Algebra 2 Name KEY

Review for Semester 1 Final

Date_____ Period____

Solve each equation with the quadratic formula.

1) $3n^2 - n = 5$

$3n^2 - n - 5 = 0$

$n = \frac{1 \pm \sqrt{(-1)^2 - 4(3)(-5)}}{2(3)} = \frac{1 \pm \sqrt{61}}{6}$

2) $3m^2 = 11 + 5m$

$3m^2 - 5m - 11 = 0$

$m = \frac{5 \pm \sqrt{(-5)^2 - 4(3)(-11)}}{2(3)} = \frac{5 \pm \sqrt{157}}{6}$

3) $8r^2 + 9r = -7$

$8r^2 + 9r + 7 = 0$

$r = \frac{-9 \pm \sqrt{9^2 - 4(8)(7)}}{2(8)} = \frac{-9 \pm \sqrt{-143}}{16} = \frac{-9 \pm i\sqrt{143}}{16}$

4) $10x^2 + 5x = -1$

$10x^2 + 5x + 1 = 0$

$x = \frac{-5 \pm \sqrt{5^2 - 4(10)(1)}}{2(10)} = \frac{-5 \pm \sqrt{-15}}{20} = \frac{-5 \pm i\sqrt{15}}{20}$

Solve each equation by factoring.

5) $k^2 + 4 = -4k$

$k^2 + 4k + 4 = 0$

$(k+2)(k+2) = 0$

$k = -2$

6) $6x^2 = -252 + 78x$

$6x^2 - 78x + 252 = 0$

$6(x^2 - 13x + 42) = 0$

$6(x-6)(x-7) = 0$ $x = 6, 7$

7) $7n^2 = -70n - 147$

$7n^2 + 70n + 147 = 0$

$7(n^2 + 10n + 21) = 0$

$7(n+3)(n+7) = 0$

$n = -3, -7$

8) $p^2 + 7p = -6$

$p^2 + 7p + 6 = 0$

$(p+6)(p+1) = 0$ $p = -6, -1$

Find all zeros.

9) $f(x) = x^4 - 9x^2 + 14$

$0 = (x^2 - 2)(x^2 - 7)$

$x^2 - 2 = 0$ $x^2 = 2$ $x = \pm\sqrt{2}$

$x^2 - 7 = 0$ $x^2 = 7$ $x = \pm\sqrt{7}$

10) $f(x) = x^4 + 12x^2 + 32$

$0 = (x^2 + 8)(x^2 + 4)$

$x^2 + 8 = 0$ $x^2 = -8$ $x = \pm\sqrt{-8} = \pm 2i\sqrt{2}$

$x^2 + 4 = 0$ $x^2 = -4$ $x = \pm\sqrt{-4}$ $x = \pm 2i$

11) $f(x) = x^4 + 9x^2 + 8$

$0 = (x^2 + 8)(x^2 + 1)$

$x^2 + 8 = 0$ $x^2 = -8$ $x = \pm 2i\sqrt{2}$

$x^2 + 1 = 0$ $x^2 = -1$ $x = \pm i$

12) $f(x) = x^3 - 8$ diff of 2 cubes

$0 = (x-2)(x^2 + 2x + 4)$

$x - 2 = 0$ $x = 2$

Quad Formula:

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

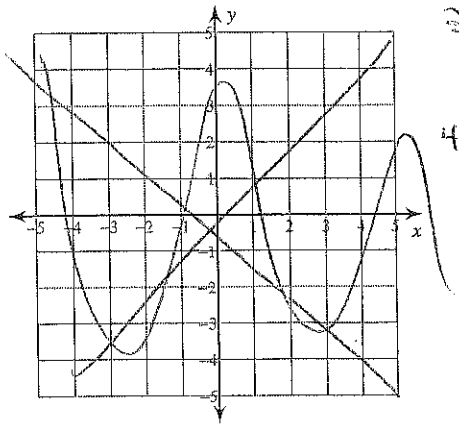
$x = \frac{-2 \pm \sqrt{-12}}{2}$

$x = \frac{-2 \pm 2i\sqrt{3}}{2}$

$x = -1 \pm i\sqrt{3}$

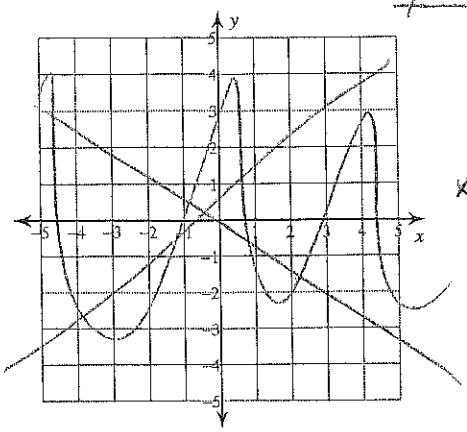
Solve each system by graphing.

