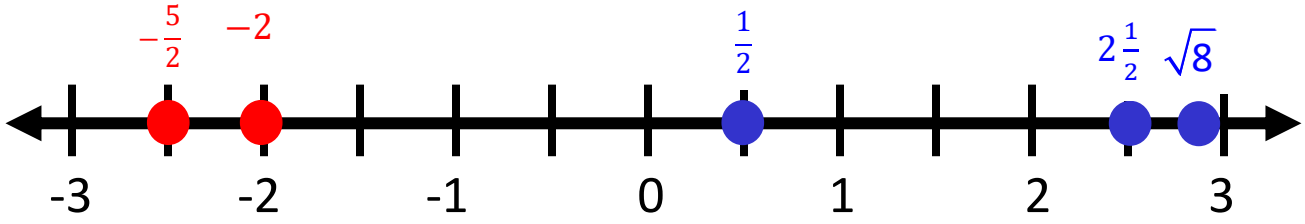
Grade 8 Mathematics
Vocabulary Word Wall Cards

Mathematics vocabulary word wall cards provide a display of mathematics content words and associated visual cues to assist in vocabulary development. The cards should be used as an instructional tool for teachers and then as a reference for all students. **The cards are designed for print use only.**

Table of Contents

Comparing Real Numbers



Values for numbers get smaller as move further to the left on the number line

Values for numbers get larger as move further to the right on the number line

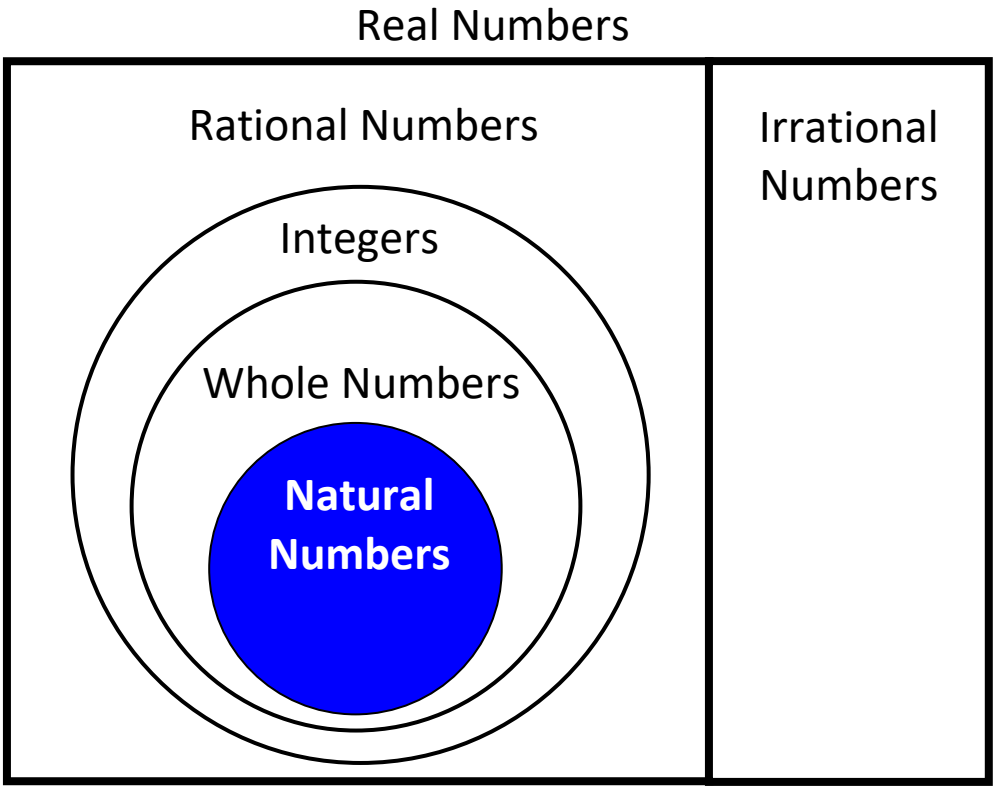
$$-\frac{5}{2} < \frac{1}{2} \text{ or } \frac{1}{2} > -\frac{5}{2}$$

