

Algebra 2 // BM 2 // Worksheet A

↳ Assignment over Thanksgiving Break 2009

1. Solve for x . $|3x-2|=10$

$$\begin{array}{r} 3x-2=10 \\ +2 \quad +2 \\ \hline 3x=12 \\ \frac{3x}{3}=\frac{12}{3} \\ \boxed{x=4} \end{array}$$

$$\begin{array}{r} 3x-2=-10 \\ +2 \quad +2 \\ \hline 3x=-8 \\ \frac{3x}{3}=\frac{-8}{3} \\ \boxed{x=-\frac{8}{3}} \end{array}$$

2. $|5-2x| \leq 1$

$$\begin{array}{r} 5-2x \leq 1 \\ -5 \quad -5 \\ \hline -2x \leq -4 \\ \frac{-2x}{-2} \leq \frac{-4}{-2} \\ \boxed{x \geq 2} \end{array}$$

$$\begin{array}{r} 5-2x \geq -1 \\ -5 \quad -5 \\ \hline -2x \geq -6 \\ \frac{-2x}{-2} \geq \frac{-6}{-2} \\ \boxed{x \leq 3} \end{array}$$

3. $|\frac{3x-1}{4}| \geq 2$

$$4 \cdot \frac{3x-1}{4} \geq 2 \cdot 4 \quad 4 \cdot \frac{3x-1}{4} \leq -2 \cdot 4$$

$$\begin{array}{r} 3x-1 \geq 8 \\ +1 \quad +1 \\ \hline 3x \geq 9 \\ \frac{3x}{3} \geq \frac{9}{3} \\ \boxed{x \geq 3} \end{array}$$

$$\begin{array}{r} 3x-1 \leq -8 \\ +1 \quad +1 \\ \hline 3x \leq -7 \\ \frac{3x}{3} \leq \frac{-7}{3} \\ \boxed{x \leq -\frac{7}{3}} \end{array}$$

4. Sketch: $|x+3| < 5$

$$\begin{array}{r} x+3 < 5 \\ -3 \quad -3 \\ \hline \boxed{x < 2} \end{array}$$

$$\begin{array}{r} x+3 > -5 \\ -3 \quad -3 \\ \hline \boxed{x > -8} \end{array}$$



5. $y=2x+1$ for x

$$4x-y=7$$

$$4x - (\cancel{2x} + 1) = 7$$

$$\begin{array}{r} 4x-2x+1=7 \\ -1 \quad -1 \\ \hline 2x=6 \\ \frac{2x}{2}=\frac{6}{2} \\ \boxed{x=3} \end{array}$$

$$\begin{array}{l} 6. -3x-2y=-14 \rightarrow -3x-2y=-14 \\ -2(2x-y=7) \rightarrow -4x+2y=-14 \end{array}$$

$$\begin{array}{r} -7x = -28 \\ \frac{-7x}{-7} = \frac{-28}{-7} \\ \boxed{x=4} \end{array}$$

$$(7.) \begin{cases} 2x+3y-z=-4 \\ 3x-y+z=7 \\ 4x+6y-2z=4 \end{cases} \rightarrow \begin{cases} 4x+6y-2z=-4 \\ 6x-2y+2z=14 \\ 4x+6y-2z=4 \end{cases}$$

↓

$$\begin{array}{r} 4x+6y-2z=-4 \\ 6x-2y+2z=14 \\ \hline 10x+4y=10 \end{array}$$

→

$$\begin{array}{r} 10x+4y=10 \\ -1 \cdot 10x+4y=18 \rightarrow \end{array}$$

↓

$$\begin{array}{r} 6x-2y+2z=14 \\ 4x+6y-2z=4 \\ \hline 10x+4y=18 \end{array}$$

↙

$$\begin{array}{r} 10x+4y=18 \\ -10x-4y=-18 \\ \hline 0+0=2 \end{array}$$

$$0+0=2$$

$$0=2$$

No! →
so, no solutions!