13) $4x+3y=6$
$x+3y=-3$ (M(-1))



$4x+3y=6$
$-x-3y=3$
$3x=9$
$x=3$
$4(3)+3y=6$
$3y=-6$
$y=-2$
$(3,-2)$

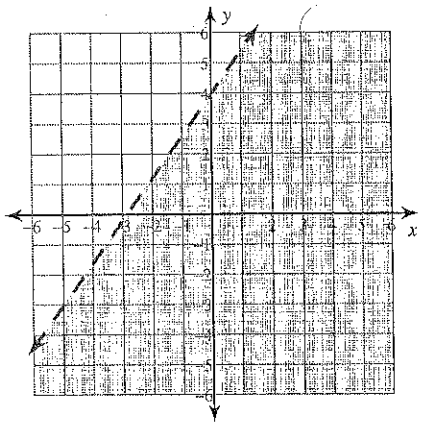
14) $x-3y=-6$
$x+y=-2$ M(-1)



$x-3y=-6$
$-x-y=2$
$-4y=-4$
$y=1$
$x+(1)=-2$
$x=-3$
$(-3,1)$

Sketch the graph of each linear inequality.

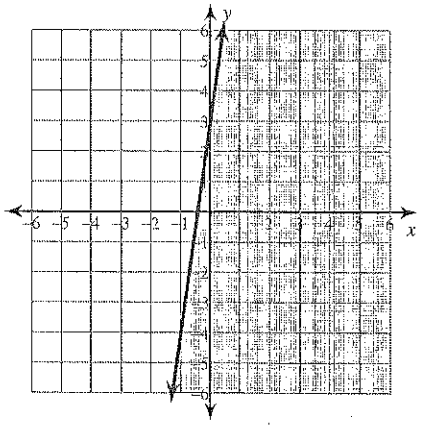
15) $7x-5y>-20$



x	y
0	4
$-2\frac{6}{7}$	0

$7x=-20$
$x=\frac{-20}{7}$
$=-2\frac{6}{7}$

16) $7x-y\geq-3$



x	y
0	3
$-\frac{3}{7}$	0

Write the slope-intercept form of the equation of the line described.

17) through: (1, 0), parallel to $y=-2x+5$
$y=-2x+b$
$0=-2(1)+b$ $b=2$ $y=-2x+2$

18) through: (3, 4), parallel to $y=x+5$
$y=1x+b$
$4=3+b$ $b=1$ $y=x+1$

19) through: (5, 3), perp. to $x=0$
$y=3$

20) through: (–3, –4), perp. to $y=-\frac{3}{7}x+5$
$y=\frac{7}{3}x+b$
$-4=\frac{7}{3}(-3)+b$
$-4=-7+b$
$3=b$
$y=\frac{7}{3}x+3$

Solve each equation.

21) $\begin{bmatrix} -3 & -1 \\ 5 & 3 \end{bmatrix} X = \begin{bmatrix} -12 & 1 & 0 \\ 24 & -3 & 12 \end{bmatrix}$

[A] [B]

$A^{-1} \cdot B = \begin{bmatrix} 3 & 0 & -3 \\ 3 & -1 & 9 \end{bmatrix}$

22) $\begin{bmatrix} -1 & -1 \\ 9 & 8 \end{bmatrix} X = \begin{bmatrix} 4 \\ -39 \end{bmatrix}$

[A] [B]

$A^{-1} \cdot B = \begin{bmatrix} -7 \\ 3 \end{bmatrix}$

Find each product.

Use distributive property.