$$-2 > -2\frac{1}{2} \text{ or } -2\frac{1}{2} < -2$$

$$2\frac{1}{2} < \sqrt{8} \text{ or } \sqrt{8} > 2\frac{1}{2}$$

Natural Numbers

The set of numbers
1, 2, 3, 4…



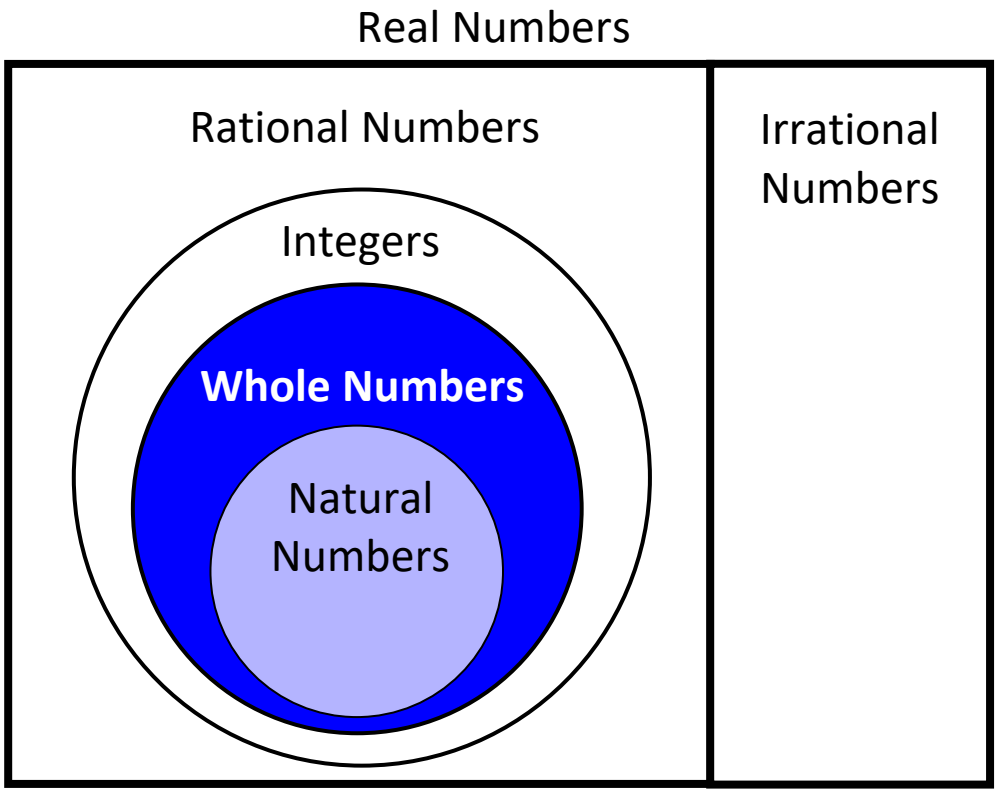
Examples

15 , $\frac{8}{1}$, 101 , 1, 5.0, $\sqrt{16}$, $\frac{10}{2}$

Whole Numbers

The set of numbers

0, 1, 2, 3, 4…



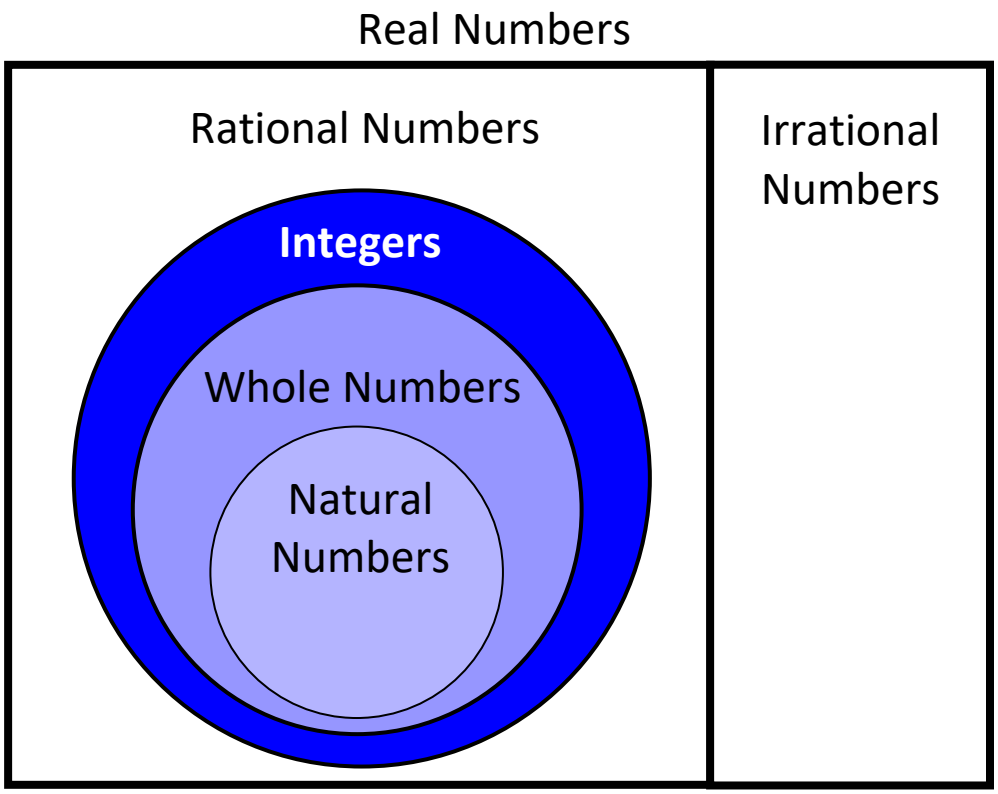
Examples

$19\ ,\ \frac{99}{1},\ 953\ ,\ 1,\ \ 7.0,\ 0,\ \sqrt{81}\ ,\ \frac{18}{3}$

Integers

The set of numbers

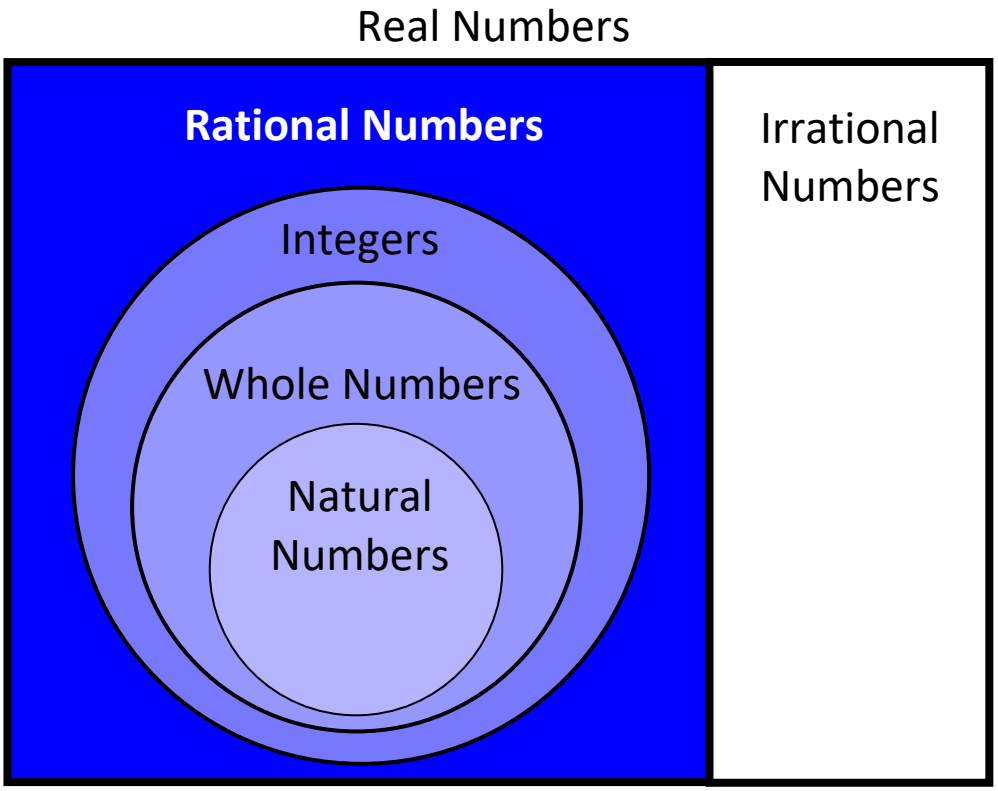
…-3, -2, -1, 0, 1, 2, 3…



Examples

-13 , $\frac{6}{1}$, 27 , $(-3)^2$, 5.0, $-\sqrt{25}$, 0, $\frac{22}{11}$

Rational Numbers

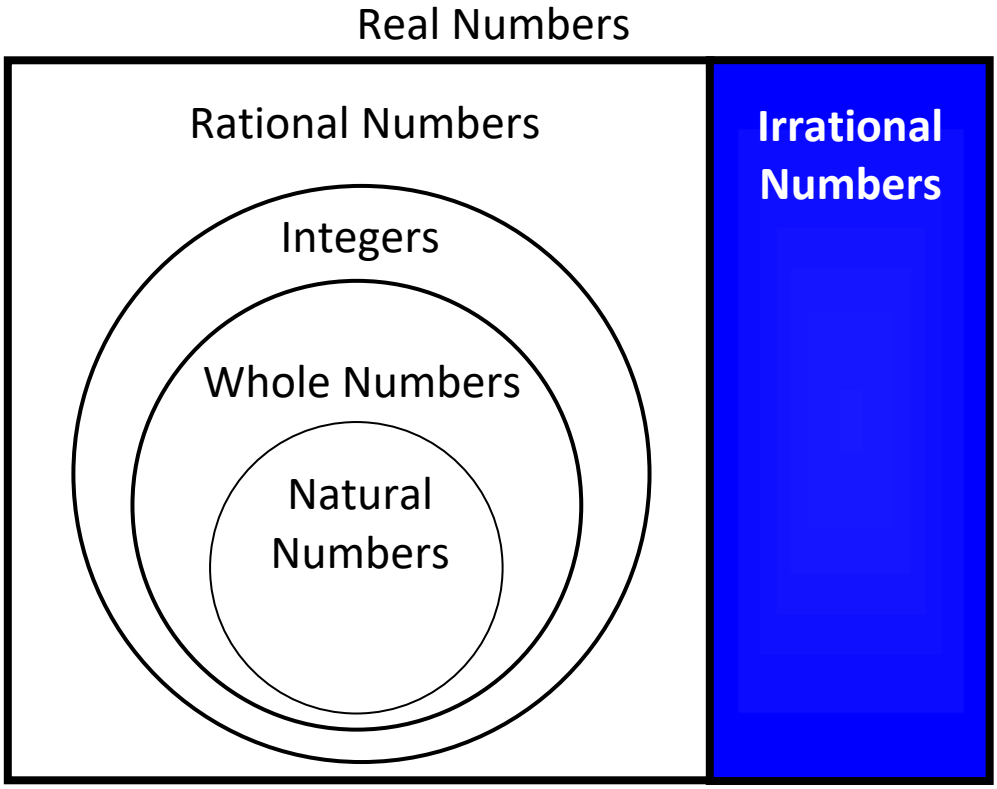


The set of all numbers that can be written as the ratio of two integers with a non-zero denominator

Examples

$2\frac{3}{5}$, -5 , 0, 0.3, $\sqrt{16}$, $0.\overline{66}$, $\frac{13}{7}$

Irrational Numbers

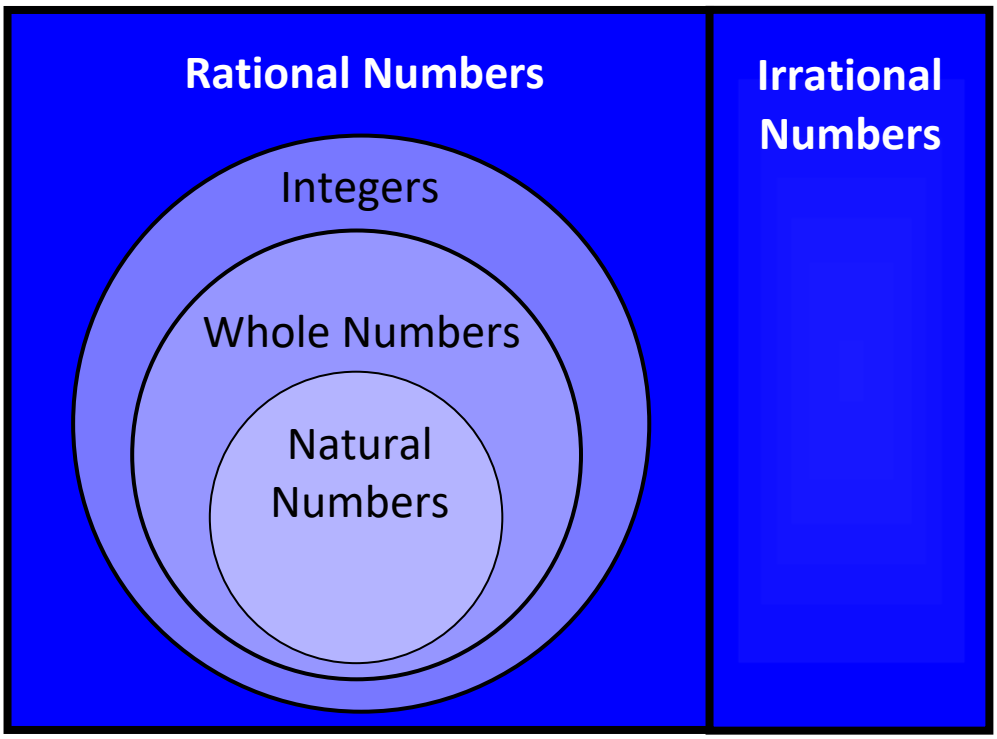


The set of all numbers that cannot be expressed as the ratio of integers

Examples

$\sqrt{7}$, π , -0.232232232223…

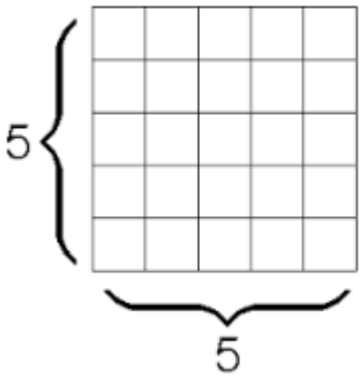
Real Numbers



The set of all rational and irrational numbers

Square Root

any number which, when multiplied by itself, equals the number



radical symbol

$$\sqrt{25} = 5$$

$$\sqrt{25} = \sqrt{5 \cdot 5} = \sqrt{5^2} = 5$$

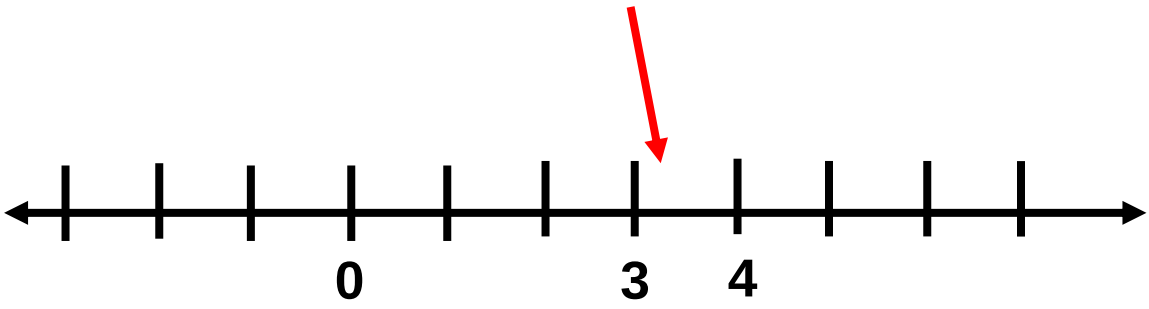
Squaring a number and taking a square root are inverse operations.

$$-\sqrt{36} = -6$$

$$(-6)^2 = -6 \cdot -6 = 36$$

Square Root

$\sqrt{10} \approx 3.16$



$\sqrt{10}$ is between $\sqrt{9}$ and $\sqrt{16}$

Proportion

a statement of equality between two ratios

$$\frac{a}{b} = \frac{c}{d} \qquad a:b = c:d$$

a is to b

as c is to d

Example

$$\frac{2}{5} = \frac{4}{10} \qquad 2:5 = 4:10$$

2 is to 5 as 4 is to 10

Percent of Increase

$$\text{Percent of change} = \frac{\text{new - original}}{\text{original}} \cdot 100$$

Was $2.25 per gallon

Now $2.55 per gallon

What is the percent of increase?

$$\frac{2.55 - 2.25}{2.55} \cdot 100$$

$$\frac{0.30}{2.55} \cdot 100 = 0.13 \cdot 100 = 13$$

increase of 13%

Percent of Decrease

$$\text{Percent of change} = \frac{\text{new - original}}{\text{original}} \cdot 100$$

Was $1200
Now only $900

What is the percent of decrease?

$$\frac{900-1200}{1200} \cdot 100$$

$$\frac{-300}{1200} \cdot 100 = -0.25 \cdot 100 = -25$$

decrease of 25%

Reconcile an Account

Joe owed a balance of $147.60 on his credit card account on June 1. Below is a list of transactions that occurred during June.

Transactions		
Date	**Description**	**Amount**
6/3	Giddy-up Gas	$ 31.00
6/7	Payment	$ 150.00
6/12	Food-o-rama	$ 134.12
6/22	Big Top Pizza	$ 34.32
6/28	Bart's Sport Shop	$ 16.04

Determine how much he owes on his credit card account after the purchase at Bart's Sport Shop.

Purchases:

