

GRADE 6 · GEOMETRY · ANSWER KEY

SIDE LENGTHS FROM COORDINATES

Today's goal: I can use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate and apply the technique of finding side lengths from coordinates in the context of solving real-world and mathematical problems.



How to use this key. Problem numbers match the student sheets. Each answer shows the steps and the slip Mr DJ sees most, so a wrong answer tells you what to reteach. Pepper levels: **Mild** warm-up, **Medium** stretch, **Spicy** challenge, **Extra Spicy** big brain.

Practice

8 problems + Mr DJ's worked example

Use: During the lesson after the deck. Items 2–6 deliberately alternate between same-side-of-zero (subtract) and crossing-zero (add). Item 8 is the two-answer item. **Timing:** 15–25 min · pairs or independent · circulate on 5, 6 and 9. A number line drawn under each item settles the sign question faster than a rule.

1 7 units

2 5 units

3 6 units

4 9 units

5 11 units

6 28 units

7 45 square units

8 (11, 5) or (–5, 5)

1 **MILD** (1, 4) to (8, 4)?

7 units

1. Same y → horizontal. $8 - 1 = 7$ units.

Watch for: Subtracted the y-values, getting 0.

2 **MILD** (–6, 5) to (–1, 5)?

5 units

1. Same y → horizontal. $-1 - (-6) = -1 + 6 = 5$ units.

2. Both points are left of zero, so this is just the gap between 6 and 1.

Watch for: Answered 7 by adding the two distances from zero. That only applies when the side **CROSSES** zero.

3 **MEDIUM** (–2, –7) to (–2, –1)?

6 units

1. Same x → vertical. $-1 - (-7) = -1 + 7 = 6$ units.

2. Both below zero, so subtract: $7 - 1 = 6$.

Watch for: Answered 8 by adding, or –6 by keeping the sign. Distance is never negative.

4 **MEDIUM** (–5, 3) to (4, 3)?

9 units

1. Same y → horizontal. $4 - (-5) = 4 + 5 = 9$ units.

2. This side **CROSSES** zero: 5 units to reach 0, then 4 more. $5 + 4 = 9$.

Watch for: Answered 1 by computing $4 - 5$.

5 **MEDIUM** (2, –6) to (2, 5)?

11 units

1. Same x → vertical. $5 - (-6) = 5 + 6 = 11$ units.

2. Crosses zero: 6 units up to 0, then 5 more.

Watch for: Answered 1. Watch for the sign — subtracting a negative adds.

6 **SPICY** Rectangle (–3, –2), (6, –2), (6, 3), (–3, 3) — perimeter?

28 units

1. Bottom: (–3, –2) to (6, –2), horizontal, $6 - (-3) = 9$ units.

2. Right: (6, –2) to (6, 3), vertical, $3 - (-2) = 5$ units.

3. Sides are 9, 5, 9, 5.

4. Perimeter: $9 + 5 + 9 + 5 = 28$ units, or $2 \times (9 + 5) = 28$.

Watch for: Added only two sides, giving 14. Perimeter goes all the way around.

7 **SPICY** Same rectangle — area, and why the units differ?

45 square units

1. Area = $9 \times 5 = 45$ square units.
2. Perimeter measures a LENGTH — the distance you would walk around the edge — so it is in units.
3. Area measures a COVERING — how many 1-by-1 squares fit inside — so it is in square units.
4. One is a walk around the outside; the other is a filling of the inside. Different questions, different units.

Watch for: Wrote 45 units instead of 45 square units. The unit is part of the answer.

8 **EXTRA SPICY** Horizontal side from (3, 5), length 8 — other endpoint?

(11, 5) or (-5, 5)

1. Horizontal means the y-value stays 5.
2. Going right: $3 + 8 = 11 \rightarrow (11, 5)$.
3. Going left: $3 - 8 = -5 \rightarrow (-5, 5)$.
4. There are two answers because length tells you HOW FAR but not WHICH WAY. A distance has no direction.
5. Check: from (3, 5) to (-5, 5) is $3 + 5 = 8$ units, crossing zero.

Watch for: Gave only (11, 5). Going right is the default assumption, but nothing in the problem rules out going left.

Homework

7 problems + Mr DJ's worked example

Use: Parallels the practice sheet. Items 2–6 keep alternating between the subtract case and the add case so neither becomes an automatic habit. **Timing:** ~15 min at home · independent · review items 4 and 5 as the next-day warm-up.

1 9 units

2 5 units

3 5 units

4 13 units

5 11 units

6 26 units

7 42 square units

1 **MILD** (2, 6) to (11, 6)?

9 units

1. Same y $\rightarrow$ horizontal. $11 - 2 = 9$ units.

Watch for: Subtracted the y-values.

2 **MILD** (-8, 2) to (-3, 2)?

5 units

1. Horizontal. $-3 - (-8) = -3 + 8 = 5$ units.
2. Both left of zero, so this is the gap between 8 and 3.

Watch for: Answered 11 by adding both distances from zero.

