Name: _key_   Period: _____

1. Functions:

Given: $f(x) = x^2 + 4x$ and
$g(x) = x - 1$

EX: Find $f(1) + g(2)$

$f(1) = 1^2 + 4(1)$
$= 1 + 4$
$= 5$

$g(2) = 2 - 1$
$= 1$

$f(1) + g(2)$
$5 + 1 = \boxed{6}$

EX: Find $f(g(3))$

$g(3) = 3 - 1 = 2$

$f(2) = 2^2 + 4(2)$
$= 4 + 8$
$= \boxed{12}$

EX: Find $\frac{f}{g}(2)$

$f(2) = 2^2 + 4(2)$
$= 4 + 8$
$= 12$

$g(2) = 2 - 1 = 1$

$\frac{f}{g}(2) = \frac{12}{1} = \boxed{12}$

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1. Given: $f(x) = 2x^2 + x - 1$
and $g(x) = x + 2$

a) Find $f(3) - g(-3)$

$f(3) = 2(3)^2 + 3 - 1$
$= 2(9) + 3 - 1$
$= 18 + 3 - 1$
$= 21 - 1$
$= 20$

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

$f(3) - g(-3) = 20 - (-1) = \boxed{21}$

a) Find $f(g(-2))$

$g(-2) = -2 + 2 = 0$

$f(0) =$
$2(0)^2 + 0 - 1 = \boxed{-1}$

a) Find $\frac{f}{g}(2)$

$f(2) = 2(2)^2 + 2 - 1$
$= 2(4) + 2 - 1$
$= 8 + 2 - 1$
$= 10 - 1$
$= 9$

$g(2) = 2 + 2 = 4$

$\frac{f}{g}(2) = \boxed{9/4}$

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2. Given: $f(x) = 2x^2 - 3$
and $g(x) = x^2$

b) Find $f(4) + g(5)$

$f(4) = 2(4)^2 - 3$
$= 2(16) - 3$
$= 32 - 3 = 29$

$g(5) = 5^2 = 25$

$f(4) + g(5) = 29 + 25 = \boxed{54}$

b) Find $g(f(2))$

$f(2) = 2(2)^2 - 3$
$= 2(4) - 3$
$= 8 - 3 = 5$

$g(5) = 5^2 = \boxed{25}$

b) Find $\frac{f}{g}(-3)$

$f(-3) = 2(-3)^2 - 3$
$2(9) - 3$
$18 - 3$
15

$g(-3) = (-3)^2 = 9$

$\frac{f}{g}(-3) = \frac{15}{9} = \boxed{\frac{5}{3}}$

2. Solving Linear Equations:

EX: $\left(\frac{1}{3}x + \frac{3}{5}\right)15 = \left(\frac{1}{5}x + 2\right)15$

$5x + 9 = 3x + 30$
$-3x \quad -3x$
$2x + 9 = 30$
$-9 \quad -9$
$2x = 21$
$\boxed{x = 21/2}$

a) $8\left(\frac{1}{4}x + \frac{3}{8}\right) = \left(2x + \frac{5}{8}\right)8$

$2x + 3 = 16x + 5$
$-16x \quad -16x$
$-14x + 3 = 5$
$-3 \quad -3$
$\dfrac{-14x}{-14} = \dfrac{2}{-14}$
$\boxed{x = -1/7}$

b) $6\left(\frac{1}{2}x + 3\right) = \left(\frac{5}{6}x + \frac{2}{3}\right)6$

$3x + 18 = 5x + 4$
$-5x \quad -5x$
$-2x + 18 = 4$
$-18 \quad -18$
$\dfrac{-2x}{} = -14$
$\boxed{x = 7}$

3. Solving for a variable:

EX: PV = mRT, solve for m

$\dfrac{PV}{RT} = \dfrac{mRT}{RT}$

$m = \dfrac{PV}{RT}$

a) $A = \frac{1}{2}(b_1 + b_2)h$, solve for b_1.