23) $(2x-7)(2x^2+x+4)$

$4x^3 - 12x^2 + x - 28$

24) $(2n+4)(8n^2-3n+1)$

$16n^3 + 26n^2 - 10n + 4$

25) $(7p+2)(2p^2-2p-7)$

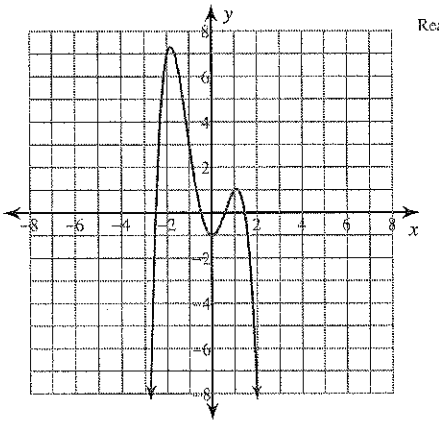
$14p^3 - 10p^2 - 53p - 14$

26) $(3k+5)(4k^2+3k-6)$

$12k^3 + 29k^2 - 3k - 30$

Sketch the graph of each function. Approximate each real zero to the nearest tenth.

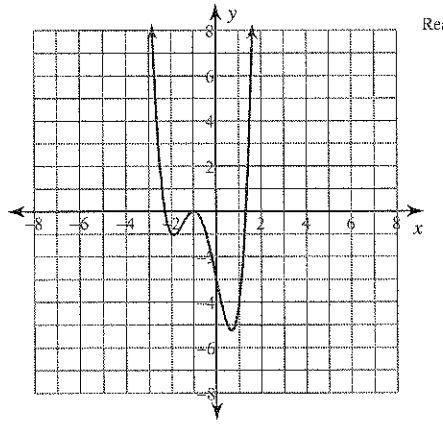
27) $f(x) = -x^4 - x^3 + 4x^2 - 1$



Real Zeros: –2.5, –0.5, 1.4, 0.6

Real zeros (approx.)
appear -2.5, -0.5, 1.4, 0.6

28) $f(x) = x^4 + 3x^3 - 3 - 5x$



Real Zeros: –2.3, –1, 1.3

Real Zeros (approx.)
-2.3, -1, 1.3

Evaluate each function at the given value.

29) $f(a) = a^4 + 3a^3 - 23a^2 + 18a - 14$ at $a = 3$

−5

30) $f(a) = -6a^4 - 27a^3 + 10a^2 - 20a + 18$ at $a = -5$

−7

3 | 1 3 −23 18 −14
3 18 −15 9
1 6 −5 3 −5

Solve each equation.

31) $|r - 4| = 13$

{17, −9}

$r - 4 = 13$
$r = 17$
$r - 4 = -13$
$r = -9$

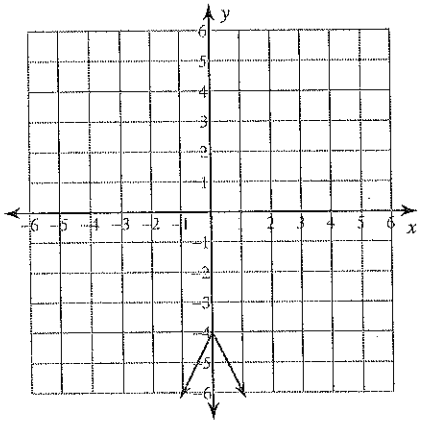
32) $\left|\frac{b}{10}\right| = 5$

{50, −50}

$\frac{b}{10} = 5$ $b = 50$
$\frac{b}{10} = -5$ $b = -50$

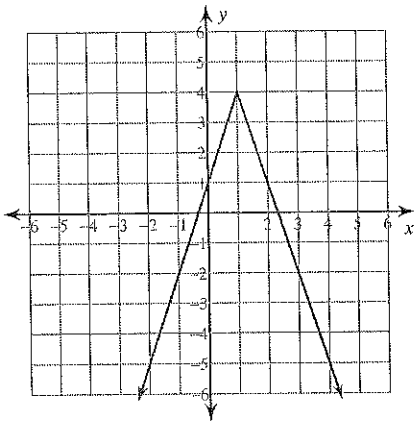
Graph each equation.

33) $y = -2|x| - 4$



vertex (0, −4)

34) $y = -3|x - 1| + 4$



vertex (1, 4)

Solve each equation.