$-31.00 - 134.12 - 34.32 - 16.04 = -\$215.48$

Balance - Purchases: $-\$147.60 - \$215.48 = -\$363.08$

Amount Owed: $-\$363.08 + \$150.00 = -\$213.08$

Complementary Angles

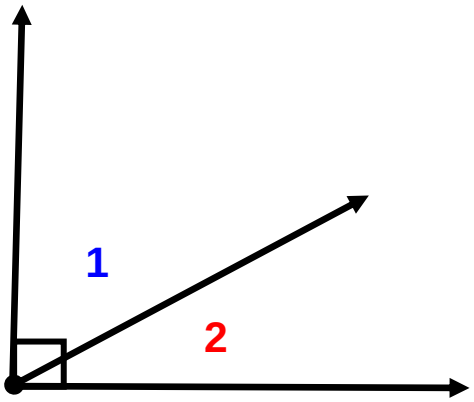


Fig 1

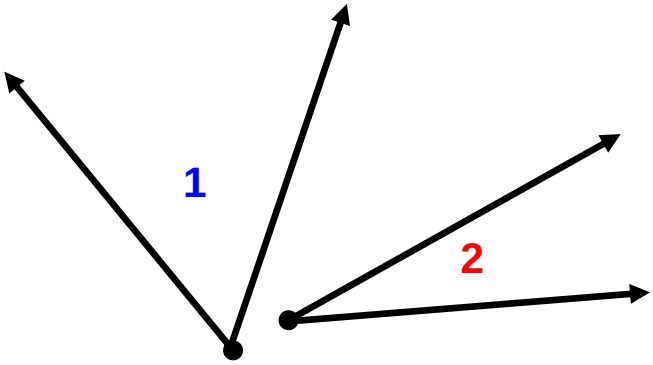


Fig 2

$m\angle 1 + m\angle 2 = 90°$

in each figure

Supplementary Angles

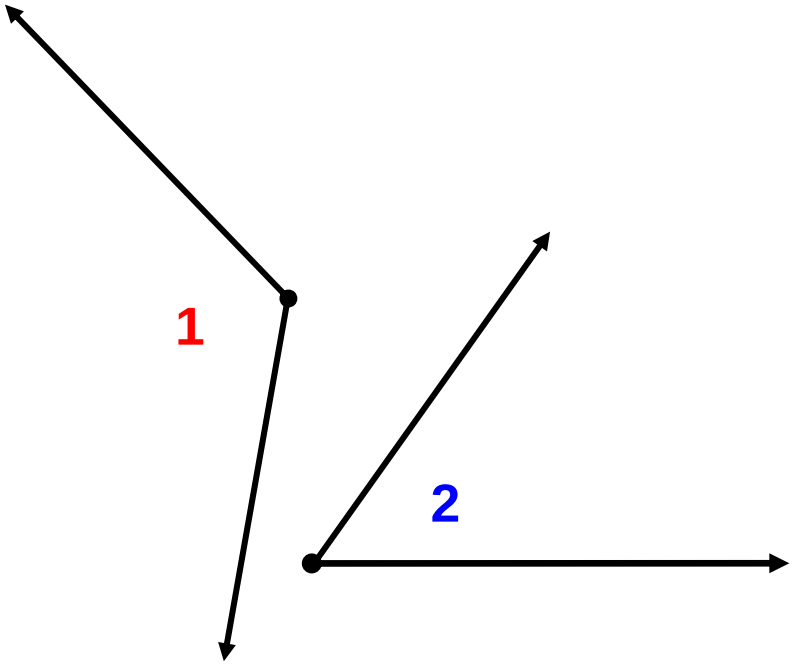


Fig 1

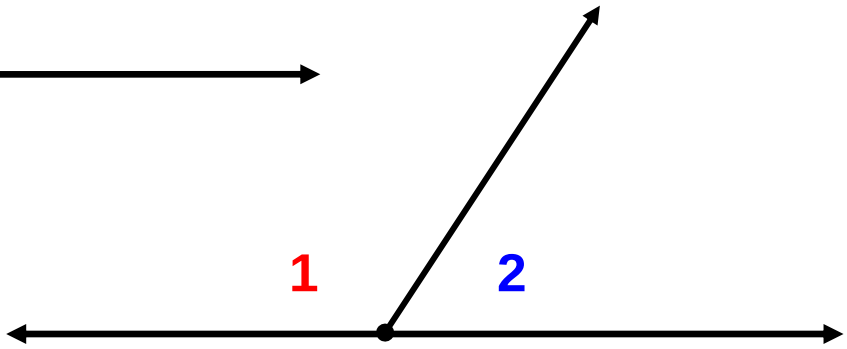
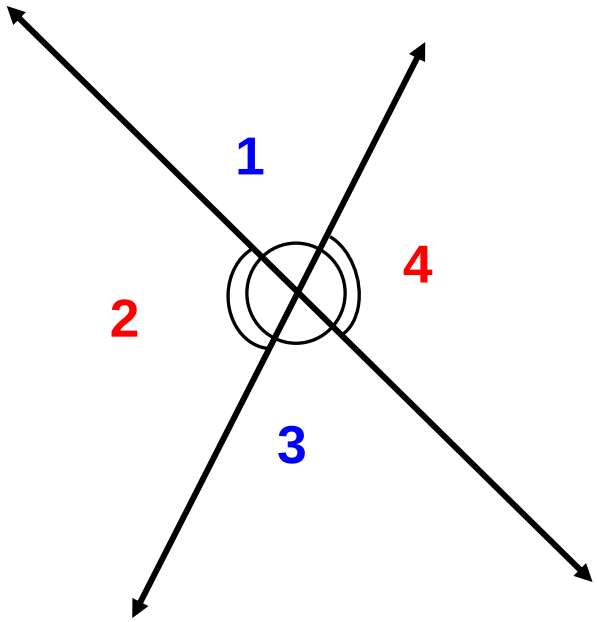


Fig 2

$m\angle 1 + m\angle 2 = 180°$

in each figure

Vertical Angles



$\angle 1$ and $\angle 3$ are vertical angles.

$\angle 2$ and $\angle 4$ are vertical angles.

$\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$

Adjacent Angles

$\angle 1$ is adjacent to $\angle 2$ in each figure

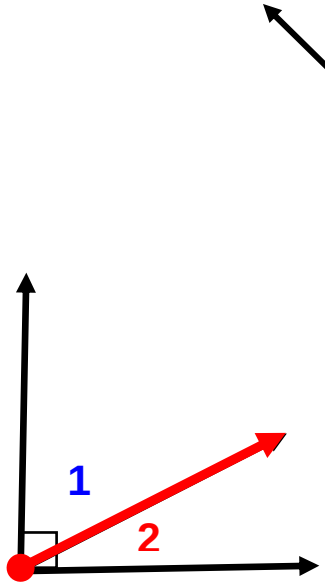


Fig 1

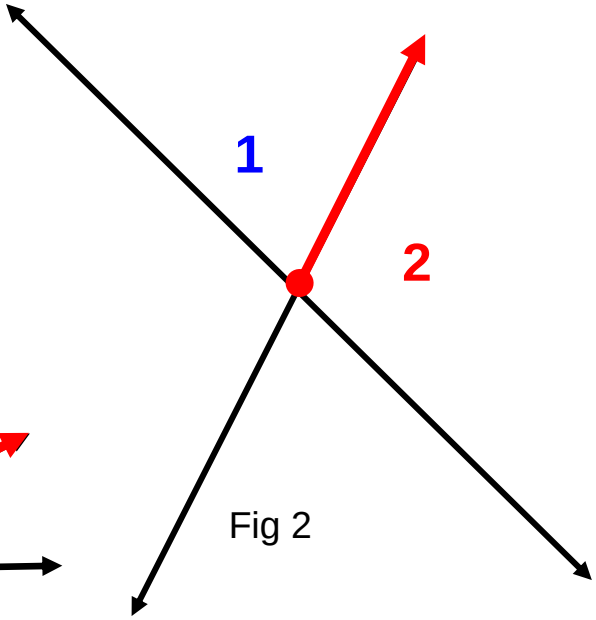


Fig 2

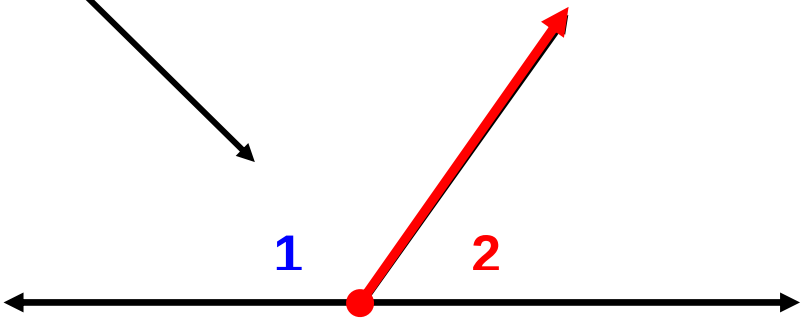
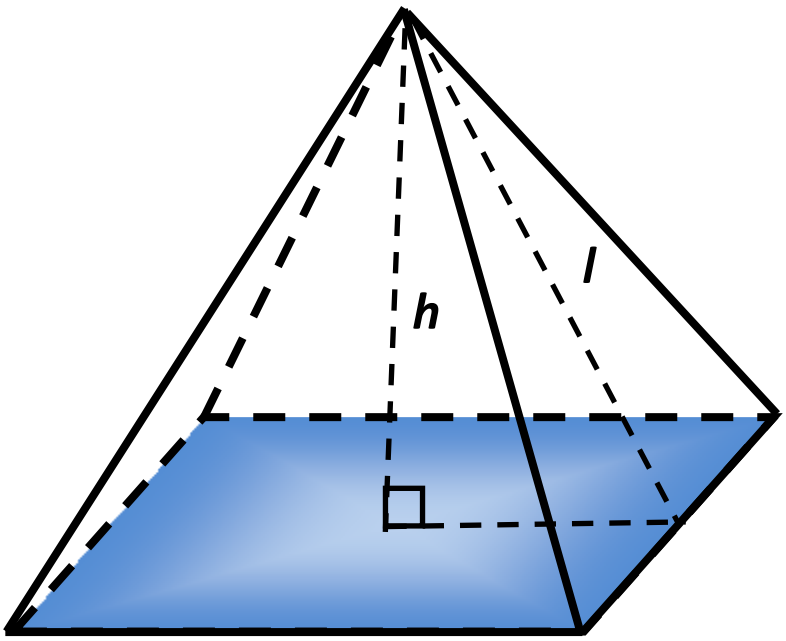


Fig 3

Share a common side and a common vertex

Square-Based Pyramid



B = area of square base

p = perimeter of base

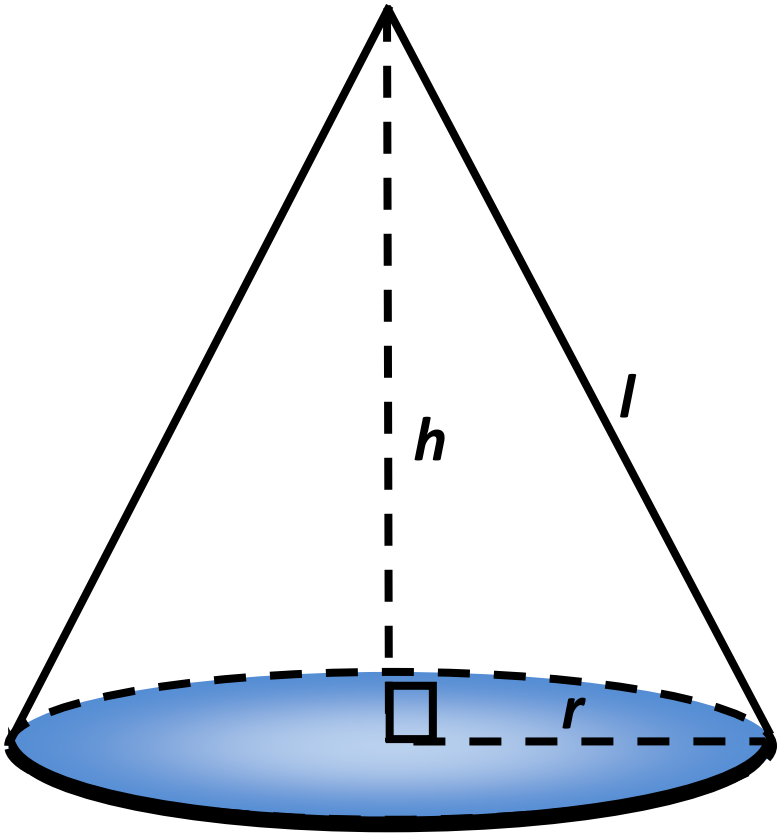
h = height

l = slant height

$$V = \frac{1}{3}Bh$$

$$S.A. = \frac{1}{2}lp + B$$

Cone



r = radius of base

h = height

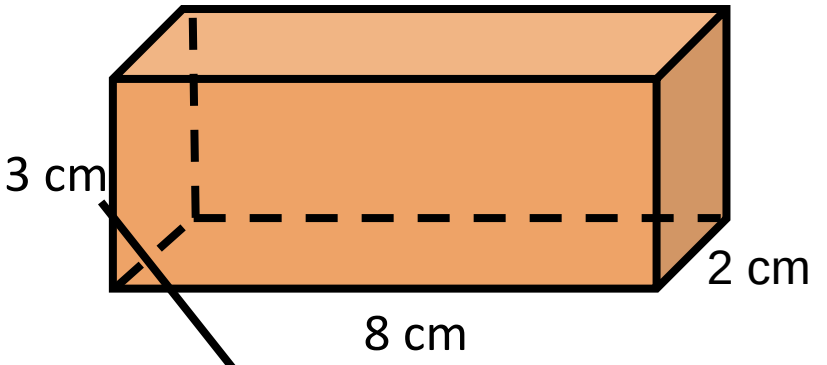
l = slant height

$$V = \frac{1}{3}\pi r^2 h$$

$$S.A. = \pi r^2 + \pi r l$$

Volume of Rectangular Prism

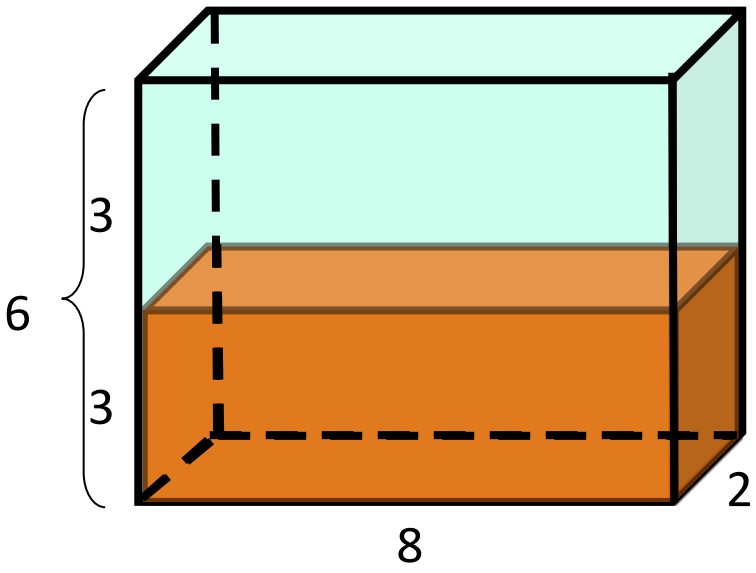
(Changing one attribute)



