Algebra 2 // BM 2 Exam Review

① $|3x-2| = 10$

$3x-2=10$ $\quad$ $3x-2=-10$

$+2 \quad +2$ $\quad$ $+2 \quad +2$

$\frac{3x}{3} = \frac{12}{3}$ $\quad$ $\frac{3x}{3} = \frac{-8}{3}$

$x=4$ $\quad$ $x=-\frac{8}{3}$

② $|5-2x| \leq 1$

$5-2x \leq 1$ $\quad$ $5-2x \geq -1$

$-5 \quad -5$ $\quad$ $-5 \quad -5$

$\frac{-2x}{-2} \leq \frac{-4}{-2}$ $\quad$ $\frac{-2x}{-2} \geq \frac{-6}{-2}$

$x \geq 2$ $\quad$ $x \leq 3$

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

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

$3x-1 \geq 8$ $\quad$ $3x-1 \leq -8$

$+1 \quad +1$ $\quad$ $+1 \quad +1$

$\frac{3x}{3} \geq \frac{9}{3}$ $\quad$ $\frac{3x}{3} \leq \frac{-7}{3}$

$x \geq 3$ $\quad$ $x \leq -\frac{7}{3}$

④ Sketch: $|x+3| < 5$

$x+3 < 5$ $\quad$ $x+3 > -5$

$-3 \quad -3$ $\quad$ $-3 \quad -3$

$x < 2$ $\quad$ $x > -8$

Hint: For 1-4, all absolute value problems will have two equations to solve. 1st is same equation; no absolutes. 2nd is left is the same but sign(s) are different. Note: 2 and 3 the $\leq, \geq$ signs flip always in 2nd.

Substitution →

⑤ $y = 2x-1$ $\quad$ Solve for x only.

$4x-y=7$

$4x-(2x-1)=7$

$4x-2x+1=7$

$2x+1=7$

$-1 \quad -1$

$\frac{2x}{2} = \frac{6}{2}$

$x=3$

Elimination → ↙ for y only.

⑥ $-3x-2y=-14 \rightarrow -3x-2y=-14$

$-2(2x-y=7) \rightarrow -4x+2y=-14$

$-7x = -28$

$\frac{-7x}{-7} = \frac{-28}{-7}$

$x=4$

$2x-y=7$

$2(4)-y=7$

$8-y=7$

$-8 \quad -8$

$-y=-1$

$y=1$

⑦ $2(2x+3y-z=-4) \rightarrow 4x+6y-2z=-8$ ①

$2(3x-y+z=7) \rightarrow 6x-2y+2z=14$ ②

$4x+6y-2z=4 \rightarrow 4x+6y-2z=4$ ③

① $4x+6y-2z=-8$

② $6x-2y+2z=14$

④ $10x+4y=6$

② $6x-2y+2z=14$

③ $4x+6y-2z=4$

⑤ $10x+4y=18$

④ $10x+4y=6$

⑤ $(10x+4y=18) \cdot -1 \rightarrow -10x-4y=-18$

$0=-12$

no solution

⑧ $3x+z=9$

$2y+3z=7$

$x-2y=4$

$3x+z=9$

$2y+3z=7$

$x-2y=4$

$2y+3z=7$

$x-2y=4$

$x+3z=11$

$3x+z=9$

(9) $\$6c + \$2d = \$52$ ← keep your money together!

$-2 \times (c + d = 20)$ ← keep the number of things

↳ $6c + 2d = 52$

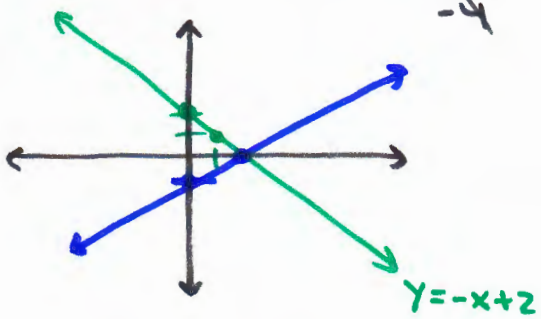
$-2c - 2d = -40$

$\frac{4c}{4} = \frac{12}{4} \rightarrow c = 3 \rightarrow$ 3 bunches of carnations

