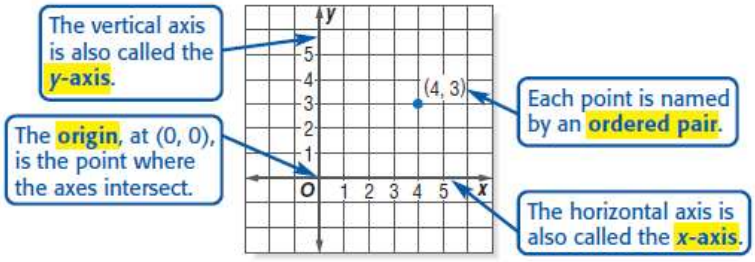
Functions and Graphs

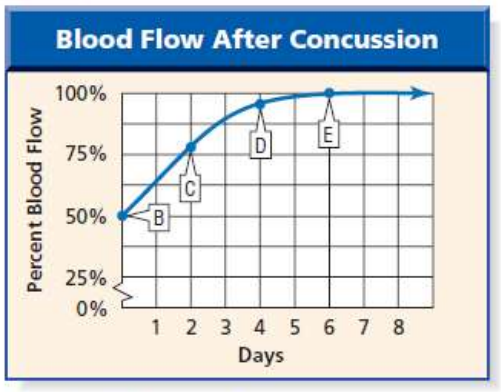
The Coordinate Plane:



Example 1:

The graph shows that as the number of days after a concussion increases, the percent of blood flow increases.

The return of normal blood flow is said to be a function of the number of days since the concussion.



Source: *Scientific American*

Name the ordered pair at point C and explain what it represents.

Point C is at the intersection of 2 on the x-axis and 75% on the y-axis. So, the coordinates of point C are $(2, 75)$.

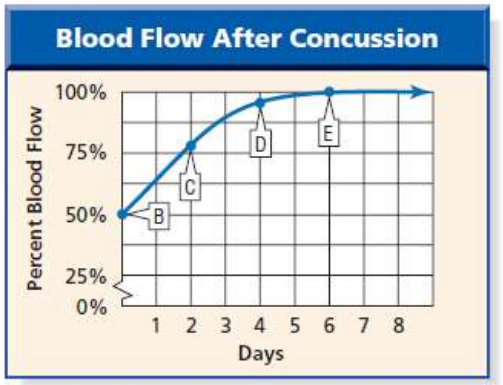
If we look at the labels on the axes, 2 on the x-axis represents 2 days and 75% on the y-axis represents 75% of normal blood flow has returned.

Point C is located at $(2, 75)$. This point represents that 2 days after a concussion blood flow to the brain has returned to 75% of normal.

Example 2:

The graph shows that as the number of days after a concussion increases, the percent of blood flow increases.

The return of normal blood flow is said to be a function of the number of days since the concussion.



Source: *Scientific American*

Name the ordered pair at point B and explain what it represents.

Point B is at the intersection of 0 on the x-axis and 50% on the y-axis. So, the coordinates of point B are $(0, 50)$.

If we look at the labels on the axes, 0 on the x-axis represents 0 days and 50% on the y-axis represents 50% of normal blood flow has returned.

Point B is located at $(0, 50)$. This point represents that on the day of a concussion blood flow to the brain is 50% of normal.

Independent and Dependent Variables:

If we use the graph from Examples 1 and 2 to determine independent vs. dependent variables:

> The independent variable is the variable of input values. The independent variable is graphed on the x-axis. (Ex: days from injury)
>
> The dependent variable is the variable that can be considered output values. The dependent variable is graphed on the y-axis. (Ex: percent blood flow)

Typically, if time is one of the measures, it is an independent variable.

Example 3:

Identify the independent and dependent variables for each function.

a) In general, the average price of gasoline slowly and steadily increases throughout the year.

b) Art club members are drawing caricatures of students to raise money for their trip to New York City. The profit that they make increases as the price of their drawings increases.

In general, the average price of gasoline slowly and steadily increases throughout the year.

Since the price of gasoline depends on the time of year, **time of year is the independent variable and price is the dependent variable.**

Art club members are drawing caricatures of students to raise money for their trip to New York City. The profit that they make increases as the price of their drawings increases.

Since the profit made depends on the price of the drawings, **price of the drawings is the independent variable and profit is the dependent variable.**

Example 4:

Identify the independent and dependent variables for each function.

a) The distance a person runs with time.
b) As the dimensions of a square decrease, so does the area.

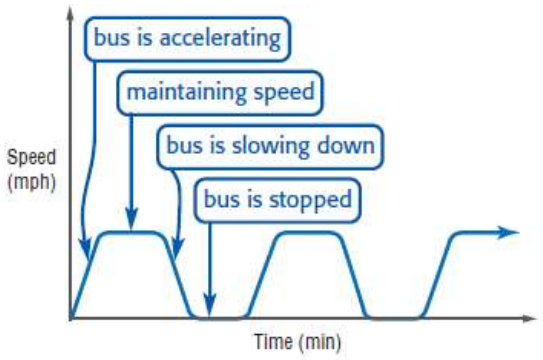
The distance a person runs with time.

Since the distance the person runs depends on the time, **time is the independent variable and distance is the dependent variable.**

As the dimensions of a square decrease, so does the area.