$\dfrac{2A}{h} = \dfrac{(b_1 + b_2)h}{h}$

$\dfrac{2A}{h} = b_1 + b_2$

$b_1 = \dfrac{2A}{h} - b_2$

b) $V = \frac{4}{3}\pi r^3$, solve for r.

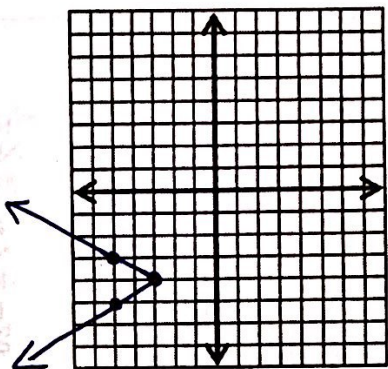$\dfrac{3}{4} \cdot \dfrac{4}{3} V = \dfrac{\pi r^3}{\pi}$

$\dfrac{1}{\pi} \cdot \dfrac{3}{4} V = \dfrac{\pi r^3}{\pi}$

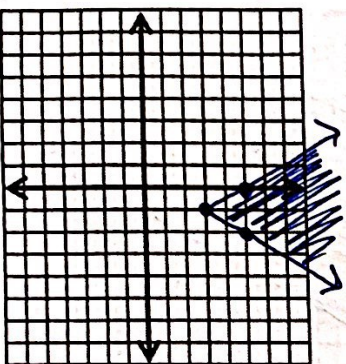$\sqrt[3]{\dfrac{3V}{4\pi}} = \sqrt[3]{r^3}$

$r = \sqrt[3]{\dfrac{3V}{4\pi}}$

EX: $y = -2|x - 4| - 3$

a) $y = |x - 3| + 2$

b) $y = -|x + 4| - 2$

EX: $y \geq 2|x - 1| + 3$

a) $y \leq \frac{1}{2}|x + 4| - 1$

b) $y > 3|x - 4| - 1$
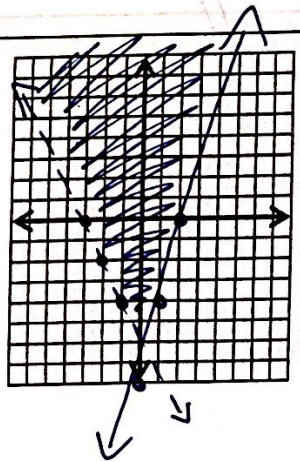
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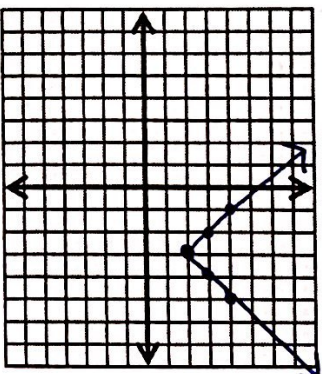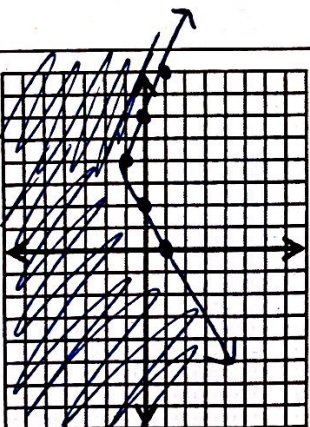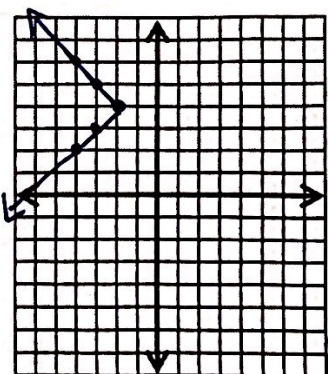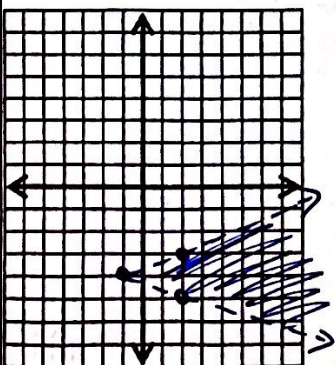
5. Graphing Systems of Inequalities/Equations

