

# Vocabulary Cards and Word Walls

Revised: September 9, 2011

## Important Notes for Teachers:

- The vocabulary cards in this file match the Common Core, the mathematics learning standards adopted by the Washington State Board of Education on July 11, 2011. The cards are arranged alphabetically.
- Each card has three sections:
  - Section 1 contains only the word. It is to be used as a visual aid for spelling, pronunciation, and when students are writing their own “kid-friendly” definition or drawing their own graphic.
  - Section 2 adds a graphic to the word. This provides additional context clues as a model.
  - Section 3. has the word, a graphic, and a definition. This can be used for a Word Wall in the classroom.
- These cards are designed to help all students with math content vocabulary, including ELL, Gifted and Talented, Special Education, and Regular Education students.

For possible additions or corrections to the vocabulary cards, contact the Pasco School District at 509-543-6700.

### Bibliography of Definition Sources:

Algebra to Go, Great Source, 2000. ISBN 0-669-46151-8

Math on Call, Great Source, 2004. ISBN-13: 978-0-669-50819-2

Math at Hand, Great Source, 1999. ISBN 0-669-46922

Math to Know, Great Source, 2000. ISBN 0-669-47153-4

Illustrated Dictionary of Math, Usborne Publishing Ltd., 2003. ISBN 0-7945-0662-3

Math Dictionary, Eula Ewing Monroe, Boyds Mills Press, 2006. ISBN-13: 978-1-59078-413-6

Student Reference Books, Everyday Mathematics, 2007.

Houghton-Mifflin eGlossary, <http://www.eduplace.com>

Interactive Math Dictionary, <http://www.amathsdictionaryforkids.com/>

# absolute value equation

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absolute value  
equation

$$|3x - 7| = 23$$

absolute  
value  
equation

$$|3x - 7| = 23$$

An equation with a  
variable within an  
absolute value symbol.

# absolute value inequality

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absolute value  
inequality

$$18 < |-2x + 6|$$

absolute  
value  
inequality

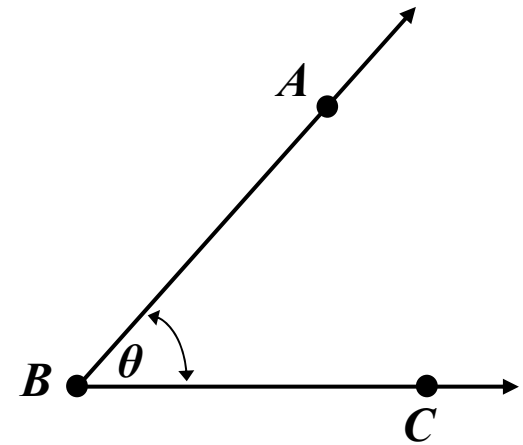
$$18 < |-2x + 6|$$

An inequality that has a variable within an absolute value symbol.

# angle

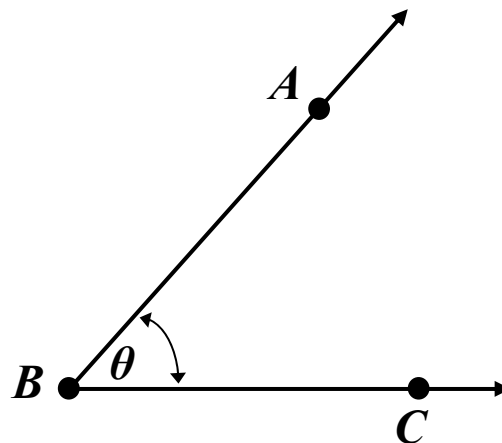
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# angle



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# angle



The union of two rays  
that have the same  
endpoint.

# area

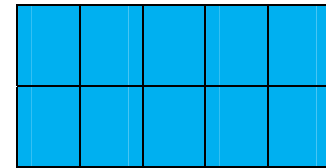
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# area

**2 rows of 5 = 10 square units**

**or**

**$2 \cdot 5 = 10$  square units**

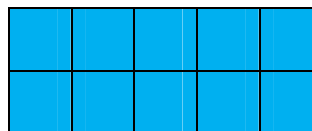


**2 rows of 5 = 10 square units**

**or**

**$2 \cdot 5 = 10$  square units**

# area



The measure, in square units, of the interior region of a 2-dimensional figure or the surface of a 3-dimensional figure.

# arithmetic sequence

---

## arithmetic sequence

$$a_n = a_1 + (n - 1)d$$

The first term is  $a_1$ , the common difference is  $d$ , and the number of terms is  $n$ .

**Example:** 3, 7, 11, 15, 19  
 $a_1 = 3, d = 4, n = 5$

The explicit formula is  
 $a_n = 3 + (n - 1) \cdot 4 = 4n - 1$

---

## arithmetic sequence

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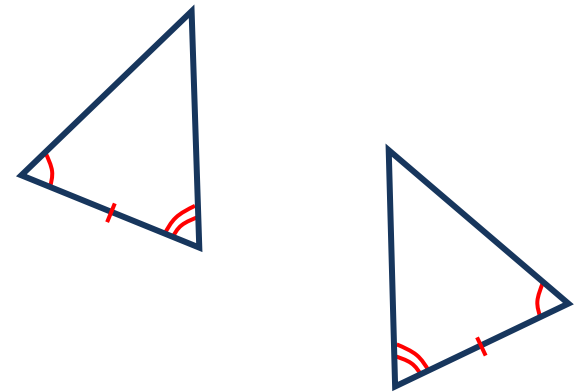
The explicit formula is  
 $a_n = 3 + (n - 1) \cdot 4 = 4n - 1$

A sequence such as 1, 5, 9, 13, 17, 21 or 12, 7, 2, -3, -8, -13 which has a constant difference between terms.

# ASA

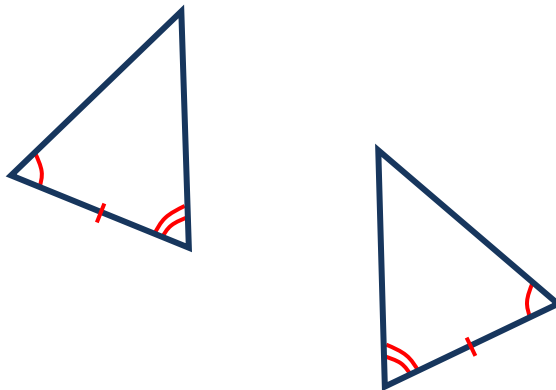
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## ASA



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## ASA



### ASA (Angle-Side-Angle)

If two angles and the included side of one triangle are congruent to the corresponding angles and included side of another triangle, then the triangles are congruent.

# association

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association



**The more food you eat, the more calories you ingest.**

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association



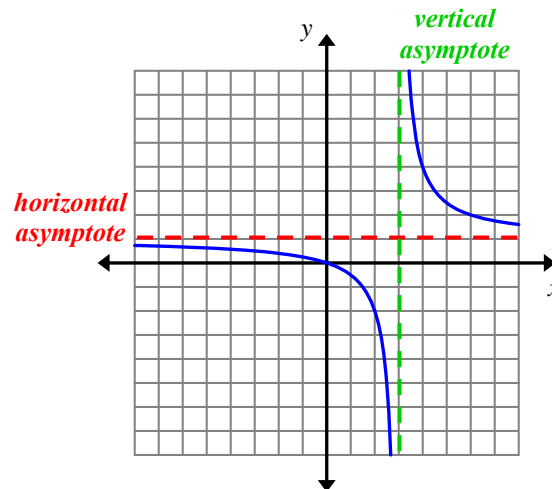
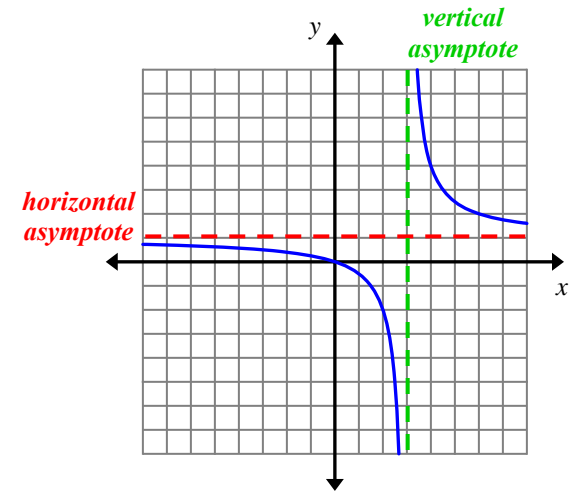
**The more food you eat, the more calories you ingest.**

Any relationship between two measured quantities that renders them statistically dependent. The term “association” refers broadly to any such relationship, whereas the “correlation” refers to a linear relationship between two quantities.



# asymptote

asymptote



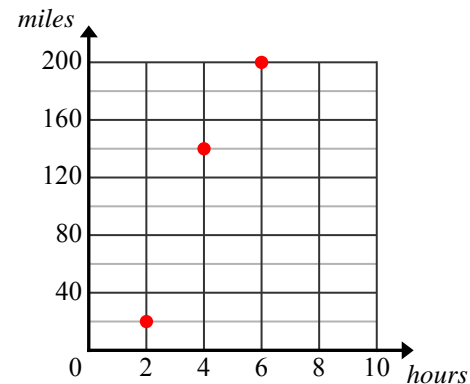
asymptote

A line that the graph of a function gets closer to as  $x$  or  $y$  gets larger in absolute value.

# average rate of change

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## average rate of change

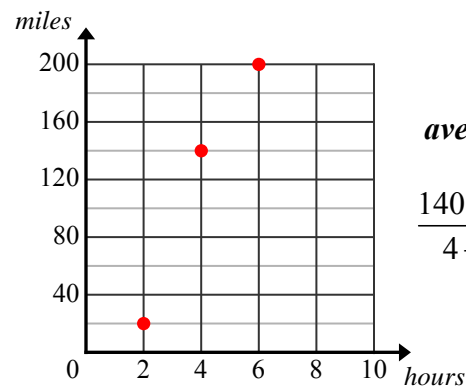


*average rate of change*

$$\frac{140 - 20}{4 - 2} = \frac{120}{2} = 60 \text{ mph}$$

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## average rate of change



*average rate of change*

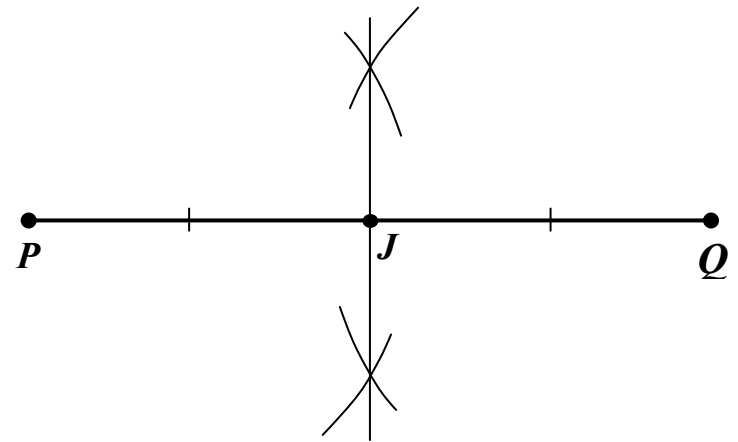
$$\frac{140 - 20}{4 - 2} = \frac{120}{2} = 60 \text{ mph}$$

The average rate of change of a function between any two points is the slope of the line connecting those two points.

# bisect

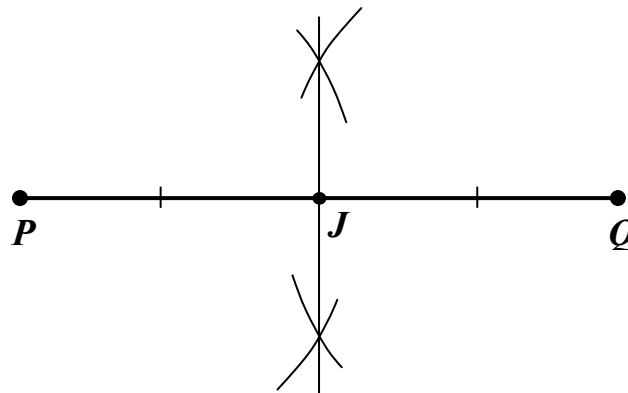
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# bisect



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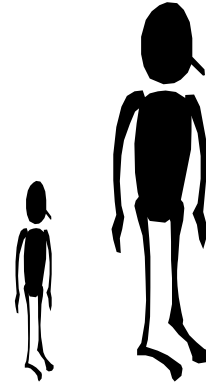
# bisect



Divide into two equal parts.

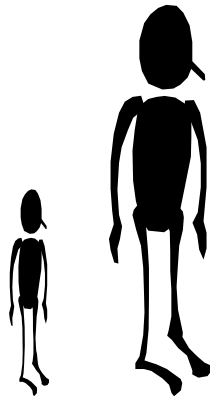
# bivariate data

bivariate  
data



<i>Height (inches)</i>	<i>Weight (pounds)</i>
67	155
72	220
77	240
74	195
69	175

bivariate  
data

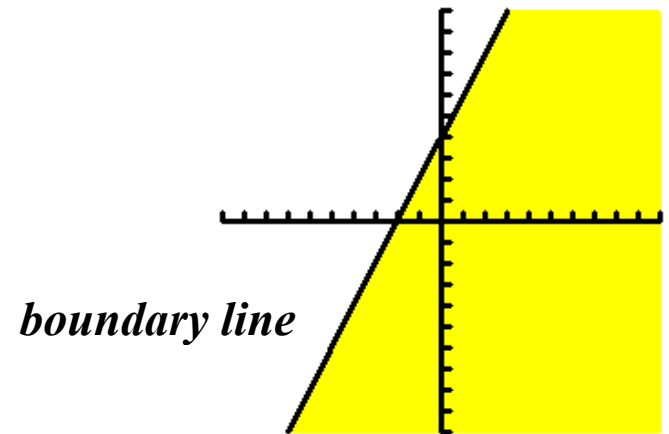


<i>Height (inches)</i>	<i>Weight (pounds)</i>
67	155
72	220
77	240
74	195
69	175

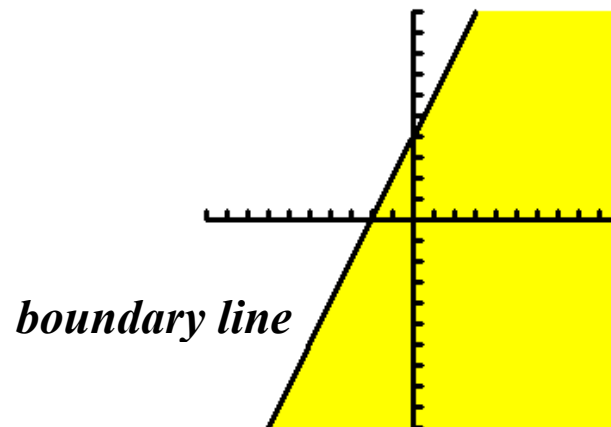
A set of data that  
show the relationship  
between two  
variables.

# boundary line

boundary  
line



boundary  
line

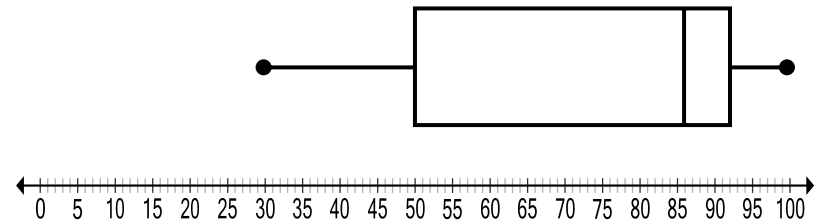


The line that divides a plane into two half-planes, e.g., when graphing the inequality  $y \leq 2x + 4$  the boundary line is the graph  $y = 2x + 4$ . The boundary line may or may not be part of the solution to an inequality.

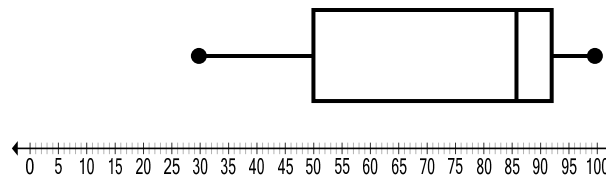
# box plot

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## box plot



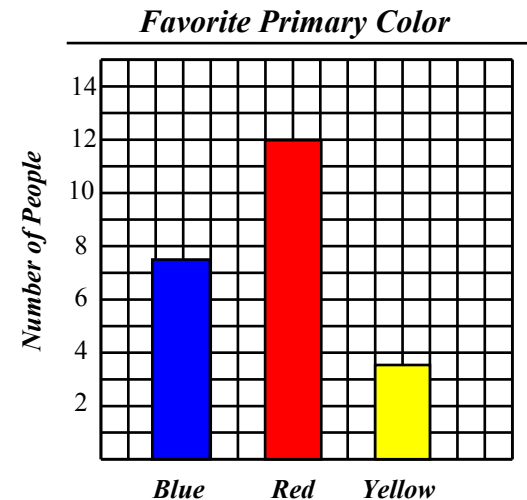
## box plot



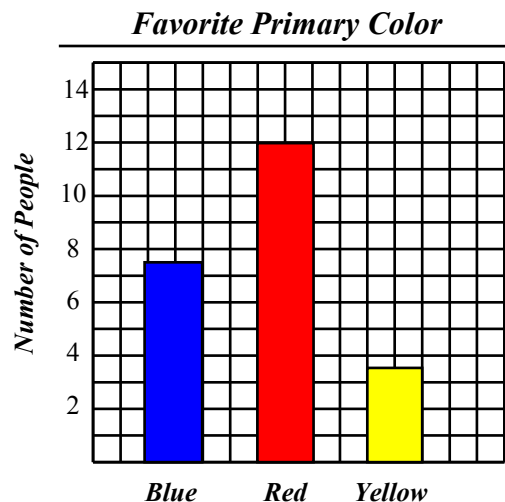
A diagram that shows the five number summary of a distribution. (Five number summary includes lowest value, lower quartile, median, upper quartile, and highest value.)

# categorical (qualitative) data

categorical  
(qualitative)  
data



categorical  
(qualitative)  
data



Data where the values of the variables are merely the names of discrete, independent categories. The categories can be given numerical codes, but they cannot be ranked, added, multiplied or measured against each other.

# causation

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*Ulcers are caused by stress and spicy food.*

# causation

There is a *correlation* between the independent variables (stress/spicy food) and the dependent variable (ulcers) but the independent variables were **NOT** the cause. We know that ulcers are caused by a corkscrew-shaped bacterium *Helicobacter pylori* (H.pylori).

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# causation

*Ulcers are caused by stress and spicy food.*

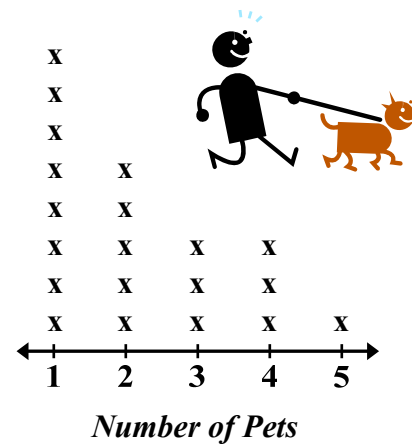
There is a *correlation* between the independent variables (stress/spicy food) and the dependent variable (ulcers) but the independent variables were **NOT** the cause. We know that ulcers are caused by a corkscrew-shaped bacterium *Helicobacter pylori* (H.pylori).

The relationship between cause and effect. This occurs **only** when the relationship between the two variables can be proven through a scientific experiment following strict guidelines. Only in this way can we rule out other factors that may affect the relationship that we see in the observed values.



# center

# center



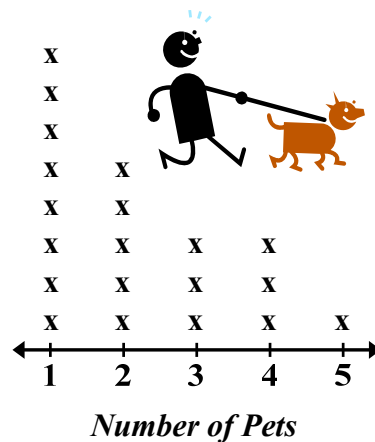
**Examples:**

**Mode = 1**

**Median = 2**

**Mean = 2.3**

# center



**Examples:**

**Mode = 1**

**Median = 2**

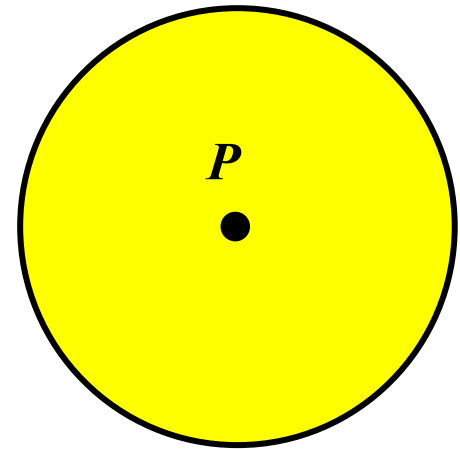
**Mean = 2.3**

An average; a single value that is used to represent a collection of data. Three commonly used types of averages are mode, median, and mean. (Also called measures of central tendency or measures of average.)