$V = lwh$

$8 \cdot 2 \cdot 3 = 48 \text{ cm}^3$

Height is multiplied by 2



New Volume

$V = 8 \cdot 2 \cdot 6 = 96 \text{ cm}^3$

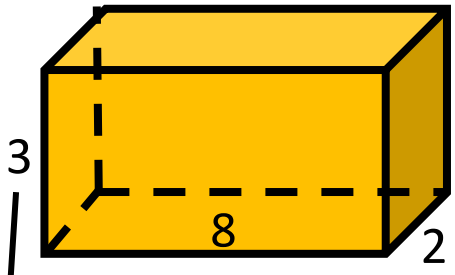
Volume is multiplied by 2

Surface Area of a Rectangular Prism (Changing one attribute)

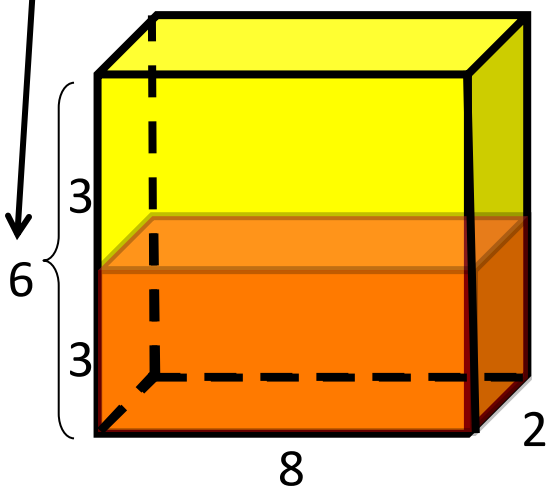
$S.A. = 2lw + 2lh + 2wh$

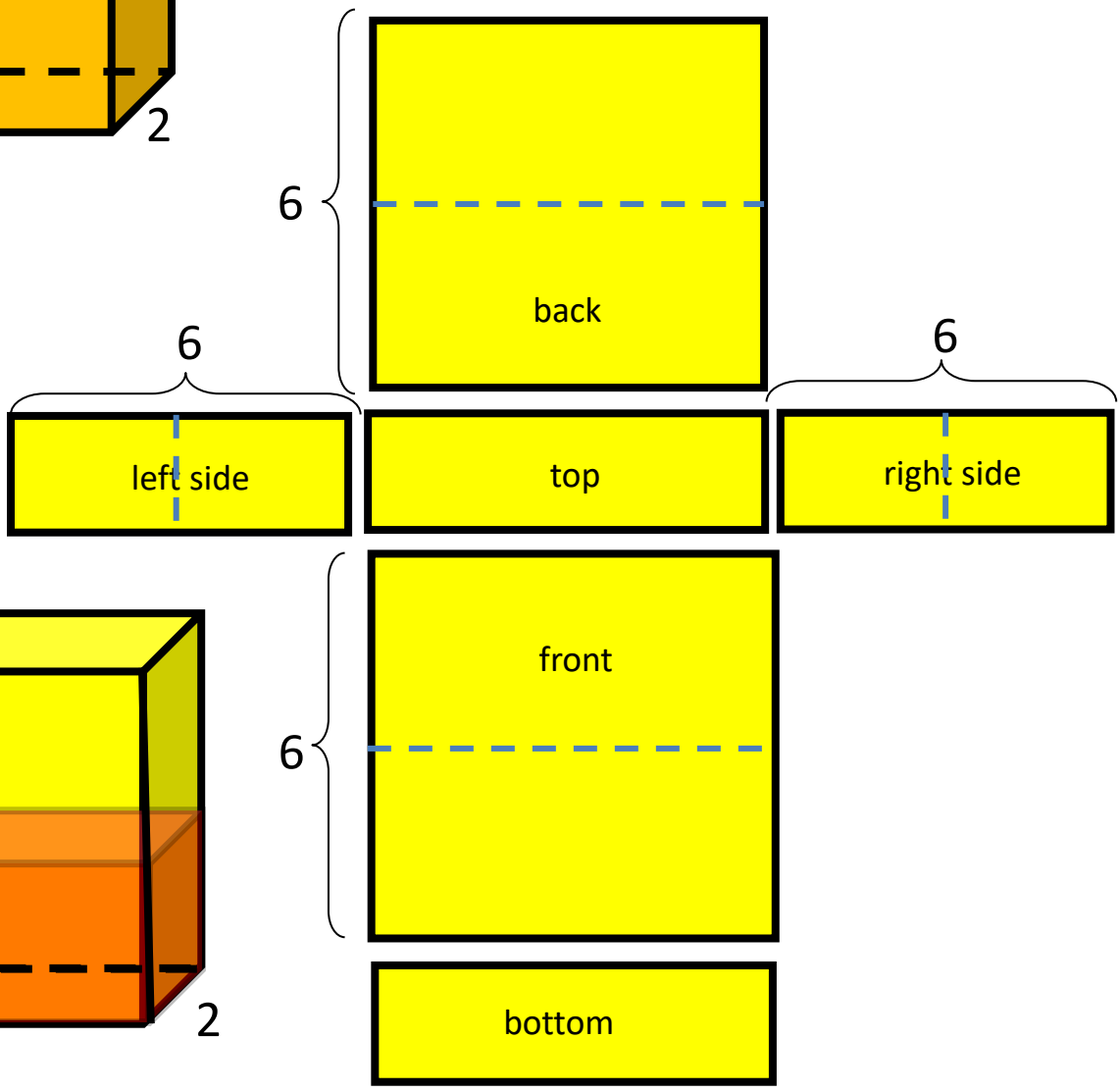
$S.A. = 2(8 \cdot 2) + 2(8 \cdot 3) + 2(2 \cdot 3)$

$S.A. = 32 + 48 + 12 =$ **92 units²**



Height is multiplied by 2



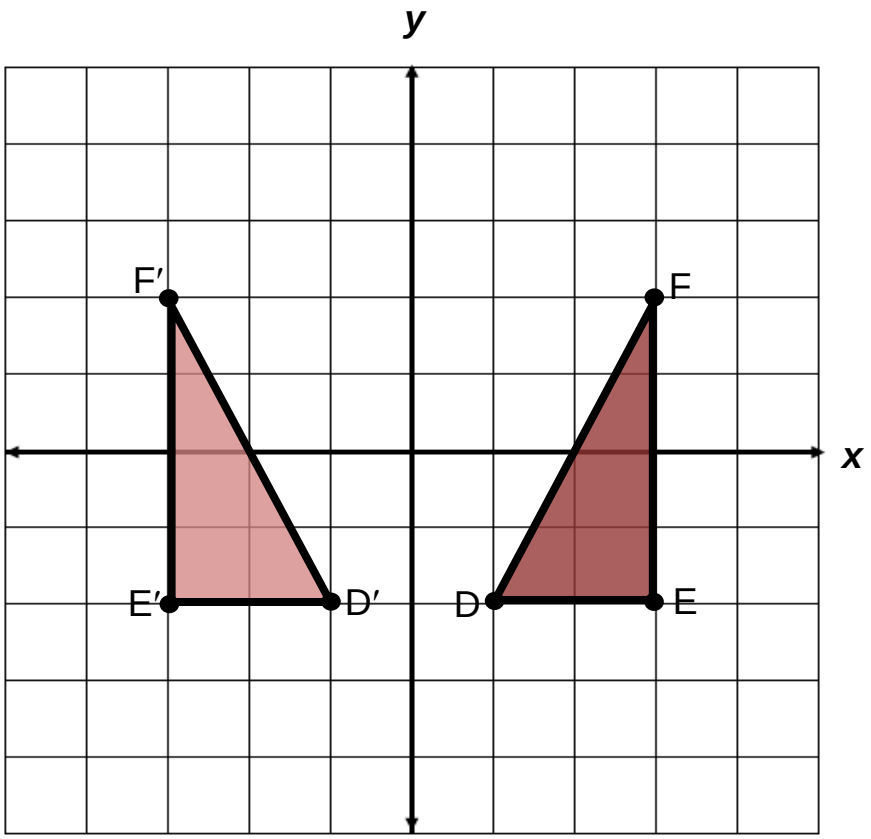


New $S.A. = 2(8 \cdot 2) + 2(8 \cdot 6) + 2(2 \cdot 6)$

New $S.A. = 32 + 96 + 24 =$ **152 units²**

Reflection

a transformation in which an image is formed by reflecting the preimage over a line called the line of reflection
(all corresponding points in the image and preimage are equidistant from the line of reflection)

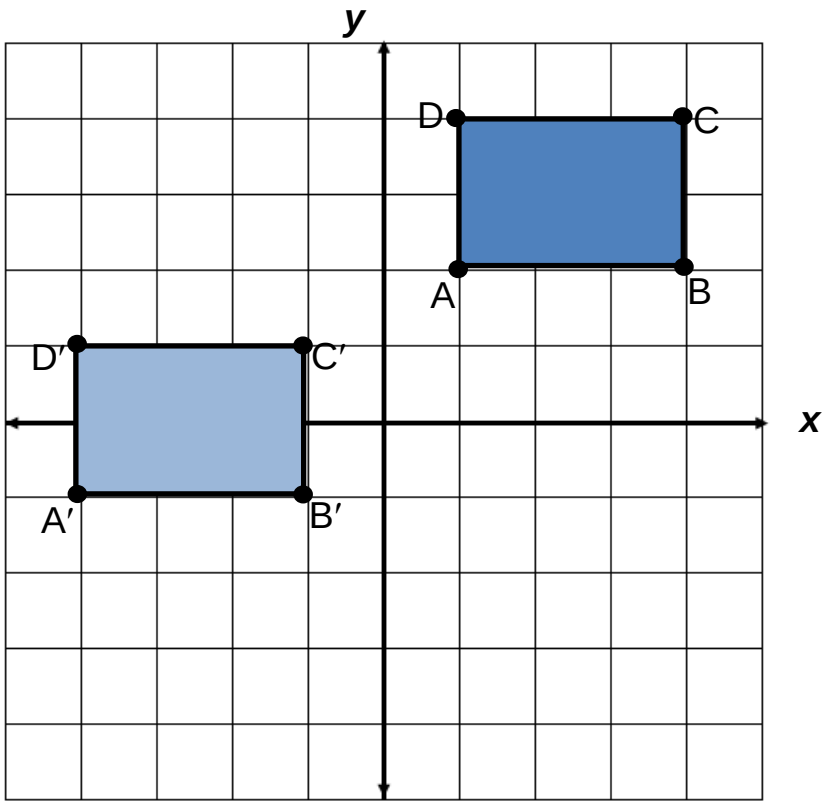


The preimage of triangle DEF is reflected across the *y*-axis to create the image D'E'F'

Preimage	Image
D(1,-2)	D′(-1,-2)
E(3,-2)	E′(-3,-2)
F(3,2)	F′(-3,2)

Translation

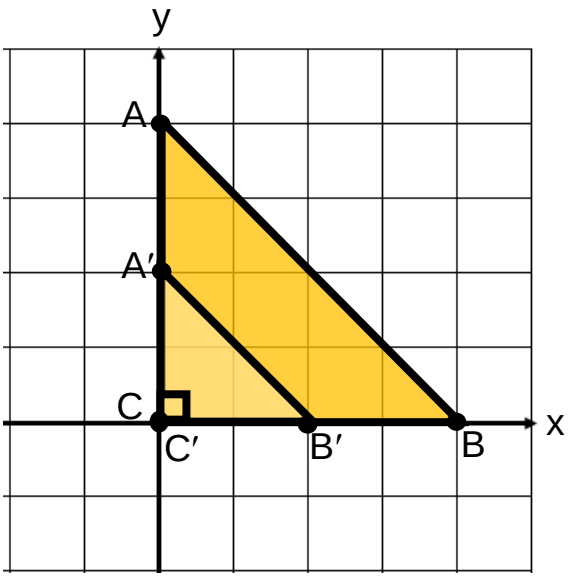
a transformation in which an image is formed by moving every point on the preimage the same distance in the same direction.