3 **MEDIUM** (-1, -9) to (-1, -4)?

5 units

1. Vertical. $-4 - (-9) = -4 + 9 = 5$ units.
2. Both below zero: $9 - 4 = 5$.

Watch for: Answered 13 by adding, or -5 by keeping the sign.

4 **MEDIUM** (-7, 4) to (6, 4)?

13 units

1. Horizontal. $6 - (-7) = 6 + 7 = 13$ units.
2. Crosses zero: 7 units to reach 0, then 6 more.

Watch for: Answered 1 by computing $7 - 6$.

5 MEDIUM (5, -3) to (5, 8)?

11 units

1. Vertical. $8 - (-3) = 8 + 3 = 11$ units.
2. Crosses zero: 3 up to 0, then 8 more.

Watch for: Answered 5.

6 SPICY Rectangle (-4,-1), (3,-1), (3,5), (-4,5) — perimeter?

26 units

1. Bottom: $3 - (-4) = 7$ units.
2. Right: $5 - (-1) = 6$ units.
3. Sides are 7, 6, 7, 6.
4. Perimeter: $2 \times (7 + 6) = 26$ units.

Watch for: Added only two sides, giving 13.

7 SPICY Same rectangle — area, and why the units differ?

42 square units

1. Area = $7 \times 6 = 42$ square units.
2. Perimeter is a distance around the edge, measured in units.
3. Area is a covering of the inside, measured in square units because it counts 1-by-1 squares.
4. Notice the perimeter (26) is smaller than the area (42) here — they are not comparable quantities, so that is not a contradiction.

Watch for: Wrote 42 units, or assumed area must always exceed perimeter. They measure different things and cannot be ranked.

Exit Ticket

4 problems

Use: End of the side-length lesson, immediately after the “Drawing polygons in the coordinate plane” lesson. 5–8 min, independent. Item 3 is the crossing-zero trap. **Timing:** 5–8 min · independent. An answer of 1 on item 3 is the diagnostic signal.

1 7 units

2 7 units

3 7 units

4 Perimeter 20 units; area 24 square units

1 MILD (2, 3) to (9, 3)?

7 units

1. The y-values match, so the side is horizontal — subtract the x-values.
2. $9 - 2 = 7$ units.

Watch for: Subtracted the y-values and got 0. Matching coordinates tell you which pair to leave alone.

2 MILD (5, 1) to (5, 8)?

7 units

1. The x-values match, so the side is vertical — subtract the y-values.
2. $8 - 1 = 7$ units.

Watch for: Subtracted the x-values and got 0.

3 MEDIUM (-4, 2) to (3, 2)?

7 units

1. Horizontal side, so subtract the x-values: $3 - (-4) = 3 + 4 = 7$ units.
2. Count it to check: from -4 to 0 is 4, and from 0 to 3 is 3. $4 + 3 = 7$.

Watch for: Answered 1 by computing $3 - 4$, ignoring the negative sign. When a side crosses zero the two distances ADD.

4 SPICY Rectangle (-2,1), (4,1), (4,5), (-2,5) — perimeter and area?

Perimeter 20 units; area 24 square units

1. Bottom side (-2, 1) to (4, 1): horizontal, $4 - (-2) = 6$ units.
2. Right side (4, 1) to (4, 5): vertical, $5 - 1 = 4$ units.
3. Opposite sides of a rectangle are equal, so the sides are 6, 4, 6, 4.
4. Perimeter: $6 + 4 + 6 + 4 = 20$ units.
5. Area: $6 \times 4 = 24$ square units.
6. Perimeter is a distance around (units); area is a covering (square units).

Watch for: Got 2 for the bottom side by mishandling the negative, or swapped perimeter and area. Check the units: 20 units around, 24 square units inside.

Slide	Time	What to do
1	0:00	Frame it: the coordinates already contain the measurement.
2	1:00	Hook — poll 1 vs 7. Do NOT resolve. Nearly every wrong answer here is 1.
3	3:00	Establish the rule. Ask students to say WHY the matching pair is the one you ignore: it does not change, so it contributes no length.
4	5:00	WE1 — resolve the hook. Draw the number line underneath and count both hops aloud.
5	7:00	WE2, the necessary counterexample. Without it students over-generalise slide 4 into ‘always add’.
6	11:30	Bridge to perimeter and area, and hold the line on units. Square units are not decoration.
7		Show the problem and the slip. Pairs: what went wrong, and what is the right answer? Take two answers before moving on.
8		Solve it together, one step at a time. It is also the worked example at the top of the practice sheet, so students can look back at it.
9	9:30	CFU — all-student response. Answer 11 units. Watch for 1 and for -11. Whiteboards: everyone tries Mild, then climbs. These are #1, #3, #6 on the practice sheet.
10		Fingers up: 3 = got it, 2 = almost, 1 = not yet. Pull the 1s for a quick reteach while everyone else starts the practice sheet.
11	13:30	Launch the in-class practice sheet. Launch the practice sheet. Exit ticket in the last 5–8 minutes.