

TEST 3 - REVIEW

KNOW YOUR FORMULAS

① $P(-5, -1), Q(5, 4)$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(5 - (-5))^2 + (4 - (-1))^2}$$

$$= \sqrt{10^2 + 5^2} = \sqrt{125}$$

$$= 5\sqrt{5}$$

③ $(x-h)^2 + (y-k)^2 = r^2$
 $(x-(-6))^2 + (y-(-4))^2 = (3)^2$
 $(x+6)^2 + (y+4)^2 = 9$

⑤ $5x^2 + 5y^2 - 20x - 30y + 60 = 0$

$$5x^2 - 20x + 5y^2 - 30y = -60$$

$$5x^2 - 4x + y^2 - 6y = -12$$

$$x^2 - 4x + \left(\frac{-4}{2}\right)^2 + y^2 - 6y + \left(\frac{-6}{2}\right)^2 = -12 + 4 + 9$$

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

$$(2, 3), r=1$$

⑦

4	5
7	3
10	8

 Domain: {4, 7, 12}

Range: {5, 8, 13}

NOTE: NOT A FUNCTION

⑨ $y = 2x - 4$ function
 $D: (-\infty, \infty)$

⑪ $xy = -3$
 $y = -\frac{3}{x}$ yes

$$(-\infty, 0) \cup (0, \infty)$$

⑬ $y = \sqrt{6x - 4}$ $D: [\frac{2}{3}, \infty)$

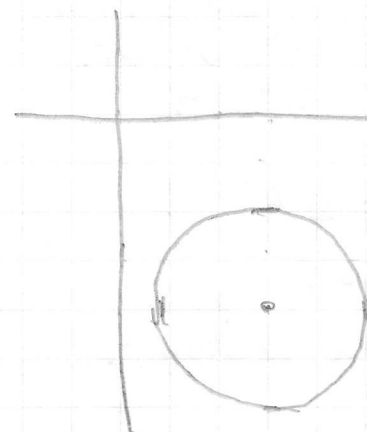
② $P(3, -9), Q(-9, 1)$

$$\left(\frac{3+(-9)}{2}, \frac{-9+1}{2}\right) = \left(\frac{-6}{2}, \frac{-8}{2}\right)$$

$$(-3, -4)$$

④ $(x-3)^2 + (y+4)^2 = 4$

$$(3, -4) r=2$$



⑥ $\{(-3, 6), (1, -1), (5, 2), (9, 2), (12, 2)\}$
 yes NO x value repeats

⑧ Function - use vertical line test

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

⑩ $x = y^2$ $\sqrt{x} = y$

NO $x \geq 0$ $[0, \infty)$

⑫ yes $[-3, 0]$

⑭ $y = \frac{-6}{x-2}$ $(-\infty, 2), (2, \infty)$

yes

15) $f(x) = 2x^2 - 2x - 5$

$$\begin{aligned} f(3) &= 2(3)^2 - 2(3) - 5 \\ &= 2 \cdot 9 - 2 \cdot 3 - 5 \\ &= 18 - 6 - 5 = 7 \end{aligned}$$

17) $S(x) = \$94 + \$44(x-1)$
 $= \$94 + \$44x - \$44$
 $= \$50 + \$44x$

$$\begin{aligned} S(5.5) &= S(6) \\ &= \$50 + \$44(6) \\ &= \$50 + \$264 \\ &= \$314 \end{aligned}$$

19) $f(x) = \frac{1}{3}x^3 - 4$

It is x^3 compressed $\frac{1}{3}$ and shifted down 4

21) $(9, 4)$ reflected $(-9, -4)$

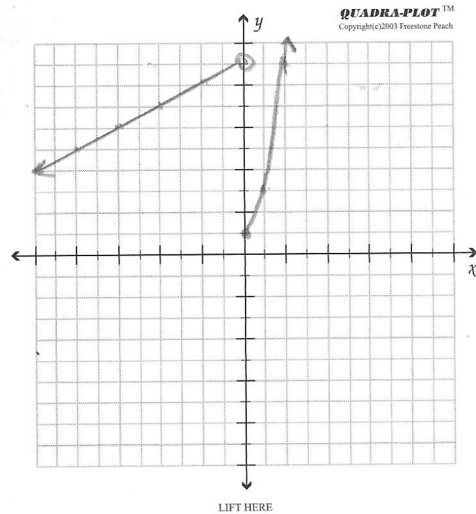
22) $y = -5x^5 - 6x^3$
 $-y = -5x^5 - 6x^3 \quad \left| \quad y = -5(-x)^5 - 6(-x)^3 \right.$
 $y = 5x^5 + 6x^3 \quad \left| \quad = 5x^5 + 6x^3 \right.$
 NOT y NOT x