# circle

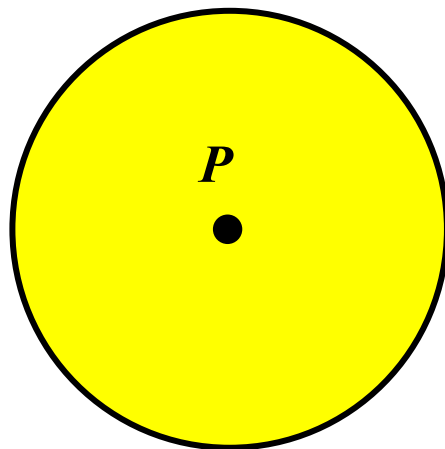
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## circle



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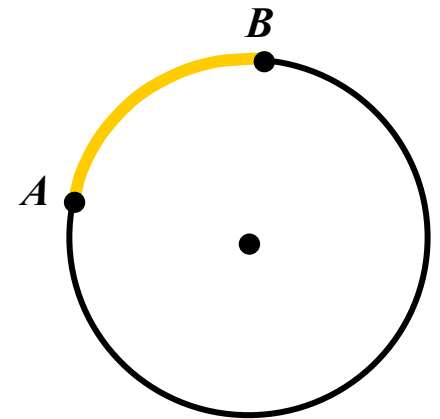
## circle



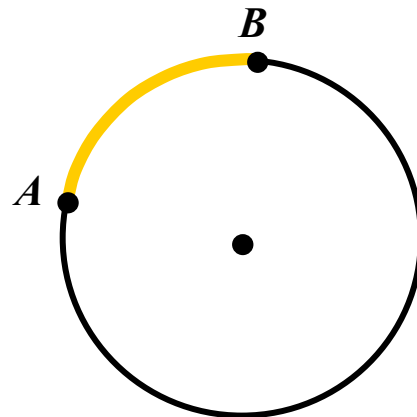
A plane figure with all points the same distance from a fixed point called a center.

# circular arc

circular  
arc



circular  
arc



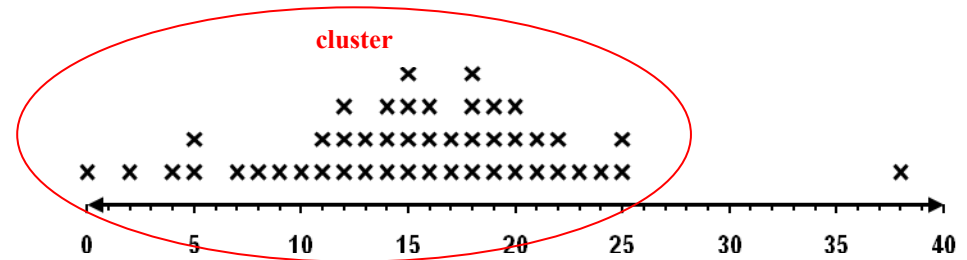
A segment of the  
circumference of a  
circle.

# cluster



# cluster

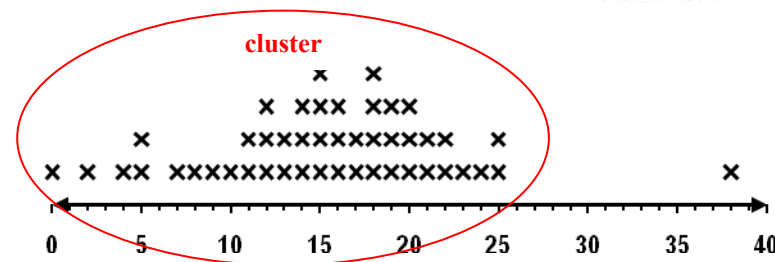
Hours Watching TV In One Week



# cluster



Hours Watching TV In One Week



A group of the same or similar elements gathered or occurring closely together on a graph.

# coefficient

---

coefficient

$5x$   
coefficient



coefficient

$5x$   
coefficient

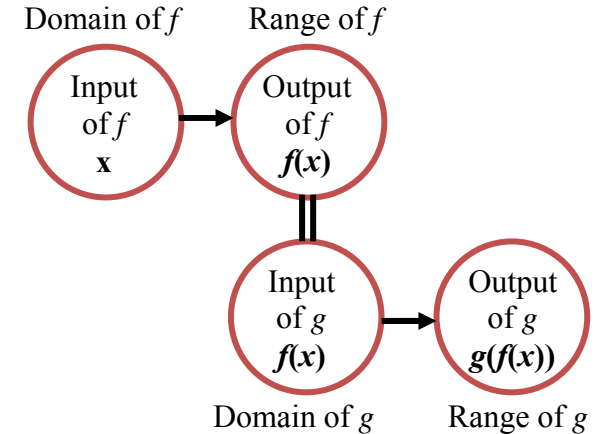


A numerical factor in a term of an algebraic expression.

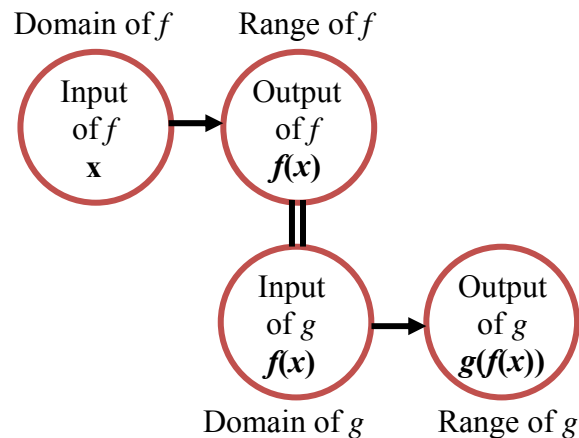
# composition of functions

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## composition of functions



## composition of functions



The output from the first function becomes the input for the second function. Usually written as  $f(g(x))$  or  $(f \circ g)(x)$ .

# compound inequality

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**compound  
inequality**

$$-1 < x \text{ and } x \leq 3$$

$$x < -1 \text{ or } x \geq 3$$

**compound  
inequality**

$$-1 < x \text{ and } x \leq 3$$

$$x < -1 \text{ or } x \geq 3$$

A mathematical sentence with two inequality statements joined by “and” or “or”.

# conditional relative frequency

---

## conditional relative frequency

---

	Dance	Sports	Movies	TOTAL
Women	0.32	0.12	0.16	0.60
Men	0.04	0.20	0.16	0.40
TOTAL	0.36	0.32	0.32	1.00

## conditional relative frequency

	Dance	Sports	Movies	TOTAL
Women	0.32	0.12	0.16	0.60
Men	0.04	0.20	0.16	0.40
TOTAL	0.36	0.32	0.32	1.00

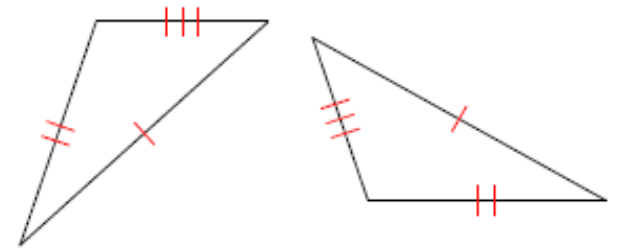
The relative frequencies in the body of the table are called *conditional frequencies* or the *conditional distribution*.



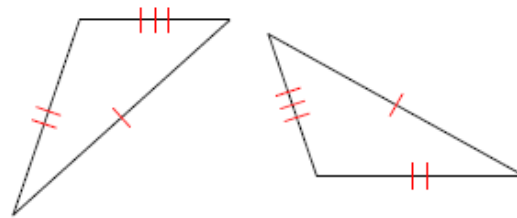
# congruent

---

## congruent



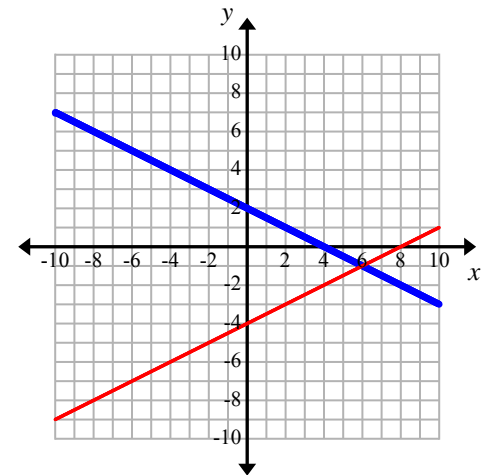
## congruent



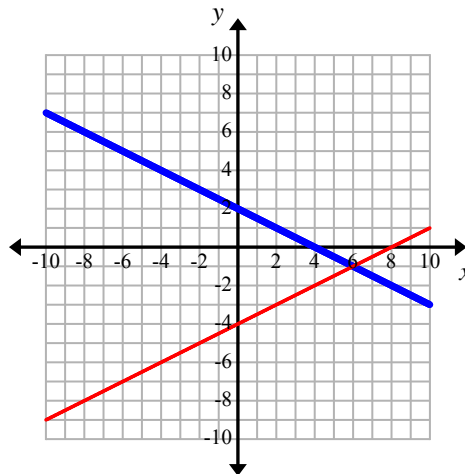
Two figures are congruent if they have the same shape and size.

# consistent system

consistent  
system



consistent  
system



A system that has at least  
one solution

# constant percent rate

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constant  
percent rate



**3.94%**  
fixed mortgage rate

---

constant  
percent rate



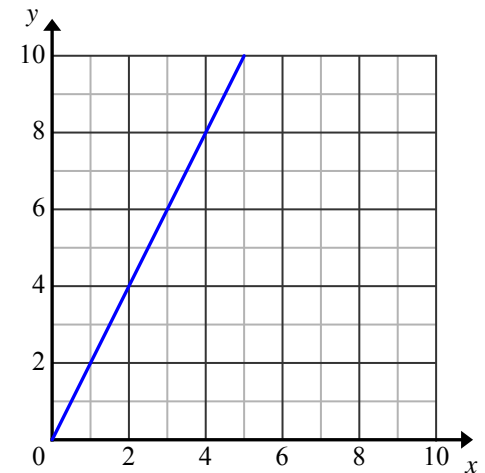
**3.94%**  
fixed mortgage rate

A percentage rate  
without any variation in  
the rate of increase or  
decrease.

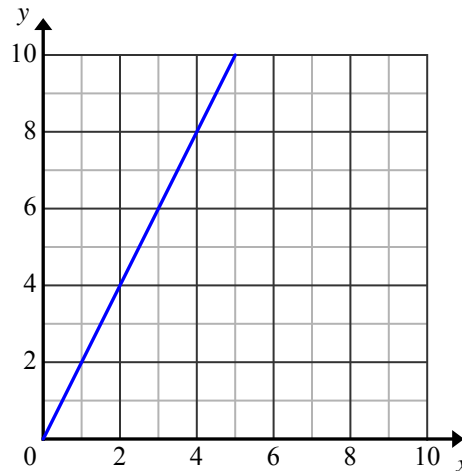
# constant rate of change

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constant rate  
of change



constant  
rate  
of change



In linear relationships the constant rate of change is illustrated as the slope of the graph of the equation.

This is so because the change in  $y$  divided by the change in  $x$  is constant for any two points on the line.

# constant term

---

constant  
term

$$5x + 4$$

constant



constant  
term

$$5x + 4$$

constant

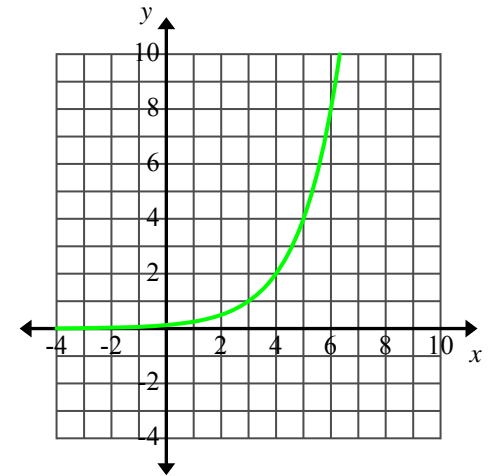


A term whose value  
does not change.

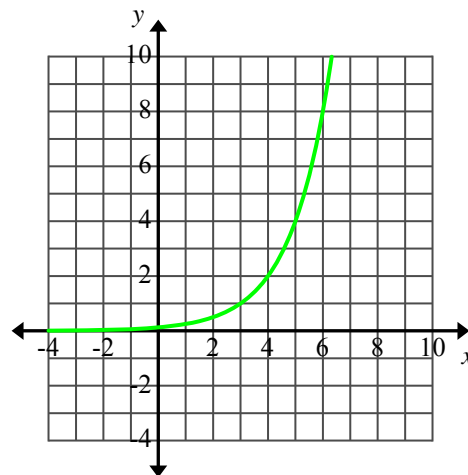
# continuous line or curve

---

**continuous  
line or curve**



**continuous  
line or curve**



A line or curve that extends without a break or irregularity.

# coordinates

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coordinates

$(3, -5)$   
 $(x, y)$

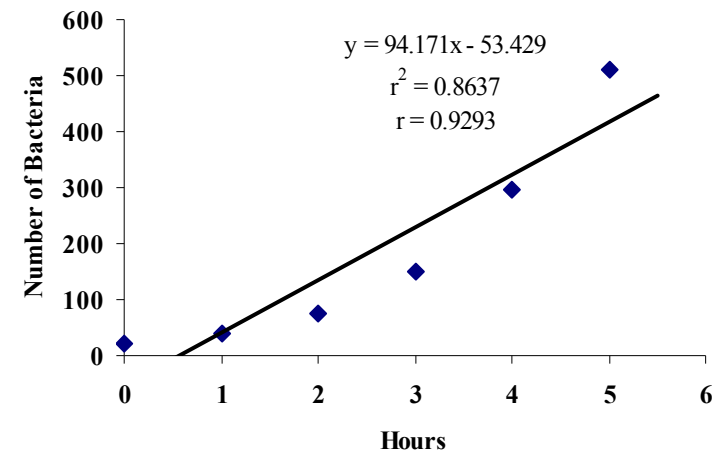
coordinates

$(3, -5)$   
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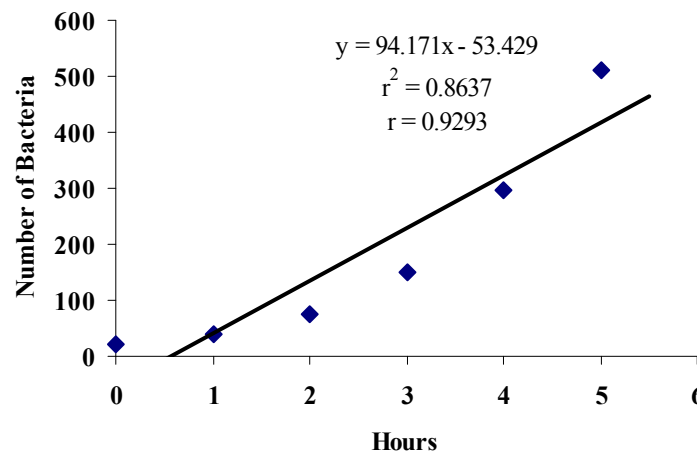
An ordered pair of numbers that identify a point on a coordinate plane.

# correlation coefficient

## correlation coefficient



## correlation coefficient



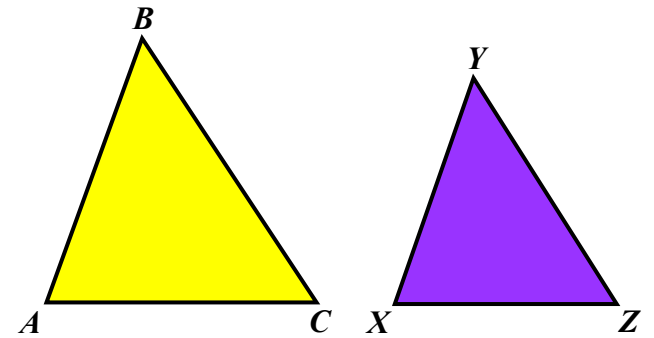
A value that shows the strength of the linear relationship between two variables.



# corresponding side

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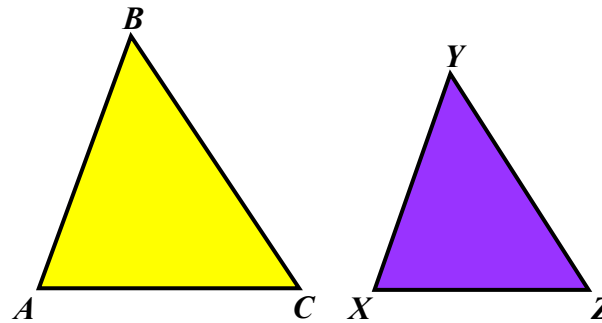
corresponding  
side



$\overline{AB}$  and  $\overline{XY}$  are corresponding sides

---

corresponding  
side



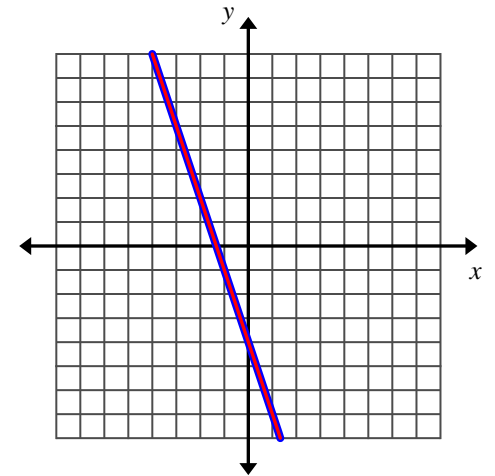
$\overline{AB}$  and  $\overline{XY}$  are  
corresponding sides

If the relative  
position of two  
sides is the same in  
two figures, then  
they are called  
corresponding sides.

# dependent system

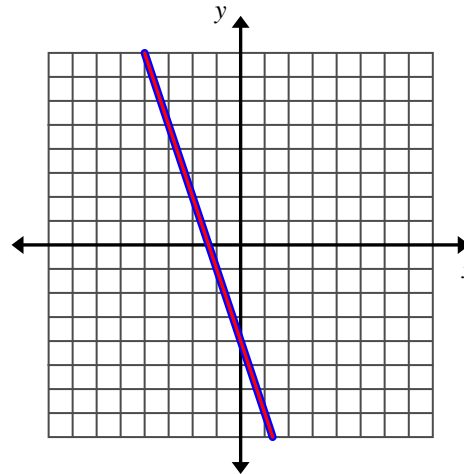
**dependent  
system**

$$3x + y = -4$$
$$-6x - 2y = 8$$



**dependent  
system**

$$3x + y = -4$$
$$-6x - 2y = 8$$

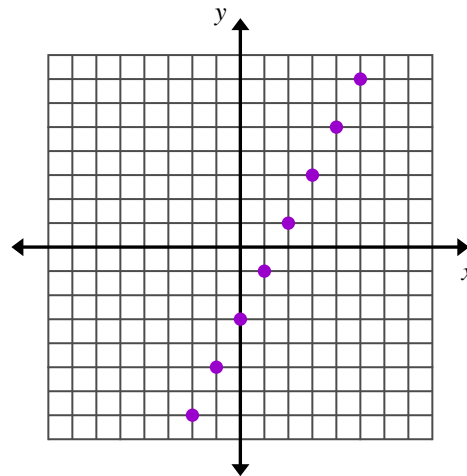
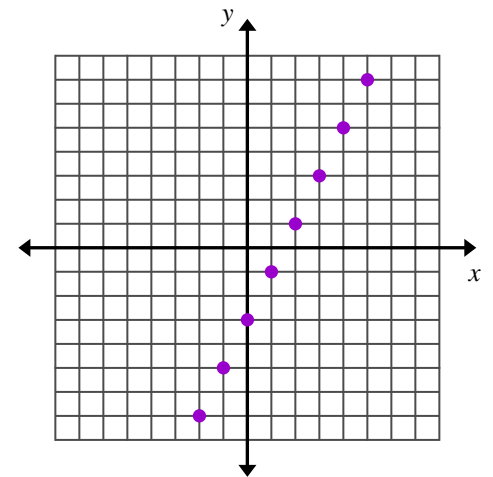


A second version of the same equation, whose graphs coincide with each other.

# discrete

---

# discrete



# discrete

A type of data is discrete if there are only a finite number of values possible or if there is a space on the number line between each 2 possible values.

# distance formula

---

distance  
formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

distance  
formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The formula used to find the distance between two points in the  $xy$ -plane.

# domain

---

domain

$\{(2, -3), (4, 6), (3, -1), (7, 6), (6, 3)\}$

domain:  $\{2, 3, 4, 6, 7\}$

---

domain

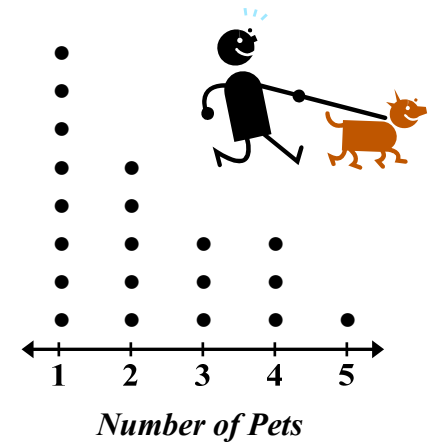
$\{(2, -3), (4, 6), (3, -1), (7, 6), (6, 3)\}$

domain:  $\{2, 3, 4, 6, 7\}$

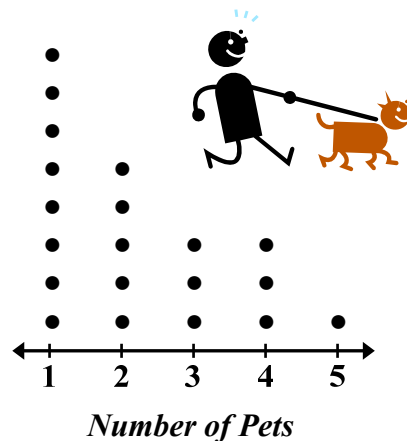
The set of “input” values for which a function is defined.

# dot plot

## dot plot



## dot plot



Also known as a line plot. A diagram showing frequency of data on a number line.

