LESSON MAKER PRO

Function Face-Off

Compare key properties from equations, tables, and descriptions.

HIGH SCHOOL · HSF-IF.C.9

CCSS.Math.Content.HSF-IF.C.9 "Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example..."

NAME _____ DATE _____

MATCH THE PROPERTY

First decide which property you are comparing, such as a maximum, minimum, y-intercept, zero, rate of change, or function value. Read that same property from each representation, then compare the numbers. In vertex form, a(x - h)^2 + k, the vertex is (h, k), and k is a maximum when a is negative or a minimum when a is positive.

WORKED EXAMPLE

Function f(x) = -(x - 17)^2 + 23. A table for g is shown: x: 14, 15, 16; g(x): 18, 21, 18. Which function has the greater maximum value?

1. The vertex of f is (17, 23), so the maximum of f is 23.
2. The greatest value in g's table is 21.
3. Since 23 > 21, f has the greater maximum.

Answer: f has the greater maximum value, 23.

PRACTICE 6 problems

1 Function f(x) = 4x - 7. A table for g is shown: x: -2, -1, 0, 1; g(x): -9, -6, -3, 0. Which function has the greater y-intercept?

ANSWER _____

2 Function p(x) = (x - 6)^2 - 12. Function q is described as a parabola with a minimum value of -10. Which function has the lower minimum value?

ANSWER _____

3 A table for h is shown: x: -7, -6, -5, -4, -3; h(x): 1, 6, 9, 10, 9. Function k(x) = -(x + 2)^2 + 12. Which function has the greater maximum value?

ANSWER _____

4 Function f(x) = x^2 - 9. The graph of g crosses the x-axis at x = -2 and x = 7. Which function has the larger positive x-intercept?

ANSWER _____

5 Function f(x) = -2x + 5. A table for g is shown: x: -1, 1, 3; g(x): 9, 3, -3. Which function has the greater rate of change?

ANSWER _____

6 Function f(x) = 3x + 2. A table for g is shown: x: -2, 0, 2; g(x): -8, -2, 4. Which function has the greater value when x = 2?

ANSWER _____

APPLY IT Show your work

1 For a game design project, two students model the height of animated rocket launches. Rocket A has height A(t) = -(t - 4)^2 + 30, where height is in feet. Rocket B has these heights: t: 1, 2, 3, 4, 5; B(t): 18, 24, 28, 30, 28. Which rocket reaches a greater maximum height, or do they tie? State the maximum height.

WORK SPACE

ANSWER _____

2 Two school clubs sell custom sticker packs. Club A's profit, in dollars, is P(x) = 5x - 12 after selling x packs. Club B's profits are shown: x: 0, 2, 4, 6; profit: -15, -7, 1, 9. Which club's profit increases faster, and by how much per pack?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Function m(x) = -x^2 + 8x - 7. A table for n is shown: x: 2, 3, 4, 5, 6; n(x): 5, 10, 13, 14, 13. Which function has the greater maximum value? Which function reaches its maximum at the smaller x-value? Explain your reasoning.

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_____

ANSWER KEY

Function Face-Off

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Function f(x) = 4x - 7. A table for g is shown: x: -2, -1, 0, 1; g(x): -9, -6, -3, 0. Which function has the greater y-intercept?	**g has the greater y-intercept: -3. The y-intercept of f is -7.**
2	Function p(x) = (x - 6)^2 - 12. Function q is described as a parabola with a minimum value of -10. Which function has the lower minimum value?	**p has the lower minimum value, -12.**
3	A table for h is shown: x: -7, -6, -5, -4, -3; h(x): 1, 6, 9, 10, 9. Function k(x) = -(x + 2)^2 + 12. Which function has the greater maximum value?	**k has the greater maximum value, 12. The maximum of h is 10.**
4	Function f(x) = x^2 - 9. The graph of g crosses the x-axis at x = -2 and x = 7. Which function has the larger positive x-intercept?	**g has the larger positive x-intercept, 7. The positive x-intercept of f is 3.**
5	Function f(x) = -2x + 5. A table for g is shown: x: -1, 1, 3; g(x): 9, 3, -3. Which function has the greater rate of change?	**f has the greater rate of change. Its rate is -2, while g's rate is -3.**
6	Function f(x) = 3x + 2. A table for g is shown: x: -2, 0, 2; g(x): -8, -2, 4. Which function has the greater value when x = 2?	**f has the greater value when x = 2. f(2) = 8 and g(2) = 4.**

PART 2 · APPLY IT

1. **They tie. Both rockets reach a maximum height of 30 feet.** Rocket A has vertex (4, 30), so its maximum is 30. The greatest height in Rocket B's table is also 30.
2. **Club A's profit increases faster by 1 dollar per pack.** Club A has a rate of change of 5 dollars per pack. Club B's profit rises 8 dollars for every 2 packs, so its rate is 4 dollars per pack.

CHALLENGE

n has the greater maximum value, 14. Rewrite m as m(x) = -(x - 4)^2 + 9, so m has maximum 9 at x = 4. The table shows that n has maximum 14 at x = 5, so m reaches its maximum at the smaller x-value.

Accept equivalent statements of each comparison, including correctly identified maximums, minimums, intercepts, and rates of change. For the challenge, students may find m's vertex by completing the square or by using x = -b/(2a).