(10) $2x - 4y = 4 \rightarrow -2x \quad -2x$

$y = -x + 2$ ✓

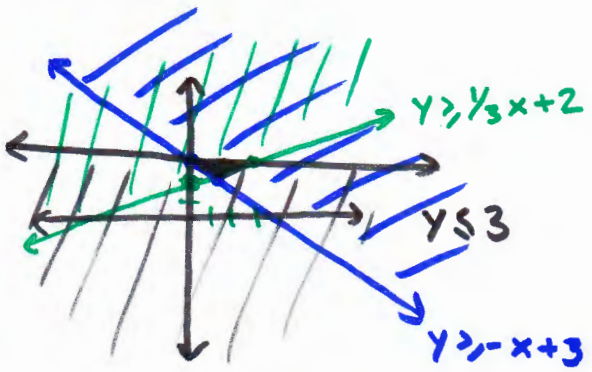
$\frac{-4y}{-4} = \frac{-2x}{-4} + \frac{4}{-4} \rightarrow y = \frac{1}{2}x - 1$ ✓



(11) $y \geq \frac{1}{3}x + 2$ ✓

$y \geq -x + 3$ ✓

$y \leq 3$ ✓



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

(13) product: $(5+i)(5-i) = 25 - 5i + 5i - i^2$

$= 25 - i^2 = 25 - (-1) = \boxed{26}$

$i^1 = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

(14) $i^{12} = \boxed{1}$

i . . .
-1 . . .
$-i$ . . .
1 . . .

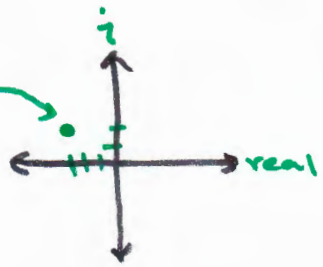
(15) $(5-2i)+(1+10i) = \boxed{6+8i}$

(16) $(2+6i)-(3-2i) = \boxed{-1+8i}$

(17) $\frac{3}{6+i}\cdot\frac{6-i}{6-i} = \frac{18-3i}{36-6i+6i-i^2} = \frac{18-3i}{36-(-1)} = \frac{18-3i}{37} = \boxed{\frac{18}{37}-\frac{3}{37}i}$

(18) $\frac{3+i}{5+2i}\cdot\frac{5-2i}{5-2i} = \frac{15-6i+5i-2i^2}{25-10i+10i-4i^2} = \frac{15-i-2(-1)}{25-4(-1)} = \frac{15-i+2}{25+4} = \boxed{\frac{17}{29}-\frac{1}{29}i}$

(19) $-3+2i$



(20) $x^2+2x+5=0 \rightarrow a=1\ b=2\ c=5$

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

$= \frac{-2}{2}\pm\frac{\sqrt{16}i}{2} = -1\pm\frac{4i}{2} = \boxed{-1\pm 2i}$

(21) $2x^2-5=45$
$+5\quad +5$

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

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

$\boxed{x=\pm 5}$

(22) $x^2+81=0$
$-81\quad -81$

$\sqrt{x^2} = \sqrt{-81}$

$\boxed{x=\pm 9i}$

(23) $x^2=6x$
$-6x\quad -6x$

$x^2-6x=0$

$x(x-6)=0$

$\boxed{x=0}$

$x-6=0$
$+6\quad +6$

$\boxed{x=6}$

(24) x-int(s) → $y = 10x^2 + x - 3$

5 · 3 = 15 ; 2 · −1 = −2 ; 15 − 2 = 13

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

$5x + 3 = 0$ → $-3 \quad -3$ → $\frac{5x}{5} = \frac{-3}{5}$ → $x = -\frac{3}{5}$

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

OR → $(-\frac{3}{5}, 0)$ $(\frac{1}{2}, 0)$

(25) Zeros? → $f(x) = x^2 - 4x - 21$

1 · −7 = −7 ; 1 · 3 = 3 ; −7 + 3 = −4

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

$x - 7 = 0$ → $+7 \quad +7$ → $x = 7$

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

OR → (7, 0) (−3, 0)

(26) The second number is 5 more than the first number.

↳ $y = x + 5$

The product of the two numbers is 1 less than their sum.

