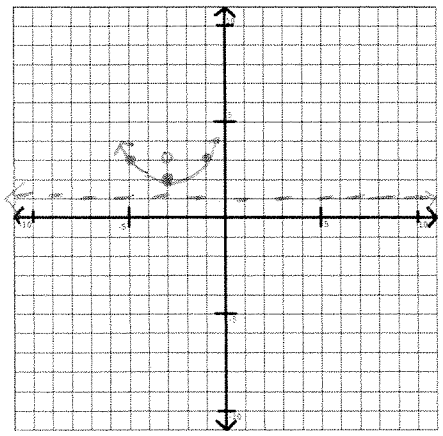
HONORS PRECALC **Name** Key
Parabolas and Circles **Period** 3

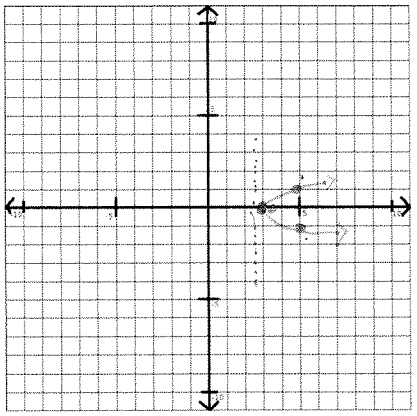
I. Identify the direction of opening, vertex, focus, axis of symmetry, length of the latus rectum (focal diameter) and graph the following:

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



Direction of Opening: up
Vertex: (-3, 2)
Focus: (-3, 3)
Directrix: y = 1
A of S: x = -3
Focal diameter: 4

2. $2y^2 = (x-3)$ $y^2 = \frac{1}{2}(x-3)$ $4p = \frac{1}{a}$ $p = 1/8$



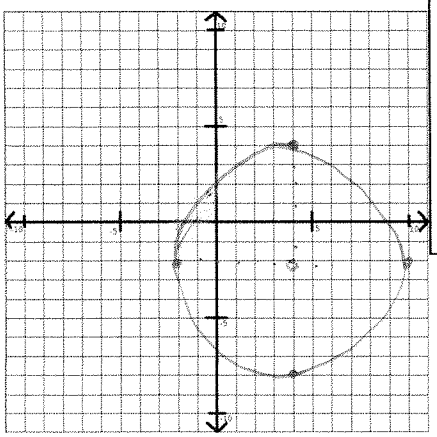
Direction of Opening: right
Vertex: (3, 0)
Focus: (3 1/8, 0)
Directrix: x = 2 7/8
A of S: y = 0
Focal diameter: 1/2
2 additional points: (5, 1), (5, -1)

$(5-3)(1/2) = 1$

x	y
5	1
5	-1

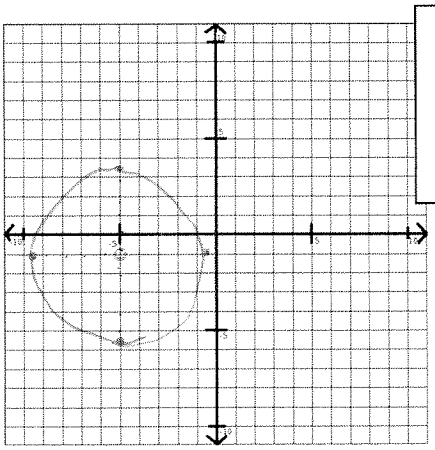
II. Identity the center and length of the radius. Graph.

3. $(x-4)^2 + (y+2)^2 = 36$



Center: (4, -2)
Length of Radius: 6

4. $(x+5)^2 + (y+1)^2 = 20$

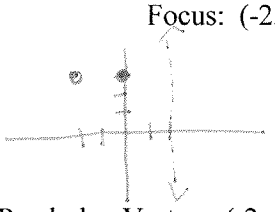


Center: (-5, -1)
Length of Radius: $\sqrt{20} = 2\sqrt{5} \approx 4.5$

III. Find the equation of each conic from the given information.

5. Parabola: Directrix: x = 2

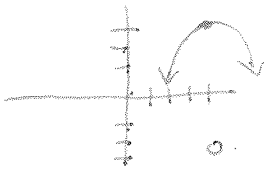
Focus: (-2, 3)