$$\begin{aligned} -y &= -5(-x)^5 - 6(-x)^3 \\ y &= 5x^5 - 6x^3 \end{aligned}$$

ORIGIN

23) $y = (x-4)(x-9)$
 parabola not on axis NOT symmetrical

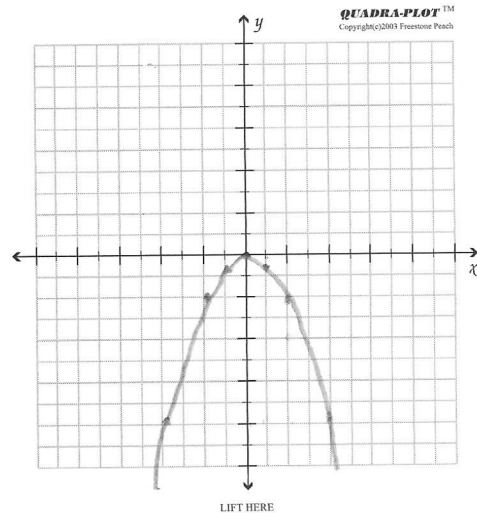
16) $f(x) = \begin{cases} 2x+9, & x < 0 \\ 2x^2+1, & x \geq 0 \end{cases}$



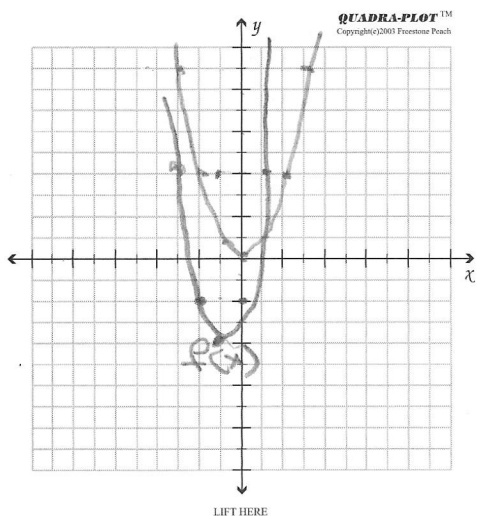
18) $f(x) = (x-6)^2$
 graph of x^2 shifted right 6

