

a. Find the slope of AB:

$$m = \frac{2}{3} \uparrow$$

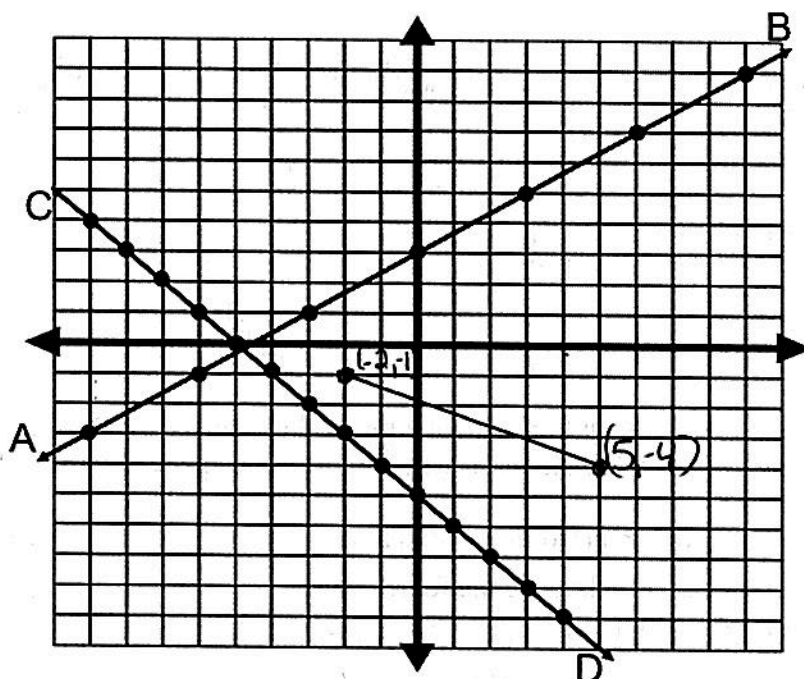
b. Find the slope of CD:

$$m = -\frac{1}{1}$$

c. What is the slope of the line passing through $(5, -4)$ & $(-2, -1)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - (-4)}{-2 - 5} = \frac{3}{-7}$$

$$m = -\frac{3}{7}$$



AIM: AVERAGE RATE OF CHANGE

SLOPE FORMULA:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

1. The table below shows the average diameter of a pupil in a person's eye as he or she grows older. What is the average rate of change, in millimeters per year, of a person's pupil diameter from age 20 to age 80?

1) 2.4

2) 0.04

3) -2.4

4) -0.04

* ask what type of function

$$\frac{4.3 - 4.7}{30 - 20} = \frac{-0.4}{10} = -0.04$$

Age (years)	Average Pupil Diameter (mm)
20	4.7
30	4.3
40	3.9
50	3.5
60	3.1
70	2.7
80	2.3

$$\frac{2.3 - 4.7}{80 - 20} = \frac{-2.4}{60} = -0.04$$

2. An astronaut drops a rock off the edge of a cliff on the Moon. The distance, $d(t)$, in meters, the rock travels after t seconds can be modeled by the function $d(t) = 0.8t^2$. What is the average speed, in meters per second, of the rock between 5 and 10 seconds after it was dropped?

- 1) 12
2) 20
3) 60
4) 80

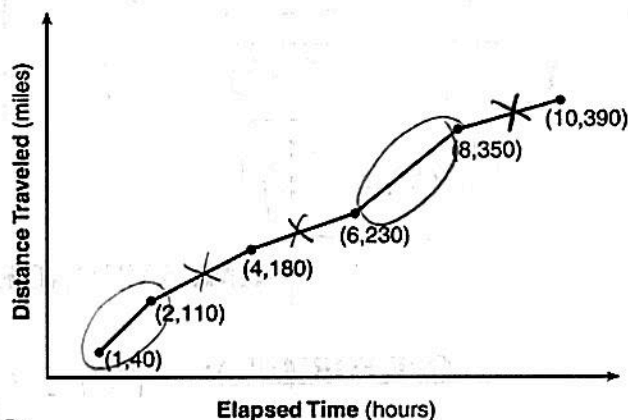
* $y = .8x^2$

x	y
5	20
10	80

or $\frac{.8(10^2) - .8(5^2)}{10 - 5} = \frac{80 - 20}{5} = \frac{60}{5} = 12$

3. The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below. During which interval was their average speed the greatest?

- 1) the first hour to the second hour
2) the second hour to the fourth hour
3) the sixth hour to the eighth hour
4) the eighth hour to the tenth hour



① $\frac{110 - 40}{2 - 1} = \frac{70}{1} = 70$

② $\frac{180 - 110}{4 - 2} = \frac{70}{2} = 35$

③ $\frac{350 - 230}{8 - 6} = \frac{120}{2} = 60$

4. A gardener is planting two types of trees:

Type A is three feet tall and grows at a rate of 15 inches per year.

Type B is four feet tall and grows at a rate of 10 inches per year.

Algebraically determine exactly how many years it will take for these trees to be the same height.

