

# Spot the Break

Read graphs for continuity and discontinuities.

HIGH SCHOOL • MA.912.C.1.10

**MA.912.C.1.10** "Given the graph of a function, identify whether a function is continuous at a point. If not, identify the type of discontinuity for the given function."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## CHECK THE POINT

A function is continuous at a point when the graph has no break there. The left and right sides must meet at the same height, and the function must have that same value.

## WORKED EXAMPLE

At  $x = 6$ , both sides of a graph approach  $y = 2$ . A solid point is at  $(6, 2)$ . Is the function continuous at  $x = 6$ ?

1. The left-hand and right-hand values both approach 2.
2. The function value is  $f(6) = 2$ .
3. The limit and function value match.

**Answer: Continuous at  $x = 6$ .**

## PRACTICE 5 problems

- 1** At  $x = -3$ , both sides meet at an open circle  $(-3, 4)$ . A solid point is at  $(-3, 1)$ . Identify the discontinuity.

ANSWER \_\_\_\_\_

- 2** At  $x = 5$ , the graph approaches 1 from the left and 7 from the right. Identify the discontinuity.

ANSWER \_\_\_\_\_

- 3** The graph has a vertical asymptote at  $x = 0$ . Identify the discontinuity.

ANSWER \_\_\_\_\_

- 4** A line passes through the solid point  $(8, -4)$  with no break. Is the function continuous at  $x = 8$ ?

ANSWER \_\_\_\_\_

- 5** At  $x = -1$ , the graph has a hole at  $(-1, 9)$ , with no solid point at  $x = -1$ . Identify the discontinuity.

ANSWER \_\_\_\_\_

## APPLY IT Show your work

- 1** A music app graphs the number of listeners during a song. At 4 minutes, both sides of the graph approach 9 listeners, but the solid point is at  $(4, 11)$ . Is the graph continuous at 4 minutes?

WORK SPACE

ANSWER \_\_\_\_\_

- 2** A ride-share fare graph changes at 3 miles. Just before 3 miles, fares approach \$5. Just after 3 miles, fares approach \$8. What type of discontinuity occurs?

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

### CHALLENGE

At  $x = 7$ , both sides of a graph approach 4, but the solid point is  $(7, -5)$ . Explain whether the function is continuous at  $x = 7$ .

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## PART 1 • PRACTICE

| # | PROBLEM                                                                                                                 | ANSWER                                   |
|---|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 1 | At $x = -3$ , both sides meet at an open circle $(-3, 4)$ . A solid point is at $(-3, 1)$ . Identify the discontinuity. | <b>Removable discontinuity.</b>          |
| 2 | At $x = 5$ , the graph approaches 1 from the left and 7 from the right. Identify the discontinuity.                     | <b>Jump discontinuity.</b>               |
| 3 | The graph has a vertical asymptote at $x = 0$ . Identify the discontinuity.                                             | <b>Infinite discontinuity.</b>           |
| 4 | A line passes through the solid point $(8, -4)$ with no break. Is the function continuous at $x = 8$ ?                  | <b>Continuous at <math>x = 8</math>.</b> |
| 5 | At $x = -1$ , the graph has a hole at $(-1, 9)$ , with no solid point at $x = -1$ . Identify the discontinuity.         | <b>Removable discontinuity.</b>          |

## PART 2 • APPLY IT

1. **No. It has a removable discontinuity.** The limit is 9, but the function value is 11. Since they do not match, the graph is not continuous.
2. **Jump discontinuity.** The left-hand and right-hand values are different. The graph jumps from \$5 to \$8.

## CHALLENGE

**The function is not continuous. It has a removable discontinuity because the limit is 4, but  $f(7) = -5$ .**

Accept "hole" for removable discontinuity and "vertical asymptote" for infinite discontinuity. For continuous items, accept statements that the limit equals the function value.