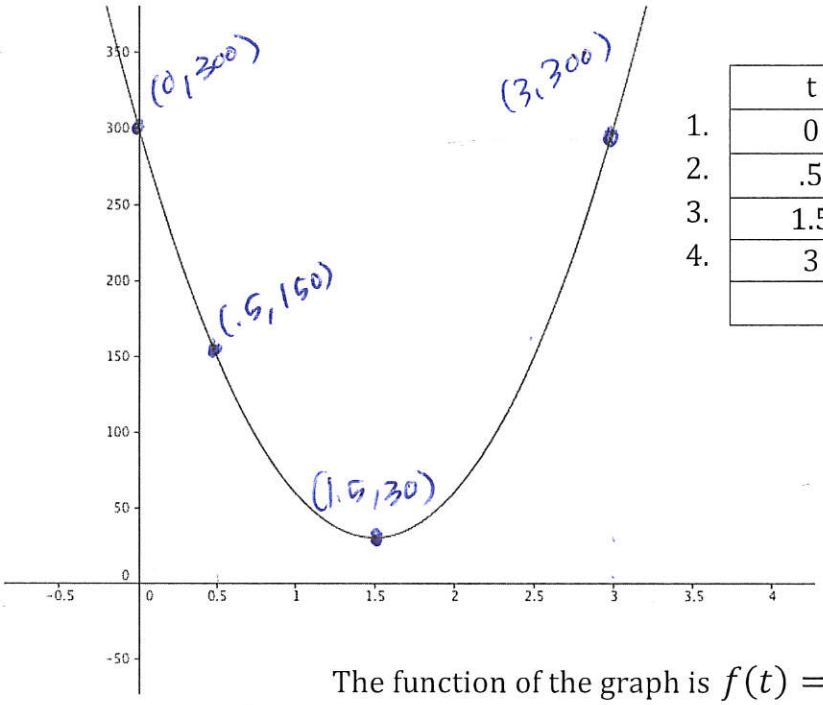
Average Rate of Change ws
Bungee Breakdown

Name: Key **Hr:**_____

The graph below models the height of a bungee jumper in feet over the time interval of three seconds [0,3]. The lowest the jumper gets is 30 ft. above the ground. Use values on the graph or use the equation for the function to fill out the table. Then using your table answer the questions below.



	t	f(t)
1.	0	300
2.	.5	150
3.	1.5	30
4.	3	300

The function of the graph is $f(t) = 120x^2 - 360x + 300$

5) a. Using the values in your table, find the average rate of change (ARC) of the given interval: [0,1.5].

b. Interpret your answer. $\frac{30-300}{1.5-0} = \frac{-270}{1.5} = -180$

On average, he drops 180 ft in 1.5 seconds

6) a. Find an interval from where the person stops descent to where the bungee has no tension. [1.5, 3]

b. Interpret your answer $\frac{300-30}{3-1.5} = \frac{270}{1.5} = 180$

on average, ascends 180 ft in 1.5 seconds

7) a. Find an interval that will produce an ARC of 0. [0,3], [0.5, 2.5], or [1,2]

b. Why and when would this occur?

he's at the same height at both times so there is no change

8) Find the average rate of change for the given equation $h(t) = -9t^2 + 45t + 3$ for a soccer ball using the following time intervals

a) [1,2] $\frac{f(2)-f(1)}{2-1} = \frac{57-39}{1} = 18$

b) [2,4] $\frac{f(4)-f(2)}{4-2} = \frac{39-57}{2} = \frac{-18}{2} = -9$

c) [4,6] $\frac{f(6)-f(4)}{6-4} = \frac{-51-39}{2} = \frac{-90}{2} = -45$

9) a. Find the average rate of change over a time interval [2,3] for the given equation $h(t) = -16t^2 + 96t + 10$ for a golf ball. $\frac{f(3)-f(2)}{3-2} = \frac{154-138}{1} = \boxed{16}$

b. What is happening to the golf ball during this interval?

raises 16 ft in 1 second

Use the tables below to answer questions 10-15.

Linear

Time (s)	Distance (ft)	
0	0	+3
1	3	+3
2	6	+3
3	9	+3
4	12	

Quadratic

Time (s)	Distance (ft)	
0	0	+3
1	3	+9
2	12	+15
3	27	+21
4	48	

Exponential

Time (s)	Distance (ft)	
0	0	+3
1	3	+6
2	9	+18
3	27	+54
4	81	

10. Is there a time interval when the rates of change are the same?

Yes, between 0 & 1 second

11. Which function has the greatest rate of change over the time interval from 2 seconds to 4 seconds?

Exponential $\frac{81-9}{4-2} = \frac{72}{2} = \boxed{36}$

12. What observations can you make about the rate of change for the linear function over the time interval given? constant... +3 ft each second

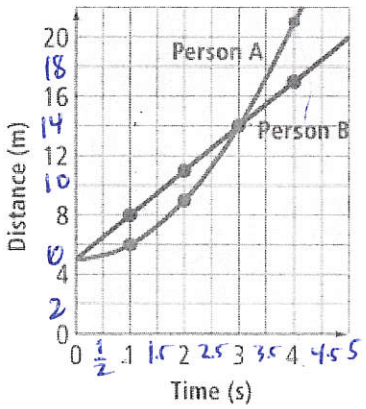
13. What observations can you make about the rate of change for the quadratic function over the time interval given? Increasing

14. What observations can you make about the rate of change for the exponential function over the time interval given? Increasing at a faster rate than quadratic

15. Which function has the greatest rate of change, and over what time interval?

Exponential [3,4] $\frac{81-27}{4-3} = \frac{54}{1} = \boxed{54}$

16. Two people are running along parallel, straight tracks. The graph shows the distance each person has traveled.



a) At what times have the two runners traveled the same distance?

at 3 seconds

b) What is the average rate of change for the runners over the interval from 1 to 4 seconds, and who is traveling faster over that interval?

A: (1,6) (4,21) $\frac{21-6}{4-1} = \frac{15}{3} = 5$

B: (1,8) (4,17) $\frac{17-8}{4-1} = \frac{9}{3} = 3$

Person A