

Check Your Understanding 8.2

Show all work and reasoning. Spiral problems revisit earlier rows — use them to keep those ideas sharp.

Basic	Intermediate	Advanced
Row 1 Spiral — What is a circle? → <i>Defining the object</i>		
<i>Basic — Spiral</i> 1. Write the equation of the circle with center $(-2, 7)$ and radius 9.	<i>Intermediate — Spiral</i> 2. A circle has equation $(x - 4)^2 + (y + 5)^2 = 64$. State its center and radius.	<i>Advanced — Spiral</i> 3. The points $(1, 0)$, $(-1, 0)$, and $(0, 1)$ lie on one circle. Find its center, radius, and equation, then explain — without substituting — whether $(0, -1)$ is also on it.
All circles are similar → <i>Why proportional reasoning works</i>		
<i>Basic</i> 4. Circle A has radius 3, Circle B has radius 7. (a) Describe the two-step process that maps A onto B (where to move the center, what dilation). (b) What is the scale factor? 5. Explain in one or two sentences why any two circles are similar. Explain the idea, not the procedure — do not use the words 'translate' or 'dilate.'	<i>Intermediate</i> 6. Explain why not all rectangles are similar, using the same kind of reasoning. 7. Circle C_1 has center $(1, 3)$ and radius 4; C_2 has center $(-2, 5)$ and radius 6. (a) What shift moves C_1 's center to C_2 's? (b) Equation of C_1 after the shift? (c) What dilation from the new center maps it onto C_2 ?	<i>Advanced</i> 8. Are all squares similar? Justify with the same style of argument as the circles proof, describing the transformations explicitly. Extension: are all regular hexagons similar? All regular n -gons (for a fixed n)?
Algebra Spiral — Exponent Rules		
<i>Simplify. Write every answer with positive exponents.</i> (a) 5^0 (b) x^{-3} (c) $(3x^2)(4x^5)$ (d) $a^5 \div a^8$		

Answers — CYU 8.2

Row 1 Spiral — What is a circle?

1. $(x + 2)^2 + (y - 7)^2 = 81$
2. Center $(4, -5)$, radius 8.
3. Center $(0, 0)$, radius 1, equation $x^2 + y^2 = 1$. $(0, -1)$ is distance 1 from the origin, so it satisfies the same condition — it is on the circle.

All circles are similar

4. (a) Shift A's center onto B's center, then dilate from that center. (b) Scale factor $7/3$.
5. A circle is completely determined by one number, its radius. Two circles can differ only in size and position, both of which can be corrected without changing shape, so any two are the same shape at different sizes.
6. A rectangle is determined by two numbers, length and width. Two rectangles can share a width but differ in length, giving genuinely different shapes; one dilation cannot fix both dimensions at once.
7. (a) Left 3, up 2. (b) $(x + 2)^2 + (y - 5)^2 = 16$. (c) Dilate from $(-2, 5)$ by $6/4 = 3/2$.
8. Yes. Shift centers together, then dilate by the side ratio b/a ; all angles are 90° and all sides equal, so one parameter (side length) fixes the shape. The same argument works for any regular n -gon.

Algebra Spiral — Exponent Rules

- (a) 1
- (b) $1/x^3$
- (c) $12x^7$
- (d) $a^{-3} = 1/a^3$