p. 655 #13-21 (53) Translations #2

WRITING EQUATIONS Write an equation of the conic section.

13. Circle with center at $(-5, 1)$ and radius 6

14. Circle with center at $(9, -1)$ and radius 2

15. Parabola with vertex at $(-4, -3)$ and focus at $(1, -3)$

16. Parabola with vertex at $(5, 3)$ and directrix $y = 6$

17. Ellipse with vertices at $(-3, 4)$ and $(5, 4)$ and foci at $(-1, 4)$ and $(3, 4)$

18. Ellipse with vertices at $(-2, 1)$ and $(-2, 9)$ and co-vertices at $(-4, 5)$ and $(0, 5)$

19. Hyperbola with vertices at $(6, -3)$ and $(6, 1)$ and foci at $(6, -6)$ and $(6, 4)$

20. Hyperbola with vertices at $(1, 7)$ and $(7, 7)$ and foci at $(-1, 7)$ and $(9, 7)$

21. **ERROR ANALYSIS** *Describe* and correct the error in writing an equation of the ellipse with vertices at $(-7, 3)$ and $(3, 3)$ and co-vertices at $(-2, 6)$ and $(-2, 0)$.

Axis is horizontal; $(h, k) = (-2, 3)$;

$a = |-7 - (-2)| = 5$; $b = |6 - 3| = 3$;

Equation: $\frac{(x - 2)^2}{25} + \frac{(y + 3)^2}{9} = 1$ X

53. **CHALLENGE** A *degenerate* conic results when the intersection of a plane with a double-napped cone is not a parabola, circle, ellipse, or hyperbola.

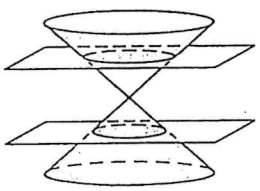

Diagram 1

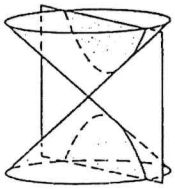

Diagram 2

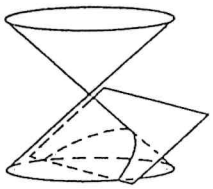

Diagram 3

a. In Diagram 1, a plane perpendicular to the cone's axis passes through the cone, intersecting it in a circle whose radius decreases and then increases. When is the intersection not a circle? What is it?

b. In Diagram 2, a plane parallel to the cone's axis passes through the cone, intersecting it in a hyperbola whose vertices get closer together and then farther apart. When is the intersection not a hyperbola? What is it?

c. In Diagram 3, a plane parallel to the cone's nappe passes through the cone, intersecting it in a parabola that first gets narrower, then flips and gets wider. When is the intersection not a parabola? What is it?