35) $8x + 34 = -7(x - 7)$

{1}

36) $3(3x + 5) + 1 = 32 + 7x$

{8}

37) $-12 - 5a = -4a - 4(3 - 8a)$

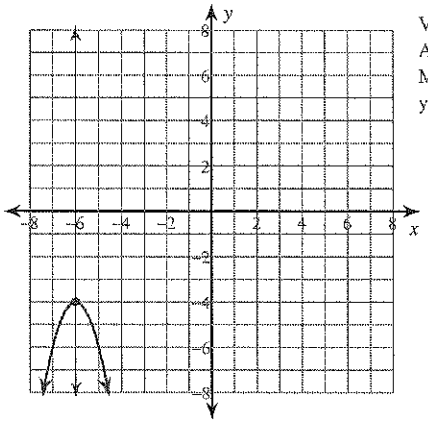
{0}

38) $31 + 6v = -7(6 - 6v) + 1$

{2}

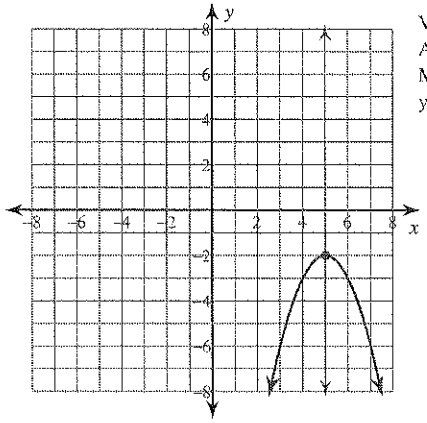
Identify the vertex, axis of symmetry, min/max value, and y-intercept of each. Then sketch the graph.

39) $y = -2x^2 - 24x - 76$



Vertex: (–6, –4)
Axis of Sym.: $x = -6$
Max value = –4
y-int: –76

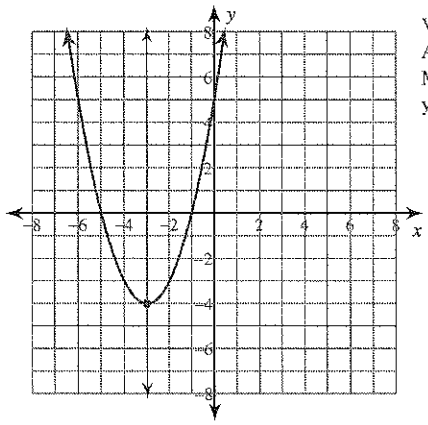
40) $y = -(x - 5)^2 - 2$



Vertex: (5, –2)
Axis of Sym.: $x = 5$
Max value = –2
y-int: –27

Refer to half sheet of notes from Chapter 4.

41) $y = (x + 5)(x + 1)$



Vertex: (–3, –4)
Axis of Sym.: $x = -3$
Min value = –4
y-int: 5

42) Describe how the graph of $y = -2(x - 4)^2 + 6$ is related to the graph of $y = x^2$. Include any horizontal and vertical translations, reflections and vertical stretch or shrink.

Vertex at (4, 6)
Reflected in x-axis
Vertical Stretch

Solve each system.

43) $x + 6y - z = -3$
$-x + 2y = -1$
$4x + 6y = -10$

$(-1, -1, -4)$

$\begin{bmatrix} 1 & 6 & -1 \\ -1 & 2 & 0 \\ 4 & 6 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -3 \\ -1 \\ -10 \end{bmatrix}$

A B

$A^{-1} \cdot B$

44) $-2x - 3y - 5z = -16$
$5x + 4y - z = 6$
$-5x - y - 6z = -14$

$(0, 2, 2)$

Set up 3x3 matrix A and 3x1 matrix B Then $A^{-1} \cdot B$ in home screen.

45) $6x - 3y - 5z = -29$
$-6x + 2y + 4z = 28$
$-x + 2y = 18$

$(-6, 6, -5)$

46) $x - 2y - 2z = -12$
$5x + 4z = -4$
$4x - y = -16$

$(-4, 0, 4)$

Solve each inequality.

47) $-6 \le 4r - 5r$

$r \le 6$

$-6 \le -1r$

$6 \ge r$

reverse inequality when dividing by a negative

$r \le 6$

48) $-5 < x + 5 + x$

$x > -5$

49) $3 > 6n - 7n$

$n > -3$

50) $3b + 2b \le 0$

$b \le 0$

51) Andrew belongs to two download clubs. His video game club charges a membership fee of $10 per month, plus $6 for each game download. His music club charges $1.09 per song. Which equation models Andrew's total monthly costs if he downloads x video games and y songs.

$6x + 1.09y + 10$

52) Jane has $30 to spend on her garden. Flowers cost $5 and leafy plants cost $3. She would like at least 3 of each type of plant. Write and graph a system of linear inequalities that describes the information. Use x for the number of flowers and y for the number of leafy plants.

The dot next to the choice indicates that it is the answer.

$x \ge 3$ $y \ge 3$

$5x + 3y \le 30$