Dear Family,

Your child is learning to understand linear functions.

A function is a relationship between two quantities where one quantity depends on the other. Functions can be either linear (the graph is a straight line with a constant rate of change) or non-linear (the graph is not a straight line and the rate of change is not constant).

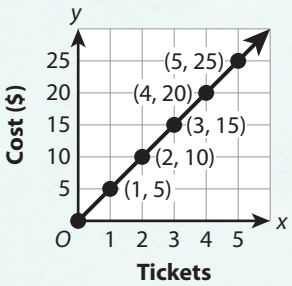
Linear

Suppose that a local movie theater charges $5 per ticket. Each point represents the total cost, *y*, for a certain number of tickets, *x*. The function is linear because the points form a line.

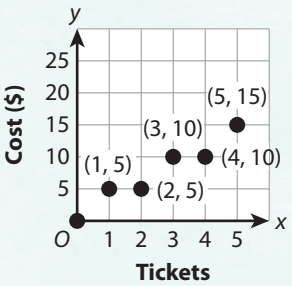
Non-Linear

The theater has a special "buy one get one free" offer. The tickets are still $5, but for each ticket purchased the next ticket is free. Notice that the points do not form a line, so the function is not linear.

Movie Tickets



Movie Tickets



Consider this problem:

The theater offers a membership where members pay a fee of $50 to get discounted rates for movie tickets. The table shows the cost of tickets for a member. Is the function linear?

Number of Tickets	0	1	2	3	4	5
Cost ($)	50	53	56	59	62	65

On the next page you will see some of the ways your child will learn to approach the problem.

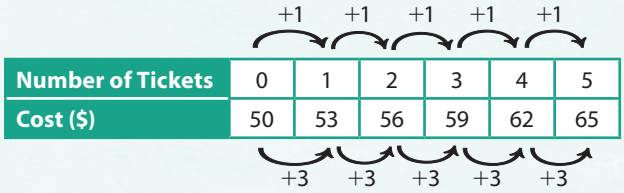
NEXT

Understand Linear Functions: Sample Solution

Is the function represented by the table a linear function?

Number of Tickets	0	1	2	3	4	5
Cost ($)	50	53	56	59	62	65

One way: Use the table.

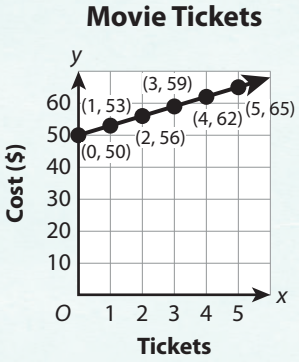


The rate of change is the ratio of the change in y, in this case the cost of the tickets, to the change in x, in this case the number of tickets purchased. The table shows that the rate of change is 3.

The rate of change is constant, so the function is linear.

Another way: Use a graph.

The graph of a linear function is a line. Plot the pairs of values from the table as points with the number of tickets as x and the cost of the tickets as y. The points form a line, so the function is linear.



A third way: Use an equation.

Linear equations can be written in the form $y = mx + b$, where m is the rate of change and b is the initial value.

Here, the rate of change m is the cost of each ticket, \$3, and the initial value b is the membership fee of \$50. Substituting 3 for m and 50 for b into $y = mx + b$ gives $y = 3x + 50$. This equation is a linear equation.

Answer: All three methods show that the function representing the cost of tickets with a membership is a linear function.

Vocabulary

linear function a function with a graph that is a non-vertical straight line, which can be represented by a linear equation in the form $y = mx + b$.