# elimination

---

## elimination

$$2x + y = 1$$

$$\underline{3x - y = 19}$$

$$5x + 0 = 20 \quad \text{Add the equations to get } x = 4.$$

$$3(4) - y = 19 \quad \text{Substitute 4 for } x \text{ in the second equation.}$$

$$12 - y = 19$$

$$y = -7 \quad \text{Solve for } y.$$

---

## elimination

$$2x + y = 1$$

$$\underline{3x - y = 19}$$

$$5x + 0 = 20 \quad \text{Add the equations to get } x = 4.$$

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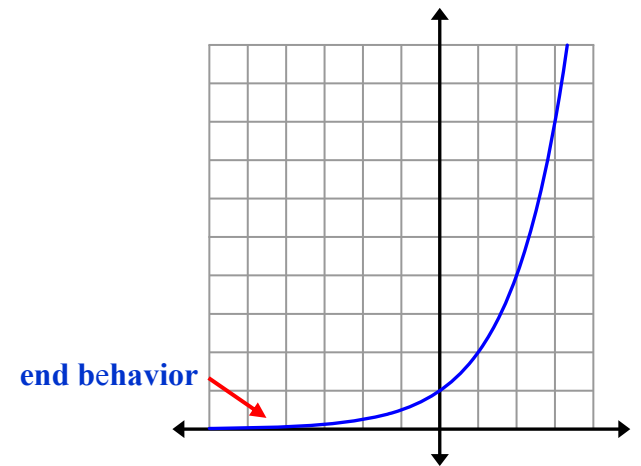
$$12 - y = 19$$

$$y = -7 \quad \text{Solve for } y.$$

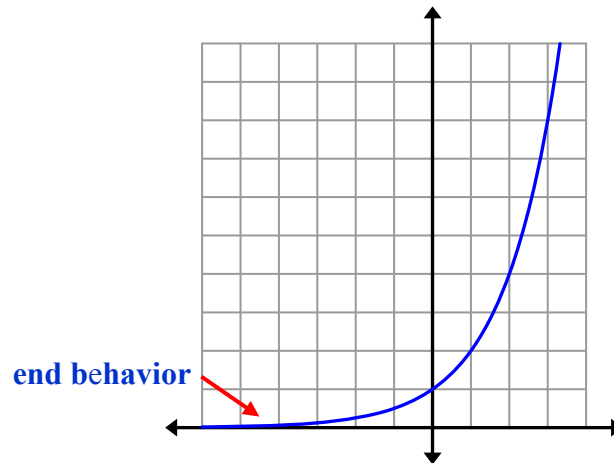
A method for solving a system of linear equations. You add or subtract the equations to eliminate a variable.

# end behavior

## end behavior



## end behavior



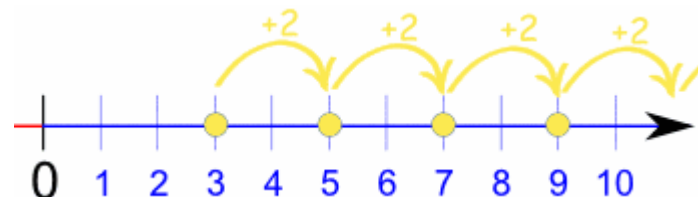
The appearance of a graph as it is followed farther and farther in either direction.



# equal differences

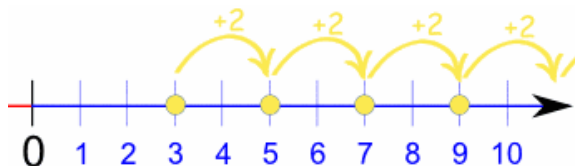
## equal differences

The sequence  $\{3, 5, 7, 9, 11, \dots\}$  is made by adding 2 each time, therefore it has a common or equal difference of 2.



## equal differences

The sequence  $\{3, 5, 7, 9, 11, \dots\}$  is made by adding 2 each time, as so has a common or equal difference of 2.



The common difference between each number in an arithmetic sequence.

# equal factors

## equal factors

A population doubles every year,  $2^n$  where two is the factor and  $n$  represents time in years.

<i>year</i>	<i>population</i>
1	2
2	4
3	8
4	16
5	32

Diagram illustrating population doubling over 5 years. The population starts at 2 in year 1 and doubles each year, reaching 32 in year 5. Red arrows on the right indicate the doubling factor of 2 for each year transition.

A population doubles every year,  $2^n$  where two is the factor and  $n$  represents time in years.

## equal factors

<i>year</i>	<i>population</i>
1	2
2	4
3	8
4	16
5	32

Diagram illustrating population doubling over 5 years. The population starts at 2 in year 1 and doubles each year, reaching 32 in year 5. Red arrows on the right indicate the doubling factor of 2 for each year transition.

Repeated multiplication by the same number or factor.

# equation

---

## equation

$$9x - 8 = 22 - x$$

## equation

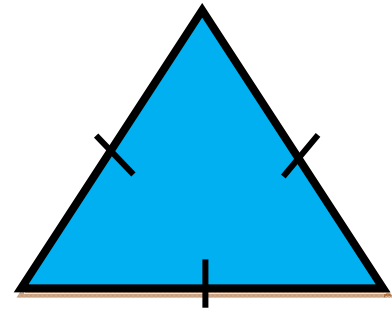
$$9x - 8 = 22 - x$$

A statement that the values of two mathematical expressions are equal (indicated by the sign =).

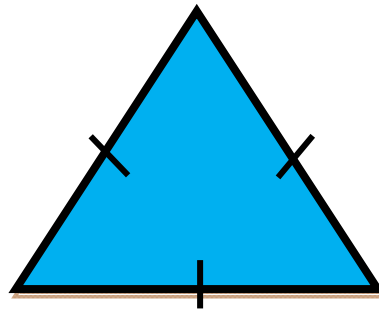
# equilateral triangle

---

equilateral  
triangle



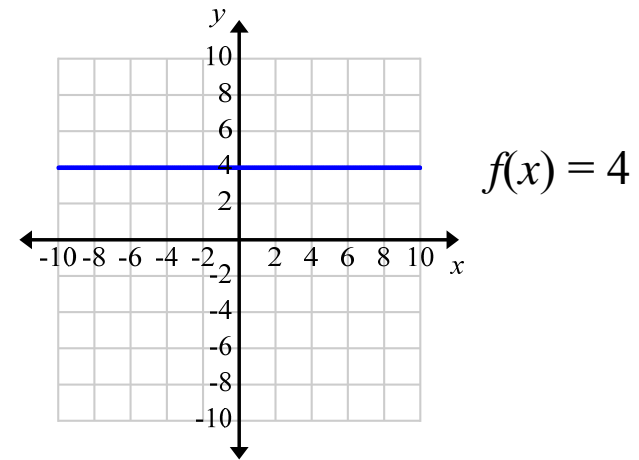
equilateral  
triangle



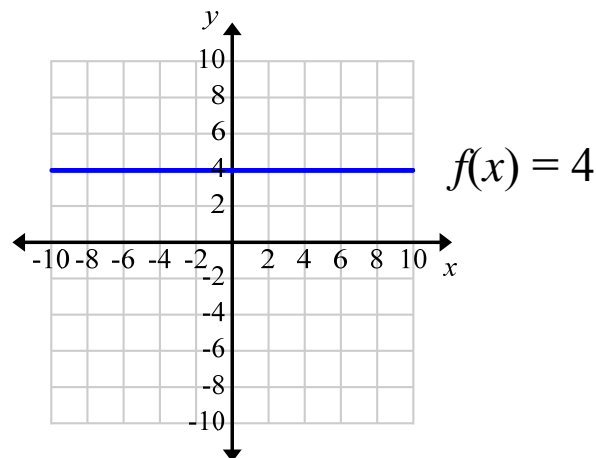
A triangle whose sides  
are all the same length.

# even function

even  
function



even  
function



A function is even if  $f(x) = f(-x)$  for all  $x$  in the domain of the function. Geometrically, the graph of an even function is symmetric with respect to the  $y$ -axis. That means that the graph of the function remains unchanged after reflection about the  $y$ -axis.

# exponential equation

---

exponential  
equation

$$5^x = 125$$

exponential  
equation

$$5^x = 125$$

An equation in which a  
variable occurs in the  
exponent.

# explicit formula

---

## explicit formula

Let  $a_n = 2n + 5$  for  
positive integers  $n$ .

If  $n = 7$ , then  
 $a_7 = 2(7) + 5 = 19$ .

## explicit formula

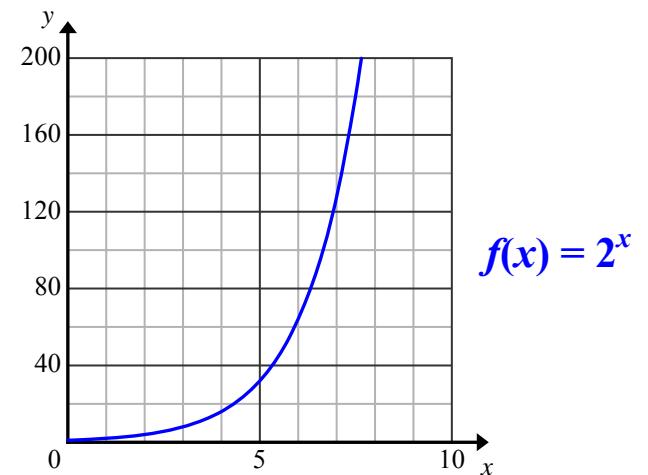
Let  $a_n = 2n + 5$  for  
positive integers  $n$ .

If  $n = 7$ , then  
 $a_7 = 2(7) + 5 = 19$ .

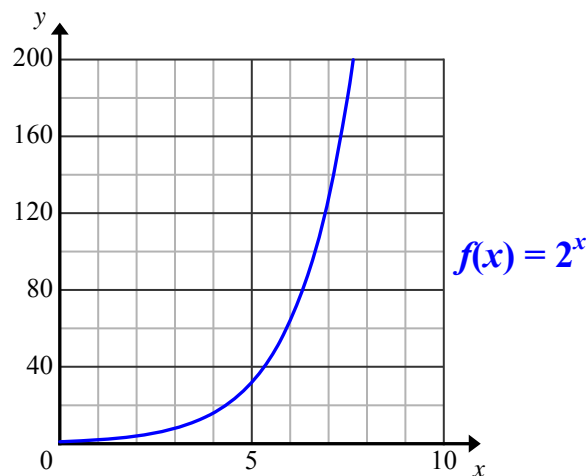
An explicit formula  
expresses the  $n$ th term of  
a sequence in terms of  $n$ .

# exponential function

## exponential function



## exponential function

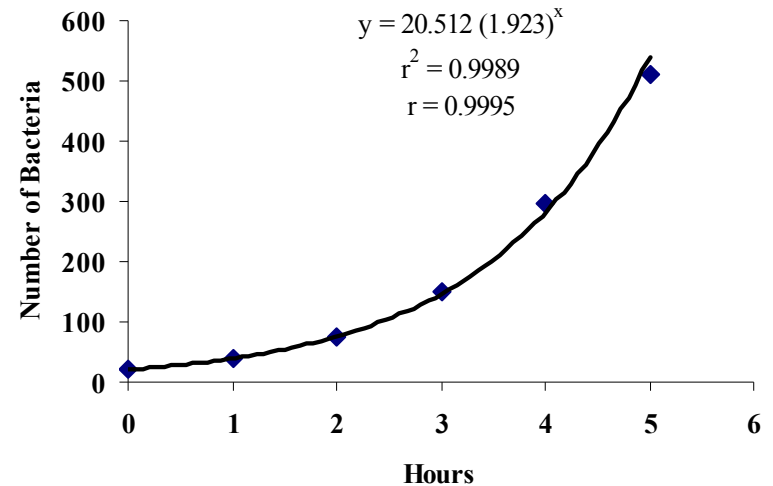


A function that repeatedly multiplies an initial amount by the same positive number. You can model all exponential functions by using  $f(x) = ab^x$ , where  $a$  is a nonzero constant,  $b > 0$  and  $b \neq 1$ .

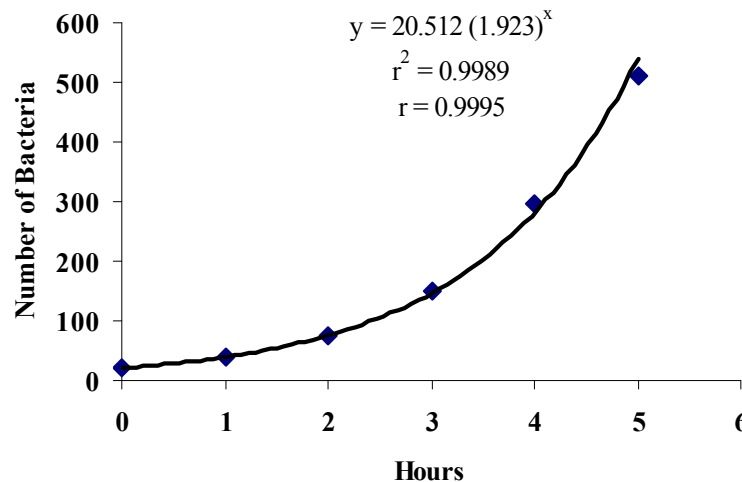


# exponential regression model

exponential  
regression  
model



exponential  
regression  
model



A model that shows the relationship between two variables by fitting an exponential function to observed data.

# expression

---

expression

$$5x + 3$$

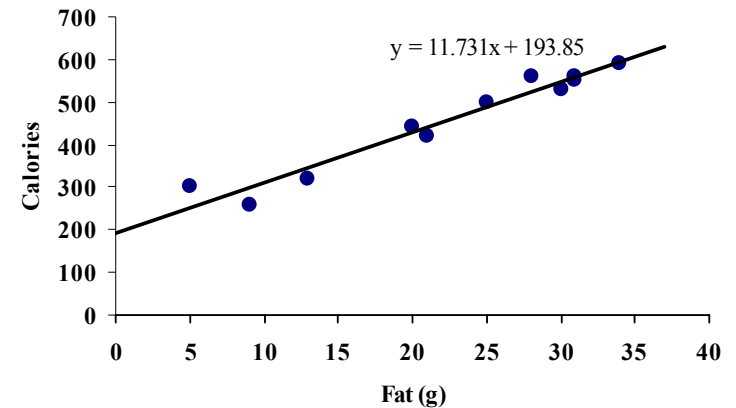
expression

$$5x + 3$$

A variable or combination of variables, numbers, and symbols that represents a mathematical relationship.

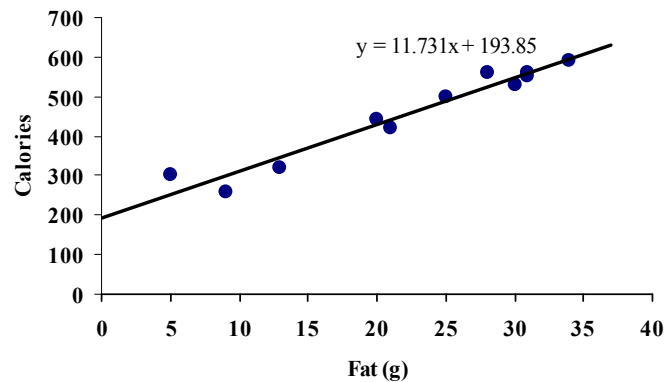
# extrapolate

# extrapolate



*Using your regression equation, find the total calories based upon 40 grams of fat?*

# extrapolate



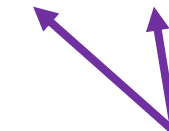
To *estimate* or infer a value or quantity beyond the known range of data.

*Using your regression equation, find the total calories based upon 40 grams of fat?*

# factor

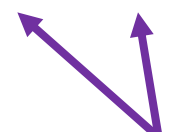
---

## factor

$$2 \cdot x = 2x$$


factors

## factor

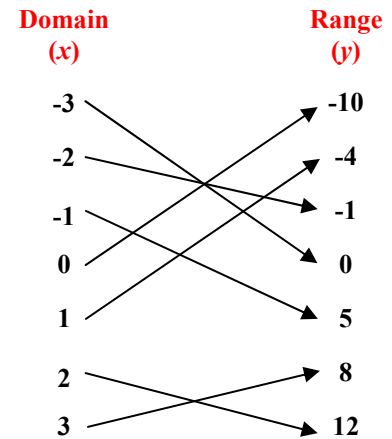
$$2 \cdot x = 2x$$


factors

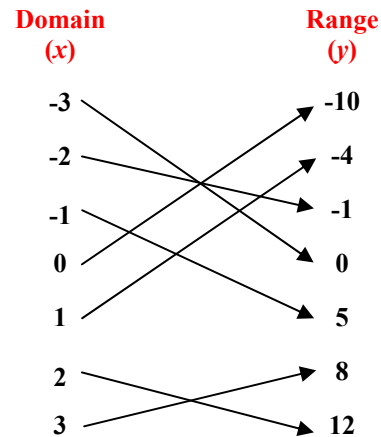
Any of the numbers or symbols in mathematics that when multiplied together form a product.

# function

# function



# function



A relation that assigns exactly one value in the range to each value in the domain.

# function notation

---

function  
notation

$$f(x) = 3x - 8$$

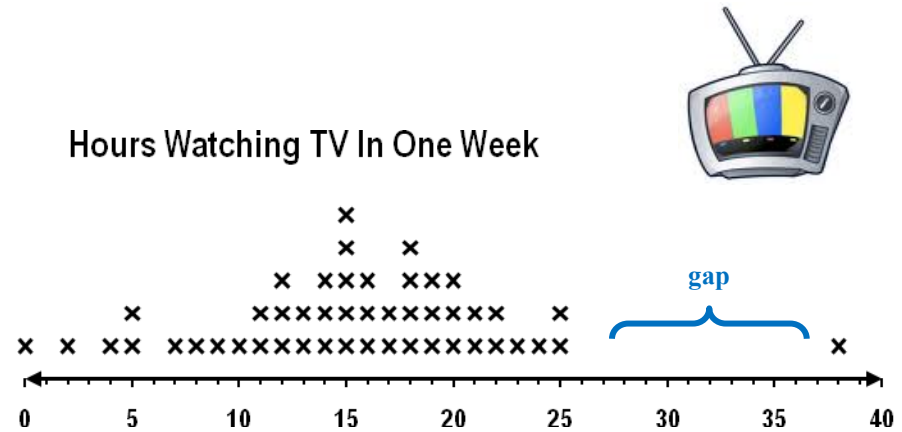
function  
notation

$$f(x) = 3x - 8$$

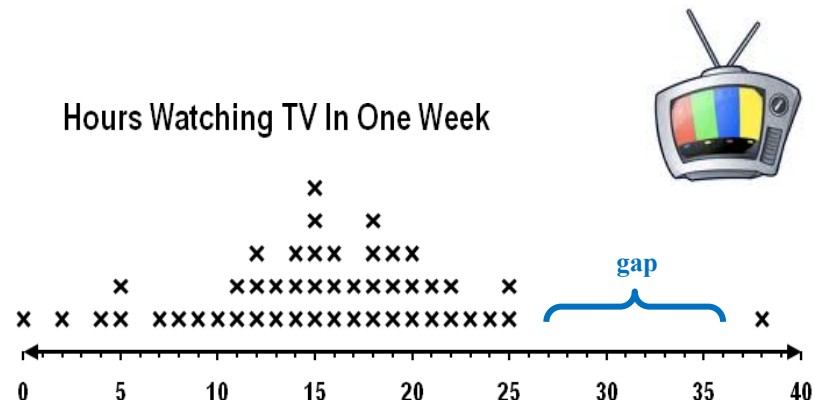
To write a rule in function notation, you use the symbol  $f(x)$  in place of  $y$ .

# gap

# gap



# gap



A place on a graph where no data values are present.

# geometric sequence

---

## geometric sequence

$$a_n = a_1 \cdot r^{n-1}$$

The first term is  $a_1$ , the common ratio is  $r$ , and the number of terms is  $n$ .

**Example:** 2, 6, 18, 54, 162

$$a_1 = 2, r = 3, n = 5$$

The explicit formula is

$$a_n = 2 \cdot 3^{n-1}$$

---

## geometric sequence

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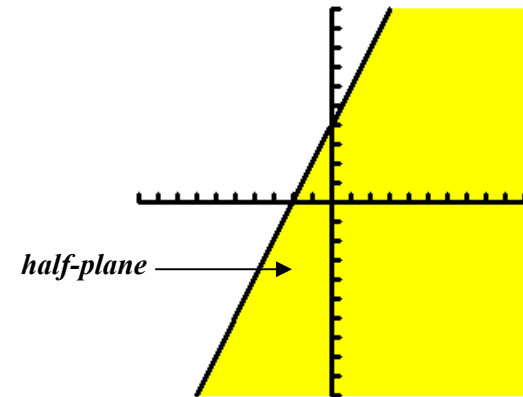
A sequence such as 2, 6, 18, 54, 162 or  $3, 1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}$  which has a constant ratio between terms.



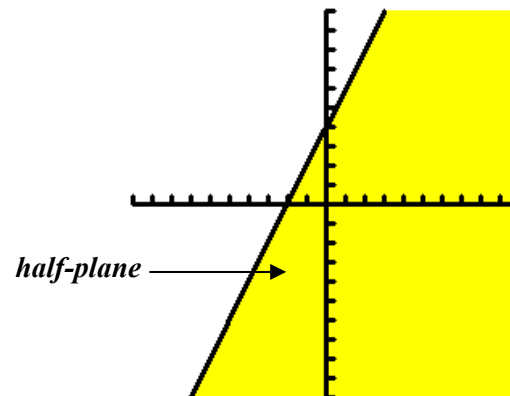
# half-plane

---

half-plane



half-plane

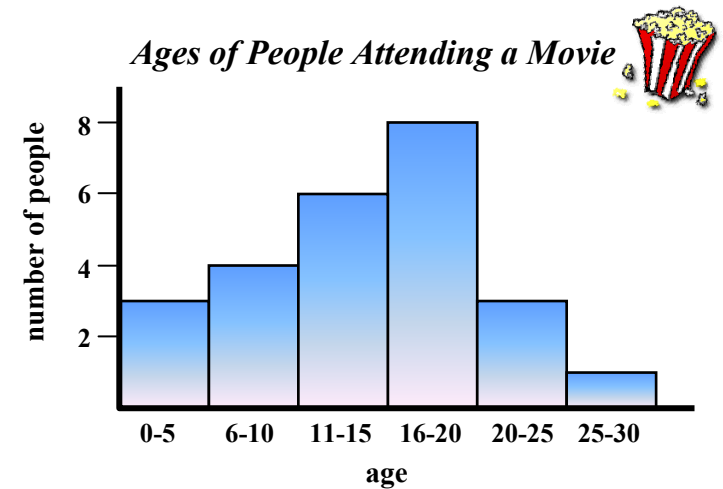


The portion of a plane lying on one side of some line in the plane. The graph of a linear inequality is always a half-plane.

