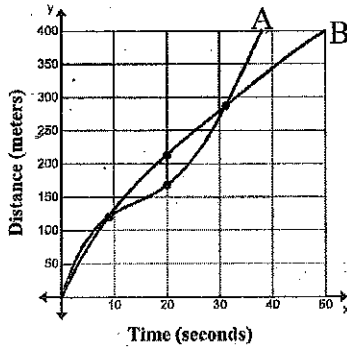# Rate of Change Practice Worksheet

Name: _____ Date: _____

Below is the graph and table for 2 runners running the 400 meter hurdles race.

Time	Runner A	Runner B
0	0	0
9	120	120
20	168	213
31	287	287

1. Which runner has a faster average speed for the first 9 seconds?

   Same

2. Which runner has a faster average speed from 9 to 20 seconds?

   A = 4.36   B = 8.45

   A (9,120) B(9,120)
   (20,168)   (20,213)

3. Which runner has a faster average speed from 20 to 31 seconds?

   A = 10.8   B = 6.73

   A (20,168) B(20,213)
   (31,287)   (31,287)

4. Which runner has a faster average speed from 9 to 31 seconds?

   A = 7.6   B = 7.6   Same

   A (9,120) B(9,120)
   (31,287)   (31,287)
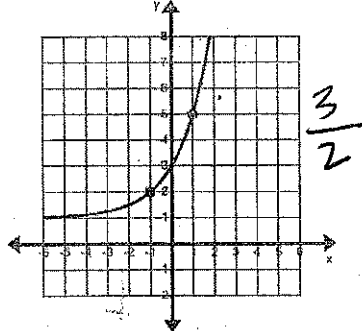
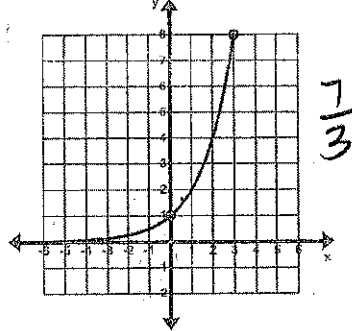5. Which runner wins the race? How do you know?

   Runner A - finishes faster (less time on graph)

Find the average rate of change for each of the following graphs over the given interval.
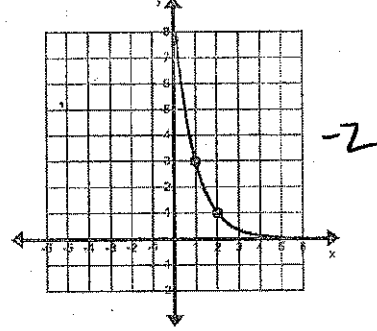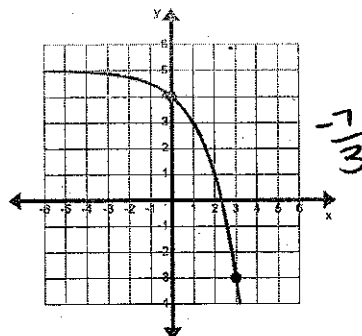
6. [-1, 1]

$\dfrac{3}{2}$
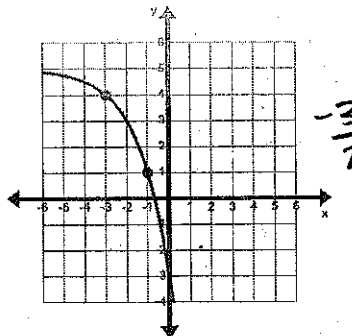
7. [0, 3]

$\dfrac{7}{3}$

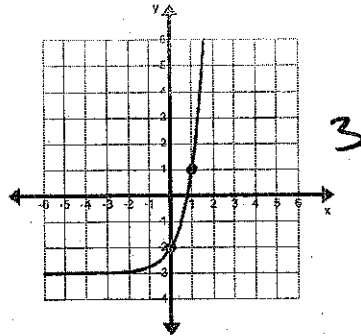8. [1, 2]

-2

9. [0, 3]

$\dfrac{-7}{3}$

10. [-3, -1]

$\dfrac{-3}{2}$

11. [0, 1]

3

6

Suppose 25 flour beetles are left undisturbed in a warehouse bin. The beetle population doubles in size every week. The equation $P(x) = 25 \cdot 2^x$ can be used to determine the number of beetles after x weeks. Complete the table.

Week	Population
0	25
1	50
2	100
3	200
4	400
5	800

12. Calculate the average growth rate between weeks 1 and 3.

$(1, 50)$
$(3, 200)$

$$\frac{200 - 50}{3 - 1} = \frac{150}{2} = \boxed{75}$$

13. Calculate the average growth rate for the first five weeks [0, 5].
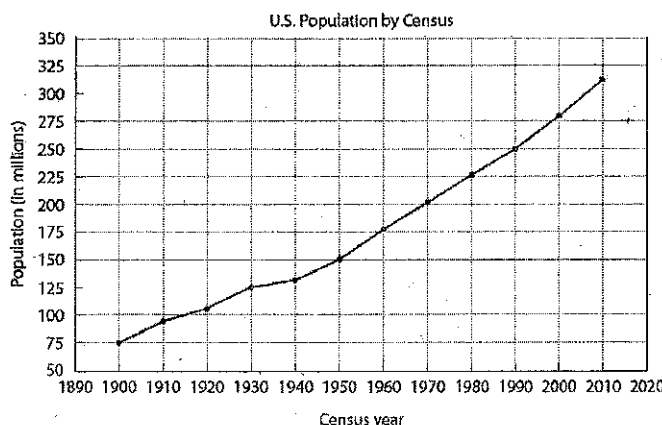
$(0, 25)$
$(5, 800)$

$$\frac{800 - 25}{5 - 0} = \frac{775}{5} = \boxed{155}$$

14. Which average growth rate is higher? Why do you think it is higher?

First 5 weeks gives greater values.

The graph below shows the United States population from 1900 to 2010, as recorded by the U.S. Census Bureau.

U.S. Population by Census

15. What was the rate of change in the population from 1900 to 2000? Is this greater or less than the rate of change in the population from 2000 to 2010?

$(1900, 75) (2000, 280)$

$$\frac{280 - 75}{2000 - 1900} = \frac{205}{100} = 20.5$$

$(2000, 280)(2010, 315)$

$$\frac{315 - 280}{2010 - 2000} = \frac{35}{10} = 3.5 \quad \boxed{\text{Less than}}$$

take from graph

16. Which 10-year time periods have the highest and the lowest rates of change? How did you find these? Low → 1910-1920, 1930-1940

High → 1950-1960, 1960-1970, 1970-1980, 1980-1990
1990-2000, 2000-2010

Find the rate of change of Pete's height from 3 to 5 years.

17.

Time (years)	1	2	3	4	5	6
Height (in.)	27	35	37	42	45	49

$$\frac{45 - 37}{5 - 3} = \frac{8}{2} = \boxed{4}$$

For $f(x) = x^2 - 2$, find the rate of change on the interval [-2, 4]. $(-2, 2) (4, 14)$

18.
$f(-2) = 4 - 2 = 2$
$f(4) = 16 - 2 = 14$

$$\frac{14 - 2}{4 + 2} = \frac{12}{6} = \boxed{2}$$

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