The preimage of rectangle ABCD is translated 5 units to the left and 3 units down to create the image A'B'C'D'

Preimage	Image
A(1,2)	A′(-4,-1)
B(4,2)	B′(-1,-1)
C(4,4)	C′(1, 1)
D(1,4)	D′(-4, 1)

Dilation



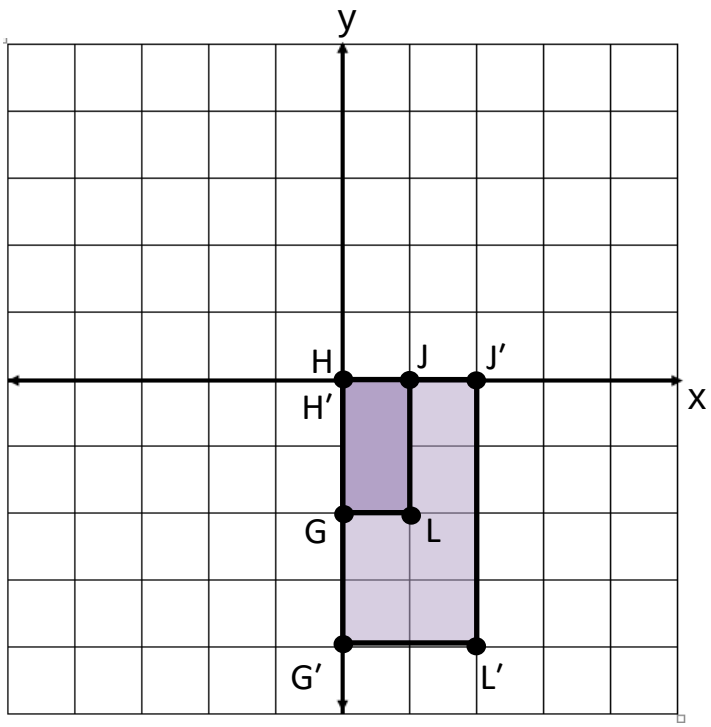
center of dilation is (0,0)

scale factor = $\frac{1}{2}$

Preimage	Image
A(0,4)	A′(0,2)
B(4,0)	B′(2,0)
C(0,0)	C′(0,0)

center of dilation is (0,0)
scale factor = 2

Preimage	Image
G(0,-2)	G′(0,-4)
H(0,0)	H′(0,0)
J(1,0)	J′(2,0)
L(1, -2)	L′(2,-4)



Reflection and Translation

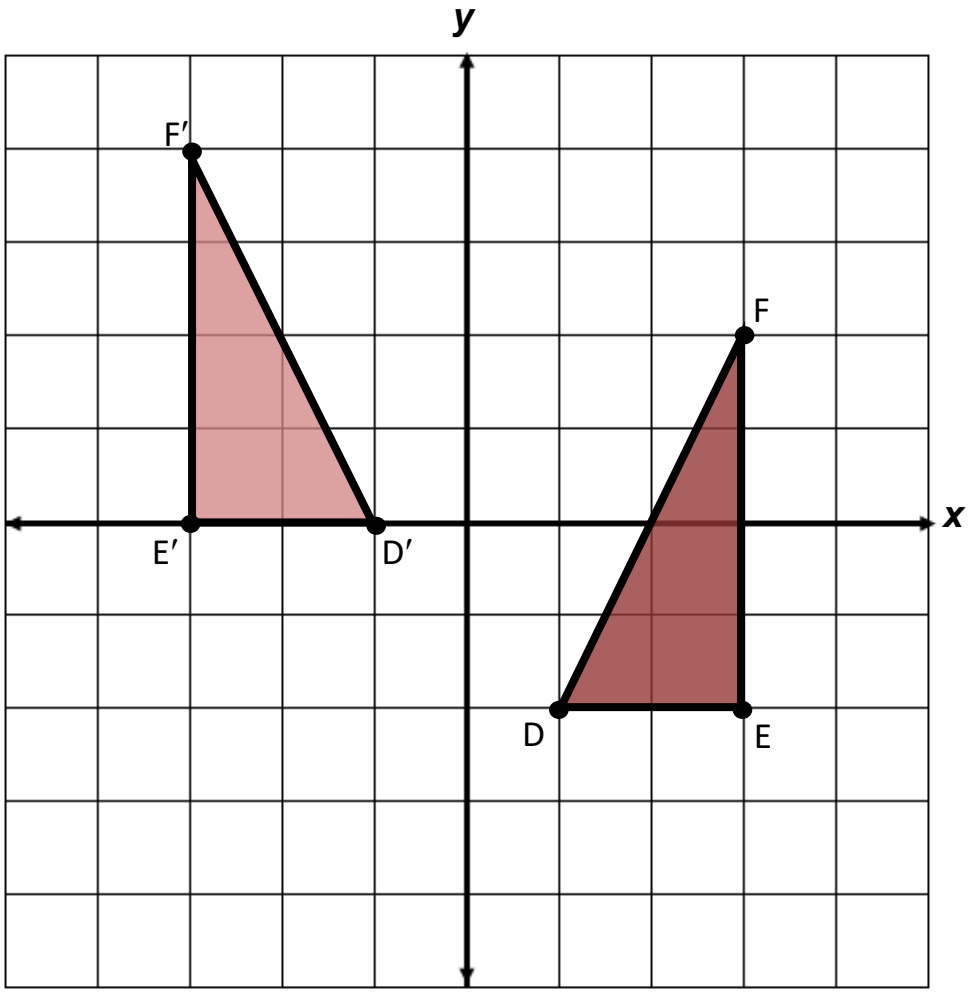
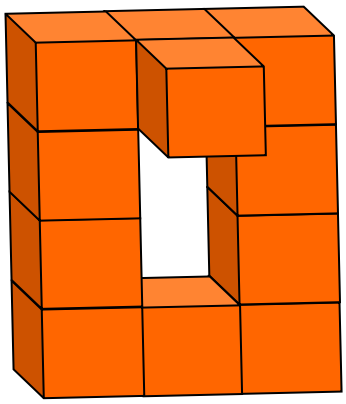


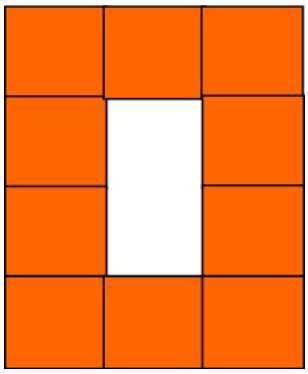
Figure *DEF* is reflected over the *y*-axis and translated up 2 units to create the image *D'E'F'*.

Preimage	Image
D(1,-2)	D′(-1,0)
E(3,-2)	E′(-3,0)
F(3,2)	F′(-3,4)