# histogram

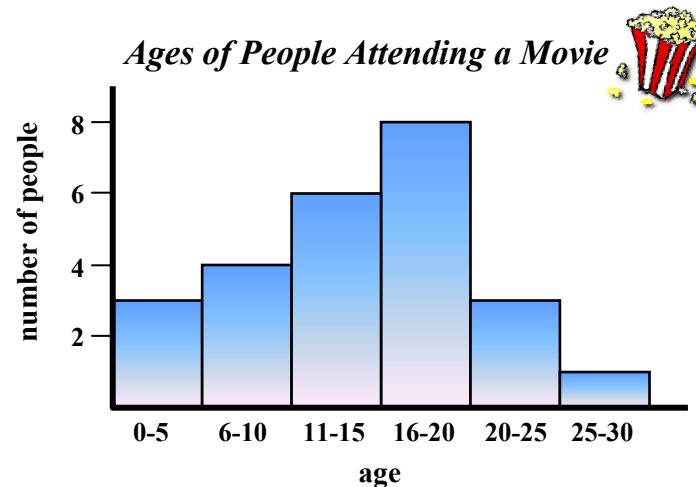
---

# histogram



---

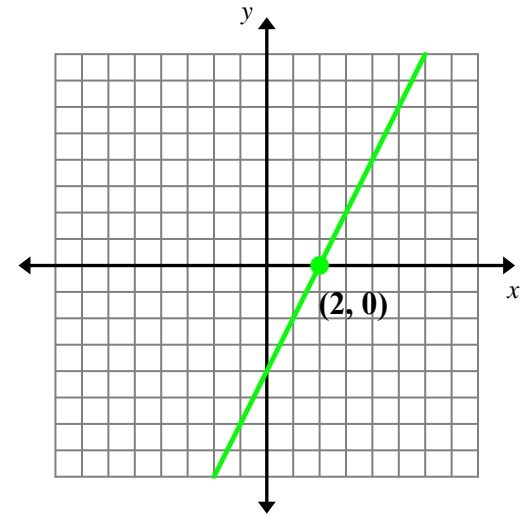
# histogram



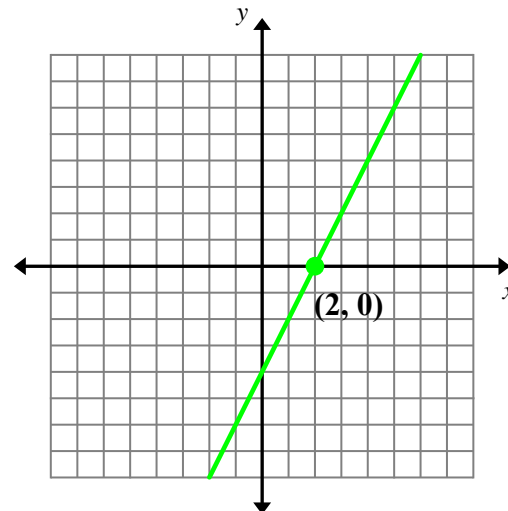
A bar graph in which the labels for the bars are numerical intervals.

# horizontal intercept

horizontal  
intercept



horizontal  
intercept

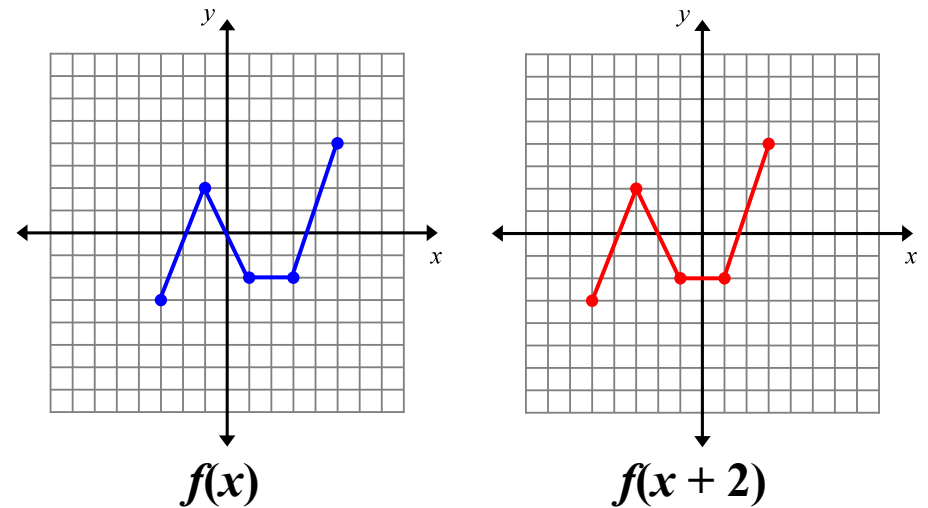


Also known as the  $x$ -intercept. It can be found by substituting “0” for the variable  $y$  in the equation  $y = mx + b$ .

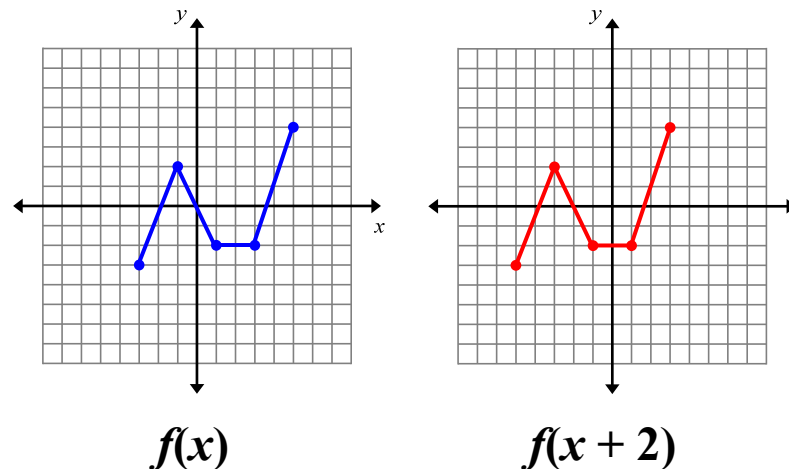
$$0 = m \cdot x + b$$

# horizontal translation

## horizontal translation



## horizontal translation

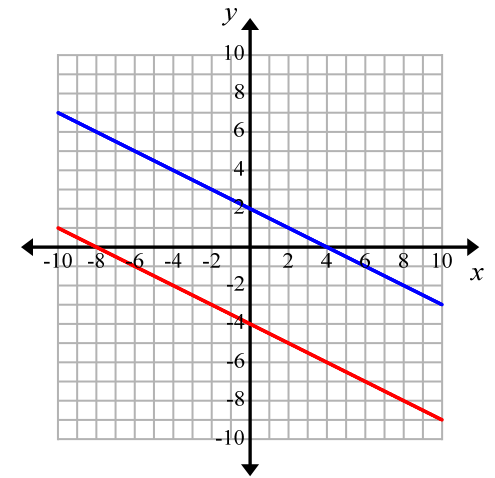


Horizontally translating a graph is equivalent to shifting the parent function left or right in the direction of the  $x$ -axis. A graph is translated  $k$  units horizontally by moving each point on the graph  $k$  units horizontally.

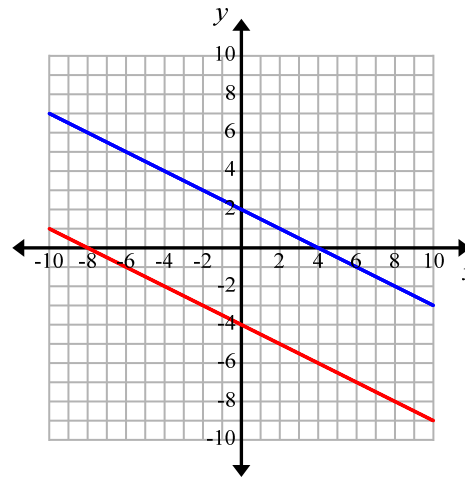
# inconsistent system

---

**inconsistent  
system**



**inconsistent  
system**

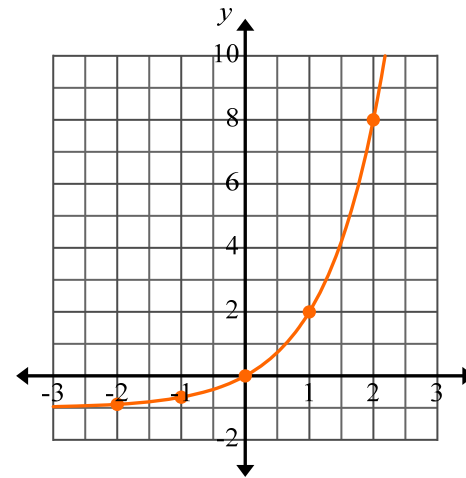


A system that has no  
solution.

# increasing exponentially

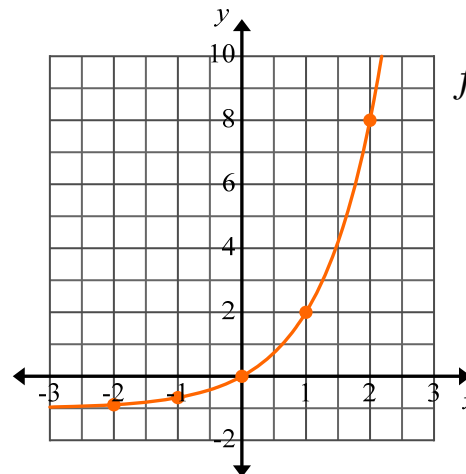
---

increasing  
exponentially



$$f(x) = 3^x - 1$$

increasing  
exponentially

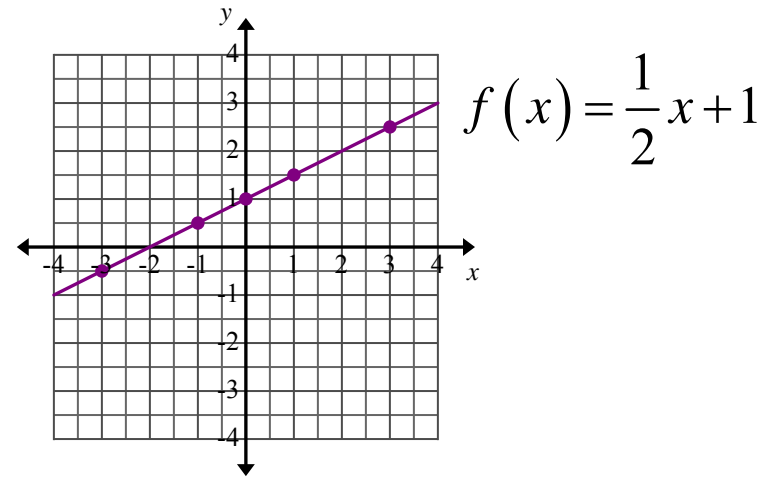


$$f(x) = 3^x - 1$$

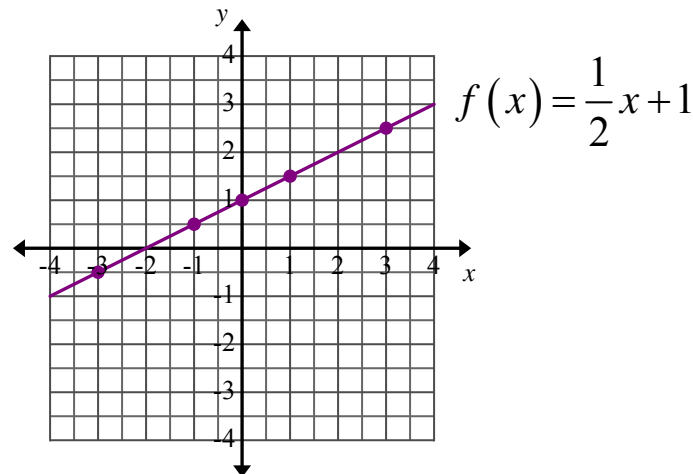
Something is said to *increase exponentially* if its rate of change is expressed using exponents. A graph of such a rate would appear not as a straight line, but as a curve that continually becomes steeper or shallower.

# increasing linearly

increasing  
linearly



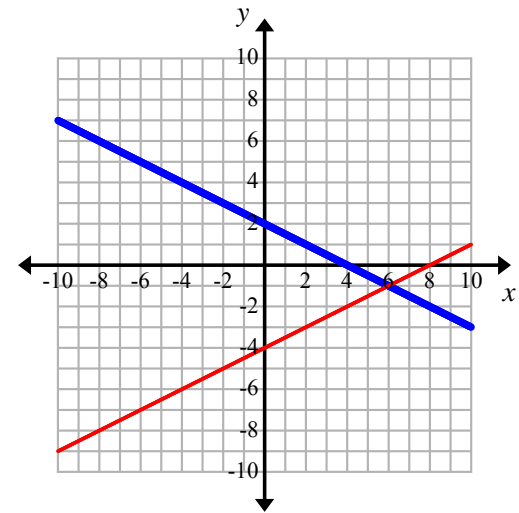
increasing  
linearly



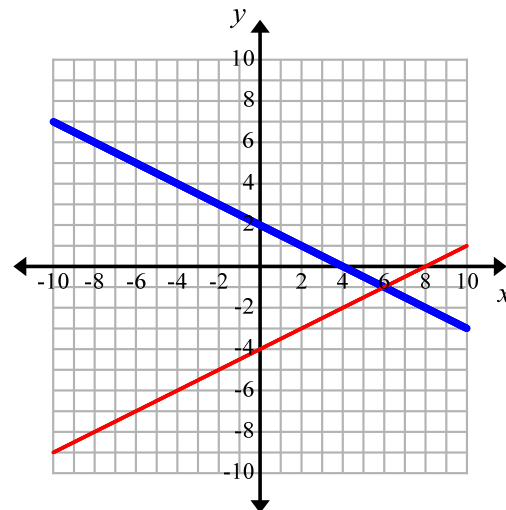
A function is said to increase linearly if its rate of change is constant. That is, the change in  $y$  divided by the change in  $x$  is constant for any two points on the function. The graph of such a function would appear as a straight line.

# independent system

## independent system



## independent system



A system of linear equations that has a unique solution.



# inequality

---

$$5x + 6 < 20 - 2x$$

inequality



$$5x + 6 < 20 - 2x$$

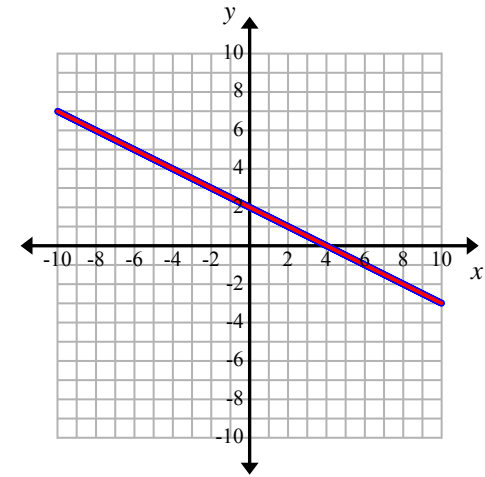
inequality



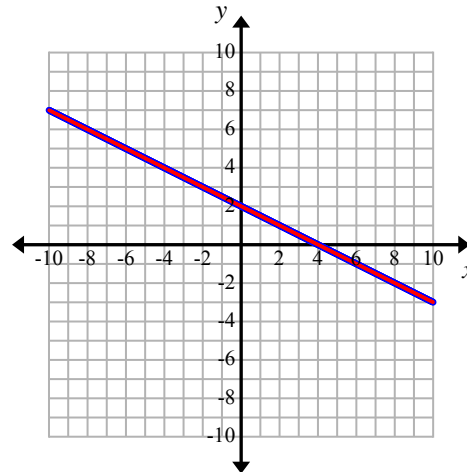
A mathematical sentence that compares two unequal expressions using one of the symbols  $<$ ,  $>$ ,  $\leq$ ,  $\geq$ , or  $\neq$ .

# infinitely many solutions

infinitely many solution



infinitely many solutions



A system of equations that are dependent and consistent.

# input

---

# input

$$f(x) = 2(x + 1) - 7$$

input:  $x = 3$

$$\begin{aligned} f(3) &= 2(3 + 1) - 7 \\ &= 2(4) - 7 \\ &= 8 - 7 \\ &= 1 \end{aligned}$$

$$f(x) = 2(x + 1) - 7$$

input:  $x = 3$

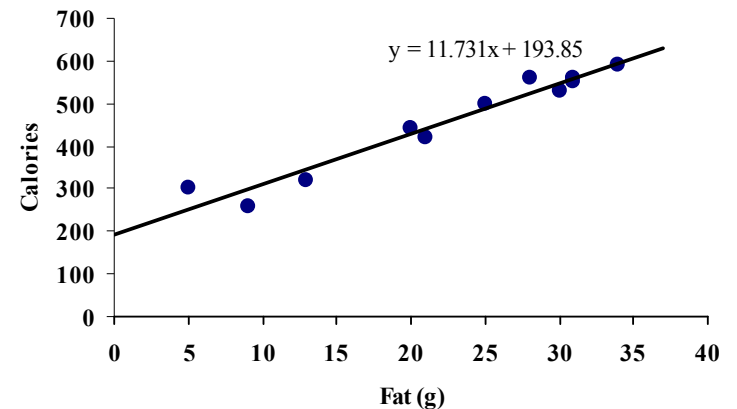
$$\begin{aligned} f(3) &= 2(3 + 1) - 7 \\ &= 2(4) - 7 \\ &= 8 - 7 \\ &= 1 \end{aligned}$$

# input

A value of the independent variable.

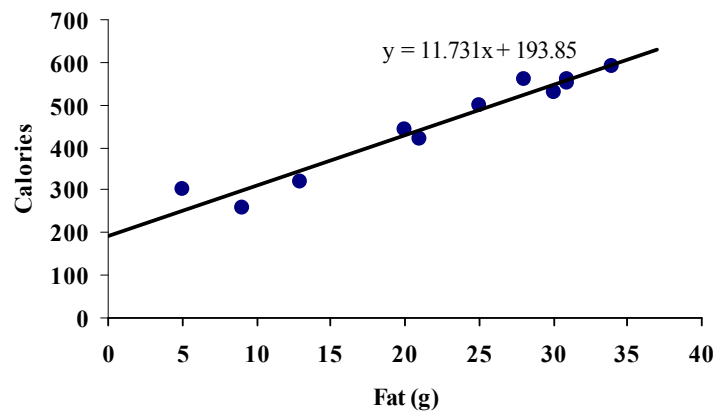
# interpolate

# interpolate



*Using your regression equation, find the total calories based upon 26 grams of fat?*

# interpolate

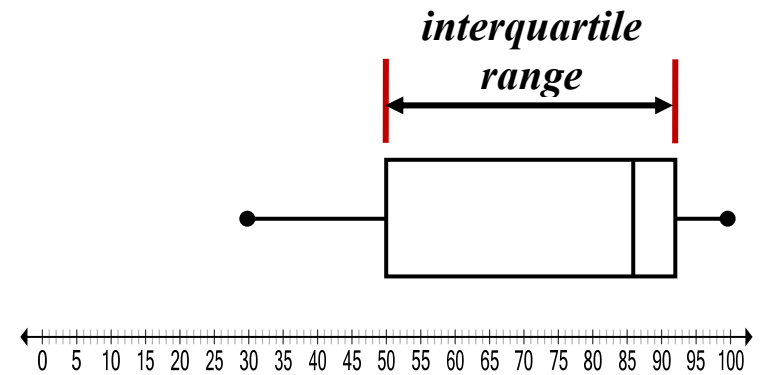


*Using your regression equation, find the total calories based upon 26 grams of fat?*

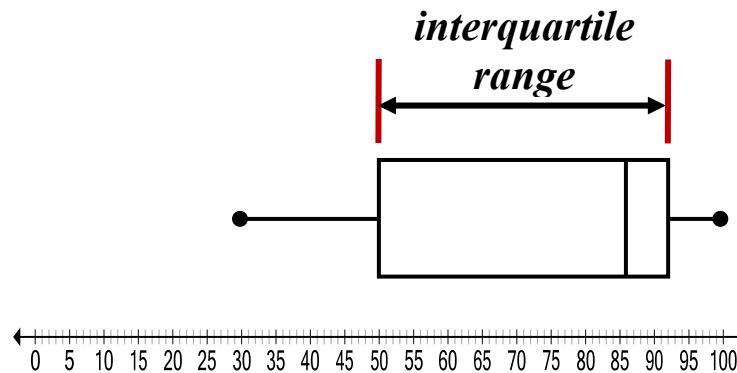
To *estimate* or infer a value or quantity that falls within the range of values plotted on the scatter plot.

# interquartile range

## interquartile range



## interquartile range

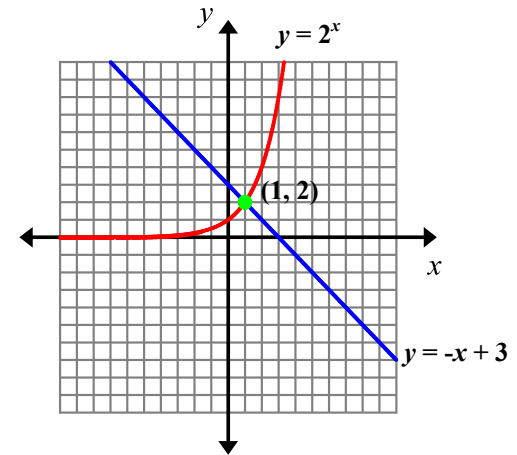


The difference  
between the upper  
quartile and the  
lower quartile.

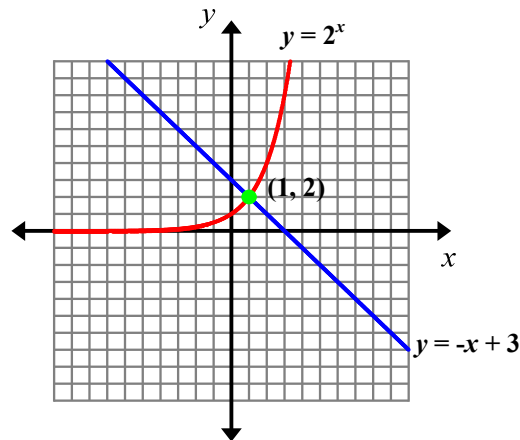
# intersection

---

intersection



intersection



A point where two or more functions intersect.

