Function Property Comparisons

Compare intercepts and increasing or decreasing intervals from an equation, graph, and table

Name: _____ Date: _____

Stretch Challenge: Equation and Graph

1. Compare the two functions below. Function f is defined for all real numbers: f(x) = x - 2. The complete graph shows g on the domain -4 ≤ x ≤ 4.

Read values and intervals from the graph carefully. An intercept is a point where a graph meets an axis.



Property	f(x) = x - 2	g, from the graph
y-intercept		
x-intercept(s)		
Increasing interval(s)		
Decreasing interval(s)		

2. Write one comparison claim about the functions. Include at least two pieces of evidence from the organizer.

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Equation and Table: Determine the Quadratic Rule

3. Function h is defined for all real numbers: h(x) = 2x - 1. Function r is a quadratic function defined on 0 ≤ x ≤ 4. The table gives selected values of r, not every value on this continuous domain.

x	**0**	**1**	**2**	**3**	**4**
r(x)	3	0	-1	0	3

Use the fact that r is quadratic and the table values to determine its rule. r(x) =

_____

Property	**h(x) = 2x - 1**	**r, using its rule on 0 ≤ x ≤ 4**
y-intercept		
x-intercept(s)		
Increasing interval(s)		
Decreasing interval(s)		

4. Which function has the lower output at x = 2? Show calculations or table evidence. Then write one true statement that includes a domain or interval.

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Answer Key and Teaching Notes

Materials and setup: Supplied: student pages, one complete coordinate graph, equations, tables, and comparison organizers. Additionally needed: pencil and optional straightedge. Print and supply all student pages, keeping teacher-key pages separate. Say: “Today, compare what each representation tells you. An equation can support claims on its stated domain. A finite table does not show every value of a continuous function. Here, the fact that r is quadratic lets you determine a rule before describing its continuous behavior.” Students work independently for 8-12 minutes, then compare evidence with a partner for 3 minutes.

Teacher script for support: “For an x-intercept, ask where the output is zero. For increasing or decreasing behavior, read from left to right. On the table task, first identify the quadratic rule. Then use that rule only on r's stated domain.” Do not tell students which function has a greater or lower value before they justify it.

Observation method: As students work, mark whether each student (1) identifies intercepts, (2) uses interval notation or clear interval words, and (3) determines a quadratic rule for r before making continuous-interval claims. Ask one student: “What information allows you to describe r between the listed x-values?” Reteach if the student treats the table alone as evidence for every noninteger input.

1. For f: y-intercept (0, -2); x-intercept (2, 0); increasing on all real numbers; no decreasing interval. For g: y-intercept (0, 4); x-intercepts (-4, 0) and (4, 0); increasing on [-4, 0]; decreasing on [0, 4]. Accept interval wording such as “from -4 to 0” and “from 0 to 4.”

2. Sample response: “g has a greater y-intercept than f because g crosses the y-axis at 4 and f crosses at -2. Also, f increases for all real x-values, while g increases only from -4 to 0 and then decreases.” Award credit for one accurate comparison supported by two accurate facts.

3. The rule is $r(x) = (x - 2)^2 - 1$, equivalently $r(x) = x^2 - 4x + 3$. The table has a minimum value of -1 at $x = 2$ and matching values on opposite sides of $x = 2$, giving vertex form $(x - 2)^2 - 1$. For h: y-intercept (0, -1); x-intercept (1/2, 0); increasing on all real numbers; no decreasing interval. For r: y-intercept (0, 3); x-intercepts (1, 0) and (3, 0); decreasing on [0, 2]; increasing on [2, 4]. Accept “on the stated domain” with these interval descriptions. Do not accept a claim about r for x less than 0 or greater than 4.

4. $h(2) = 2(2) - 1 = 3$, while $r(2) = -1$ from the table or $r(2) = (2 - 2)^2 - 1 = -1$. Therefore r has the lower output. Sample domain-aware statement: “On $0 \le x \le 2$, r decreases from 3 to -1.” Other accurate statements with an interval or the stated domain earn credit.

Source credit: Original instructional functions and data created for this worksheet; no external source used.