$$(8) \begin{cases} 3x+z=9 \\ 2y+3z=7 \\ x-2y=4 \end{cases} \left\{ \begin{array}{l} 2y+3z=7 \\ x-2y=4 \\ \hline x+3z=11 \end{array} \right.$$

$$\begin{array}{r} -3(x+3z=11) \rightarrow -3x-9z=-33 \\ 3x+z=9 \\ \hline -8z=-24 \end{array}$$

$$\begin{array}{r} -8z=-24 \\ \hline -8 \quad -3 \\ \hline z=3 \end{array}$$

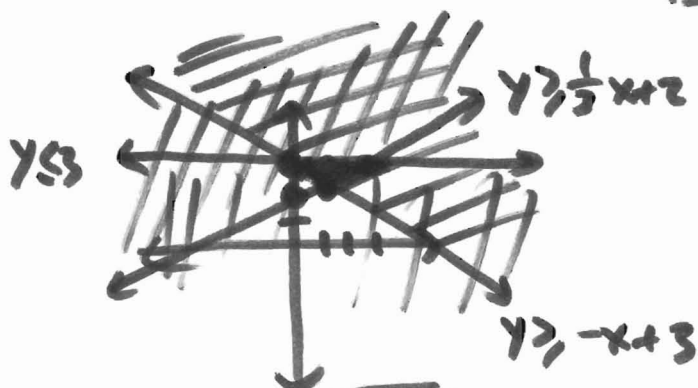
$$\begin{array}{r} 3x+z=9 \\ 3x+3=9 \\ 3x=6 \\ \hline x=2 \end{array}$$

$$\begin{array}{r} x-2y=4 \\ 2-2y=4 \\ -2y=2 \\ \hline y=-1 \end{array}$$

$$\begin{aligned}
 9. \quad 6c + 12d &= 52 & \text{--- -- -- --} &\rightarrow 6c + 2d = 52 \\
 c + d &= 20 & \rightarrow -2(c + d = 20) &\rightarrow -2c - 2d = -40 \\
 & & & \hline
 & & & 4c = 12 \\
 & & & \boxed{c = 3}
 \end{aligned}$$

$$\begin{aligned}
 10. \quad 2x - y &= 4 \\
 y &= -x + 2 \\
 & \boxed{(2, 0)} \\
 2x - (-x + 2) &= 4 \\
 2x + x - 2 &= 4 \\
 \underline{+2} \quad \underline{+2} & \\
 3x &= 6 \rightarrow \boxed{x = 2} \\
 y &= -x + 2 \\
 y &= -(2) + 2 \\
 y &= -2 + 2 \\
 & \boxed{y = 0}
 \end{aligned}$$

$$\begin{aligned}
 11. \quad y &> \frac{1}{3}x + 2 \\
 y &> -x + 3 \\
 y &\leq 3
 \end{aligned}$$



$$12. \quad 6i(3i) = 18i^2 = 18(-1) = \boxed{-18}$$

$$13. \quad (5+i)(5-i) = 25 + 5i - 5i - i^2 = 25 - (-1) = \boxed{26}$$

$$14. \quad i^{12} = (i^4)^3 \rightarrow i^0 = \boxed{1}$$

$$15. \quad (5-2i) + (1+10i)$$

$$\boxed{6 + 8i}$$

$$16. \quad (2+6i) - (3-2i)$$

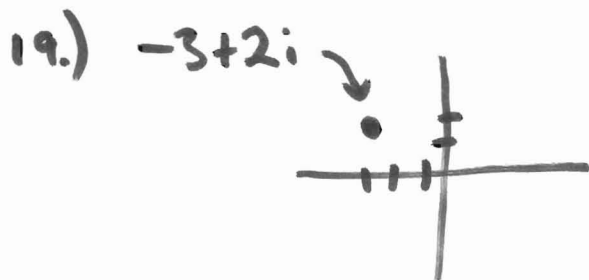
$$2+6i - 3 + 2i$$

$$\boxed{-1 + 8i}$$

$$\begin{aligned}
 17. \quad \frac{3}{6+i} \cdot \frac{6-i}{6-i} &= \frac{18-3i}{36+6i-6i-i^2} \\
 &= \frac{18-3i}{36-(-1)} = \frac{18-3i}{37} = \frac{18}{37} - \frac{3i}{37}
 \end{aligned}$$

$$18.) \frac{3+i}{5+2i} \cdot \frac{5-2i}{5-2i} = \frac{15-6i+5i-2i^2}{25+10i-10i-4i^2} = \frac{15-i-2i^2}{25-4(-1)}$$

$$= \frac{15-i-2(-1)}{25+4} = \frac{15+2-i}{29} = \frac{17-i}{29} = \frac{17}{29} - \frac{i}{29}$$



