

Review of Circles, Parabolas, Ellipses
Advanced Algebra/Trig

Name Key

Find the center and radius of the following circles.

1. $x^2 + y^2 = 121$
 $(0, 0)$
 $r = 11$

2. $(x-2)^2 + (y-5)^2 = 20$
 $(2, 5)$
 $r = 2\sqrt{5}$

3. $x^2 + y^2 + 2x - 8y - 83 = 0$
 $x^2 + 2x + 1 + y^2 - 8y + 16 = 83 + 1 + 16$
 $(x+1)^2 + (y-4)^2 = 100$
 $(-1, 4)$
 $r = 10$

4. $x^2 + y^2 + 6y - 51 = 0$
 $x^2 + y^2 + 6y + 9 = 51 + 9$
 $x^2 + (y+3)^2 = 60$
 $(0, -3)$
 $r = 2\sqrt{15}$

5. Write the equation of the circle with center $(-2, 3)$ and radius $= 3\sqrt{6}$.
 $(x+2)^2 + (y-3)^2 = (3\sqrt{6})^2$
 ~~$(x+2)^2 + (y-3)^2 = 54$~~

6. Write the equation of the circle with center $(1, -2)$ and passing through $(-5, 7)$.
 $(x-1)^2 + (y+2)^2 = 117$

$d = \sqrt{(-5-1)^2 + (-2-7)^2}$
 $d = \sqrt{36+81}$
 $r = \sqrt{117}$

Find the vertex, focus and directrix of the following parabolas.

7. $(x-2)^2 = -8(y+1)$
 vertex $(2, -1)$
 $p = -2$ so focus $(2, -3)$
 directrix $y = 1$

8. $(y+1)^2 = 12(x-5)$
 vertex $(5, -1)$
 $p = 3$
 focus $(8, -1)$
 directrix $x = 2$

$(5, -1), (8, -1)$

9. $y^2 - 6y + 4x + 17 = 0$
 $y^2 - 6y + 9 = -4x - 17 + 9$
 $(y-3)^2 = -4(x+2)$

10. $x^2 - 20y + 40 = 0$
 $x^2 = 20y - 40$
 $x^2 = 20(y-2)$

vertex $(-2, 3)$
 focus $(-3, 3)$
 directrix ~~$y = 1$~~
 $x = -1$

vertex $(0, 2)$
 focus $(0, 7)$
 directrix $y = -3$



11. Write the equation of the parabola with vertex $(4, 2)$ and focus $(4, -4)$.

$$(x-4)^2 = -24(y-2)$$



12. Write the equation of the parabola with vertex $(-1, 1)$ and passing through $(-4, 3)$ opening to the left.

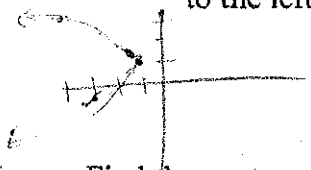
$$(y-1)^2 = p(x+1)$$

$$(3-1)^2 = p(-4+1)$$

$$4 = -3p$$

$$p = -4/3$$

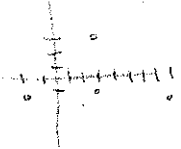
$$(y-1)^2 = -\frac{4}{3}(x+1)$$



Find the center, vertices and foci of the following ellipses.

13. $\frac{(x-3)^2}{16} + \frac{(y+1)^2}{25} = 1$

center $(3, -1)$ vertices $(7, -1)$
 $a=4$ $b=5$ foci $(-1, -1)$
 $c=3$ $(3, 2)$ $(3, 4)$
 $(3, -4)$ $(3, -6)$



14. $\frac{x^2}{4} + \frac{y^2}{1} = 1$

center $(0, 0)$ vertices $(2, 0)$
 $a=2$ foci $(-2, 0)$
 $b=1$ $(0, 1)$
 $c=\sqrt{3}$ $(0, -1)$

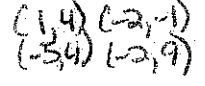
15. $25x^2 + 9y^2 + 100x - 72y + 19 = 0$

$$25x^2 + 100x + 9y^2 - 72y = -19$$

$$25(x^2 + 4x + 4) + 9(y^2 - 8y + 16) = -19 + 100 + 144$$

$$\frac{25(x+2)^2}{225} + \frac{9(y-4)^2}{225} = \frac{225}{225}$$

Center $(-2, 4)$
 $a=3$ $b=5$ $c=\pm 4$
 foci $(-2, 8)$ $(-2, 0)$
 vertices $(1, 4)$ $(-2, 1)$
 $(-5, 4)$ $(-2, 9)$



16. $16x^2 + 4y^2 - 32x - 40y + 52 = 0$

$$16x^2 - 32x + 4y^2 - 40y = -52$$

$$16(x^2 - 2x + 1) + 4(y^2 - 10y + 25) = -52 + 16 + 100$$

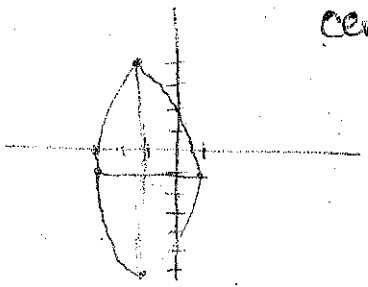
$$\frac{16(x-1)^2}{16} + \frac{4(y-5)^2}{16} = \frac{64}{16}$$

$$\frac{(x-1)^2}{4} + \frac{(y-5)^2}{16} = 1$$

center $(1, 5)$ vertices $(3, 5)$ $(-1, 5)$
 $a=2$ $b=4$ $c=\pm 2\sqrt{3}$ $(1, 9)$ $(1, 1)$
 foci $(1, 5 \pm 2\sqrt{3})$

16. Write the equation of the ellipse with vertices $(-1, 4)$, $(1, -1)$, $(-1, -6)$ and $(-3, -1)$.

center $(-1, -1)$
 $a=2$
 $b=5$



$$\frac{(x+1)^2}{4} + \frac{(y+1)^2}{25} = 1$$