# interval

---

## interval

- $0 \leq x \leq 1$  is an interval which contains 0 and 1, and all numbers between them
  - $(0, 1)$  is an open interval
  - $[0, 1]$  is a closed interval
- 

## interval

- $0 \leq x \leq 1$  is an interval which contains 0 and 1, and all numbers between them
- $(0, 1)$  is an open interval
- $[0, 1]$  is a closed interval

A set of real numbers with the property that any number that lies between two numbers in the set is also included in the set.

# interval notation

---

interval  
notation

For  $-2 \leq x < 8$ , the  
interval notation is  
 $[-2, 8)$ .

interval  
notation

For  $-2 \leq x < 8$ ,  
the interval  
notation is  
 $[-2, 8)$ .

A notation for describing an interval on a number line. The interval's endpoint(s) are given, and a parenthesis or bracket is used to indicate whether each endpoint is included in the interval.



# joint frequency

---

joint  
frequency

	Dance	Sports	Movies	TOTAL
Women	16	6	8	30
Men	2	10	8	20
TOTAL	18	16	16	50

joint  
frequency

	Dance	Sports	Movies	TOTAL
Women	16	6	8	30
Men	2	10	8	20
TOTAL	18	16	16	50

Entries in the body of the table are called *joint frequencies*.

# laws of exponents

---

## laws of exponents

---

For all real numbers  $x$  and all integers  $m$  and  $n$ ,

$$x^m \cdot x^n = x^{m+n} \quad \frac{x^m}{x^n} = x^{m-n}, x \neq 0$$

$$(x^n)^m = x^{nm} \quad (xy)^n = x^n y^n$$

---

## laws of exponents

For all real numbers  $x$  and all integers  $m$  and  $n$ ,

$$x^m \cdot x^n = x^{m+n} \quad \frac{x^m}{x^n} = x^{m-n}, x \neq 0$$

$$(x^n)^m = x^{nm} \quad (xy)^n = x^n y^n$$

The theorem stating the elementary properties of exponents.

# line

---

## line



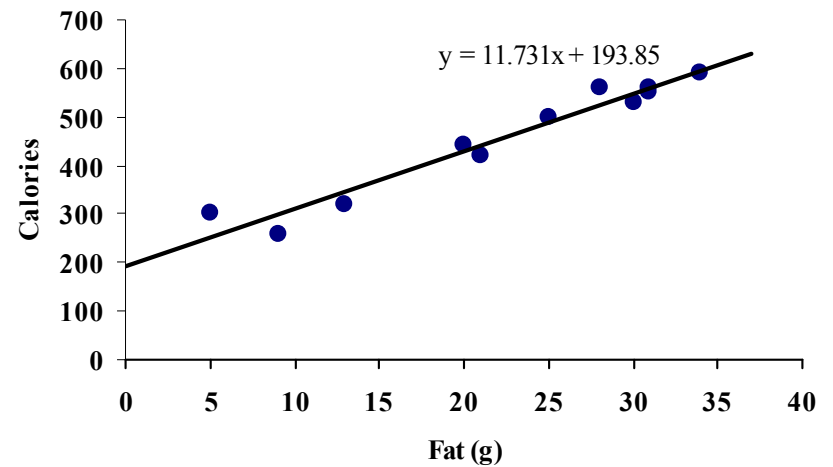
## line



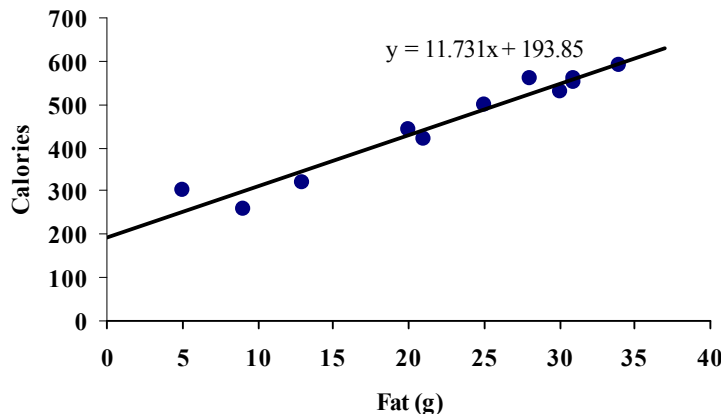
A line is the straight path connecting two points and extending beyond the points in both directions.

# line of best fit

## line of best fit



## line of best fit



A line of best fit (or “trend” line) is a straight line that best represents the data on a scatter plot. This line may pass through some of the points, none of the points, or all of the points.

# line segment

---

## line segment

---



## line segment



A line segment is a part of a line that is bounded by two end points, and contains every point on the line between its end points.

# linear equation

---

linear  
equation

$$2(x - 5) = 3x + 4$$

linear  
equation

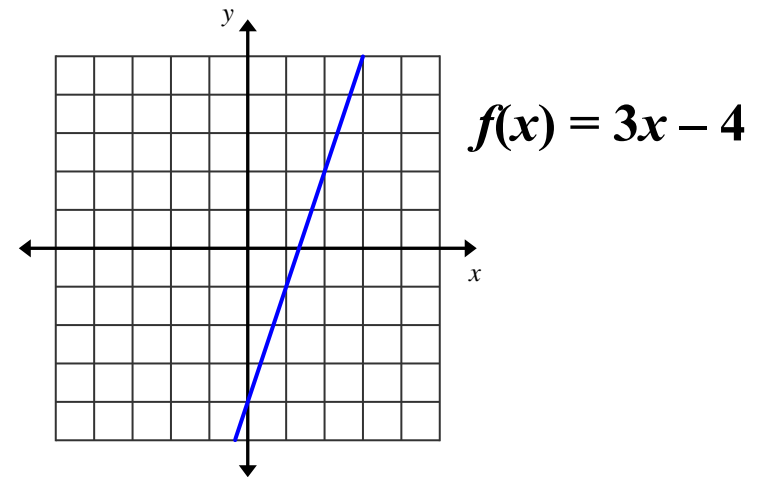
$$2(x - 5) = 3x + 4$$

An algebraic equation in which each term is either a constant or the product of a constant and (the first power of) a single variable.

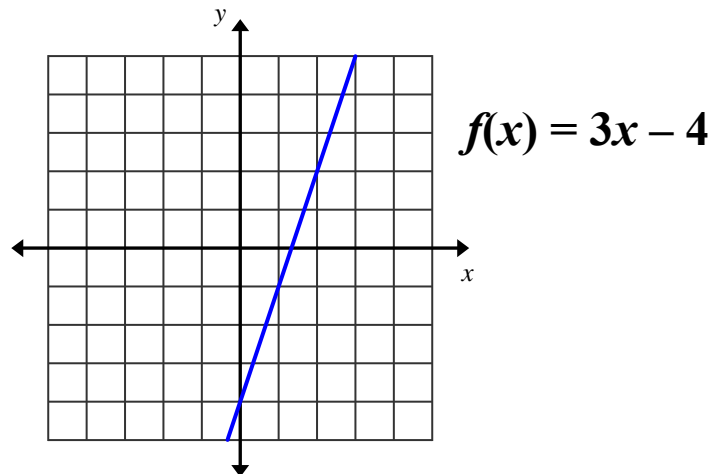
# linear function

---

linear  
function



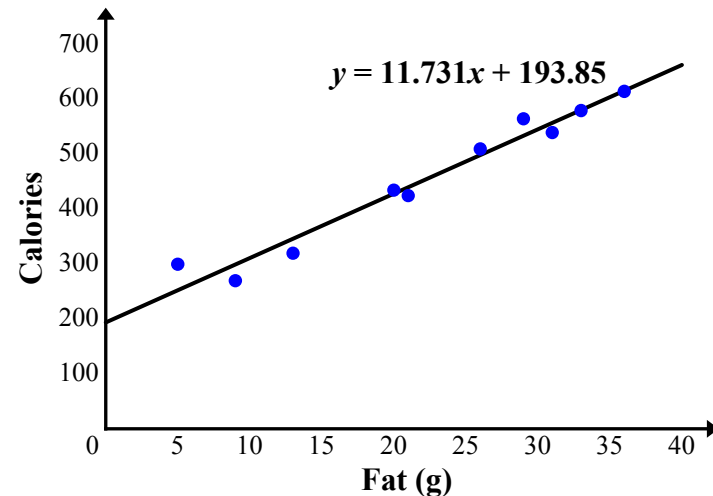
linear  
function



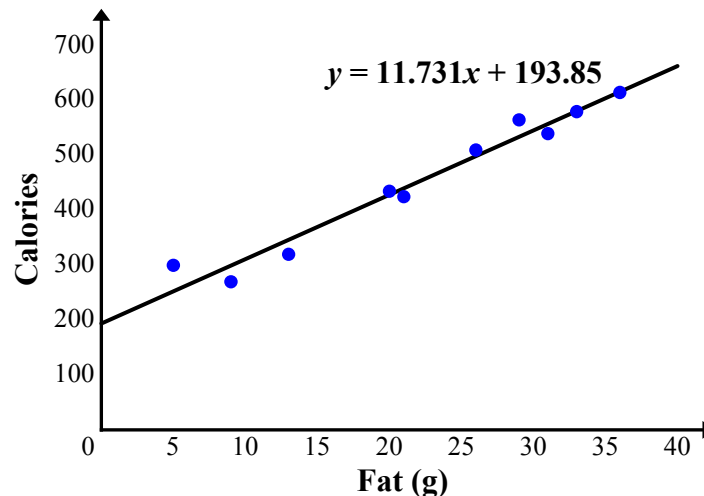
Functions that are a first-degree polynomial of one variable. The graph of the function is a line.

# linear regression model

linear  
regression  
model



linear  
regression  
model



A model that shows the relationship between two variables by fitting a linear function to observed data.



# marginal frequency

## marginal frequency

	Dance	Sports	Movies	TOTAL
Women	16	6	8	<b>30</b>
Men	2	10	8	<b>20</b>
TOTAL	<b>18</b>	<b>16</b>	<b>16</b>	50

## marginal frequency

	Dance	Sports	Movies	TOTAL
Women	16	6	8	<b>30</b>
Men	2	10	8	<b>20</b>
TOTAL	<b>18</b>	<b>16</b>	<b>16</b>	50

The total row and total column report the marginal frequencies or marginal distribution.

# mean

Data Set: 14, 21, 27, 33, 45, 46, 52

Step 1:

$$14 + 21 + 27 + 33 + 45 + 46 + 52 = 238$$

Step 2:

$$238 \div 7 = 34 \leftarrow \text{mean}$$

# mean

Data Set: 14, 21, 27, 33, 45, 46, 52

Step 1:

$$14 + 21 + 27 + 33 + 45 + 46 + 52 = 238$$

Step 2:

$$238 \div 7 = 34 \leftarrow \text{mean}$$

The sum of a set of numbers divided by the number of elements in the set. (A type of average)

# mean

# median

---

median

14, 21, 27, **33**, 45, 46, 52



median

median

14, 21, 27, **33**, 45, 46, 52



median

The middle number of a set of numbers when the numbers are arranged from least to greatest, or the mean of two middle numbers when the set has two middle numbers.

# numerical (quantitative) data

---

**numerical  
(quantitative)  
data**

Counting the number of students getting on a school.



Counting the number of  
students getting on a school.

**numerical  
(quantitative)  
data**

Numerical/quantitative data are  
numbers in context.

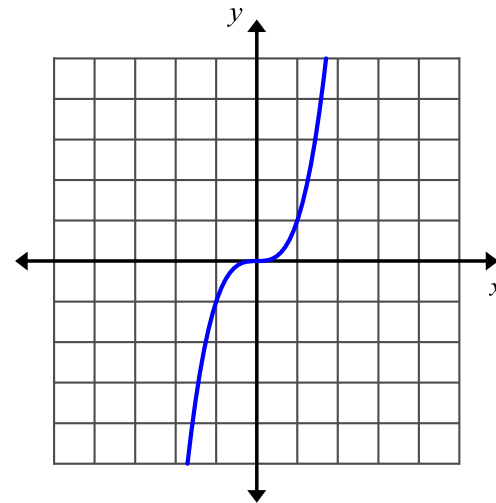
Examples:

- 'there are 43 flies on the ceiling'
- 'there are 5 pieces of gum in a pack'
- 'there are 8 planets in the solar system'



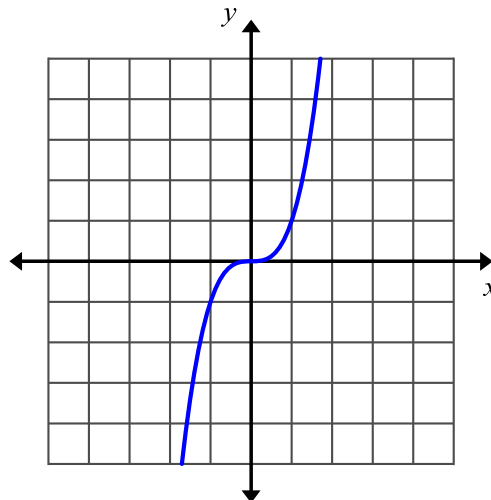
# odd function

## odd function



$h(x) = x^3$  is an example of an odd function. Notice that if you rotate the graph  $180^\circ$  around the origin, it will match up with itself.

## odd function

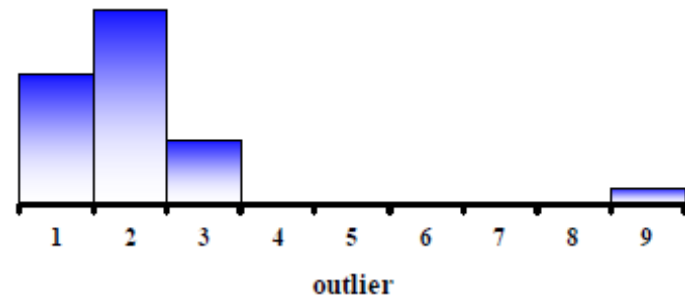


A function is odd if  $-f(x) = f(-x)$  for all  $x$  in the domain of the function, or  $-f(x) + f(-x) = 0$ . Geometrically, the graph of an odd function has rotational symmetry with respect to the origin.

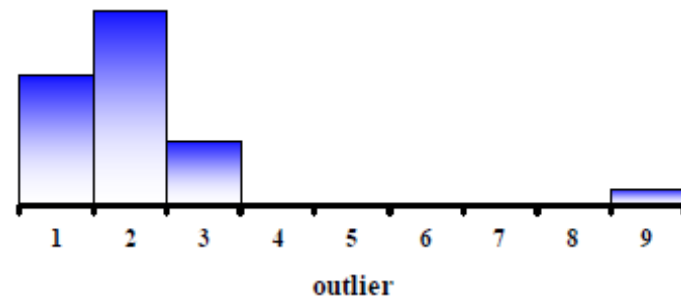
# outlier

# outlier

Looking back at Bob's points scored, any outliers lie outside the interval (3.25, 17.25).



Looking back at Bob's points scored, any outliers lie outside the interval (3.25, 17.25).



Extreme values that differ greatly from the other observations.

As a rule, an extreme value is considered to be an outlier if it is at least 1.5 *interquartile ranges* below the lower quartile (Q1), or at least 1.5 *interquartile ranges* above the upper quartile (Q3).

# outlier

# output

---

# output

$$f(x) = 2(x + 1) - 7$$

input:  $x = 3$

$$\begin{aligned} f(3) &= 2(3 + 1) - 7 \\ &= 2(4) - 7 \\ &= 8 - 7 \\ &= \mathbf{1} \end{aligned}$$

**output is 1**

---

$$f(x) = 2(x + 1) - 7$$

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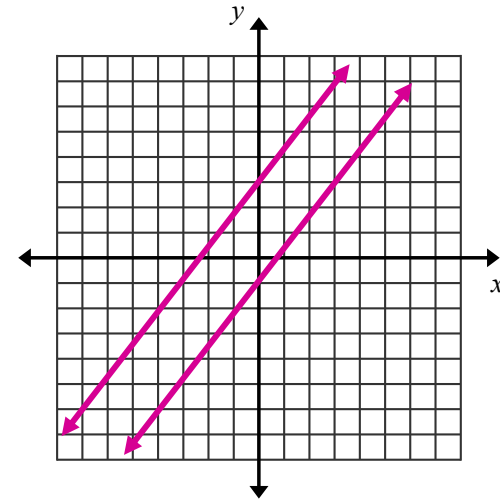
**output is 1**

A value of the  
dependent variable.

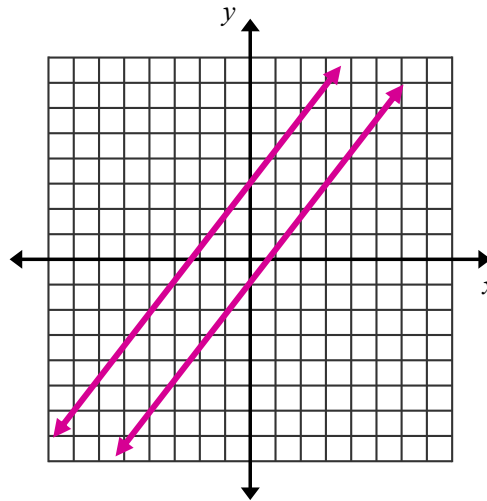
# output

# parallel lines

parallel  
lines



parallel  
lines



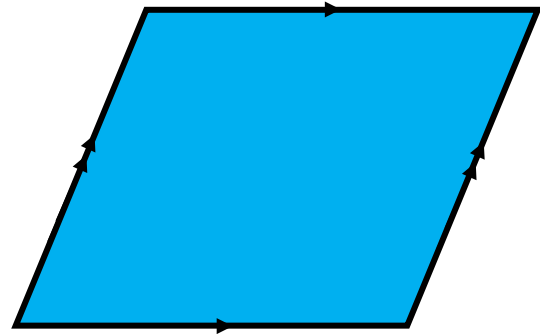
Two lines in the same plane that never intersect. Parallel lines have the same slope.



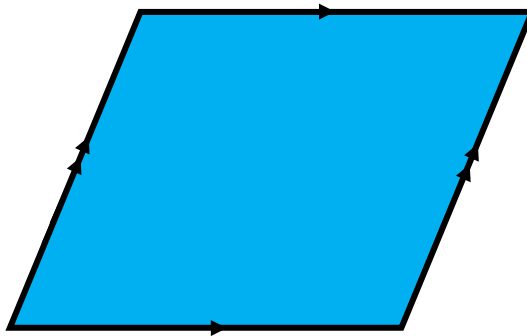
# parallelogram

---

parallelogram



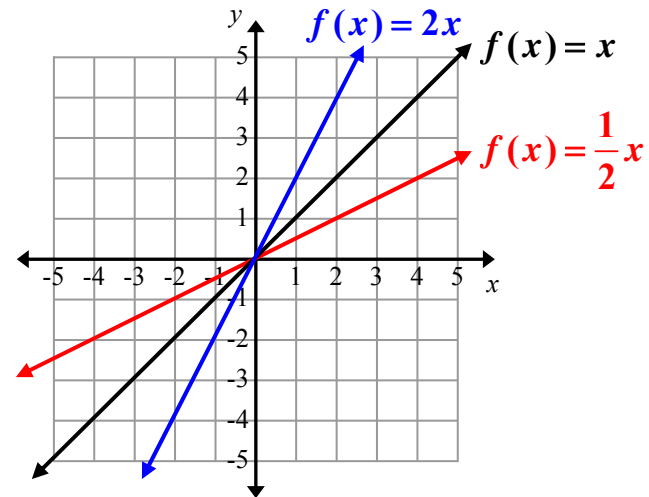
parallelogram



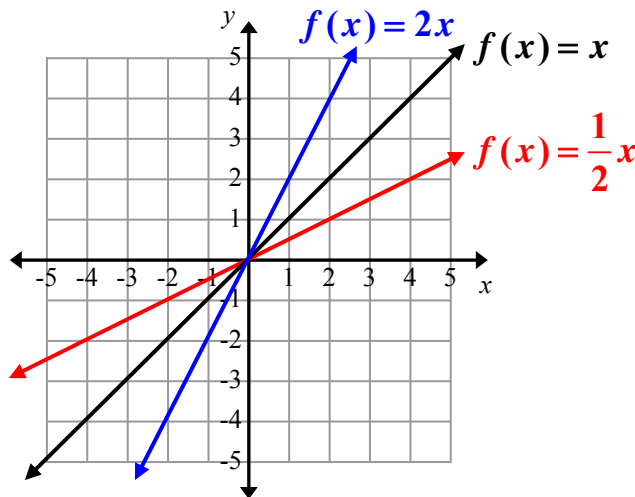
A quadrilateral with two pairs of parallel and congruent sides.

# parameter

parameter



parameter

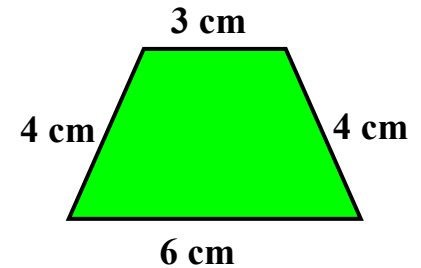


A constant or variable term in a function that determines the specific form of the function but not its general nature, as  $a$  in  $f(x) = ax$ , where  $a$  determines only the slope of the line described by  $f(x)$ .

# perimeter

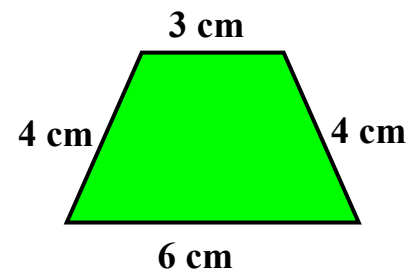
---

## perimeter



$$\begin{aligned}\text{Perimeter} &= 4\text{cm} + 6\text{cm} + 4\text{cm} + 3\text{cm} \\ &= 17\text{cm}\end{aligned}$$

## perimeter



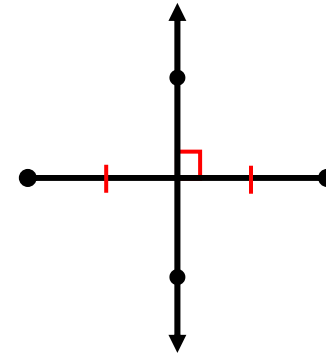
$$\begin{aligned}\text{Perimeter} &= 4\text{cm} + 6\text{cm} + 4\text{cm} + 3\text{cm} \\ &= 17\text{cm}\end{aligned}$$

The continuous line forming the boundary of a closed geometric figure.