20.) Solutions? $x^2+2x+5=0$

x -factor doesn't work, so quadratic formula

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(5)}}{2(1)} = \frac{-2 \pm \sqrt{4-20}}{2} = \frac{-2 \pm \sqrt{-16}}{2}$$

$$= \frac{-2 \pm 4i}{2} = \boxed{-1 \pm 2i}$$

21.) $2x^2 - 5 = 45$

$$\begin{array}{r} 2x^2 - 5 = 45 \\ +5 \quad +5 \\ \hline \end{array}$$

$$\frac{2x^2}{2} = \frac{50}{2}$$

$$x^2 = 25$$

$$\boxed{x = \pm 5}$$

22.) $x^2 + 8 = 0$

$$\begin{array}{r} x^2 + 8 = 0 \\ -8 \quad -8 \\ \hline \end{array}$$

$$\sqrt{x^2} = \sqrt{-8}$$

$$\boxed{x = \pm 8i}$$

$$23.) x^2 = 6x$$

$$\underline{-6x} \quad \underline{-6x}$$

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

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

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

$$\boxed{x=6}$$

$$24.) y = 10x^2 + x - 3$$

$$\begin{matrix} 1 \cdot 10 & & 1 \cdot -3 \\ 2 \cdot 5 & \times & -1 \cdot 3 \end{matrix}$$

$$(5x-3)(2x-1) = 0$$

$$5x-3=0$$

$$\underline{+3} \quad \underline{+3}$$

$$\frac{5x}{5} = \frac{3}{5}$$

$$\boxed{x = \frac{3}{5}}$$

$$2x-1=0$$

$$\underline{+1} \quad \underline{+1}$$

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

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

$$25.) f(x) = x^2 - 4x - 21$$

$$\begin{matrix} 1 & \times & -7 \\ 1 & & +3 \end{matrix}$$

$$(x-7)(x+3) = 0$$

$$x-7=0 \quad x+3=0$$

$$\underline{+7} \quad \underline{+7} \quad \underline{+3} \quad \underline{+3}$$

$$\boxed{x=7} \quad \boxed{x=-3}$$

29.) vertex

$$y = -2(x-4)^2 - 7$$

$$\downarrow$$

$$\boxed{(4, -7)}$$

$$27.) f(x) = 5(x+4)^2 - 2$$

$\downarrow$
minimum value is the
vertex

$$\downarrow$$

$$(-4, -2)$$

$$28.) y = x^2 - 2x + 3$$

$$x = \frac{-b}{2a} = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1 \quad \underline{\underline{x=1}}$$

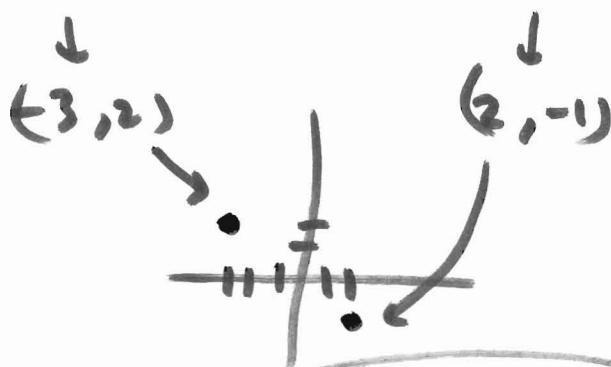
$$y = (1)^2 - 2(1) + 3$$

$$y = 1 - 2 + 3 = -1 + 3 = 2$$

$$\boxed{(1, 2)}$$

30.) If $a > 1$, then it's "skinny" or "narrow"
 If $0 < a < 1$ then it's "wide"
 If $a < 0$, then it's upside down

31.) $y = (x+3)^2 + 2 \rightarrow y = (x-2)^2 - 1$



translation: down to the right 5
down 3

32.) $y = 2(x+4)^2 - 1 \rightarrow y = 8(x+4)^2 - 1$

↓
 same vertex, different shape
 (look at a)

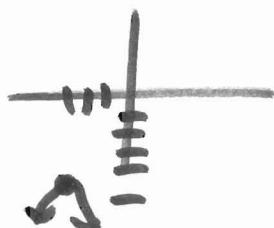
33.) $f(x) = (x-b)^2 + c$

vertex $(5, -2)$

↓ ↓
 $b = 5 \quad c = -2$

35.) $y = -4(x+3)^2 - 5$

↓
 $(-3, -5)$



34.) $4x^2 - 16x - 1$

$x = \frac{-b}{2a} = \frac{-(-16)}{2(4)} = \frac{16}{8} = 2$

$x = 2$

$y = 4(2)^2 - 16(2) - 1$

$y = 4(4) - 32 - 1$

$y = 16 - 32 - 1$

$y = -16 - 1 = -17 \quad (2, -17)$