LESSON MAKER PRO

Rate Matchup

Compare how functions change.

HIGH SCHOOL · FA.F.20

FA.F.20 "Compare the properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example..."

NAME _____ DATE _____

COMPARE THE RATES

Average rate of change is the change in output divided by the change in input. A linear function has the same rate everywhere, shown by m in y = mx + b. For a quadratic function, compare average rates over the same interval.

WORKED EXAMPLE

Function A is linear and shown in the table. Function B is y = 5x + 28. Which has the greater rate of change?

FUNCTION A

x	y
10	45
12	57

1. A: (57 - 45)/(12 - 10) = 12/2 = 6.
2. B: The coefficient of x is 5.
3. Compare: 6 > 5.

Answer: Function A has the greater rate of change.

PRACTICE 4 problems

1 A is linear through (0, 1) and (3, 13). B is y = 2x + 9. Which has the greater rate of change?

ANSWER _____

2 A is y = -x + 8. B is linear through (-2, 9) and (1, 0). Which has the greater rate of change?

ANSWER _____

3 A earns $8 per hour. B's earnings are y = 7x + 18, where x is hours. Which has the greater hourly rate?

ANSWER _____

4 A is linear through (1, 3) and (3, 9). B is y = x^2 + 2. From x = 1 to x = 3, which has the greater average rate? Give both rates.

ANSWER _____

APPLY IT Show your work

1 Two music plans have costs in dollars after x months. Plan A is in the table; Plan B costs y = 3x + 9. Which plan's cost rises faster each month?

PLAN A

Months x	Cost y
0	6
2	14
4	22

ANSWER _____

2 For a fundraiser, Dani has $18 and saves $9 each week. Lee's total is y = 7x + 26, where x is weeks. Whose total grows faster?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A is shown in the table. B is $y = 2x^2 - 3x + 1$. From x = 1 to x = 3, which has the greater average rate of change? Explain using both rates.

FUNCTION A

x	y
1	2
2	5
3	10

WORK SPACE AND ANSWER

ANSWER KEY

Rate Matchup

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A is linear through (0, 1) and (3, 13). B is y = 2x + 9. Which has the greater rate of change?	**A, with a rate of 4; B's rate is 2.**
2	A is y = -x + 8. B is linear through (-2, 9) and (1, 0). Which has the greater rate of change?	**A, with a rate of -1; B's rate is -3.**
3	A earns $8 per hour. B's earnings are y = 7x + 18, where x is hours. Which has the greater hourly rate?	**A, at $8 per hour; B earns $7 per hour.**
4	A is linear through (1, 3) and (3, 9). B is $y = x^2 + 2$. From x = 1 to x = 3, which has the greater average rate? Give both rates.	**B has the greater average rate. A's rate is 3; B's average rate is 4.**

PART 2 · APPLY IT

1. **Plan A, by $4 per month; Plan B rises by $3 per month.** Plan A's monthly increase is (14 - 6)/(2 - 0) = 4. Plan B's monthly increase is the coefficient of x, which is 3.
2. **Dani's total grows faster, by $9 per week versus $7 per week.** Dani adds $9 each week. The coefficient of x shows that Lee adds $7 each week.

CHALLENGE

B has the greater average rate. A's rate is (10 - 2)/(3 - 1) = 4. B has outputs 0 and 10 at x = 1 and x = 3, so its rate is (10 - 0)/(3 - 1) = 5.

Accept equivalent calculations. For the quadratic comparisons, students must use the endpoints of the stated interval.