P. Math 11 Quadratics Review Worksheet #1 Name: key

Part A: Solve the following equations: No Decimal answers.

#2) $\sqrt{(2x+9)^2} = \sqrt{169}$

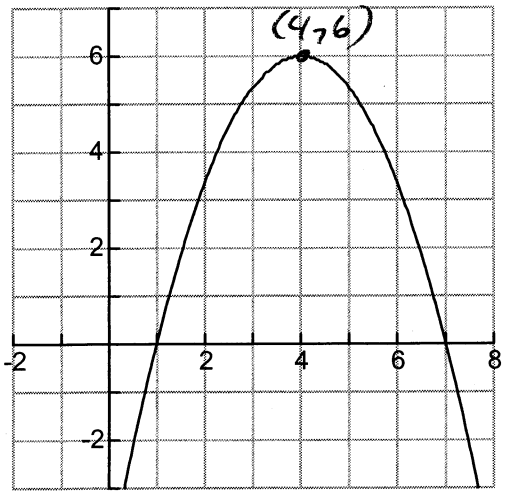
$2x+9 = \pm 13$

① $2x+9=13$ ② $2x+9=-13$

$2x=4$ $2x=-22$

$x=2$ $x=-11$

Part B: The parabola. Answer the following about the given graph.



Equation: $y=-\frac{2}{3}(x-4)^2+6$

Vertex : (4,6)

Axis of symmetry: $x=4$

Direction of opening: down

x – intercept: 1 & 7

y – intercept:

Max/Min? Max

Domain: $x \in R$ Range: $y \leq 6$

Part C: Complete the Square for:

1) $y=-2x^2+32x-51$

$y=-2(x^2+16x+64-64)-51$

$y=-2(x+8)^2+77$

2) $y=\frac{1}{4}x^2-3x+29$

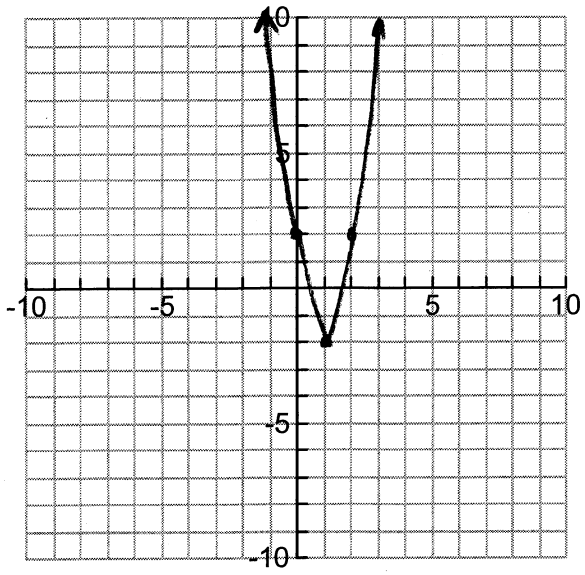
$y=\frac{1}{4}(x^2-12x+36-36)+29$

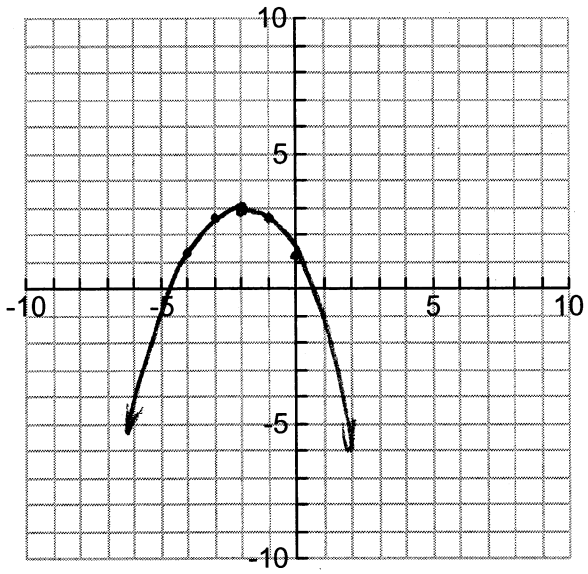
$y=\frac{1}{4}(x-6)^2+20$

Part D: Graph the following parabolas:

