

**Do Now:**

1. Grace tutors math to her classmates. She charges an initial fee of \$5 and then charges \$10 per hour. Write a function that models this situation.

Linear  
Function

$$y = mx + b$$

$$\boxed{y = 10x + 5}$$

2. The cost of belonging to a gym can be modeled by  $C(m) = 50m + 79.50$ , where  $C(m)$  is the total cost for  $m$  months of membership. State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.

Linear  
Function

Slope  $\rightarrow$  \$50 per month

y-intercept  $\rightarrow$  \$79.50 initial fee

**AIM: MODELING FUNCTIONS**

3. Luke plans to purchase a TV that costs \$2,000. He has \$1,000 in his savings account, and plans to save \$40 per week from his allowance until he has enough money to buy the TV. He needs to figure out how long it will take.

- a. What type of function should he use to model this problem?

Linear because there a common difference.

- b. Write a function that represents the amount of Luke's money over a period of time (in weeks).

$$y = mx + b$$

$$\boxed{y = 40x + 1000}$$

$$m = 40$$

$$b = 1000$$

- c. How much will he have saved in 20 weeks?

$$x = 20$$

$$y = ?$$

$$y = 40x + 1000$$

$$y = 40(20) + 1000$$

$$y = 1800$$

$$\begin{array}{r} 1800 \\ - 1000 \\ \hline \end{array}$$

$$\boxed{\$800 \text{ saved}}$$

- d. How many weeks will he need to save up in order to purchase it?

$$y = 2000$$

$$x = ?$$

$$y = 40x + 1000$$

$$2000 = 40x + 1000$$

$$\begin{array}{r} 2000 \\ - 1000 \\ \hline 1000 \end{array} = \begin{array}{r} 40x \\ - 1000 \\ \hline \end{array}$$

$$\frac{1000}{40} = \frac{40x}{40}$$

$$25 = x$$

$$\boxed{25 \text{ weeks}}$$

4. Andy's Cab Service charges a \$6 fee plus \$0.50 per mile. His twin brother Randy starts a rival business where he charges \$0.80 per mile, but does not charge a fee.

a. Write a cost equation for each cab service in terms of the number of miles.

Andy:

$$y = .50x + 6$$

Randy:

$$y = .80x$$

b. If you are planning on getting a cab to go to the mall which is 6.8 miles away from your house, which cab service would it be more cost effective to use?

Andy:

$$y = .50(6.8) + 6$$

$$y = \$9.40$$

Randy:

$$y = .80(6.8)$$

$$y = \$5.44$$

c. How many miles will Andy's Cab Service cost the same as Randy's Cab Service? Justify your answer algebraically.

$$y_1 = y_2$$

$$.50x + 6 = .80x$$

$$- .50x \quad - .50x$$


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$$6 = .30x$$

$$\frac{6}{.30} = \frac{.30x}{.30} \quad x = 20$$

20 miles

5. Bella is a BMX bike racer and wants to identify the relationship between her bike's weight and the height of jumps (a category she gets judged on when racing). On a practice course, she tests out 7 bike models with different weights and comes up with the following data.

a) What type of function is represented by the table? Justify your answer.

Linear → common difference  
of  $-.08$

b) What is the equation of the function?

$$m = -.08$$

$$b = 10.5$$

$$y = -.08x + 10.5$$

Weight (lbs.)	Height (ft.)
20	8.9
21	8.82
22	8.74
23	8.66
24	8.58
25	8.5
26	8.42
27	8.34

c) Bella is sponsored by Twilight Bikes and must ride a 32-lbs bike. What can she expect her jump height to be?

$$x = 32$$

$$y = -.08(32) + 10.5$$

$$y = 7.94$$

$$7.94 \text{ ft}$$

6. A student is conducting an experiment and, as time passes, the number of cells in the experiment decreases.

a. What type of function is represented by the table? Justify your answer.

exponential b/c common ratio

b. What is the equation of the function? Round values to the nearest hundredth.

$$a = 5,000,000 \quad y = 5,000,000(.55)^x$$

$$b = (.55)$$

Time (minutes)	Cells
0	5,000,000
1	2,750,000
2	1,512,500
3	831,875
4	457,531
5	251,642
6	138,403

c. How many cells will there be after 16 minutes, to the nearest hundredth?

$$x = 16 \quad y = 5,000,000(.55)^{16}$$

$$y = \boxed{350.57 \text{ cells}}$$

7. The table shows the average sale price  $p$  of a house in New York City, for various years  $t$  since 1960.

Years since 1960, $t$	0	1	2	3	4	5	6
Average sale price (in thousands of dollars), $p$	45	36	29	24	21	20	21

$$\begin{array}{cccccc} -9 & -7 & -5 & -3 & -1 & +1 \\ +2 & +2 & +2 & +2 & +2 & \end{array}$$

a. What type of function represents this set of data? Explain.

Quadratic b/c 2nd set of common Differences

b. Write a function to represent the data.

$$y = x^2 - 10x + 45$$

c. In what year is the price at the lowest?

year 5

d. Mr. Samuels bought his house in New York City in 1970. If the trend continued, how much was he likely to have paid?

$$x = 10$$

$$(1970 - 1960)$$

$$y = (10)^2 - 10(10) + 45$$

$$y = 45$$

$$\boxed{\$45,000}$$