20) $f(x) = -\frac{1}{2}x^2$

x	y
0	0
1	$-\frac{1}{2}$
-1	$-\frac{1}{2}$
2	-2
-2	-2

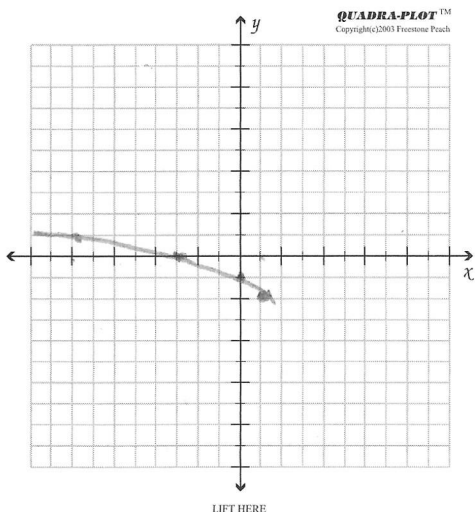


24) $f(x) = 2(x+1)^2 - 4$

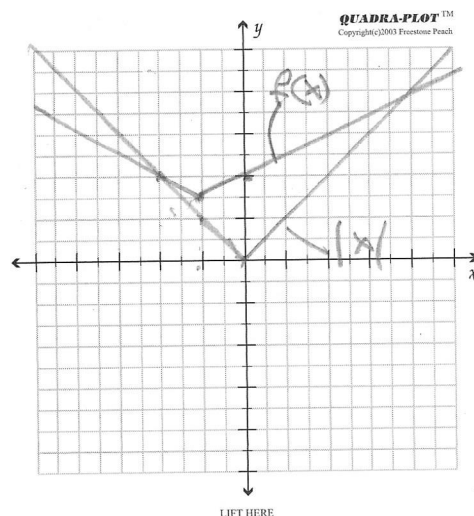


Shift left 1, down 4
stretch

26) $h(x) = \sqrt{-x+1} - 2$

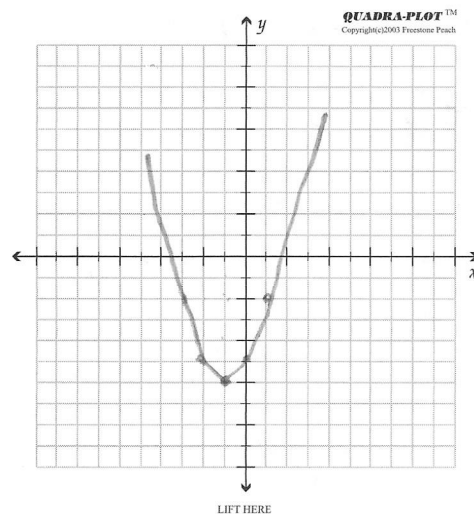


25) $g(x) = \frac{1}{2}|x+2| + 3$

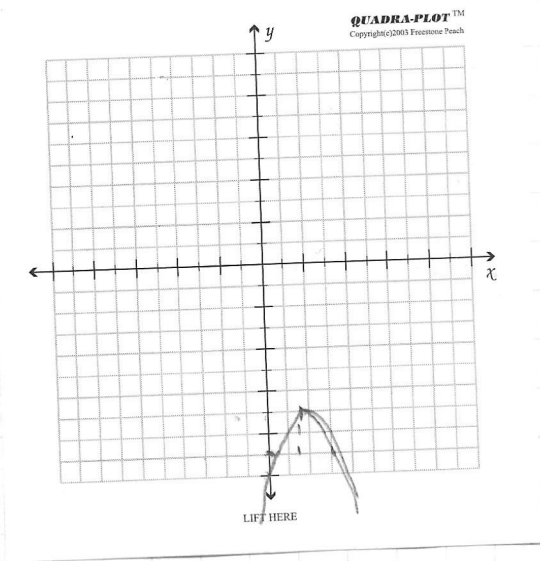


Absolute value shift left 2, up 3
compressed 1/2

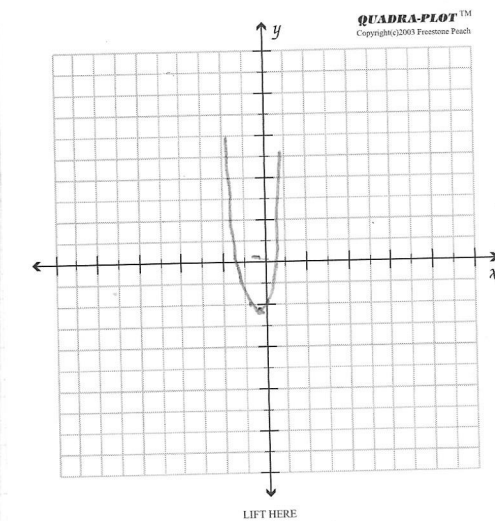
27) $y = (x+1)^2 - 6$ (-1, -6)



28) $y = -x^2 + 3x - 9$
 $= -(x^2 - 3x + \frac{9}{4}) - 9 + \frac{9}{4}$
 $= -(x^2 - 3x + (\frac{-3}{2})^2) - 9 + \frac{9}{4}$
 $= -(x - \frac{3}{2})^2 - \frac{27}{4}$
 $x = \frac{-b}{2a} = \frac{-3}{2(-1)} = \frac{3}{2}$



29) $y = 3x^2 + 2x - 2$
 Axis $x = \frac{-2}{2(3)} = -\frac{1}{3}$
 $3(\frac{-1}{3})^2 + 2(\frac{-1}{3}) - 2$
 $3(\frac{1}{9}) - \frac{2}{3} - 2$
 $\frac{1}{3} - \frac{2}{3} - 2 = -\frac{7}{3}$ Vertex $(-\frac{1}{3}, -\frac{7}{3})$



30) $f(x) = -2x^2 - 8x - 13$
 find Vertex & Axis
 $x = \frac{-b}{2a} = \frac{-(-8)}{2(-2)} = -2$
 $f(-2) = -2(-2)^2 - 8(-2) - 13$
 $= -2(4) + 16 - 13$
 $= -8 + 16 - 13 = -5$
 Vertex $(-2, -5)$
 Range $(-\infty, -5]$