Equation	Vertex	Up/Down	Max/Min	Expanded/ Compressed
1) $y = 4(x-1)^2 - 2$	$(1,-2)$	up	Min	Vertically Expanded
2) $y = -\frac{2}{5}(x+2)^2 + 3$	$(-2,3)$	down	Max	Vertically Compressed

Part E: Max-Min Problems





1. Pamela is selling authentic Juventus jerseys. She usually sells about 600 jerseys a year at $40 each. She is planning to maximize her revenue by increasing the price. She's calculated that for every $10 increase in price, there will be a drop of 20 sales a year. What price would maximize her revenue?

Let x = # of increases

$\text{Revenue}(x) = (40+10x)(600-20x)$

$= 24000 - 800x + 6000x - 200x^2$

$= -200x^2 + 5200x + 24000$

$= -200(x^2 - 26x + 169 - 169) + 24000$

$= -200(x-13)^2 + 57900$

∴ 13 increments of \$10 ⇒ \$130

∴ New Price: \$170

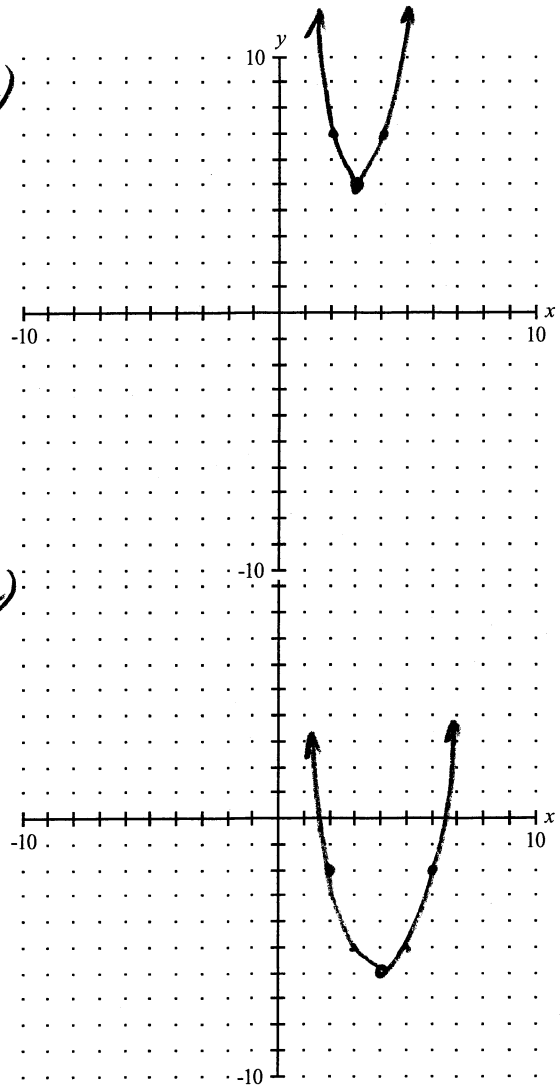
∴ 340 Jerseys sold

∴ Revenue: \$57 800

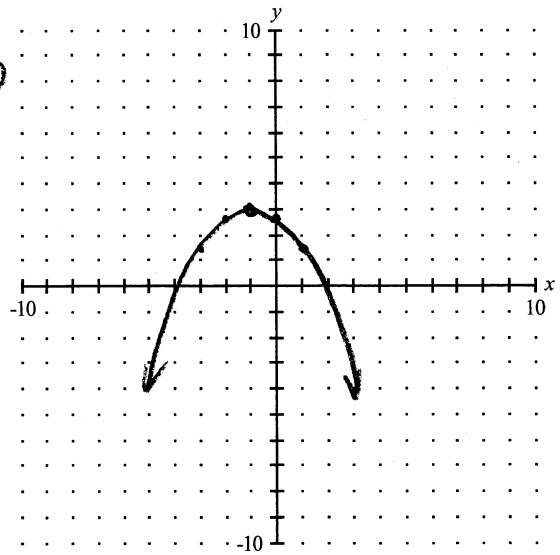
Part B: Parabolas: Complete the chart then graph them on the grids below.

