LESSON MAKER PRO

Rate Change Quest

Measure how fast a function changes.

HIGH SCHOOL · HSF-IF.B.6

CCSS.Math.Content.HSF-IF.B.6 "Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. *"

NAME _____ DATE _____

FIND THE AVERAGE CHANGE

Average rate of change tells how much the output changes for each 1-unit change in the input. For an interval [a, b], calculate (f(b)-f(a))/(b-a). A positive rate means the outputs increase overall, and a negative rate means they decrease overall.

WORKED EXAMPLE

Find the average rate of change of r(x)=41x+43 over the interval [17, 19].

1. Find r(17): 41(17)+43=740.
2. Find r(19): 41(19)+43=822.
3. Compute (822-740)/(19-17)=82/2=41.

Answer: 41

PRACTICE 6 problems

1 Find the average rate of change of f(x)=4x-1 over [1, 4].

ANSWER _____

2 Find the average rate of change of g(x)=6x+5 over [-3, 3].

ANSWER _____

3 Find the average rate of change of h(x)=-5x+8 over [0, 4].

ANSWER _____

4 A graph of y=f(x) passes through the clear grid points (1, 3) and (7, 21). Estimate the average rate of change from x=1 to x=7.

ANSWER _____

5 Use the table to find the average rate of change over [-1, 6]. x: -4, -1, 3, 6. k(x): 15, 9, -3, -12.

ANSWER _____

6 Find the average rate of change of m(x)=9-4x over [-1, 5].

ANSWER _____

APPLY IT Show your work

1 During an online gaming session, a player's score rises from 12 points after 1 hour to 36 points after 5 hours. What is the average rate of change of the score?

WORK SPACE

ANSWER _____

2 A phone battery is at 90% at 8 a.m. and 54% at 11 a.m. What is the average rate of change of the battery percentage?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A function has the table x: 0, 3, 6 and p(x): 1, 10, 37. Find the average rate of change over [0, 6]. Then compare it with the average rate of change over [0, 3] and explain what the comparison shows.

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_____

ANSWER KEY

Rate Change Quest

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the average rate of change of f(x)=4x-1 over [1, 4].	**4**
2	Find the average rate of change of g(x)=6x+5 over [-3, 3].	**6**
3	Find the average rate of change of h(x)=-5x+8 over [0, 4].	**-5**
4	A graph of y=f(x) passes through the clear grid points (1, 3) and (7, 21). Estimate the average rate of change from x=1 to x=7.	**3**
5	Use the table to find the average rate of change over [-1, 6]. x: -4, -1, 3, 6. k(x): 15, 9, -3, -12.	**-3**
6	Find the average rate of change of m(x)=9-4x over [-1, 5].	**-4**

PART 2 · APPLY IT

1. **6 points per hour** Compute (36-12)/(5-1)=24/4=6. The score increases by an average of 6 points each hour.
2. **-12 percentage points per hour** Compute (54-90)/(11-8)=-36/3=-12. The negative rate shows that the battery percentage is decreasing.

CHALLENGE

Over [0, 6], the average rate of change is 6. Over [0, 3], it is 3, so the average rate of change is not constant.

Accept equivalent fraction, decimal, or integer forms when applicable. For context problems, require the correct units and accept wording such as points per hour or percentage points per hour.