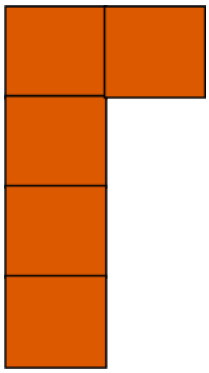
Three Dimensional Models



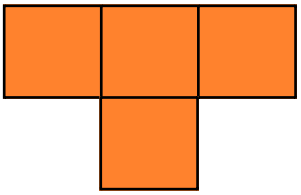
front

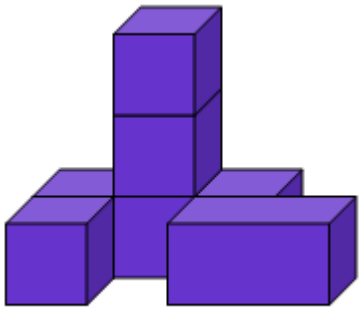


side

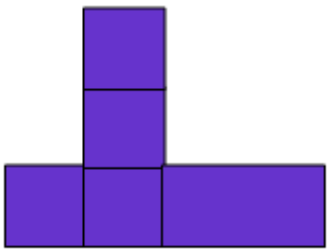


top

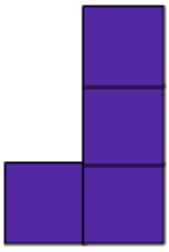




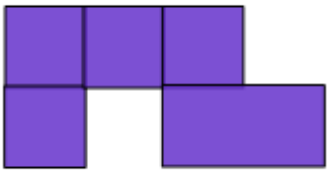
front



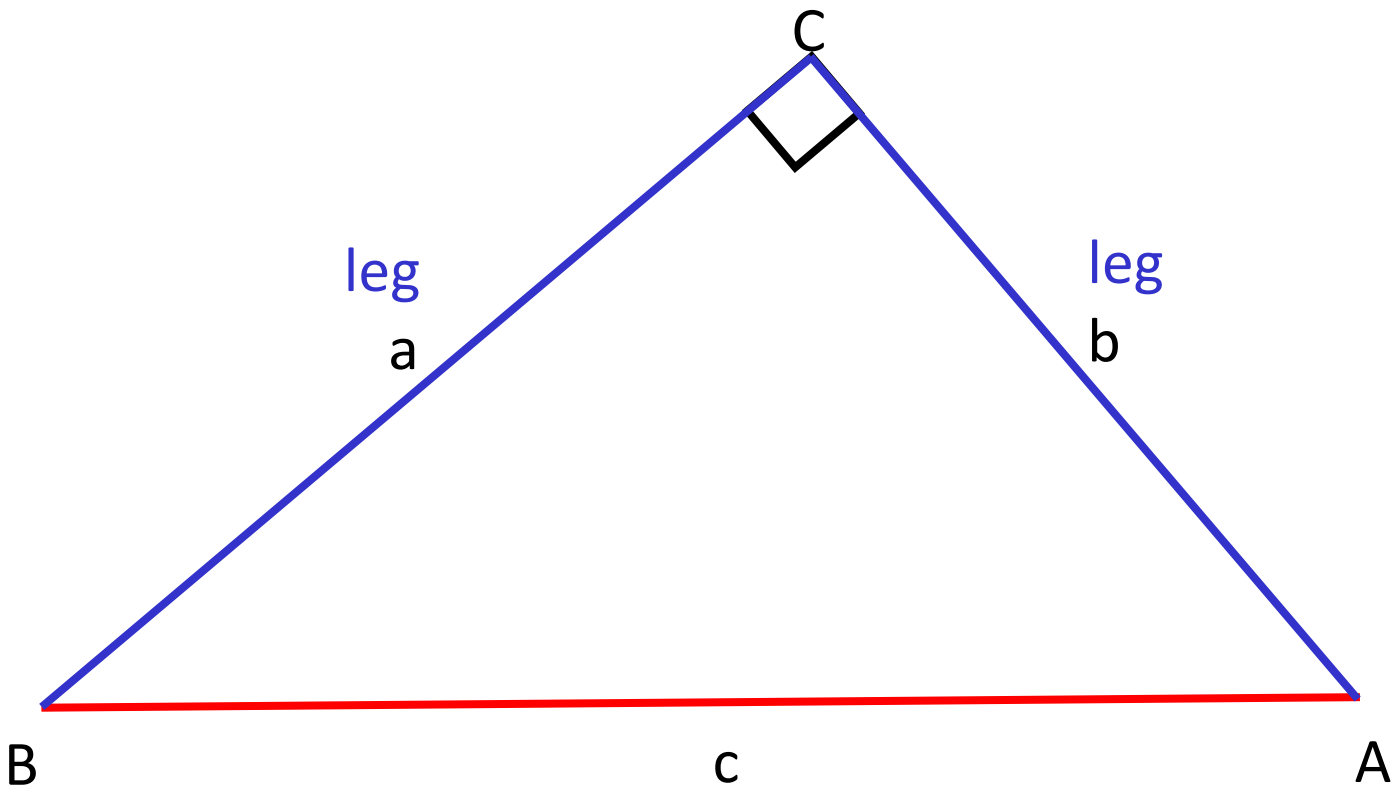
side



bottom

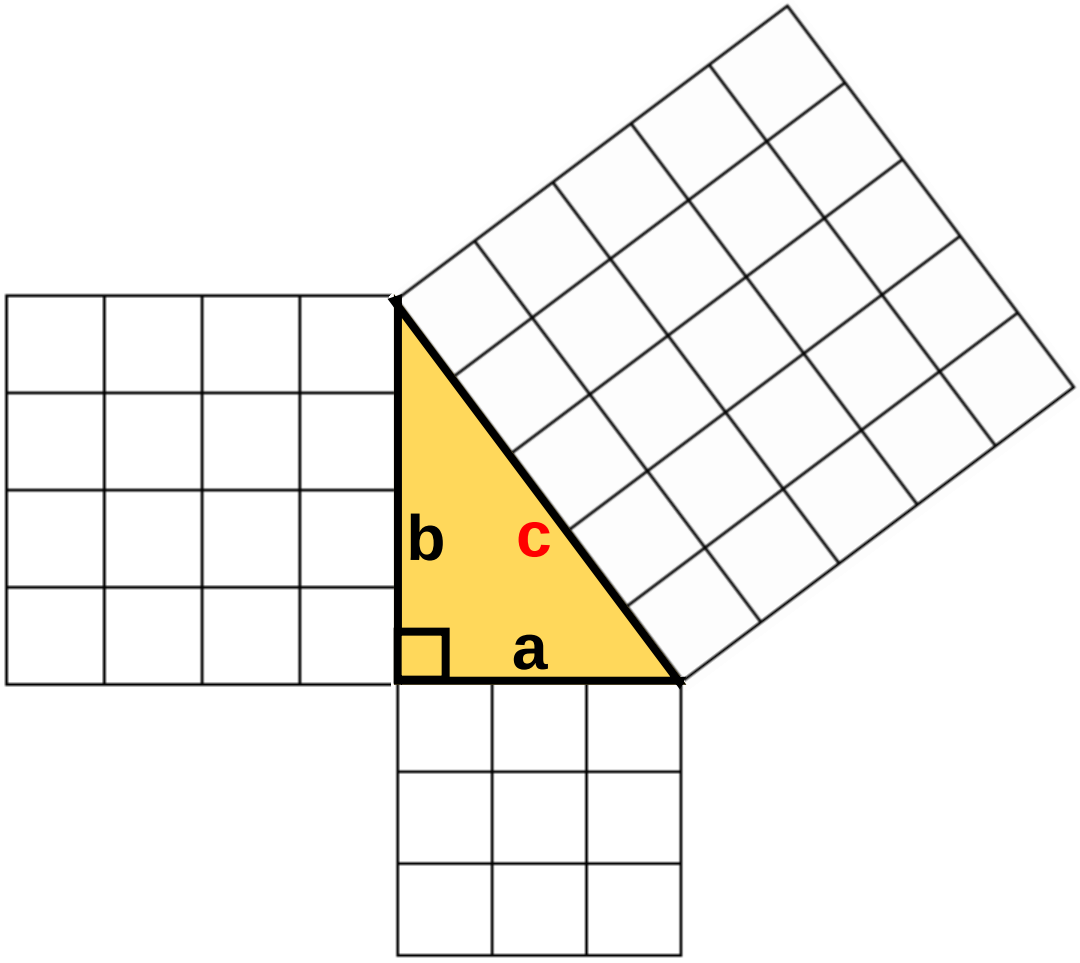


Right Triangle



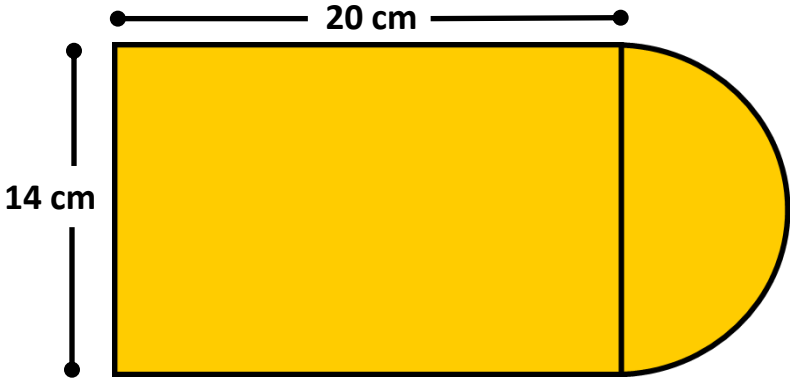
In a right triangle, the hypotenuse is the side opposite the right angle.
The hypotenuse is the longest side of the right triangle.

Pythagorean Theorem

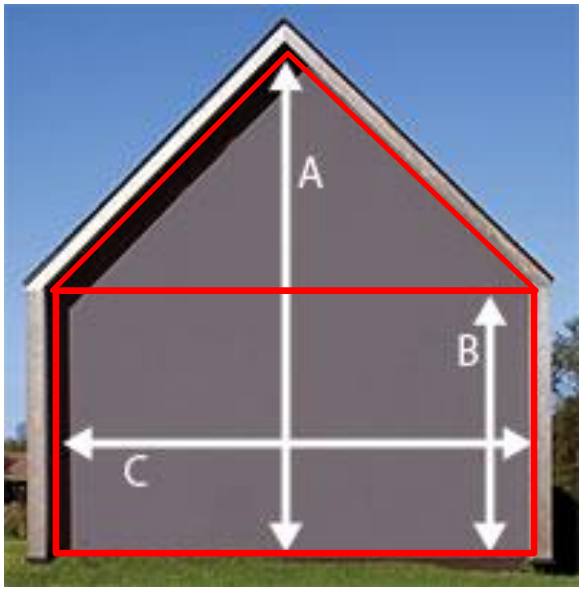


$$a^2 + b^2 = c^2$$

Composite Figures



Example 1: Subdivide the composite figure into other figures, then determine the perimeter.



A – 40 ft

B – 21 ft

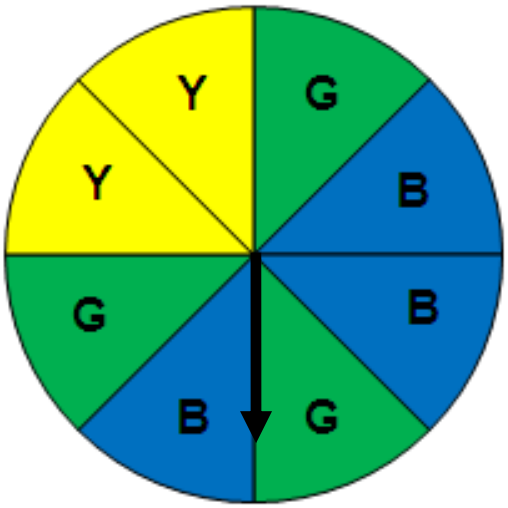
C – 38 ft

Example 2: Subdivide the composite figure into other figures to determine the area of the side of the house.

$$\text{Area} = (38)(21) + \frac{1}{2}(38)(19) = 798 + 361 = \mathbf{1159\ ft^2}$$

Probability of Independent Events

The outcome of one event does not affect the outcome of the other event.



What is the probability of landing on green on the first spin and then landing on yellow on the second spin?

P(green and yellow) =

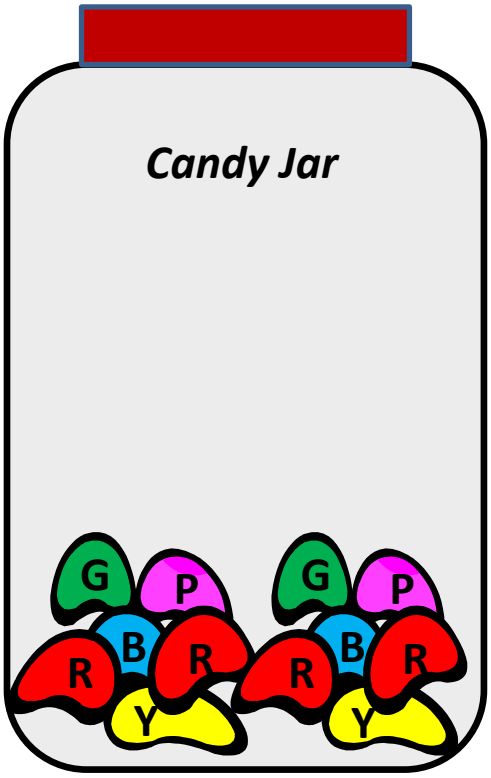
P(green) · P(yellow) =

$$\frac{3}{8} \cdot \frac{1}{4} = \frac{3}{32}$$

Probability of Dependent Events

The outcome of one event has an impact on the outcome of the other event.

What is the probability of choosing a red jelly bean on the first pick and then <u>without replacing it</u>, choosing a green jelly bean on the second pick?

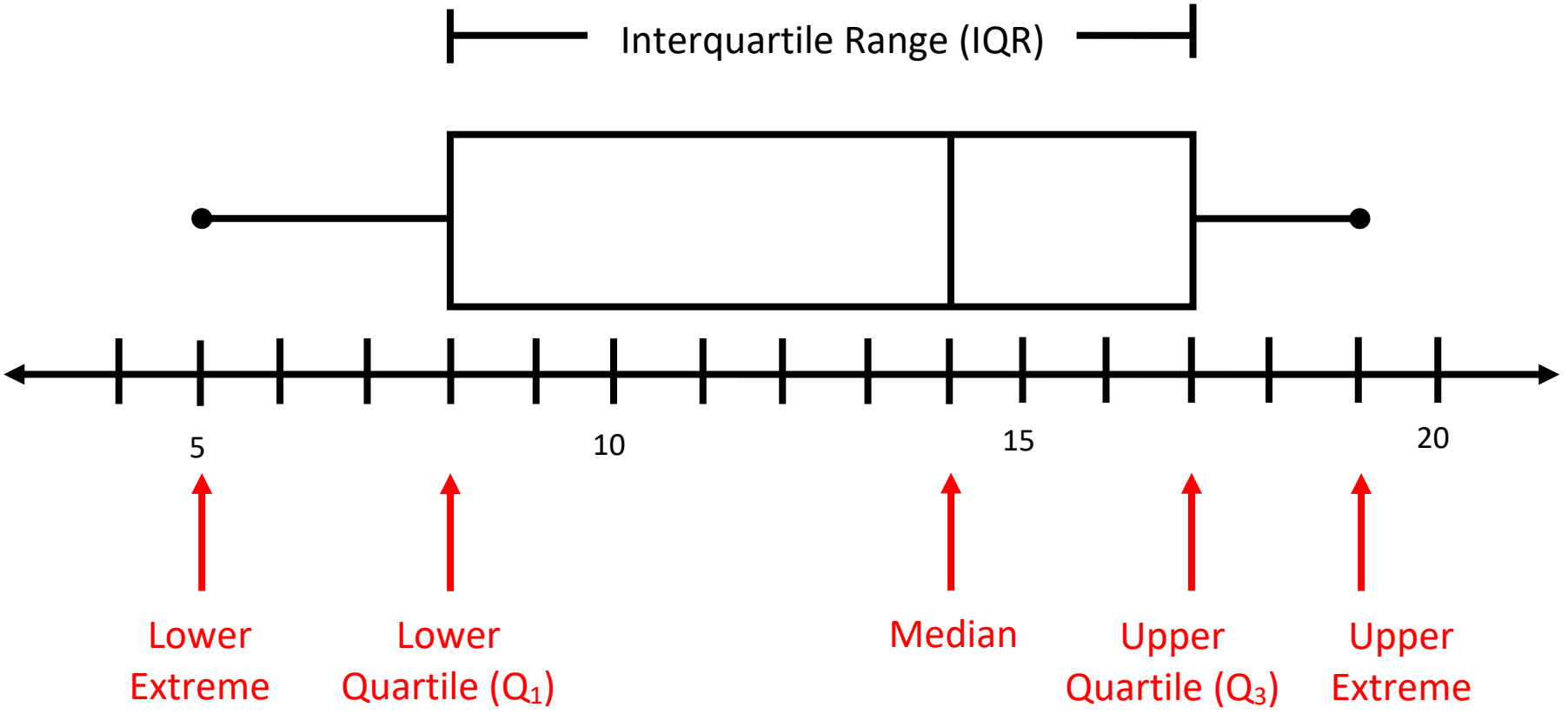


$$P(\text{red}) \cdot P(\text{green after red}) = \frac{4}{12} \cdot \frac{2}{11} = \frac{8}{132} = \frac{2}{33}$$

Boxplots

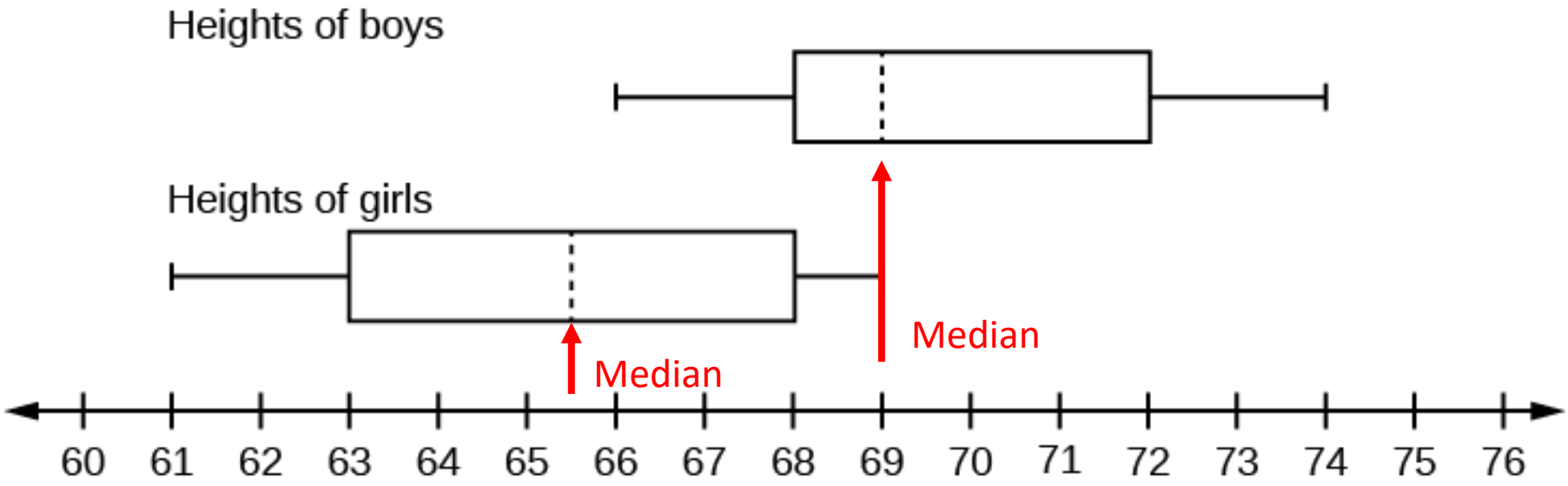
(Box-and-Whisker Plots)

