NAME ______________________ DATE __________

Challenge: Skills and Applications

For use with pages 636–640

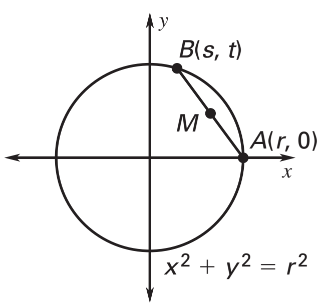
1. Circle C_1 has equation $(x + 2)^2 + (y + 4)^2 = 64$, and circle C_2 has equation $(x - h)^2 + (y - 1)^2 = 81$. The distance between the centers of the circles is 13.

a. Find all possible values of h.

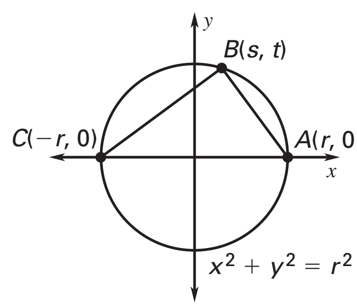
b. If a segment connecting the centers of the circles is drawn, let A be the intersection of the segment with C_1, and let B be the intersection of the segment with C_2. Find AB. (*Hint:* Use a diagram and the known radii.)

c. Find the equations of the two circles that have the same center as C_1 and are tangent with C_2. (*Hint:* Use your diagram and answer from part (b).)

2. Use the diagram to write a coordinate proof showing that the perpendicular bisector of a chord of a circle contains the center of the circle. (Let M be the midpoint of the chord.)



3. Use the diagram to write a coordinate proof showing that if one side of a triangle inscribed in a circle is a diameter of the circle, then the triangle is a right triangle.



In Exercises 4–9, find the center and radius of the circle.

Example: $x^2 + y^2 - 6x + 4y - 3 = 0$

Complete the square in x and in y.

$$x^2 - 6x \qquad + y^2 + 4y \qquad = 3$$

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

$$(x - 3)^2 + (y + 2)^2 = 16$$

The circle has center $(3, -2)$ and radius 4.

4. $x^2 + y^2 + 4x + 6y - 36 = 0$

5. $x^2 + y^2 - 10x + 8y - 23 = 0$

6. $x^2 + y^2 + 2x - 35 = 0$

7. $x^2 + y^2 + 6x - 8y = 0$

8. $x^2 + y^2 + 6x - 14y - 12 = 0$

9. $x^2 + y^2 - 8x - 4y + 18 = 0$