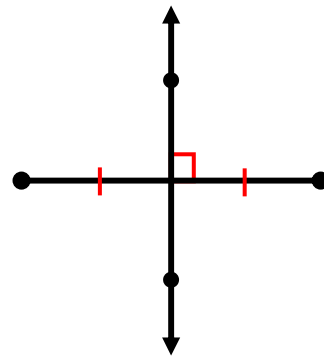
# perpendicular bisector of a segment

---

perpendicular  
bisector  
of a segment



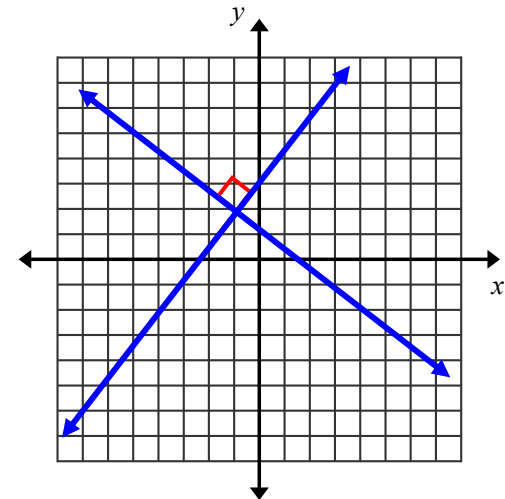
perpendicular  
bisector  
of a segment



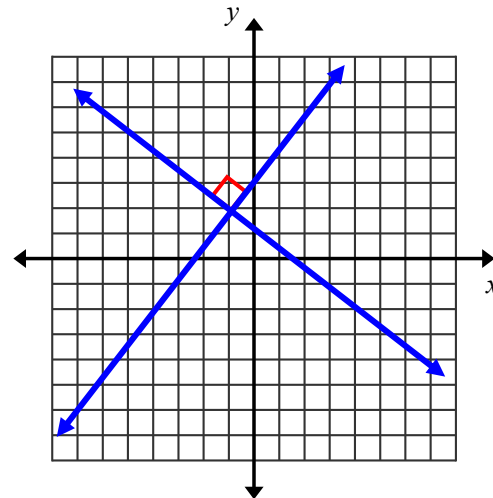
A line, segment, or ray that  
is perpendicular to the  
segment at its midpoint.

# perpendicular lines

perpendicular  
lines



perpendicular  
lines



Lines that intersect to form right angles. Two lines are perpendicular if the product of their slopes is  $-1$ .

# point

---

## point



---

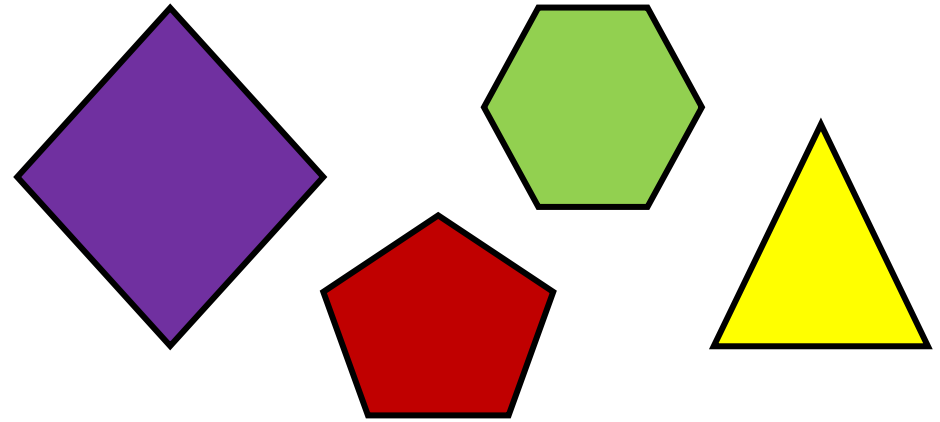
## point



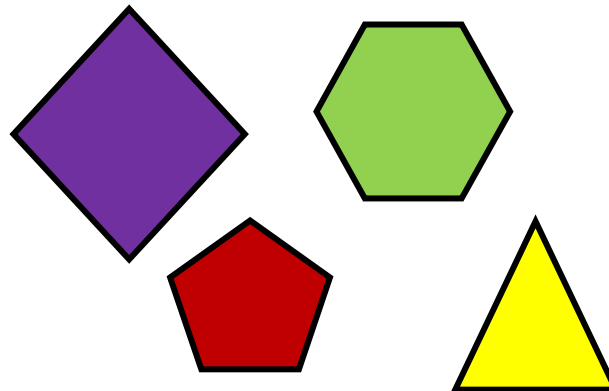
In Euclidean geometry, a point is undefined. You can think of a point as a location. A point has no size.

# polygon

polygon



polygon



A closed figure formed from  
line segments that meet only at  
their endpoints.

# Pythagorean Theorem

## Pythagorean Theorem

$$a^2 + b^2 = c^2$$

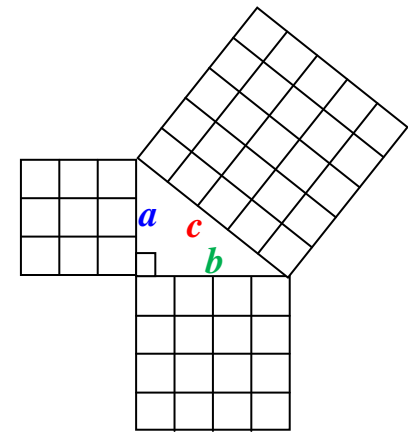
$$a = 3$$

$$b = 4$$

$$c = 5$$

$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$



## Pythagorean Theorem

$$a^2 + b^2 = c^2$$

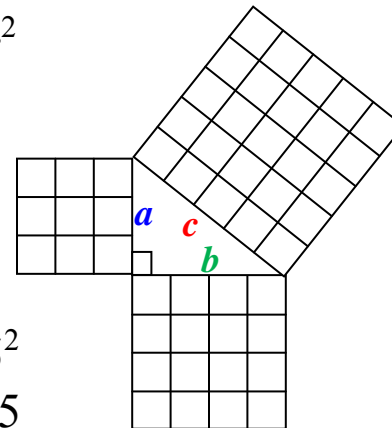
$$a = 3$$

$$b = 4$$

$$c = 5$$

$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$



In any right triangle, the sum of the squares of the length legs ( $a$  and  $b$ ) is equal to the square of the length of the hypotenuse  $c$ .

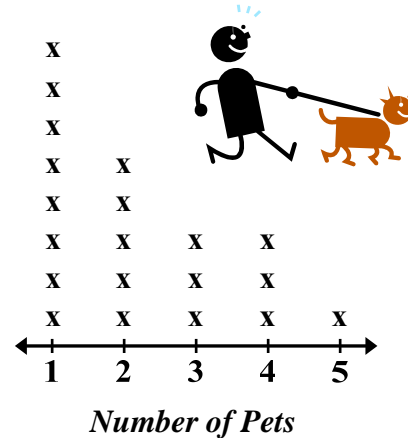


# range

(statistics)

# range

(statistics)

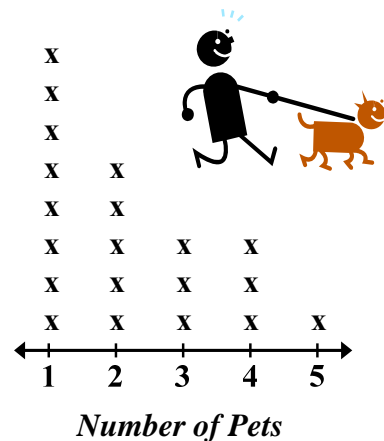


$$5 - 1 = 4$$

Range is 4.

# range

(statistics)



$$5 - 1 = 4$$

Range is 4.

The difference between the greatest number and the least number in a set of numbers.

# range

---

## range

$\{(2, -3), (4, 6), (3, -1), (7, 6), (6, 3)\}$

range:  $\{-3, 6, -1, 6, 3\}$

---

## range

$\{(2, -3), (4, 6), (3, -1), (7, 6), (6, 3)\}$

range:  $\{-3, 6, -1, 6, 3\}$

The set of “output” values for which a function is defined.

# rate of change

---

## rate of change

Input	Output
1	25
3	75
5	125
7	175
9	225

$$\frac{\text{Change in the output}}{\text{Change in the input}} = \frac{125 - 75}{5 - 3} = \frac{50}{2} = 25$$

## rate of change

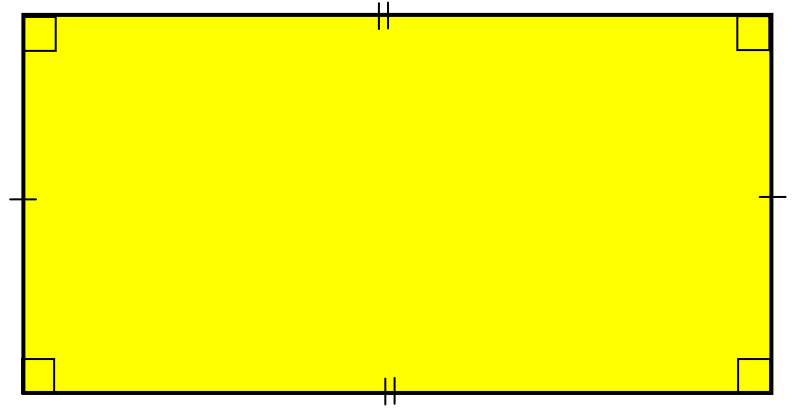
Input	Output
1	25
3	75
5	125
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9	225

$$\frac{\text{Change in the output}}{\text{Change in the input}} = \frac{125 - 75}{5 - 3} = \frac{50}{2} = 25$$

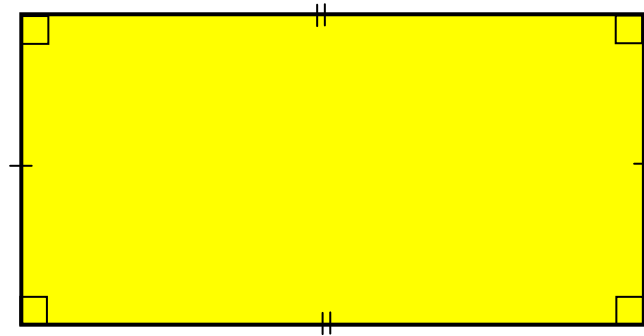
The ratio of the change in the output value and change in the input value of a function.

# rectangle

rectangle



rectangle



A quadrilateral with two pairs of congruent, parallel sides and four right angles.

# recursive

---

# recursive

2, 5, 8, 11, 14...

$$a_n = a_{n-1} + d$$

$$a_n = a_{n-1} + 3$$

# recursive

2, 5, 8, 11, 14...

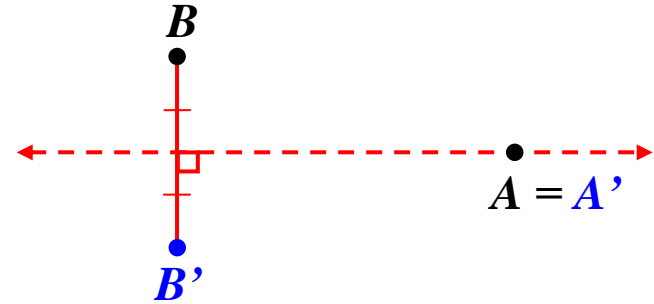
$$a_n = a_{n-1} + d$$

$$a_n = a_{n-1} + 3$$

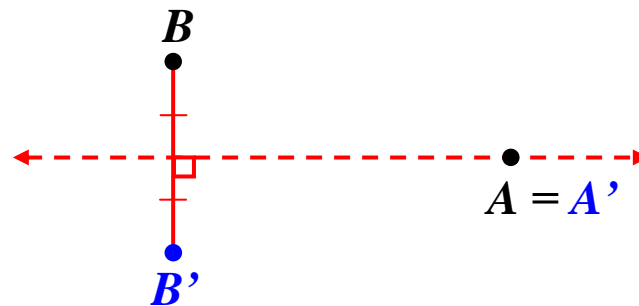
Pertaining to or using a rule or procedure that can be applied repeatedly.

# reflection

## reflection



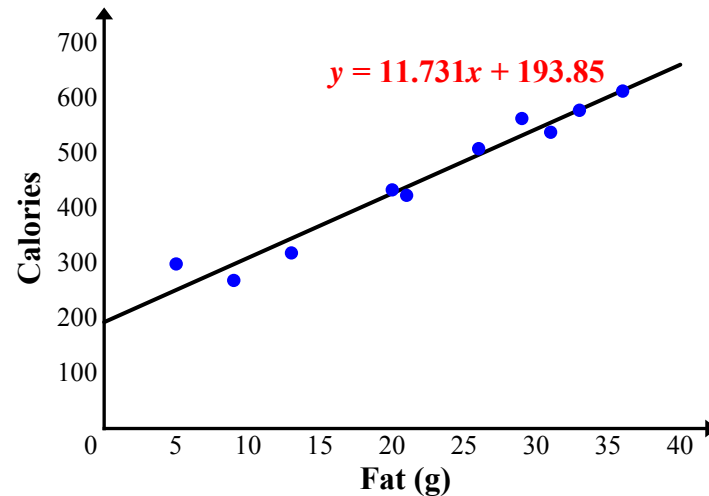
## reflection



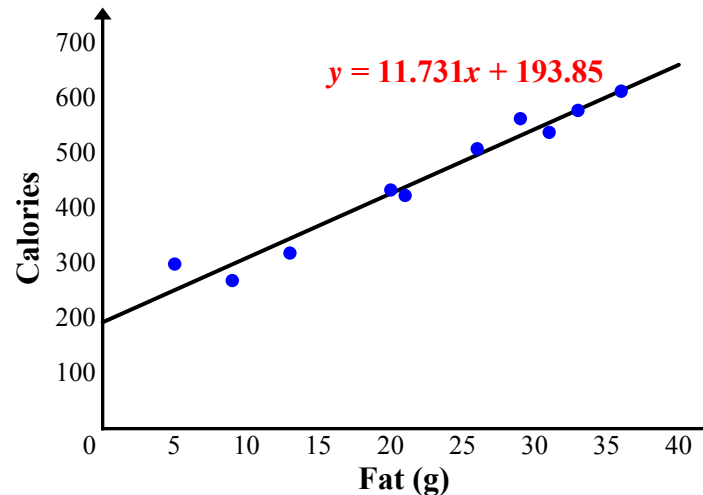
A transformation such that if a point  $A$  is on line  $r$ , then the image of  $A$  is itself, and if a point  $B$  is not on line  $r$ , then its image  $B'$  is the point such that  $r$  is the perpendicular bisector of  $\overline{BB'}$ .

# regression equation

regression  
equation



regression  
equation

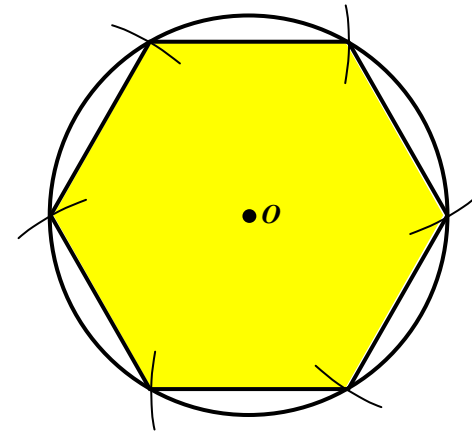


The equation representing the relation between selected values of one variable ( $x$ ) and observed values of the other ( $y$ ); it permits the prediction of the most probable values of  $y$ .

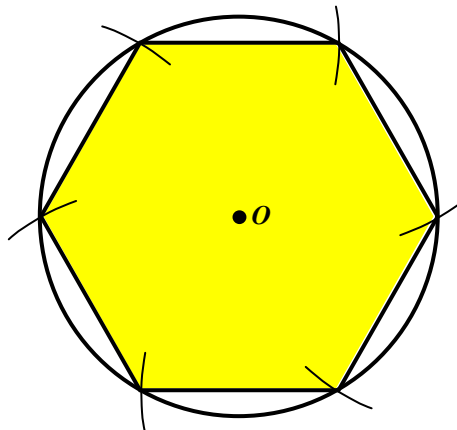
# regular hexagon in a circle

---

regular  
hexagon in a  
circle



regular  
hexagon in a  
circle



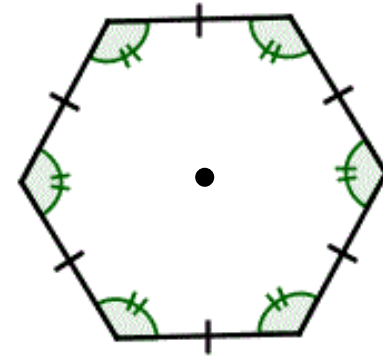
A regular hexagon that has  
been inscribed in a circle.



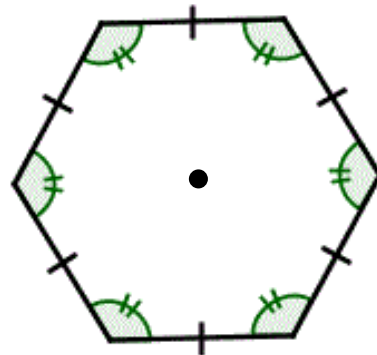
# regular polygon

---

regular  
polygon



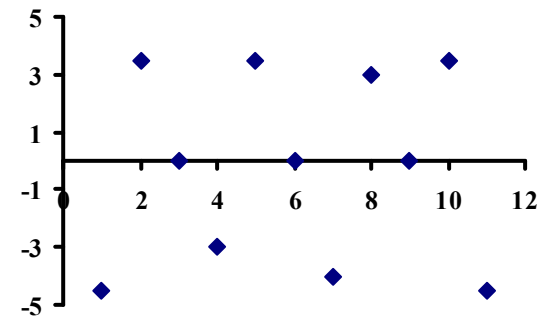
regular  
polygon



A polygon that is both  
equilateral and equiangular.  
Its center is the point that is  
equidistant from its vertices.

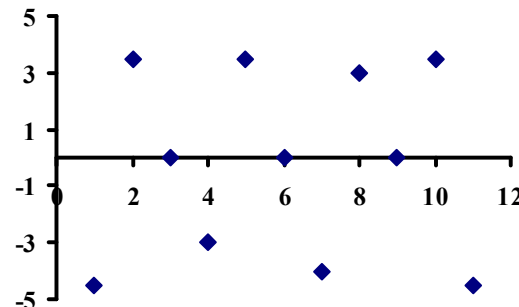
# residuals

The residual plot shows a random pattern indicating a good fit for a linear model.



# residuals

The residual plot shows a random pattern indicating a good fit for a linear model.



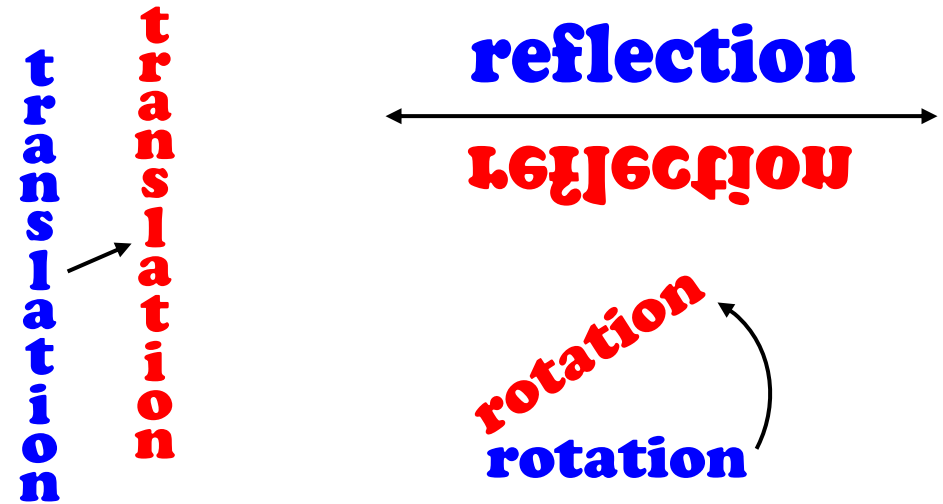
Residual (or error) represents unexplained variation after fitting a regression model. The difference between the observed value of the dependent variable ( $y$ ) and the predicted value ( $\hat{y}$ ) is called the **residual** ( $e$ ).

$$e = y - \hat{y}$$

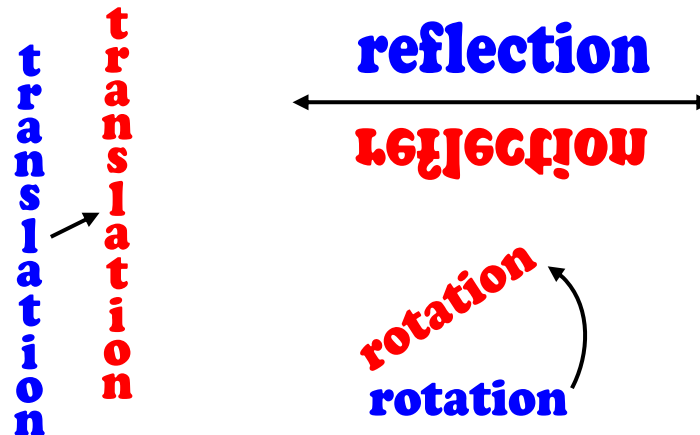
# residuals

# rigid motion

rigid  
motion



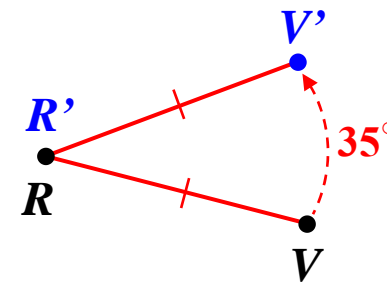
rigid  
motion



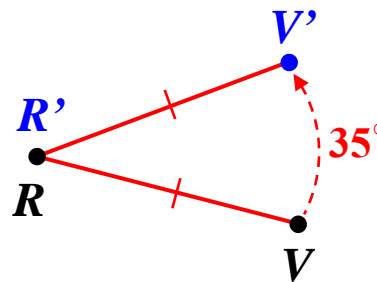
A transformation in the plane that preserves distance and angle measure.

