

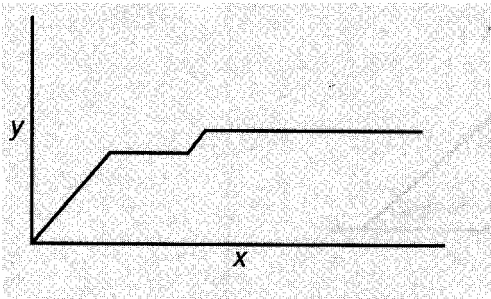
Graphs of Contextual Situations :

A model is a mathematical representation of a real world situation. Graphs are useful in many real world situations. There are times when you might be given a graph that shows a relationship between two quantities and have to determine what type of situation the graph represents.

PRACTICE

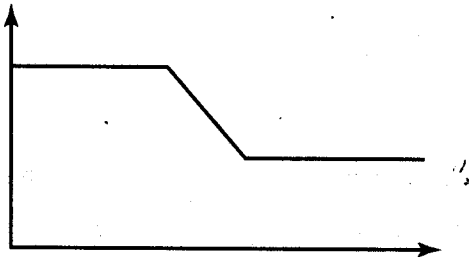
Describe a situation that could be depicted by the graphs shown below.

❖



Person drives from 0 to the speed limit of 60 mph , then enters an area where the speed limit is 70 mph

❖



A person decides to diet and then holds at their goal weight

Domain and Range of functions :

Domain

The set of all x-coordinates is called the domain of a relation.

Range

The set of all y-coordinates is called the range of a relation.

We have previously defined the domain and range of a graph when we talked about determining if relations are functions. In this prompt we will determine how you write the domain and range from a set of ordered pairs, a table, and a graph.

❑ **Set of ordered pairs**

When you have a set of ordered pairs and you want to find the domain you put the x-coordinates (the first value of each ordered pair) inside a set of braces separated by commas. When you are trying to find the range you put the y-coordinates (the second value of each ordered pair) inside a set of braces separated by commas.

❑ **Tables**

When you have a table you need to put the values under or to the right of the x inside a set of braces. This will be the domain. If you are trying to find the range you put the numbers under or to the right of the y in a set of braces.

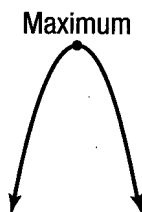
❑ **Graphs**

When you are determining the domain of a relation from a graph you need to determine how wide (left-to-right) the graph is. The domain goes along the x-axis. When you are determining the range of a relation from a graph you need to determine how tall (up-and-down) the graph goes. The range goes along the y-axis.

Maximum and Minimum of a function :

Maximum

The maximum of a function is the point where the function attains its largest value. In other words, the maximum is the largest y-value plotted on the graph. The vertex of a parabola is a maximum if the parabola opens downward.



Minimum

The minimum of a function is the point where the function attains its smallest value. The minimum is the smallest y-value plotted on the graph. The vertex of a parabola is a minimum if the parabola opens upward.



Parallel, Perpendicular, and Coincidental lines :

Slope-intercept form

The slope-intercept form of a linear equation is $y = mx + b$, where x is the independent variable, y is the dependent variable, m is the slope and b is the y-intercept.

Parallel

Two lines are parallel if they have the same slopes but different y-intercepts.

$$\blacksquare y = \frac{a}{b}x + 5 \quad \text{and} \quad y = \frac{a}{b}x - 3$$

Perpendicular

Two lines are perpendicular if they have opposite (signs), reciprocal (fraction turns over) slopes.

$$\blacksquare y = \frac{a}{b}x + 1 \quad \text{and} \quad y = -\frac{b}{a}x - 2$$

Coincide

If two lines overlap completely, they are coincident. This means that they have identical slopes and identical y-intercepts.

$$\blacksquare y = \frac{a}{b}x - 5 \quad \text{and} \quad y = \frac{a}{b}x - 5$$

Intersecting but not perpendicular

If two lines intersect but are not perpendicular, they have completely different slopes but can have different or the same y-intercept.

$$\blacksquare y = \frac{a}{b}x + 2 \quad \text{and} \quad y = \frac{c}{d}x - 1$$

There are two steps in deciding if two linear equations are parallel, perpendicular, coincide, or intersect but are not perpendicular. The first step is to put each equation into slope-intercept form (get y by itself). The second step is to compare the numbers in front of the x and determine which scenario the lines fit into.