A graphical representation of the five-number summary



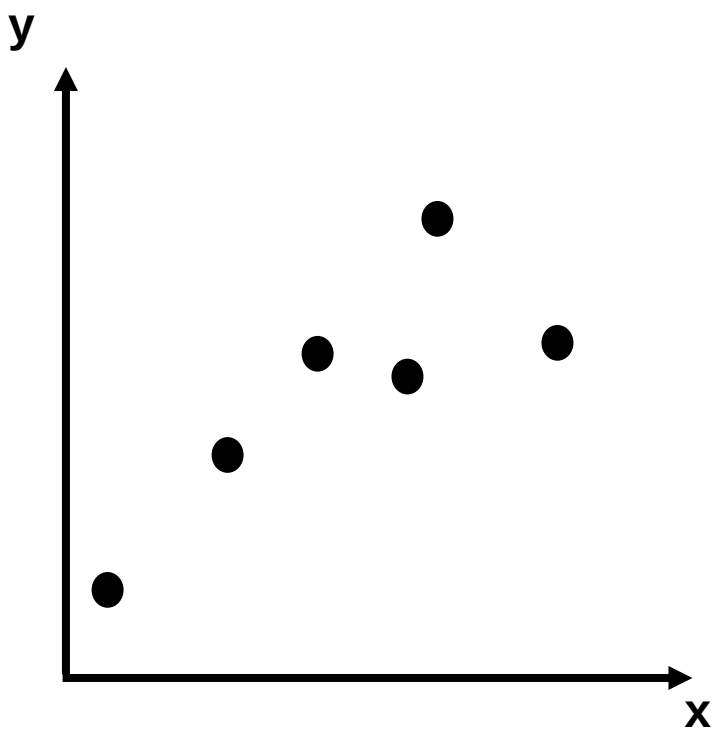
Comparing Boxplots

Comparing the heights (inches) of high school boys and girls



Scatterplot

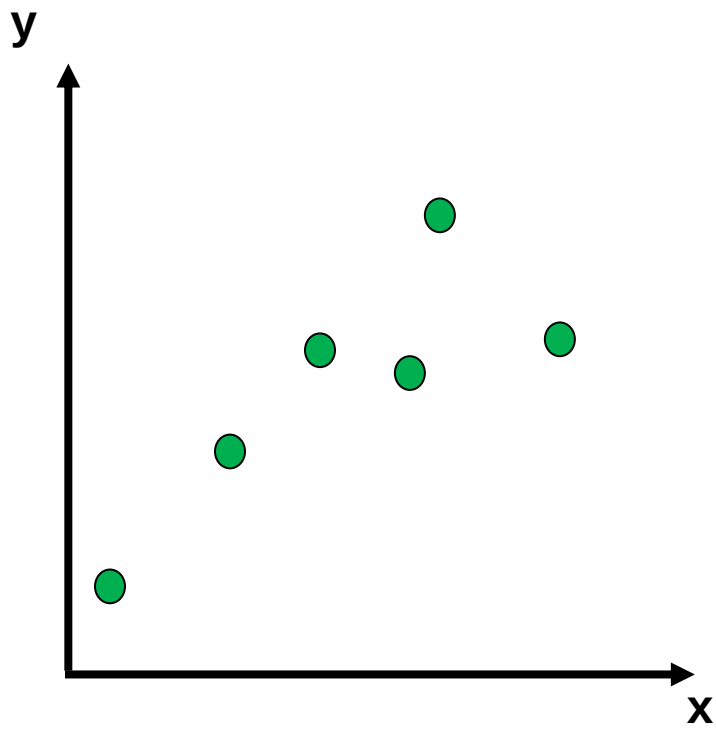
Illustrates the relationship between two sets of data.



Positive Linear Relationship

Pattern of points slopes from lower left to upper right.

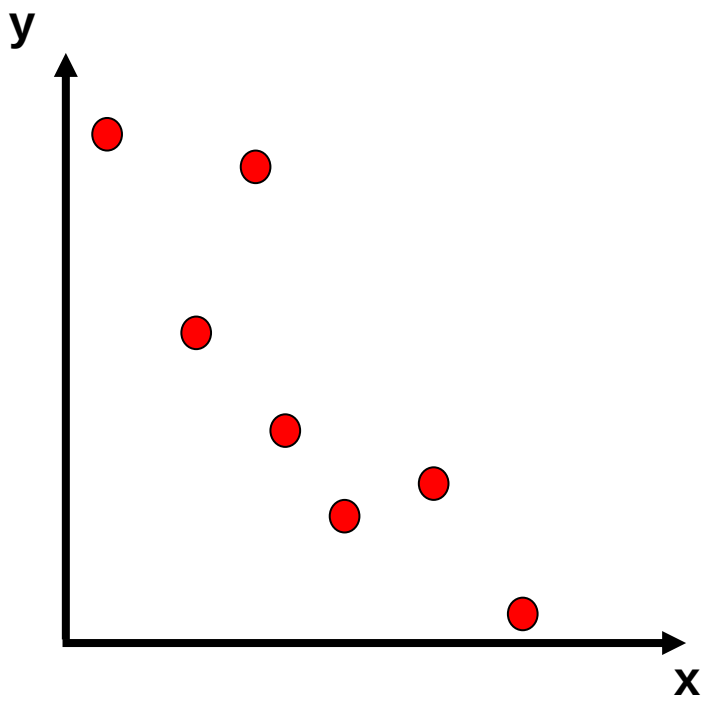
(Generally, as the *x*-coordinates increase in value, the *y*-coordinates increase in value)



Negative Linear Relationship

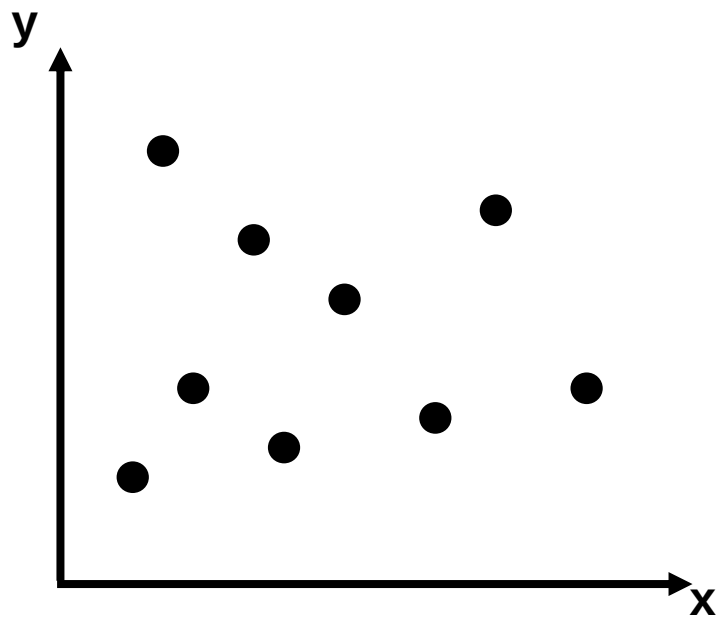
Pattern of points slopes from upper left to lower right

(Generally, as the *x*-coordinates increase in value, the *y*-coordinates decrease in value)



No Linear Relationship

no relationship exists between the *x*- and *y*-coordinates



Term

$\underbrace{3x} + \underbrace{2y} - \underbrace{8}$

3 terms

$\underbrace{-5x^2} + \underbrace{(-2x)}$

2 terms

$\underbrace{\frac{2}{3}ab}$

1 term

Constant

$4x - 12$ → **-12**

$7 - 2y + x - 6x^2$ → **7**

$3(x + 3.9) + \frac{8}{9}$ → **3.9**, **$\frac{8}{9}$**

Like Terms

$4x - 3y + 6x - 7$

$2y^2 - 3y + 7y^2$

$-5r^2 - 6 + 2r + 2$

Order of Operations

Grouping Symbols

( ) $\sqrt{\square}$

{ } $|\square|$

[ ] $\frac{\square}{\square}$

Exponents

Multiplication or Division — Left to right

Addition Subtraction — Left to right

Relation

Any set of ordered pairs

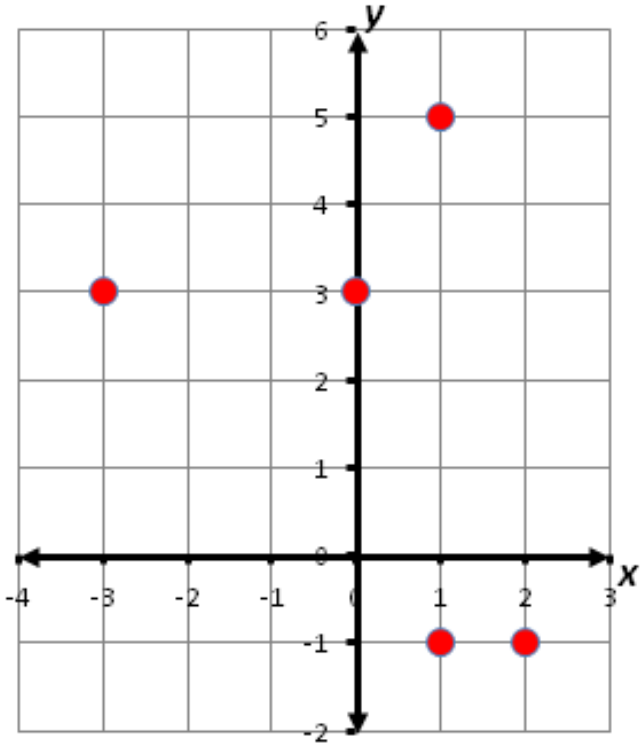
Ordered Pairs

{(-3,3), (0,3), (1,5), (1,-1), (2, -1)}

Table

x	*y*
-3	3
0	3
1	5
1	-1
2	-1

Graph

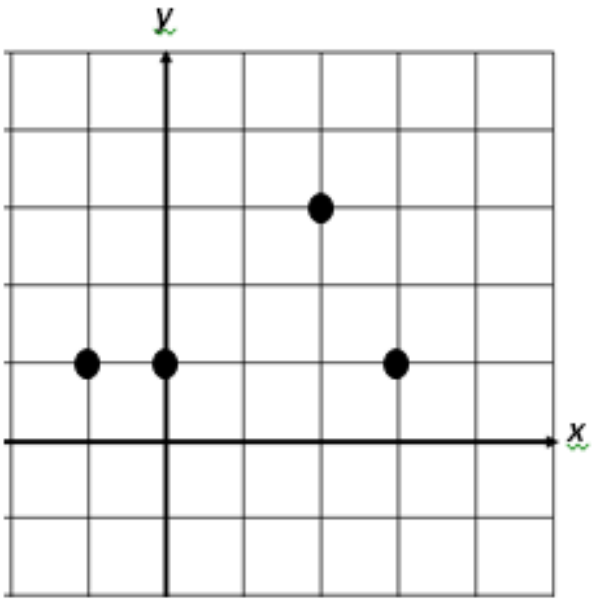


Function

A relation between a set of inputs, called the domain, and a set of outputs, called the range, with the property that each input is related to exactly one output