Since the area of the square depends on the dimensions, **dimensions are the independent variable and area is the dependent variable.**

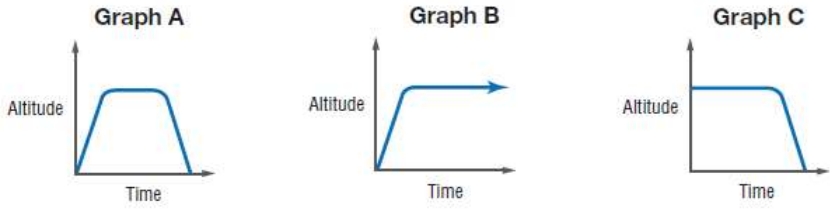
Analyzing graphs:



At the origin, the bus is stopped. It accelerates and maintains a constant speed. Then it begins to slow down, eventually stopping. After being stopped for a short time, the bus accelerates again. The process repeats continually.

Example 5:

Identify the graph that represents the altitude of a space shuttle above Earth, from the moment it is launched until the moment it lands.

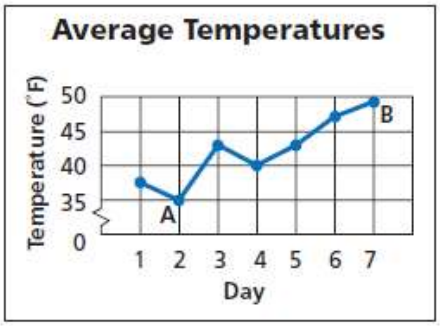


At launch the space shuttle should be on Earth's surface. Only graphs A and B show the shuttle starting on Earth's surface. So, it cannot be graph C. Graphs A and B both how the space shuttle rising above Earth's surface and maintaining a distance above Earth's surface for a period of time. However, only graph A shows the shuttle returning to Earth's surface.

Graph A

Example 6:

Name the ordered pair at point A and explain what it represents.



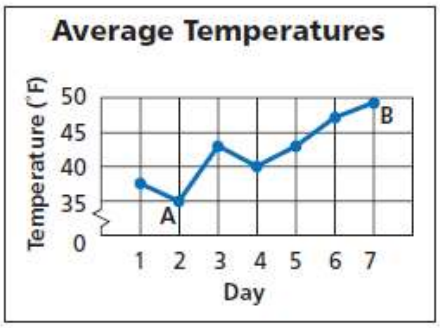
Point A is at the intersection of 2 on the x-axis and 35 on the y-axis. So, the coordinates of point A are $(2, 35)$.

If we look at the labels on the axes, 2 on the x-axis represents 2 days and 35 on the y-axis represents 35 degrees Fahrenheit.

Point A is located at $(2, 35)$. This point represents that on day 2 the temperature was 35°F.

Example 7:

Name the ordered pair at point B and explain what it represents.



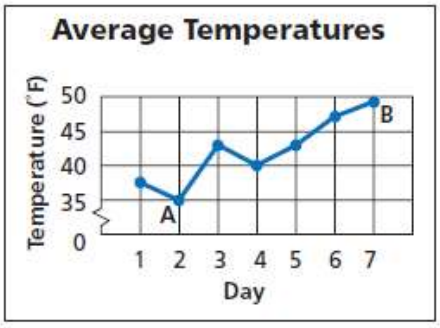
Point B is at the intersection of 7 on the x-axis and 49 on the y-axis. So, the coordinates of point B are $(7, 49)$.

If we look at the labels on the axes, 7 on the x-axis represents 7 days and 49 on the y-axis represents 49 degrees Fahrenheit.

Point B is located at $(7, 49)$. This point represents that on day 7 the temperature was 49°F.

Example 8:

Identify the independent and dependent variables for the function.

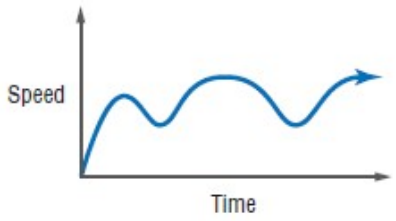


The variable on the x-axis is the independent variable.

Day is the independent variable. Temperature is the dependent variable.

Example 9:

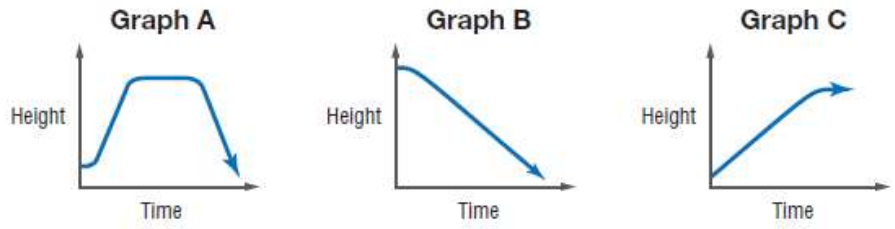
The graph represents Alexi's speed as he rides his bike. Describe what is happening in the graph.



Alexi starts riding his bike. His speed increases. Then he slows down and speeds back up. He slows down again and then speeds back up. This would be consistent with Alexi riding his bike over hills.

Example 10:

Identify the graph that represents the altitude of a skydiver just before she jumps from a plane until she lands.



Since we are picking the graph that starts just before she jumps from the plane until she lands, it must be **graph B**.