Vertex (0,3)
opens left
$p = 2$
$(y-3)^2 = -8x$

6. Parabola: Focus: (4, -3)

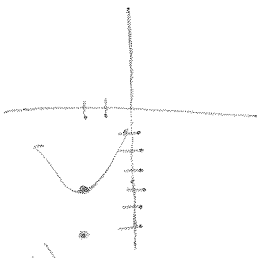
Vertex: (4, 3)



opens down
$p = 6$
$(x-4)^2 = -24(y-3)$

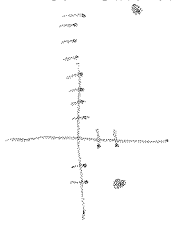
7. Parabola: Vertex: (-2, -4)

Directrix: $y = -6$



opens up
$p = 2$
$(x+2)^2 = 8(y+4)$

8. Circle: The point (2, 8) is on the circle with a center at (2, -3)



$r = \sqrt{(2-2)^2 + (8-3)^2}$
$r = \sqrt{121} = 11$
$(x-2)^2 + (y+3)^2 = 121$

9. The points (4, 6) and (-4, -2) are on the diameter of the circle.

$m\left(\frac{4+-4}{2}, \frac{6+-2}{2}\right)$
$m(0, 2)$
$r = \sqrt{(4-0)^2 + (6-2)^2}$
$= \sqrt{16+16} = \sqrt{32}$
$r^2 = 32$
$x^2 + (y-2)^2 = 32$

IV. Determine the standard form for each of the following.

10. Circle: $2x^2 + 2y^2 - 8x + 8y = 0$

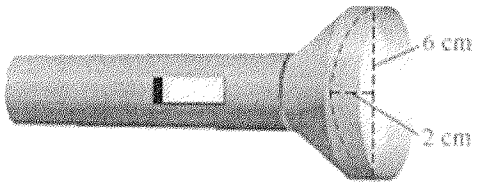
$x^2 + y^2 - 4x + 4y = 0$
$x^2 - 4x + 4 + y^2 + 4y + 4 = 4 + 4$
$(x+2)^2 + (y+2)^2 = 8$

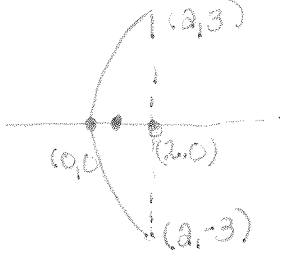
11. Parabola: $2y^2 - 3y + 3x = 0$

$\frac{2y^2}{2} - \frac{3y}{2} = -\frac{3x}{2}$
$y^2 - 3y + \frac{9}{4} = -\frac{3}{2}x + \frac{9}{4}$
$\left(y - \frac{3}{2}\right)^2 = -\frac{3}{2}\left(x - \frac{3}{2}\right)$

V. Solve

12. The mirror of a flashlight is a paraboloid of revolution. Its diameter is 6 cm and its depth is 2 cm. How far from the vertex should the filament of the light bulb be placed for the flashlight to have its beam run parallel to the axis of its mirror?





opens right
$V(0,0)$
$y^2 = 4px$
$9 = 4p(3)$
$9/8 = p$
1 1/8 cm from the vertex

13. A bridge is to be built in the shape of a parabolic arch and is to have a span of 120 feet and a maximum height of 25 feet. Choose a suitable rectangular coordinate system and find the height of the arch at a distance of 10, 30 and 50 feet from the center.

$x^2 = -144(y-25)$
$100 = -144(y-25)$
$-144 + 25 = y$
$-119 = y$

10	$875/36 \approx 24.3$
30	18.75
50	$275/36 \approx 7.64$

opens down. vertex
$x^2 = -4p(y-25)$
$60^2 = -4p(-35)$
$3600/100 = 36/1 = 4p$
$p = 36$

14. Todd is flying his radio-controlled airplane 30 m above the ground in a circular path described by the equation $(x-5)^2 + (y-2)^2 = 36$. Emiko is flying her plane at the same height in a circular path described by the equation $(x+1)^2 + (y-4)^2 = 25$. Do the paths of the two planes intersect? If so, at how many points? yes, 2

(graph them)