④ $\frac{390 - 350}{10 - 8} = \frac{40}{2} = 20$

Type A: $y = 15x + 36$

Type B: $y = 10x + 48$

~~15x + 36 = 10x + 48~~
~~-10x~~ ~~-10x~~

$5x + 36 = 48$
 $-36 - 36$

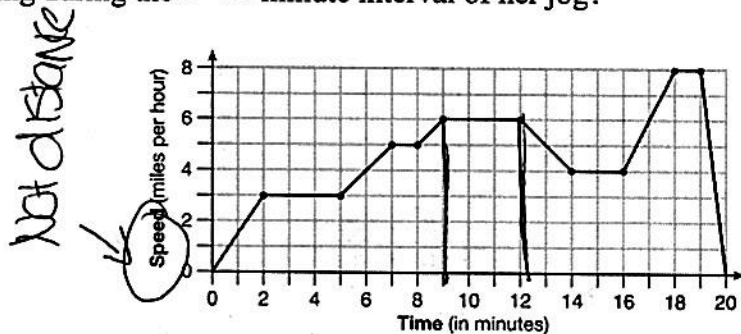
$5x = 12$
 $\frac{5x}{5} = \frac{12}{5}$

$x = 2.4$ years

PRACTICE PROBLEMS

5. The graph below represents a jogger's speed during her 20-minute jog around her neighborhood. Which statement best describes what the jogger was doing during the 9 – 12 minute interval of her jog?

- ☒ 1) She was standing still.
☐ 2) She was increasing her speed.
☐ 3) She was decreasing her speed.
☒ 4) She was jogging at a constant rate.



Time Increases
speed remains the same!

6. Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement. What is the average rate of change of the area from the original photograph to the fourth enlargement, to the nearest tenth?

Enlargement	0	1	2	3	4
Area (square inches)	15	18.8	23.4	29.3	36.6

- 1) 4.3
 2) 4.5
☒ 3) 5.4
 4) 6.0

$$\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4$$

7. Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to 200°F. During which time interval did the temperature in the kiln show the greatest average rate of change?

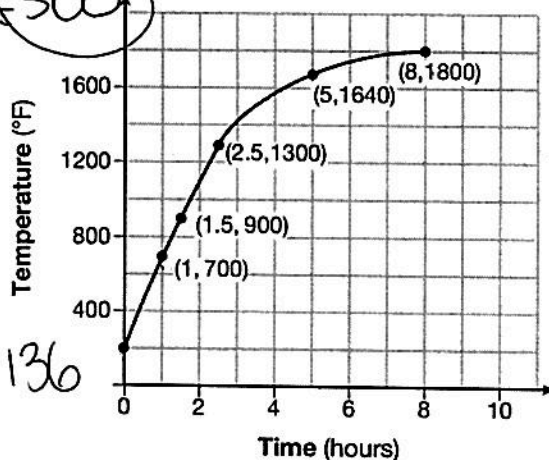
- ☒ 1) 0 to 1 hour
☐ 2) 1 hour to 1.5 hours
☐ 3) 2.5 hours to 5 hours
☐ 4) 5 hours to 8 hours

① $\frac{700 - 200}{1 - 0} = \frac{500}{1} = 500$

② $\frac{900 - 700}{1.5 - 1} = \frac{200}{.5} = 400$

③ $\frac{1640 - 1300}{5 - 2.5} = \frac{340}{2.5} = 136$

④ $\frac{1800 - 1640}{8 - 5} = \frac{160}{3} = 53.3$



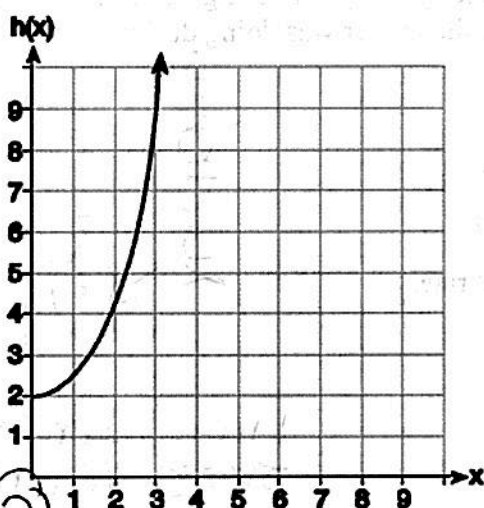
8. Given the functions $g(x)$, $f(x)$, and $h(x)$ shown below:

$$g(x) = x^2 - 2x$$

$$\frac{3-0}{3-0} = \frac{3}{3} = 1$$

x	f(x)
0	1
1	2
2	5
3	7

$$\frac{7-1}{3-0} = \frac{6}{3} = 2$$



$$\frac{9-2}{3-0} = \frac{7}{3}$$

The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \leq x \leq 3$ is

- (1) $f(x)$, $g(x)$, $h(x)$ (2) $h(x)$, $g(x)$, $f(x)$ (3) $g(x)$, $f(x)$, $h(x)$ (4) $h(x)$, $f(x)$, $g(x)$