac{x-4}{x}-\frac{3}{x+1}+\frac{4}{x^2+x}=0$

Summary:

1. In this example: $\frac{1}{x+3}+\frac{x+2}{x^2+3x}=\frac{1}{x}$,

What is the step after finding the common denominator? ______________________________

2. In this example: $\frac{1}{x+3}+\frac{x+2}{x^2+3x}$,

What is the step after finding the common denominator? ______________________________

3. What is the difference between the examples in problem #1 and #2? ______________________________

3.5N – Solving for a Specified Variable

A. Name the operation (addition, subtraction, multiplication, division, squaring, or square root) that is happening to x, or tween x and another variable or number.

1. xy multiply	2. $\frac{x}{r}$ divide	3. $\sqrt{x}$ square root	4. $x-4$ subtract	5. x^2 square
6. $5+x$ add	7. $(x-3)^2$ subtract and square	8. $3x$ multiply	9. $x-h$ subtract	10. $\sqrt{x+5}$ add and sqare root

B. Name the *opposite operation* of the operations you listed above.

1. divide	2. multiply	3. square	4. add	5. square root
6. Subtract	7. square root and add	8. divide	9. add	10. square and subtract

Solve for the specified variable.

1. $y+10x=3$ (solve for $\underline{\underline{x}}$) $-y \quad -y$ $\frac{10x}{10}=\frac{3-y}{10}$ $\boxed{x=\frac{3-y}{10}}$	2. $4x+2y=14$ (solve for $\underline{\underline{y}}$) $-4x \quad -4x$ $\frac{2y}{2}=\frac{14-4x}{2}$ $\boxed{y=7-2x}$	3. $16+2y=18x-2$ (solve for $\underline{\underline{y}}$) $-16 \quad -16$ $\frac{2y}{2}=\frac{18x-18}{2}$ $\boxed{y=9x-9}$
4. $ax-by=c$ (solve for $\underline{\underline{x}}$) $+by \quad +by$ $\frac{ax}{a}=\frac{c+by}{a}$ $\boxed{x=\frac{c+by}{a}}$	5. $R\cdot I=\frac{E}{\cancel{R}}\cancel{R}$ (solve for $\underline{\underline{R}}$) $\frac{RI}{I}=\frac{E}{I}$ $\boxed{R=\frac{E}{I}}$	6. $P=R-\underline{C}$ (solve for $\underline{\underline{C}}$) $-R \quad -R$ $\frac{P-R}{-1}=\frac{-C}{-1}$ $-P+R=C$ $\boxed{C=R-P}$
7. $(\sqrt{d^2-4ef})^2=(g)^2$ (solve for d) $d^2-4ef=g^2$ $+4ef \quad +4ef$ $\sqrt{d^2}=\sqrt{g^2+4ef}$ $\boxed{d=\sqrt{g^2+4ef}}$	8. $(x+2)y=\frac{x-3}{\cancel{x+2}}(\cancel{x+2})$ (solve for x) $xy+2y=x-3$ $-x \quad -x$ $xy-x=-2y-3$ $\frac{x(y-1)}{y-1}=\frac{-2y-3}{y-1}$ $\boxed{x=\frac{-2y-3}{y-1} \text{ or } \frac{2y+3}{-y+1}}$	9. $h-\frac{rx}{t}=k$ (solve for $\underline{x}$) $-h \quad -h$ $t\cdot\frac{-rx}{t}=(k-h)t$ $\frac{-rx}{-r}=\frac{kt-ht}{-r}$ ÷ top & bottom by negative $\boxed{x=\frac{-kt+ht}{r}}$

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