EX: $2x+y\leq 4$ $y\leq -2x+4$

$y<\dfrac{2}{3}x+1$
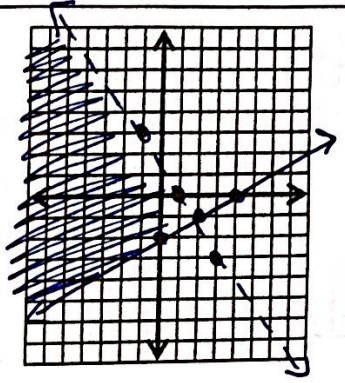
a) $y>\dfrac{1}{2}x-3$
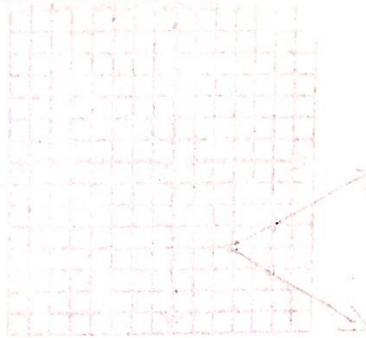
$x+4y\leq 8$ $4y\leq -x+8$ $y\leq -\dfrac{1}{4}x+2$

b) $4x+2y\leq 8$ $2y\leq -4x+8$ $y\leq -2x+4$

$-x+3y>9$ $3y>x+9$ $\dfrac{3y}{3}>\dfrac{x+9}{3}$ $y>\dfrac{1}{3}x+3$
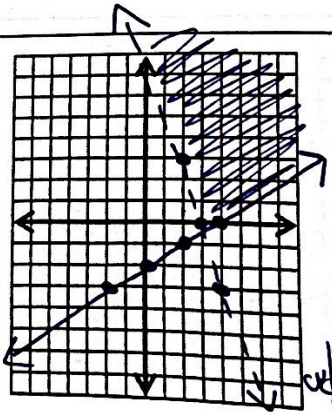
6. ~~Solving 3x3 Systems of Equations:~~

EX: $-x-5y-5z=2$
$4x-5y+4z=19$
$x+5y-z=-20$

a) $-4x-5y-z=18$
$-2x-5y-2z=12$
$-2x+5y+2z=4$
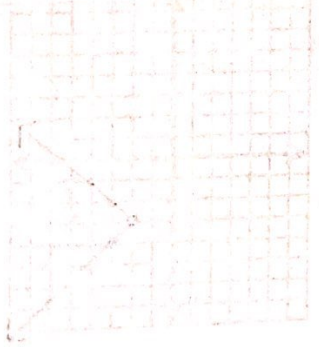
b) $-x-5y+z=17$
$-5x-5y+5z=5$
$2x+5y-3z=-10$
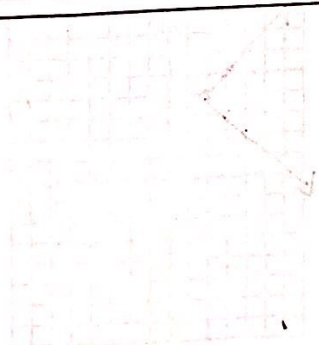
Radicals

EX: $\sqrt{27} + \sqrt{243} - \sqrt{24} + \sqrt{32}$

$3\sqrt{3} + 9\sqrt{3} - 2\sqrt{6} + 4\sqrt{2}$

$\boxed{12\sqrt{3} - 2\sqrt{6} + 4\sqrt{2}}$

a) $-\sqrt{8} - \sqrt{80} + \sqrt{75}$

$\boxed{-2\sqrt{2} - 4\sqrt{5} + 5\sqrt{3}}$

b) $\sqrt{-12} + \sqrt{-27} - \sqrt{-128} + \sqrt{8}$

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8. Write the Equation of a line parallel or perpendicular.

Given $y = \frac{1}{3}x + 2$

EX: Write the equation of the line __parallel__ to the line and passes through (-3,4) in standard form.