↳ $xy = x + y - 1$ ← *use substitution*

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

$x^2 + 5x = 2x + 5 - 1$

$x^2 + 5x = 2x + 4$

$-2x \quad -4 \quad -2x \quad -4$

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

$1 \quad +4$

$1 \quad -1$

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

$x + 4 = 0$ | $x - 1 = 0$

$-4 \quad -4$ | $+1 \quad +1$

$x = -4$ | $x = 1$

$y = x + 5$ | $y = x + 5$

$y = -4 + 5$ | $y = 1 + 5$

$y = 1$ | $y = 6$

[-4 and 1] also [1 and 6]

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

[y-value of vertex] ↳ vertex is $(-4, -2)$

min value is $\boxed{-2}$

(28) min point of $y = x^2 - 2x + 3$

[vertex] ↳ $a=1$ $b=-2$ $c=3$

$x = \frac{-b}{2a} = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$ // ↙

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

$= 1 - 2 + 3 = -1 + 3 = 2$ //

$\boxed{(1, 2)}$

(29) vertex point : $y = -2(x-4)^2 - 7$ ← remember, looks like the opposite for "h"

(h, k) $\quad a \quad h \quad k$

↳ $\boxed{(4, -7)}$

(30) How does "a" affect ... $y = ax^2$ .... $y = x^2$

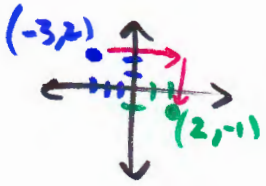
$a > 1$ thinner

$0 < a < 1$ wider

$a < 0$ down (faces down)

(31) Describe <u>translation</u> $y = (x+3)^2 + 2$ to $y = (x-2)^2 - 1$

$(-3, 2)$ $\quad$ $(2, -1)$



$(-3, 2)$ $\quad$ $(2, -1)$

$\boxed{\text{right } 5 \quad \text{down } 3}$

(32) $y = 3(x+4)^2 - 1$ $\quad y = 8(x+4)^2 - 1$

$a = 3$ $\quad (-4,-1)$ vertex $\quad a = 8$ $\quad (-4,-1)$ vertex

The a's are different numbers, so they have different shapes.

The a's are both positive, so they are facing up, so they both have minimum points.

The vertices (h,k) are the same.

→ **A**

(33) $f(x) = (x-b)^2 + c$ $\quad$ vertex is $(5,-2)$

$b = 5 \quad c = -2$

(34) $y = 4x^2 - 16x - 1 \rightarrow y = a(x-h)^2 + k$

$a = 4 \quad b = -16 \quad c = -1$

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

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

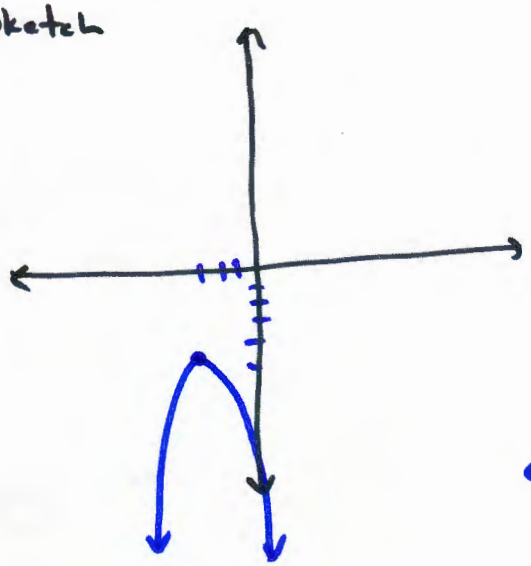
$4(4) - 32 - 1$

$16 - 32 - 1 = -16 - 1 = -17$ → k

$y = 4(x-2)^2 - 17$

(35) $y = -4(x+3)^2 - 5 \rightarrow a = -4$ $\quad$ vertex: $(-3,-5)$

Sketch



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

$= -4(x+3)(x+3) - 5$

$= -4(x^2 + 6x + 9) - 5$

$= -4x^2 - 24x - 36 - 5$

$= -4x^2 - 24x - 39$

$\rightarrow c = -39$ $\quad$ y-int $(0,-39)$

← That's good enough :)