	Equation	Vertex	Axis of Symmetry	Up/Down	Max/Min	Expanded Compressed normal
a)	$y = 2(x-3)^2 + 5$	(3, 5)	$x = 3$	up	Min	Expanded
b)	$y = -0.25(x+1)^2 + 3$	(-1, 3)	$x = -1$	down	Max	Compressed
c)	$y = (x - 4)^2 - 6$	(4, -6)	$x = 4$	up	Min	Normal

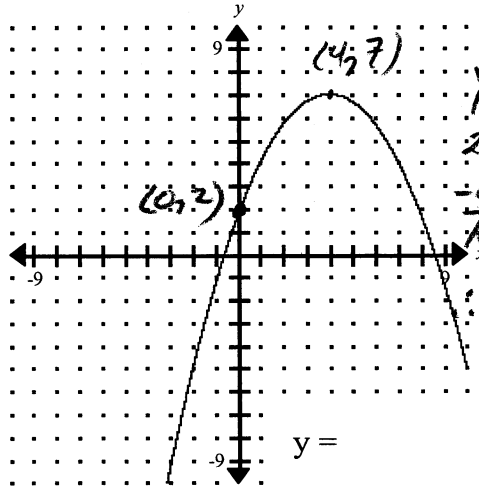
a)



b)



c)



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

$2 = a(16) + 7$

$\frac{-5}{16} = a$

$\therefore y = \frac{-5}{16}(x-4)^2 + 7$

Part C: y = Answer

the following.

1. A parabola is described by the equation $y = (x + 3)^2 - 2$. Rewrite the equation if it is moved 3 units up and 2 units to the left.

$y = (x+5)^2 + 1$

2. Write the equation of the of each parabola.
   a) with vertex (-2, 5) and passing though (-4, 13)
   b) with vertex (4, -2) and y-intercept 6

a) $y = a(x+2)^2 + 5$; $(-4, 13)$

$13 = a(-2)^2 + 5$

$8 = 4a$

$2 = a$

$\therefore y = 2(x+2)^2 + 5$

$y = a(x-4)^2 - 2$; $(0, 6)$

$6 = 16(a) - 2$

$8 = 16a$

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

$y = \frac{1}{2}(x-4)^2 - 2$

3. Solve the following equation using a graphing calculator. $y = 2x^2 - 16x + 19$

V: (4.00, −13.00) Zeros: 1.45 & 6.55

4. Write the following parabolas in standard form. $y = a(x - p)^2 + q$

a) $y = -3x^2 + 12x - 7$

$y = -3(x^2 - 4x) - 7$

$y = -3(x^2 - 4x + 4 - 4) - 7$

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

b) $y = 2x^2 + 6x - 1$

$y = 2(x^2 + 3x + 2.25 - 2.25) - 1$

$y = 2(x+1.5)^2 - 5.5$

Part D: Word Problems.

1. Megan's lawn care company charges $20 a week and has 120 clients. She estimates that for each $2 increase in its free, the company would lose 5 clients. What would be the maximum revenue?

let x = increments

$\therefore$ 7 increments @ \$2.00

$\therefore$ New Price is \$34.00

$\therefore$ Max Revenue is \$2890.00

$R(x) = (20 + 2x)(120 - 5x)$

$R(x) = 2400 - 100x + 240x - 10x^2$

$R(x) = -10x^2 + 140x + 2400$

$R(x) = -10(x^2 - 14x + 49 - 49) + 2400$

$R(x) = -10(x-7)^2 + 2890$

2. Two numbers have a sum of 20. The sum of their squares is a minimum. Find the two numbers.

Let x = 1st number

then $20 - x$ = 2nd number

3. If a ball is thrown upward from a height of 2 m with an initial velocity of 10 m/s, its height, $H(t)$ metres, after t seconds is given by the equation: $H(t) = -0.5t^2 + 10t + 2$

   a) Determine the maximum height the ball would reach.
   b) How many seconds would the ball take to reach its maximum height?

a) $H(t) = -0.5(t^2 - 20t + 100 - 100) + 2$

$H(t) = -0.5(t-10)^2 + 52$

∴ Max height is 52m

b) The ball took 10 seconds