PS: $y - 4 = \frac{1}{3}(x+3)$

SI: $y - 4 = \frac{1}{3}x + 1$

$y = \frac{1}{3}x + 5$

Stand. $3\left(-\frac{1}{3}x + y\right) = (5) - 3$

$\boxed{x - 3y = -15}$

EX: Write the equation of the line __perpendicular__ to the line $y = \frac{-1}{3}x + 5$ and passes through (5,-2) in standard form.

PS: $y - 4 = 3(x+3)$

SI: $y - 4 = 3x + 9 \quad y = 3x + 13$

$-3x + y = 13$

Stand: $\boxed{3x - y = -13}$

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a) Given $y = \frac{-3}{4}x - 2$, what is the equation of the line parallel to this line and passes through (2,0)?

PS: $y - 0 = \frac{-3}{4}(x-2)$

SI: $y = -\frac{3}{4}x + \frac{3}{2}$

St: $4\left(\frac{3}{4}x + y\right) = \left(\frac{3}{2}\right)4$

$\boxed{3x + 4y = 6}$

a) Given $y = 4x - 3$, what is the equation of the line perpendicular to this line and passes through (-5, 1)?

PS: $y - 1 = \frac{-1}{4}(x+5)$

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

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

St: $4\left(\frac{1}{4}x + y\right) = \left(-\frac{1}{4}\right)4$

$\boxed{x + 4y = -1}$

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b) Given $y = 5x - 2$, what is the equation of the line parallel to this line and passes through (-6, 3)?

PS: $y - 3 = 5(x + 6)$

SI: $y = 5x + 33$

St: $-5x + y = 33$

$\boxed{5x - y = -33}$

b) Given $y = \frac{1}{2}x + 5$, what is the equation of the line perpendicular to this line and passes through (3, -2)?

PS: $y + 2 = -2(x - 3)$

$y + 2 = -2x + 6$

$y = -2x + 4$

$\boxed{2x + y = 4}$

9. Factor A Quadratic with a ≠ 1.

EX: $3x^2 - 17x - 28$

X: -84 / 4 / -21 / -17

$$\left(x - \frac{21}{3}\right)\left(x + \frac{4}{3}\right)$$
$$(x-7)(3x+4)$$

a) $3x^2 - 2x - 16$

X: 48 / 6 / -8 / -2

$$\left(x - \frac{8}{3}\right)\left(x + \frac{6}{3}\right)$$
$$(3x-8)(x+2)$$

b) $4x^2 - 13x - 12$

X: -48 / 3 / -16 / -13

$$\left(x - \frac{16}{4}\right)\left(x + \frac{3}{4}\right)$$
$$(x-4)(4x+3)$$

10. Factor cubes

EX: $y^3 - 27$

$$(y-3)(y^2+3y+9)$$

a) $64x^3 + 125$

$$(4x+5)(16x^2-20x+25)$$

b) $125 - 27x^3$

$$(5-3x)(25+15x+9x^2)$$

So... a quadratic equation by factoring.

EX: $5x^2+2x-3=0$

$x^2+2x-15=0$

$(x+\frac{5}{5})(x-\frac{3}{5})=0$

$(x+1)(5x-3)=0$

$\boxed{X=-1}, \boxed{X=3/5}$

a) $x^2+2x-3=0$

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

$\boxed{X=-3}, \boxed{X=1}$

b) $2x^2+6x=-4$

$2x^2+6x+4=0$

$2(x^2+3x+2)=0$

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

$X=-2, X=-1$

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12. Quadratic Formula

EX: $2x^2+2x+3=0$

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

$$\frac{-2\pm\sqrt{4-24}}{4}$$

$$\frac{-2\pm\sqrt{-20}}{4}$$

NO SOLUTION

a) $a^2-4a+8=0$

$$\frac{4\pm\sqrt{16-4(1)(8)}}{2(1)}$$

$$\frac{4\pm\sqrt{16-32}}{2}$$

$$\frac{4\pm\sqrt{-16}}{2}$$

No Solution

b) $4b^2+2b+4=0$

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

$$\frac{-2\pm\sqrt{4-64}}{2}$$

$$\frac{-2\pm\sqrt{-60}}{2}$$

NO Solution