# rotation

## rotation



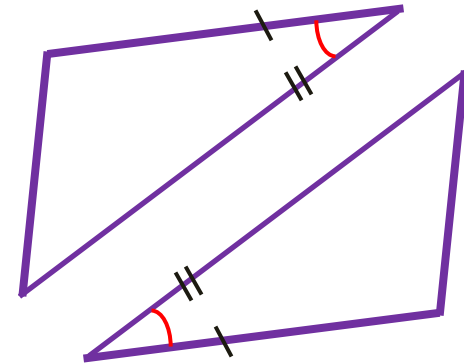
## rotation



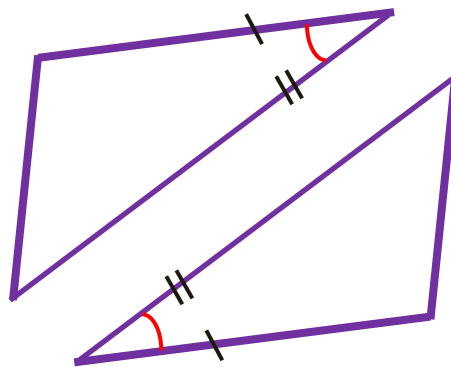
A transformation such that for any point  $V$ , its image is the point  $V'$ , where  $RV = RV'$  and  $m\angle VRV' = x$ . The image  $R$  itself. The positive number of degrees  $x$  that a figure rotates is the *angle of rotation*.

# SAS

SAS



SAS

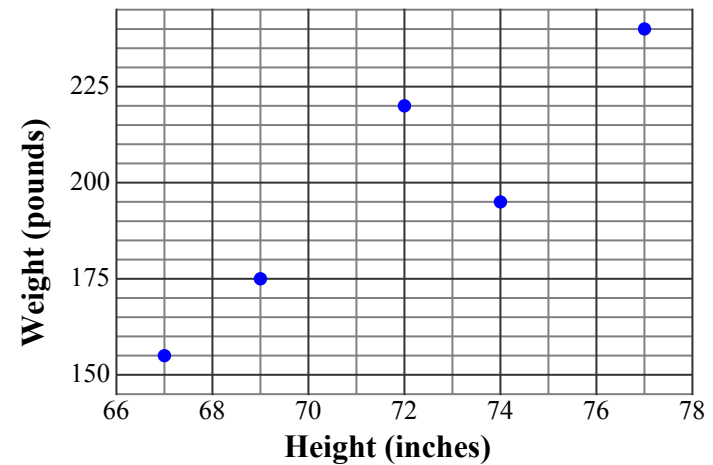


## SAS (Side-Angle-Side)

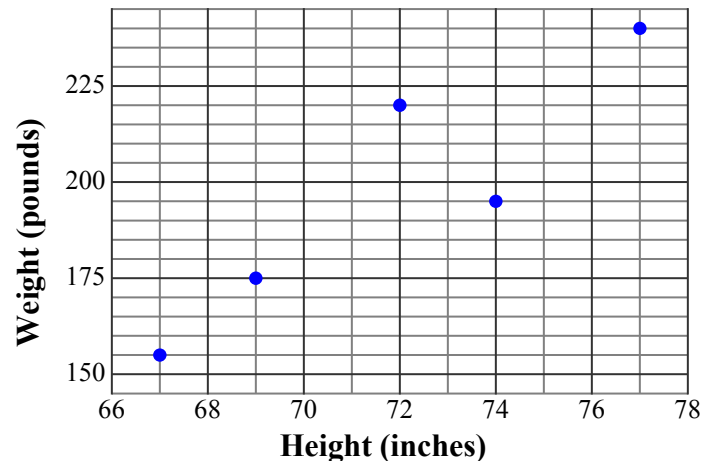
If two sides and the included angle of a triangle are congruent to two sides and the included angle of another triangle, then the two triangles are congruent.

# scatter plot

## scatter plot



## scatter plot



A graphic tool used to display the relationship between two quantitative (numerical) variables.

# segment

---

## segment



## segment



Part of a line that is bounded by two end points, and contains every point on the line between its end points.

# set builder notation

---

set builder  
notation

$$\{x \mid x \in \mathbb{R} \text{ and } x > 0\}$$

This is read as “the set of all values  $x$  such that  $x$  is a real number and  $x$  is greater than 0.

---

set builder  
notation

$$\{x \mid x \in \mathbb{R} \text{ and } x > 0\}$$

This is read as “the set of all values  $x$  such that  $x$  is a real number and  $x$  is greater than 0.

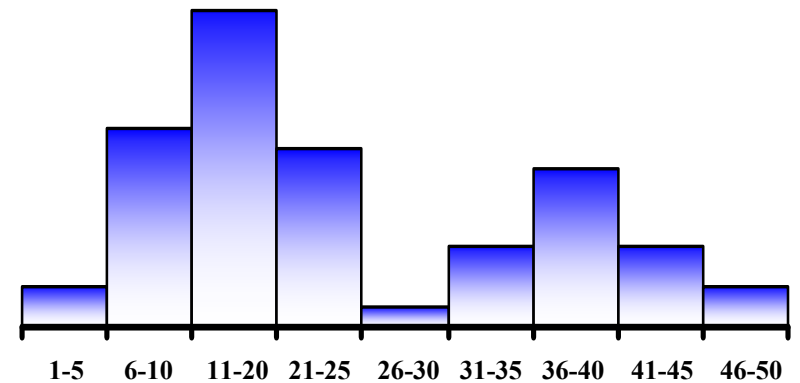
A notation used to describe the elements of a set.



# shape

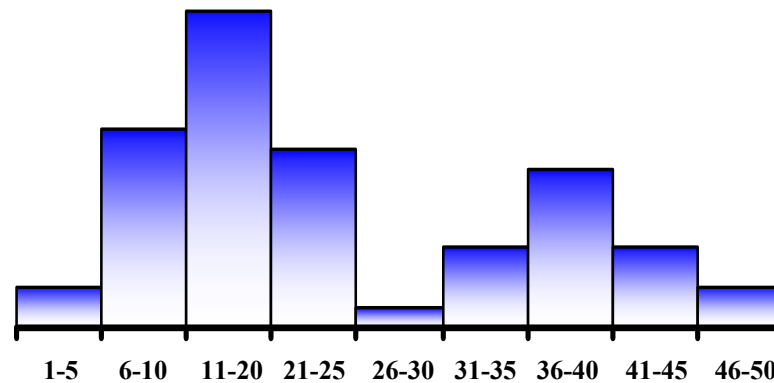
---

# shape



---

# shape



The shape of a distribution is described by symmetry, number of peaks, direction of skew, or uniformity.

# simultaneous equations

---

**simultaneous  
equations**

$$2x - 5y = 1$$

$$3x + 5y = 14$$

**simultaneous  
equations**

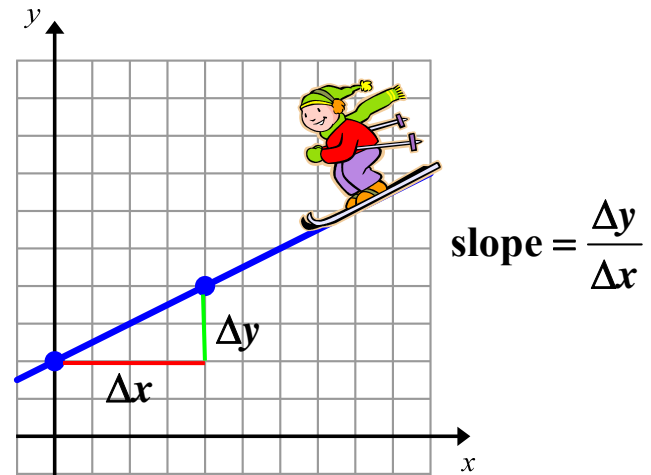
$$2x - 5y = 1$$

$$3x + 5y = 14$$

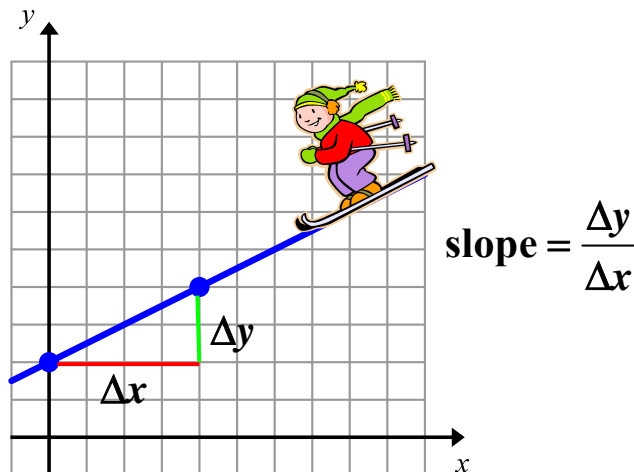
A set of equations in two or more variables for which there are values that can satisfy all the equations simultaneously.

# slope

slope



slope



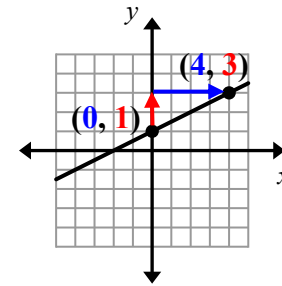
Slope describes steepness, incline, or grade of a line.

A higher slope value indicates a steeper incline.

The slope of a line is the ratio of the change in  $y$  over the change in  $x$ .

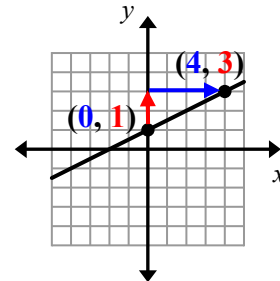
# slope formula

## slope formula



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 1}{4 - 0} = \frac{2}{4} = \frac{1}{2}$$

## slope formula



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 1}{4 - 0} = \frac{2}{4} = \frac{1}{2}$$

The formula used to find the slope of a line. Slope is often represented with the variable  $m$ .

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

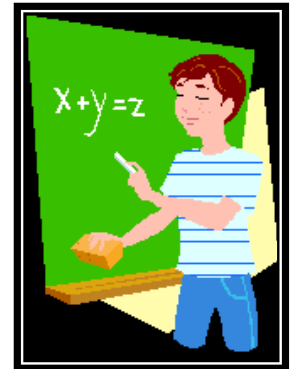
$$m = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_2 - x_1 \neq 0$$

# solution

# solution

## Examples:

- The only solution for the equation  $2x - 15 = -3$  is  $x = 4$ .
- The solutions which satisfy the inequality  $2x + 3 \leq 7$  are all values which are less than or equal to  $x$ , denoted  $x \leq 2$ , or  $(-\infty, 2]$ .



## Examples:

- The only solution for the equation  $2x - 15 = -3$  is  $x = 4$ .
- The solutions which satisfy the inequality  $2x + 3 \leq 7$  are all values which are less than or equal to  $x$ , denoted  $x \leq 2$ , or  $(-\infty, 2]$ .



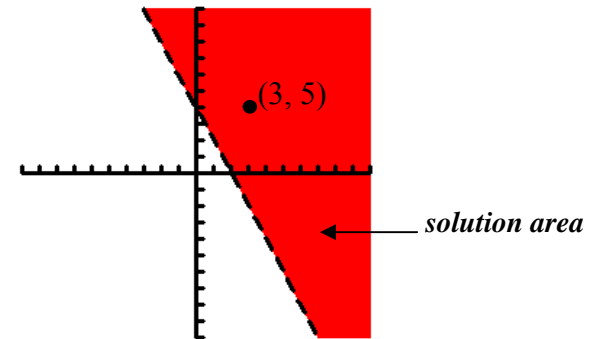
Any and all value(s) of the variable(s) which; satisfies an equation, or inequality.

# solution

# solution area

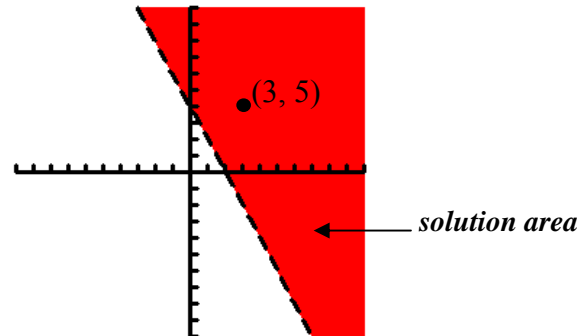
## solution area

Example:  $(3, 5)$  is a solution.



## solution area

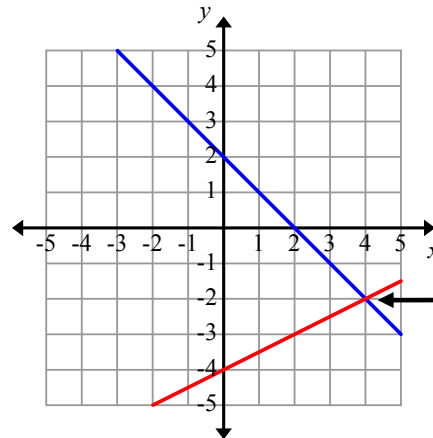
Example:  $(3, 5)$  is a solution.



A value or ordered pair is in the *solution area* of an inequality if the value or values from the ordered pair make the inequality true when substituted into the inequality.

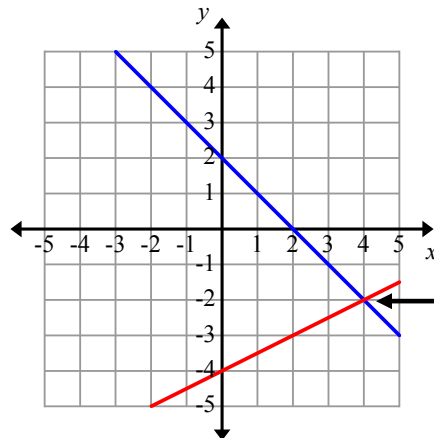
# solution point

## solution point



The solution point is the ordered pair where the two lines intersect  $(4, -2)$ .

## solution point



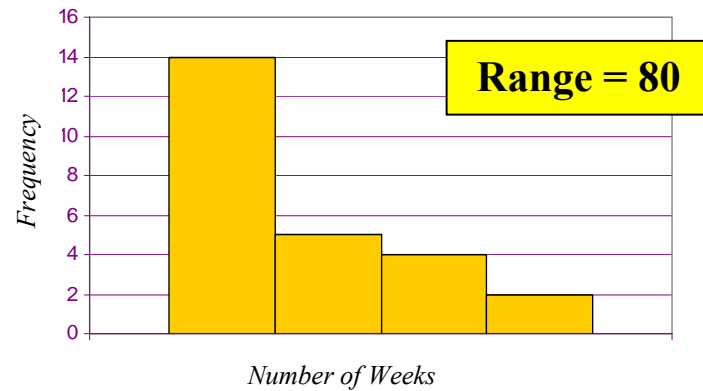
The solution point is the ordered pair where the two lines intersect  $(4, -2)$ .

A solution point or intersection; is a single point where two lines meet or cross each other.

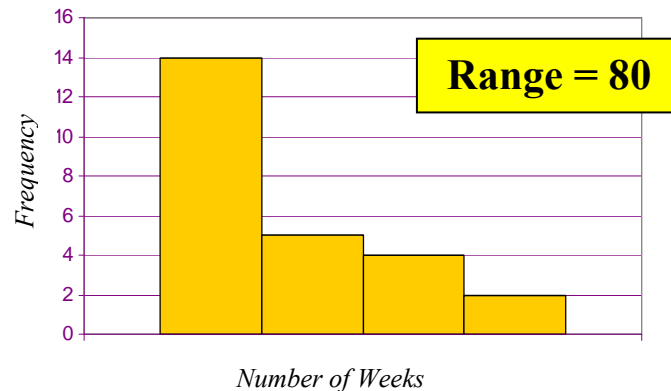
# spread

# spread

*Number of Weeks on the Top 200 Chart*



*Number of Weeks on the Top 200 Chart*



A measure of how much a collection of data is spread out. Commonly used types include range and quartiles. (Also known as measures of variation or dispersion.)

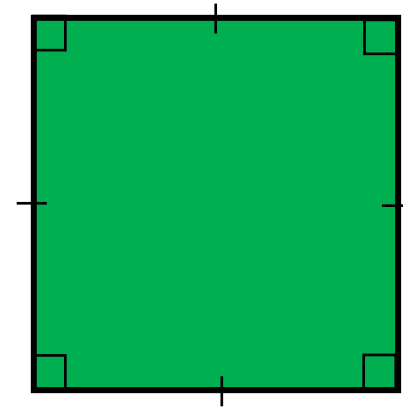
# spread



# square

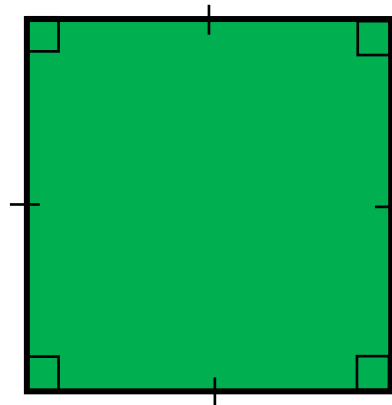
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## square



---

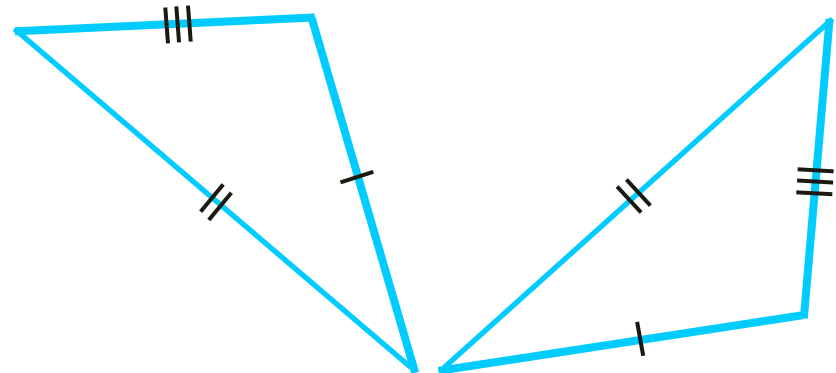
## square



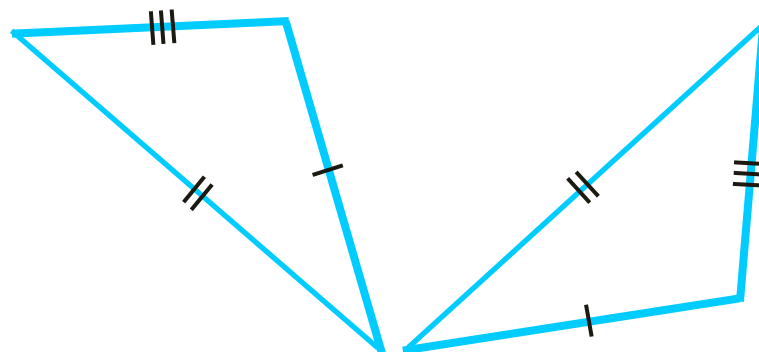
A parallelogram with four equal angles AND four equal sides.

# SSS

## SSS



## SSS



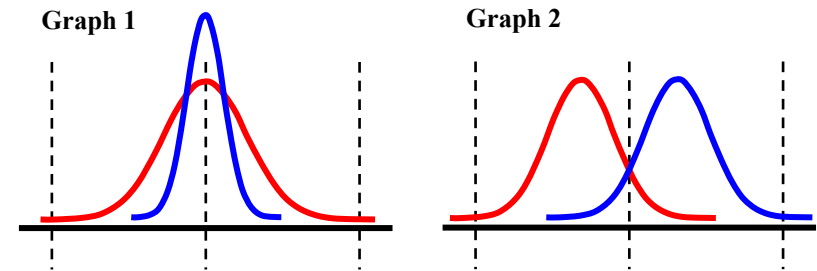
### SSS (Side-Side-Side)

If the three sides of one triangle are congruent to the three sides of another triangle, then the two triangles are congruent.

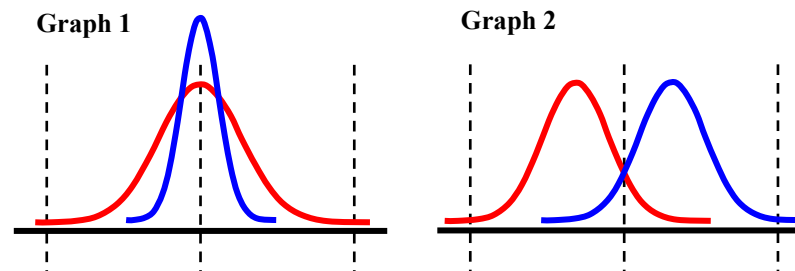
# standard deviation

## standard deviation

**Example:** In *Graph 1* two sets of data are being compared. They have the same mean, but the standard deviations are different. The red distribution has a greater spread than the blue distribution. In *Graph 2* the two distributions have about the same spread/standard deviation, but different means.



**Example:** In *Graph 1* two sets of data are being compared. They have the same mean, but the standard deviations are different. The red distribution has a greater spread than the blue distribution. In *Graph 2* the two distributions have about the same spread/standard deviation, but different means.