31) $x^2 - 7x + 12 > 0$
 $(x-3)(x-4) > 0$
 Borden +3 +4
 Test 0 3.5 5
 $0^2 - 7(0) + 12 > 0 \checkmark (\infty, 3)$
 $(3.5)^2 - 7(3.5) + 12 > 0$
 $12.25 - 24.5 + 12 > 0$
 $-0.25 > 0 \times \text{NO}$
 $(5)^2 - 7(5) + 12 > 0$
 $25 - 35 + 12 > 0$
 $2 > 0 \checkmark$
 $(-\infty, 3) \cup (4, \infty)$

32) $y = x + 3$
 $xy = 418$
 $x(x+3) = 418$
 $x^2 + 3x + 418 = 0$
 $(x+22)(x-19) = 0$
 $x = -22, x = 19$
 $(x=19) y=22$

33) $h(t) = -16t^2 + 128t + 144$
 $0 = -16t^2 + 128t + 144$
 $0 = 16t^2 - 128t - 144$
 $0 = t^2 - 8t - 9$
 $= (t-9)(t+1)$
 $t = 9 \text{ seconds}$

34


 xy

$$2x + y = 500$$

$$y = 500 - 2x$$

$$\text{Area} = (500 - 2x)(x)$$

$$\text{Area} = 500x - 2x^2$$

$$0 = -2x^2 + 500x - \text{Area}$$

$$-\frac{b}{2a} = \frac{500}{4}$$

MAXIMUM occurs at Vertex

$$x = -\frac{b}{2a} = \frac{-500}{2(-2)} = \frac{-500}{-4} = 125$$

$x = 125$ other side is 250

$$A = (125)(250) = 31,250 \text{ ft}^2$$

$$\begin{array}{r} 125 \\ 250 \\ \hline 6250 \\ 250 \\ \hline 31,250 \end{array}$$

40) $(g \circ f)(-11) = f(x) = \frac{x-4}{3}$
 $g(x) = 9x + 8$

$$\begin{aligned} (g \circ f)(-11) &= g(f(-11)) \\ &= g(-5) = 45 + 8 = \\ &= 53 \end{aligned}$$

35) $f(x) = 5x^2 + 5x$

$$\begin{aligned} f(x+h) &= 5(x+h)^2 + 5(x+h) \\ &= 5x^2 + 10xh + h^2 + 5x + 5h \end{aligned}$$

$$\frac{f(x+h) - f(x)}{h} = \frac{5x^2 + 10xh + h^2 + 5x + 5h - (5x^2 + 5x)}{h}$$

$$\frac{10xh + h^2 + 5h}{h} = 10x + 5 + h$$

36) $f(x) = 4 - 9x$ $g(x) = -2x + 9$
 $(f+g)(x) = f(x) + g(x)$
 $= 4 - 9x + (-2x + 9)$
 $= 13 - 11x$

37) $f(x) = 8x + 6$ $g(x) = 4x + 8$
 $(f \cdot g)(x) = (8x + 6)(4x + 8)$
 $= 32x^2 + 88x + 48$

38) $f(x) = 3x - 5$ $g(x) = 6x - 2$
 $(f - g)(x) = 3x - 5 - (6x - 2)$
 $= -3x - 3$

39) $f(x) = \sqrt{x}$ $g(x) = 2x - 4$
 $\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x}}{2x - 4}$

41) $(f \circ g)(7)$ $f(x) = 2x + 5$
 $g(x) = 2x^2 - 5$
 Note: ignore $g(x)$ it doesn't matter
 $f(f(7)) = f(19) = 43$

$$(42) f(x) = \frac{1}{x-2}$$

$$g(x) = \sqrt{x+1}$$

$$(f \circ g)(x) = f(g(x))$$

$$\text{Domain of } f: x \neq 2$$

$$g: x \geq -1$$

$$\text{Domain of } (f \circ g)(x)$$

$$[-1, 2) \cup (2, \infty)$$

$$(43) H(x) = (f \circ g)(x)$$

$$H(x) = \frac{1}{x^2-3}$$

$$f(x) = \frac{1}{x} \quad x \neq 0$$

$$g(x) = x^2 - 3 \quad x \in \mathbb{R}$$