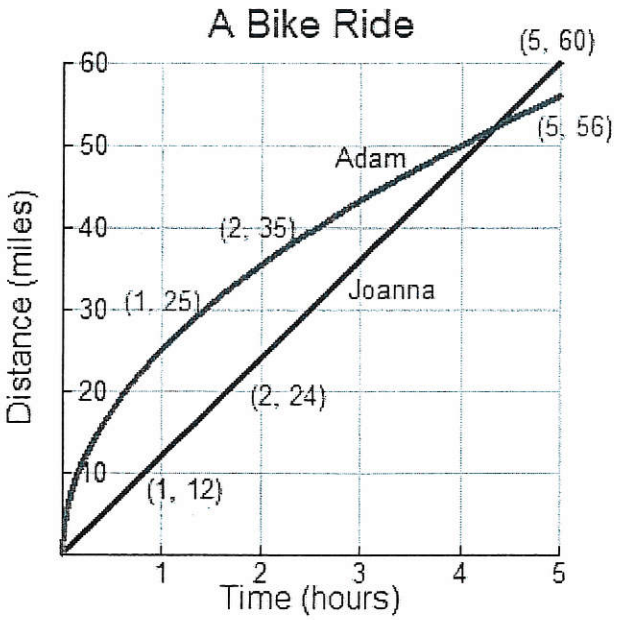
Average Rate of Change

Name KEY Hr____

1. Adam and Joanna both rode their bikes for five hours last weekend while training for a race. The graph shows their distance traveled over the five hours as a function of time.



a. Describe Joanna's speed during the 5-hour bike ride.

Remains constant at 12 mph

b. Describe Adam's speed during the 5-hour bike ride.

starts out fast, then slows down

c. Find each rider's average speed over the 5-hour time interval.

Joanna: 12 mph $\frac{60}{5}$
Adam: 11.2 mph $\frac{56}{5}$

d. Who had the fastest average speed?

Joanna

e. Find each rider's average speed over the interval [0,1]

Joanna: 12 mph
Adam: 25 mph

f. Who had the fastest average speed over this interval?

Adam

g. Find Adam's average speed over the interval [1, 2].

$\frac{35-25}{2-1} = \frac{10}{1} = 10$ mph

h. Was Adam traveling faster over the interval [0,1] or [1, 2]?

[0,1]

i. How does the graph show this?

steeper at beginning

2. An object is dropped from a 256-foot bridge into the water below. The height of this object with respect to time can be modeled by the function $h(t) = -16t^2 + 256$.

a. Use the equation to evaluate the following values of t.

$h(0) =$ 256

$h(1) =$ 240

$h(2) =$ 192

b. Find the average rate of change over the interval [0, 1]. $\frac{256-240}{0-1-0} = \frac{16}{-1} = -16$ ft/sec

c. Find the average rate of change over the interval [1, 2]. $\frac{240-192}{2-1} = 48$ (1-2)

d. Is the object traveling the same speed at every point in its descent? Explain.

No, it's traveling faster at 1-2 seconds than at 0-1 seconds

e. Explain what is happening to the average rate of change of the object as *t* increases. Why is this happening?

(AoC) It's also increasing - gravity decreasing at a neg rate

f. If the speed of the object is increasing as it falls, why is the average rate of change negative over the interval?

It's falling down ↘ headed down toward ground & the slope of the path is negative

3. The following tables show the distance traveled by ~~three~~ two different cars over five seconds.

Car 1	
Time (s)	Distance (ft)
0	0
1	4
2	7
3	10
4	13
5	16

Car 3	
Time (s)	Distance (ft)
0	0
1	3
2	5
3	9
4	17
5	33

a. Using the above tables, compare the three cars and their positions after *t* seconds. Which car is traveling the fastest? Justify your answer. car 3 - gone farthest in 5 sec

b. What is the average rate of change for each car over the interval [0, 2]?

1: $\frac{0-7}{0-2} = 3.5$ ft/sec 3: $\frac{0-5}{0-2} = 2.5$ ft/sec

c. What is the average rate of change for each car over the interval [3, 5]?

p Car 1 $\frac{10-16}{3-5} = 3$ ft/sec car 3 $\frac{9-33}{3-5} = -\frac{24}{-2} = 12$ ft/sec

d. Think about it again. Which car is traveling the fastest?

Car 1 is faster [0, 2]

car 3 is faster [3, 5]