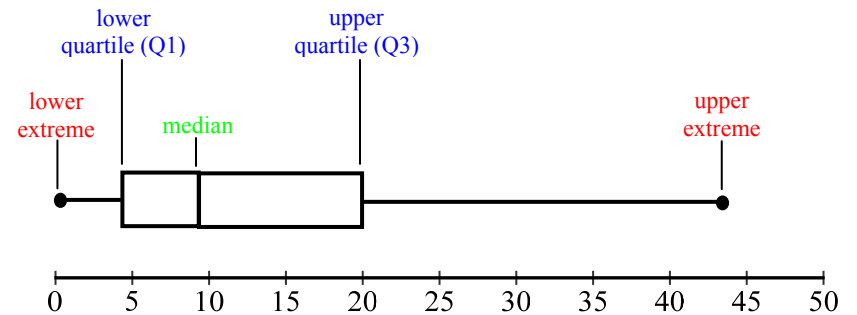


## standard deviation

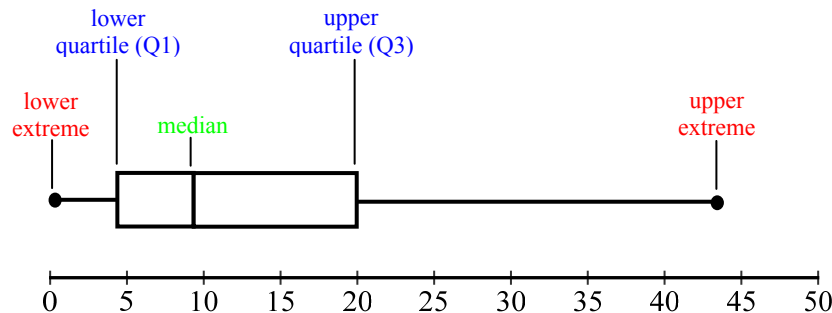
A numerical value used to indicate how widely the individual data in a group vary.

# statistical variability

## statistical variability



## statistical variability



A variability or spread in a variable or a probability distribution. Common examples of measures of statistical dispersion are the variance, standard deviation, and interquartile range.

# substitution

## substitution

$$y = 3x + 2 \text{ and } 4x + 2y = -6$$

① Substitute for  $y$  and solve for  $x$ .

$$\begin{aligned} 4x + 2(3x + 2) &= -6 \\ 4x + 6x + 4 &= -6 \\ 10x + 4 &= -6 \\ \underline{-4 \quad -4} & \\ 10x &= -10 \\ 10 & \quad 10 \\ x &= -1 \end{aligned}$$

② Substitute for  $x$  and solve for  $y$ .

$$\begin{aligned} y &= 3(-1) + 2 \\ y &= -3 + 2 \\ y &= -1 \end{aligned}$$

**Solution:**  **$(-1, -1)$**

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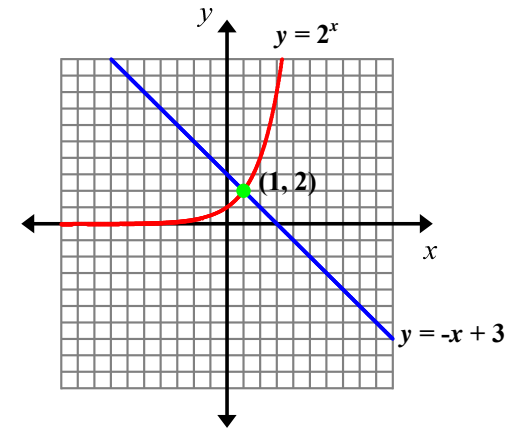
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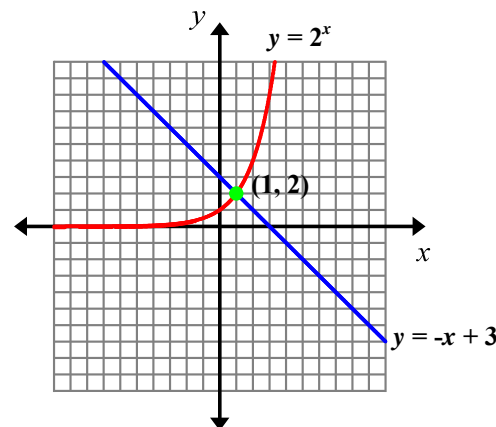
A method for solving a system of linear equations. It is used to eliminate one of the variables by isolating one variable in one equation, and substituting the resulting expression for that variable in the other equation.

# system of equations

## system of equations



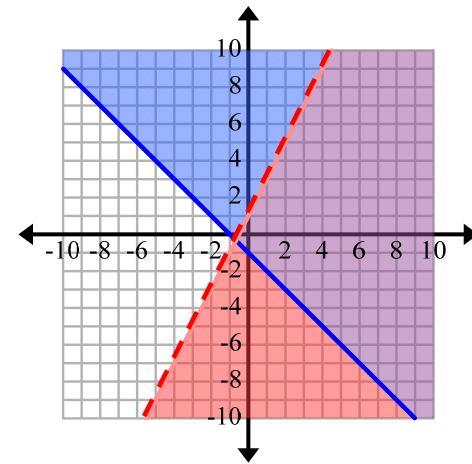
## system of equations



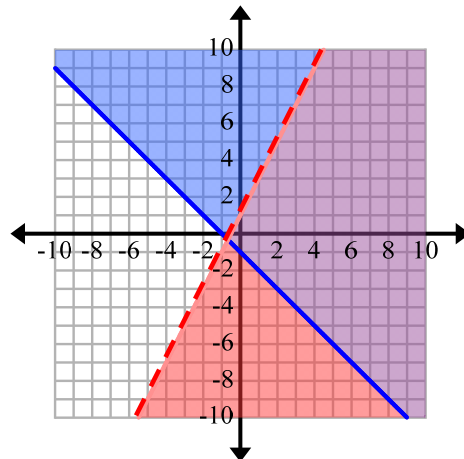
A system of equations is two or more equations with the same variables, graphed on same coordinate plane.

# system of linear inequalities

system of linear inequalities



system of linear inequalities



A system of inequalities is two or more inequalities with the same variables, graphed on the same coordinate plane. The set of solutions of a system of linear inequalities corresponds to the intersection of the half-planes defined by individual inequalities.

# table of values

---

## table of values

$x$	$f(x)$
0	1
1	4
2	7
3	10
4	13
5	16
6	19

## table of values

$x$	$f(x)$
0	1
1	4
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3	10
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5	16
6	19

A list of numbers that are used to substitute one variable, such as within an equation of a line or other functions, to find the value of the other variable.



# term

---

## term

$$3x - 5 = -7x + 10$$

term 

## term

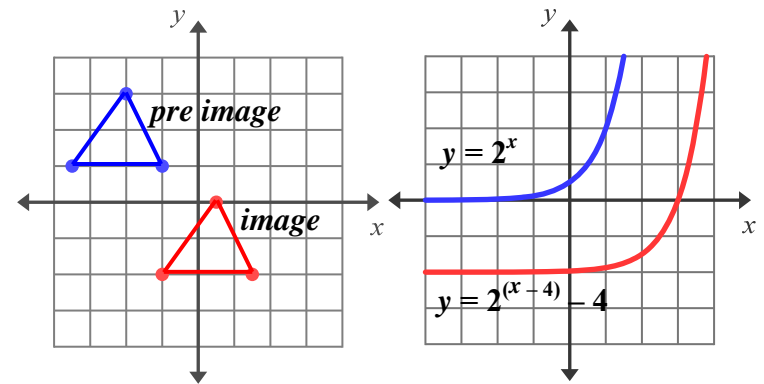
$$3x - 5 = -7x + 10$$

term 

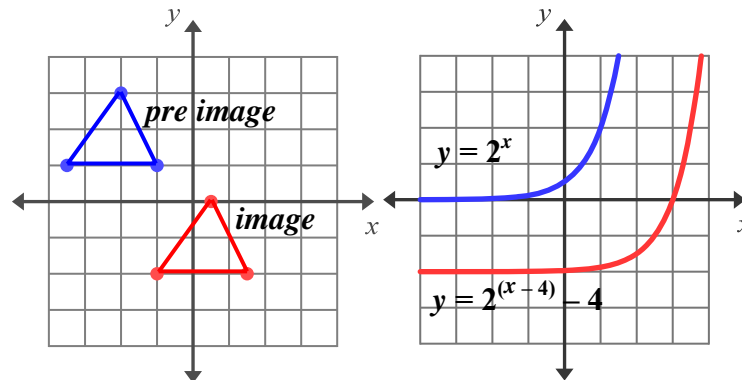
A mathematical expression which may form a separable part of an equation, a series, or another expression.

# transformation

## transformation



## transformation

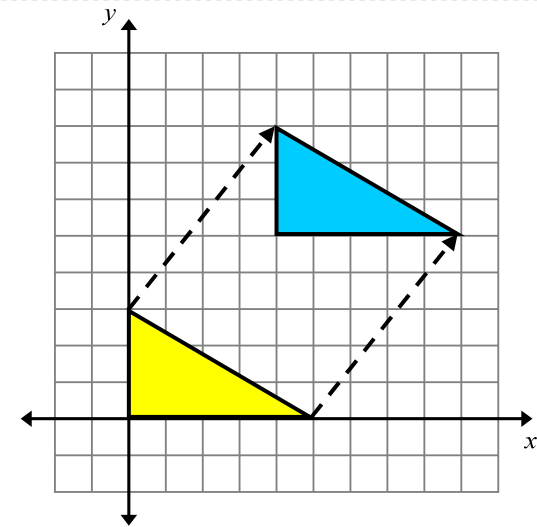


To change the position of a shape or function on a coordinate plane. There are three basic transformations:

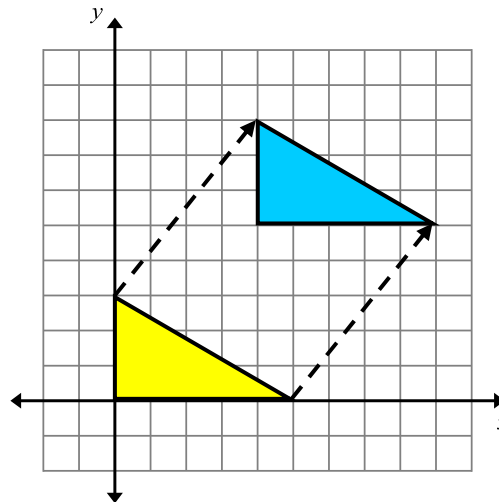
- translations
- reflections
- rotations

# translation

translation



translation

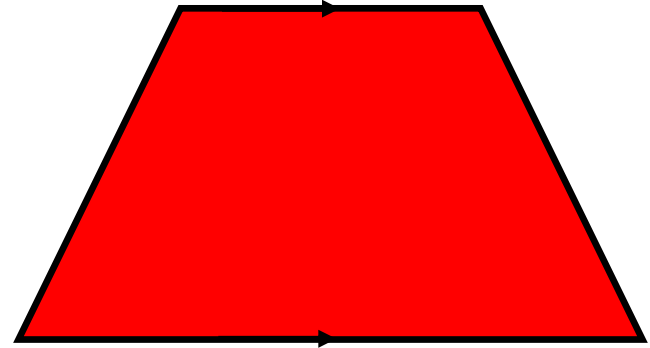


A transformation that moves points the same distance in the same direction.

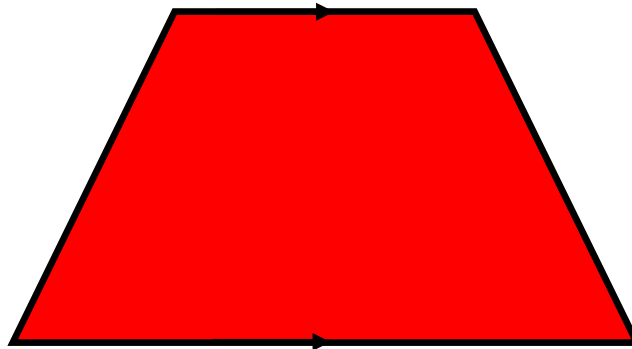
# trapezoid

---

## trapezoid



## trapezoid



A quadrilateral with only one pair of parallel sides.

# trend

---

## Males vs. Females in the US Military

# trend

Although there are still more males than females in the Armed Forces, the *trend* is that the gap is closing. However, there is no association between the number of females and the number of males in the US Military. That is, we cannot draw any conclusions about a relationship between the two.

---

## Males vs. Females in the US Military

# trend

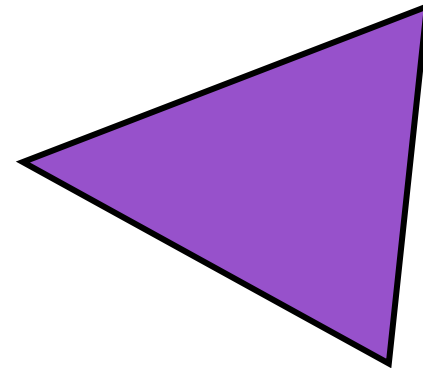
Although there are still more males than females in the Armed Forces, the *trend* is that the gap is closing. However, there is no association between the number of females and the number of males in the US Military. That is, we cannot draw any conclusions about a relationship between the two.

A change (positive, negative or constant) in data values over time.

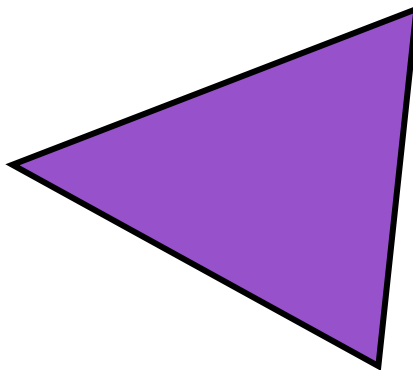
# triangle

---

triangle



triangle



A polygon with three sides  
and three angles.

# two-way frequency table

---

two-way  
frequency  
table

	Dance	Sports	Movies	TOTAL
Women	16	6	8	30
Men	2	10	8	20
TOTAL	18	16	16	50

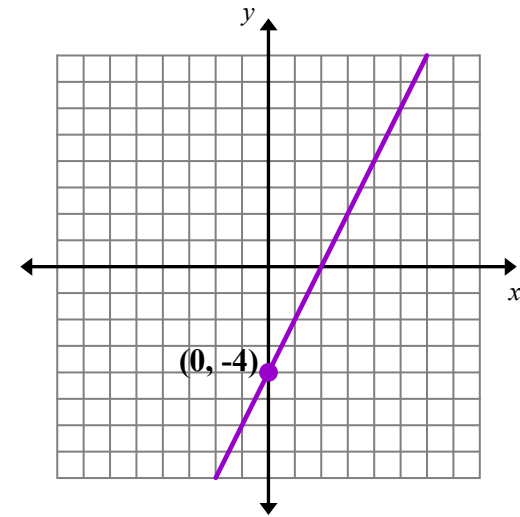
two-way  
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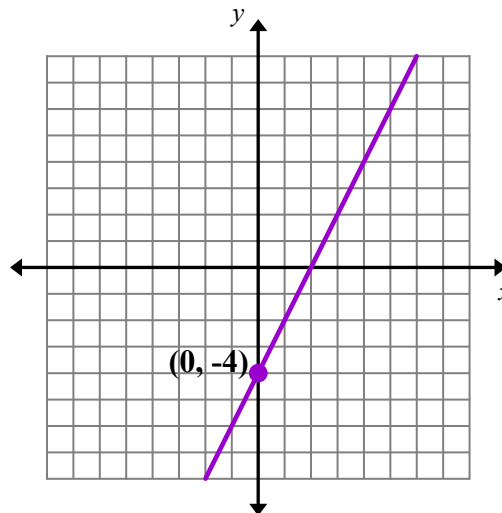
A tool used for  
examining  
relationships  
between categorical  
variables.

# vertical intercept

vertical  
intercept



vertical  
intercept



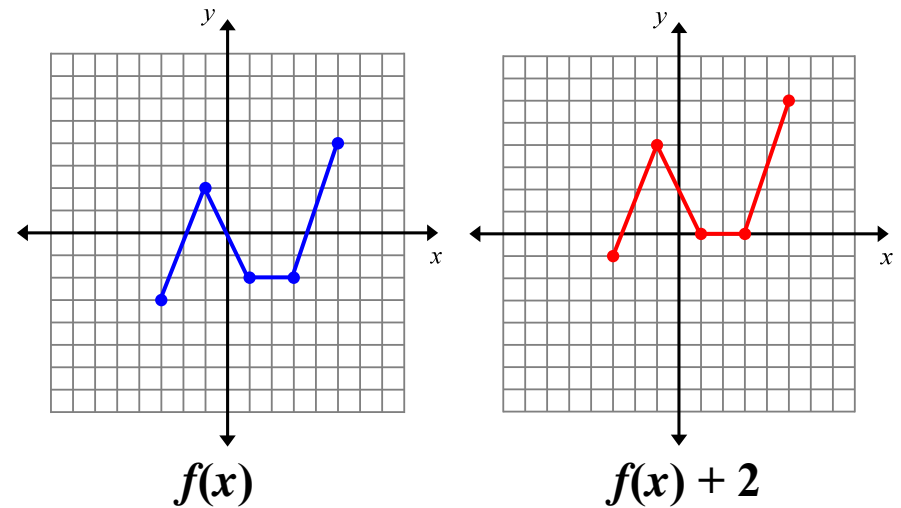
Also known as the  $y$ -intercept. It can be found by substituting “0” for the variable  $x$  in the equation  $y = mx + b$ .

$$y = m \cdot 0 + b$$

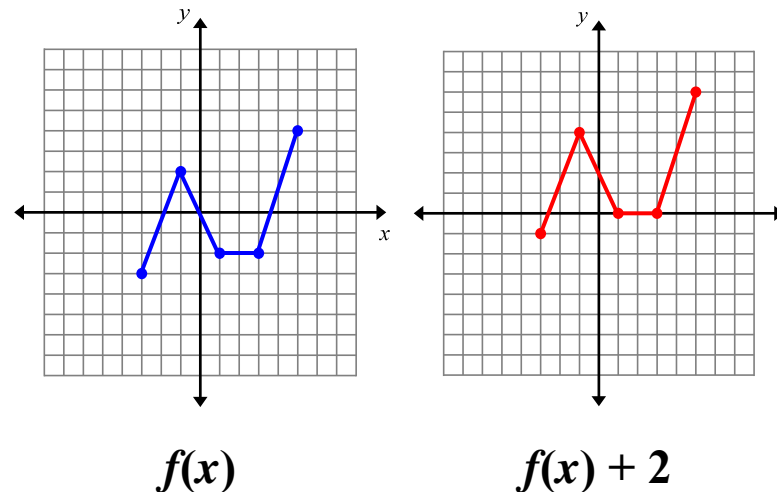


# vertical translation

## vertical translation



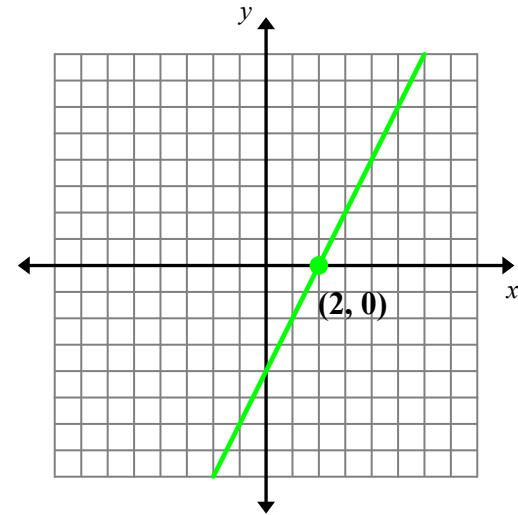
## vertical translation



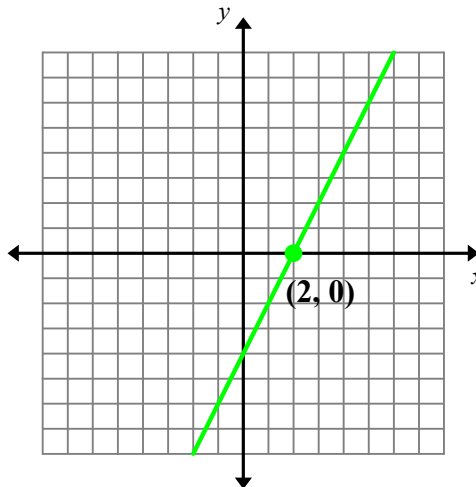
Vertically translating a graph is equivalent to shifting the parent function up or down in the direction of the y-axis. A graph is translated  $k$  units vertically by moving each point on the graph  $k$  units vertically.

# $x$ -intercept

$x$ -intercept



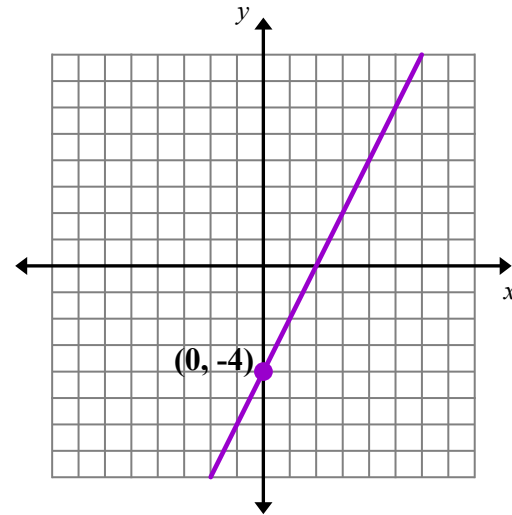
$x$ -intercept



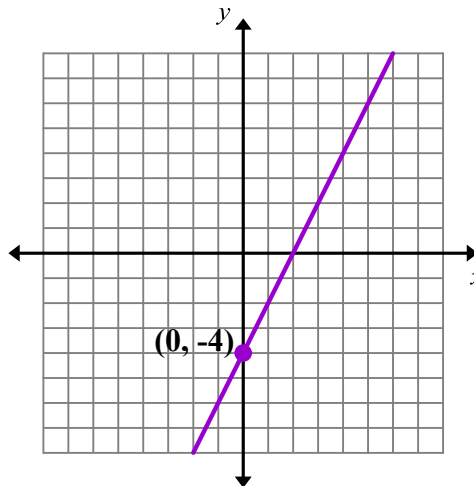
The point at which a function crosses the  $x$ -axis.

# *y*-intercept

*y*-intercept



*y*-intercept



The point at which a function crosses the *y*-axis.