LESSON MAKER PRO

Function Face-Off

Compare key properties shown in different forms.

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 _____

COMPARE ONE PROPERTY

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

WORKED EXAMPLE

Function $f(x) = -x^2 + 10x + 4$. The table gives every value of g on its domain {-2, 0, 2}. Which function has the larger maximum?

ALL VALUES OF G

x	g(x)
-2	8
0	17
2	8

1. Rewrite f(x) as $-(x - 5)^2 + 29$.
2. The maximum of f is 29.
3. The greatest output in g's complete table is 17.
4. Since 29 > 17, f has the larger maximum.

Answer: f has the larger maximum, 29.

PRACTICE 4 problems

1 Function a(x) = 6x + 7. Function b starts at 9 and decreases 3 for each increase of 1 in x. Which function has the greater y-intercept?

ANSWER _____

2 Assume p is linear. For p, the outputs 21, 42, and 63 occur at x = 3, 6, and 9. Function q(x) = 7x + 11. Compare their rates of change.

ANSWER _____

3 Function $r(x) = -(x - 7)^2 + 18$. Function s has a maximum value of 21. Which function has the larger maximum?

ANSWER _____

4 Function u(x) = 6x + 3. For v, v(7) = 49, v(9) = 63, and v(11) = 77. At x = 9, which function has the greater output? Give both outputs.

ANSWER _____

APPLY IT Show your work

1 Assume Creator A's streams follow a linear model over the interval including day 0. Two creators track streams after posting a video. The table is for Creator A. Creator B's streams follow B(d) = 3d + 11, where d is days after posting. Who had more streams at day 0? Who gains streams faster each day?

CREATOR A STREAMS

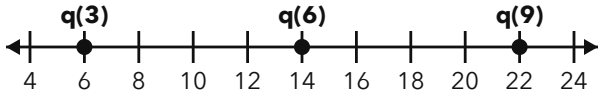
Days, d	Streams
3	25
6	43
9	61
12	79

ANSWER

2 A skateboard designer models the height of a ramp feature with $H(t) = -3(t - 6)^2 + 27$. A competing design reaches a maximum height of 24. Which design has the higher maximum height?

CHALLENGE One step up

Function $p(x) = (x - 9)^2 + 11$. The number line marks every output of q on its domain. Which function has the greater minimum? Explain using both minimum values.



ANSWER KEY

Function Face-Off

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Function a(x) = 6x + 7. Function b starts at 9 and decreases 3 for each increase of 1 in x. Which function has the greater y-intercept?	**b, with y-intercept 9.**
2	Assume p is linear. For p, the outputs 21, 42, and 63 occur at x = 3, 6, and 9. Function q(x) = 7x + 11. Compare their rates of change.	**They have the same rate of change, 7.**
3	Function $r(x) = -(x - 7)^2 + 18$. Function s has a maximum value of 21. Which function has the larger maximum?	**s has the larger maximum, 21.**
4	Function u(x) = 6x + 3. For v, v(7) = 49, v(9) = 63, and v(11) = 77. At x = 9, which function has the greater output? Give both outputs.	**v; u(9) = 57 and v(9) = 63.**

PART 2 · APPLY IT

1. **Creator B had more streams at day 0, 11 compared with 7. Creator A gains streams faster, 6 streams per day compared with 3.** Creator A's streams increase by 18 in 3 days, so its rate is 6 and its starting value is 7. Compare these with B's rate of 3 and y-intercept of 11.
2. **The designer's model has the higher maximum, 27.** The model is in vertex form, so its maximum is 27. Compare 27 with 24.

CHALLENGE

p has the greater minimum. The minimum of p is 11, and the minimum of q is 6, so 11 > 6.

Accept equivalent statements that clearly identify the correct function and compared values. For rates, accept a correct simplified rate stated as change in output per 1 unit of x.