

Check Your Understanding 8.1

Show all work and reasoning. Use your navigation instrument to decide where to focus.

Basic	Intermediate	Advanced
What is a circle? → <i>Defining the object</i>		
<i>Basic</i> 1. Write the equation of each circle: (a) center (0, 0), radius 7; (b) center (-3, 5), radius 4; (c) center (2, -1), radius $\sqrt{11}$. 2. Write the equation of the unit circle. What is special about it?	<i>Intermediate</i> 3. Identify the center and radius of each: (i) $(x - 5)^2 + (y + 3)^2 = 25$; (ii) $x^2 + (y - 6)^2 = 3$; (iii) $(x + 4)^2 + y^2 = 18$. 4. For $(x - 2)^2 + (y + 1)^2 = 25$, decide whether each point is on, inside, or outside, and explain the method: (a) (6, 2); (b) (-1, 3); (c) (2, 4).	<i>Advanced</i> 5. A circle passes through the origin and has center (3, 4). (a) Find its equation. (b) In one sentence, why is the Pythagorean theorem the key tool? 6. Two circles: center (0, 0) radius 5, and center (4, 0) radius 3. (a) Distance between centers? (b) Do they overlap, touch, or miss? Justify using only the radii and the center distance.
Algebra Spiral — Exponent Rules		
<i>Simplify. Write every answer with positive exponents.</i> (a) $x^3 \cdot x^5$ (b) $(y^4)^2$ (c) $m^7 \div m^2$ (d) $(2a)^3$		

Answers — CYU 8.1

What is a circle?

- (a) $x^2 + y^2 = 49$ (b) $(x + 3)^2 + (y - 5)^2 = 16$ (c) $(x - 2)^2 + (y + 1)^2 = 11$.
- $x^2 + y^2 = 1$. Center at the origin, radius 1; it is the basis for defining sine and cosine for all angles in precalculus.
- (i) (5, -3), $r = 5$ (ii) (0, 6), $r = \sqrt{3}$ (iii) (-4, 0), $r = 3\sqrt{2}$.
- All three give 25, so all are on the circle. Method: substitute into the left side and compare to r^2 — equal = on, less = inside, greater = outside.
- (a) $(x - 3)^2 + (y - 4)^2 = 25$. (b) The radius is the distance from the center to a point on the circle, which the distance formula (the Pythagorean theorem) computes.
- (a) 4. (b) $|5 - 3| = 2 < 4 < 5 + 3 = 8$, so the circles overlap (intersect at two points).

Algebra Spiral — Exponent Rules

- x^8
- y^8
- m^5
- $8a^3$