{(-1,1), (0,1), (2,3), (4,1)}

x	*y*
-1	1
0	1
2	3
4	1



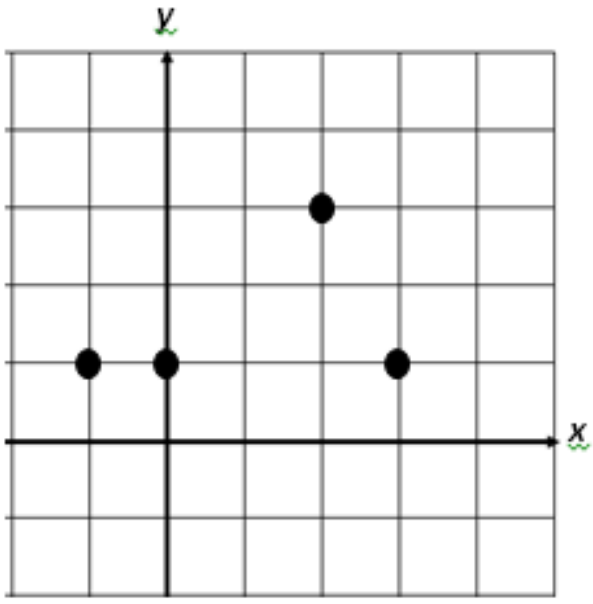
Domain

The set of all the input values for the independent variable or *x*-values (first number in an ordered pair)

{(-1,1), (0,1), (2,3), (4,1)}

x	*y*
-1	1
0	1
2	3
4	1

D: {-1, 0, 2, 4}



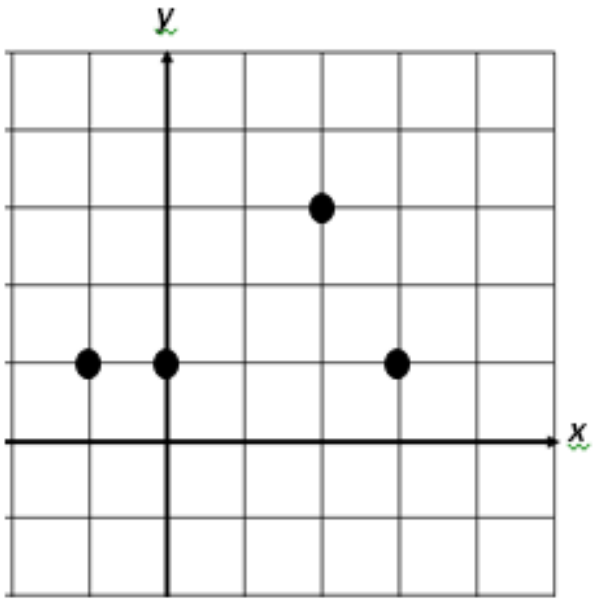
Range

The set of all the output values for the dependent variable or *y*-values (second number in an ordered pair)

{(-1,1), (0,1), (2,3), (4,1)}

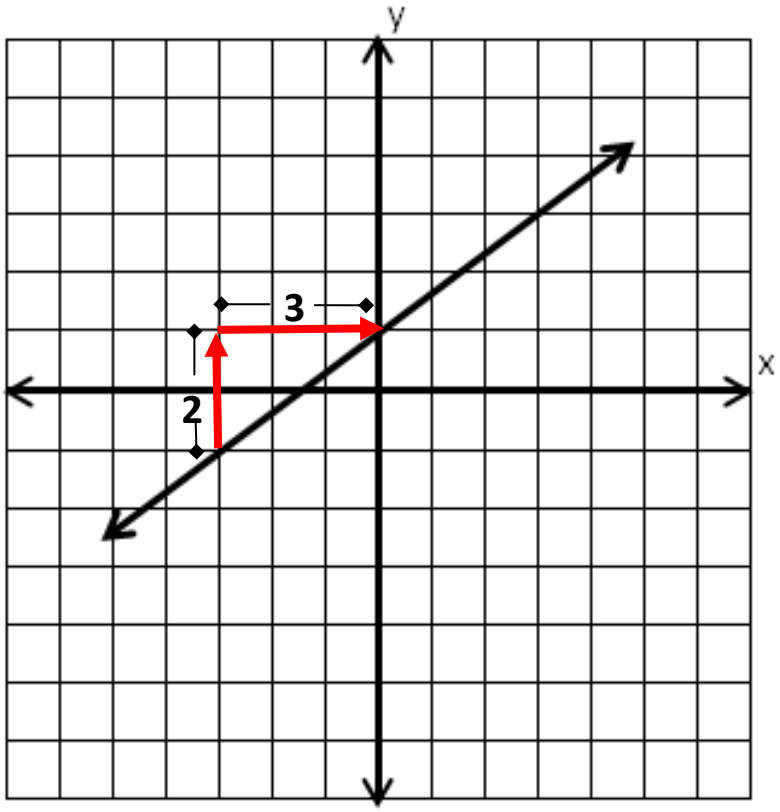
x	*y*
-1	1
0	1
2	3
4	1

R: {1, 3}



Slope

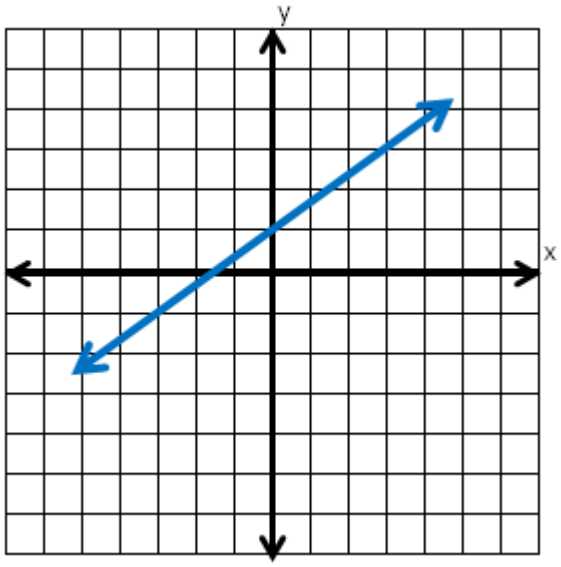
Represents the rate of change in a linear function or the “steepness” of the line.



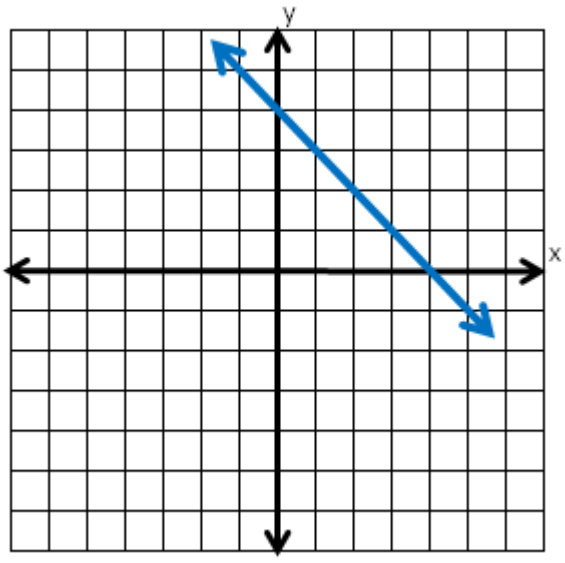
Slope = $\frac{2}{3}$

$$\text{slope} = \frac{change\ in\ y}{change\ in\ x} = \frac{vertical\ change}{horizontal\ change}$$

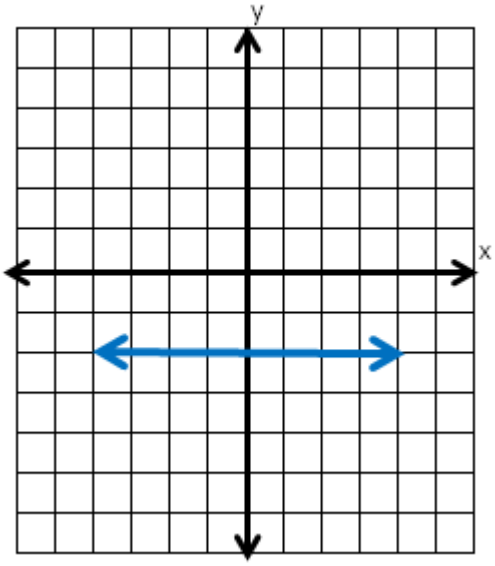
Slope



A line with a positive slope slants up to the right.



A line with a negative slope slants down to the right.



A horizontal line has a slope of zero (0).

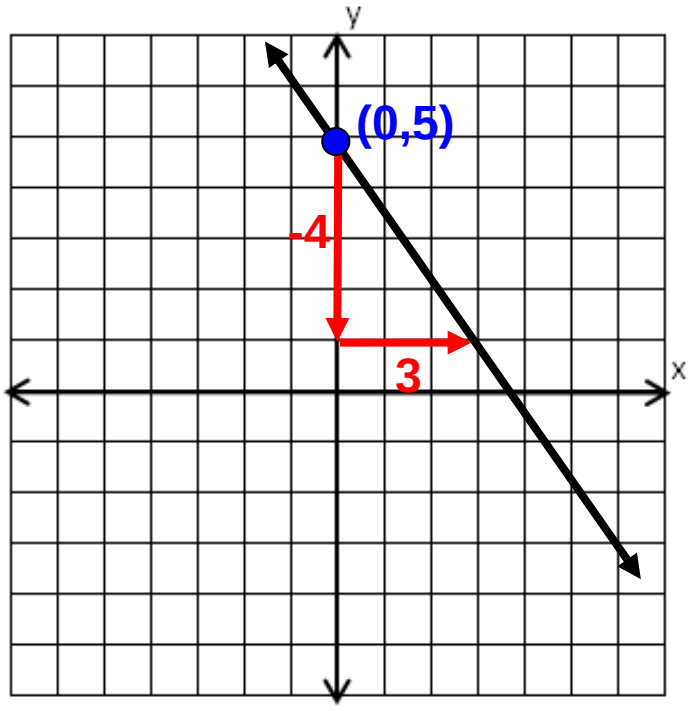
Linear Function

A linear function can be written as $y = mx + b$ and its graph is a straight line. Its slope represents a constant rate of change.

$$y = mx + b$$

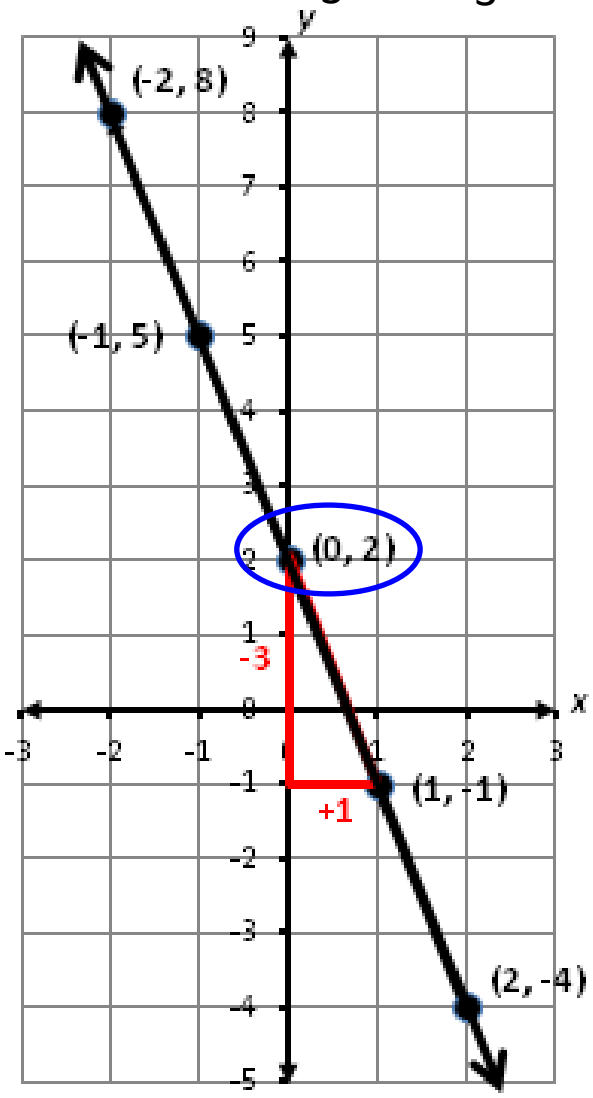
(slope is m and y-intercept is b)

Example: $y = \frac{-4}{3}x + 5$



Identifying Slope and y-Intercept

		+1	+1	+1	+1
x	-2	-1	0	1	2
y	8	5	2	-1	-4
		-3	-3	-3	-3



y-intercept, *b*, is 2, located at (0,2).

slope = $m = \frac{-3}{1} = -3$

$y = -3x + 2$

Dependent/ Independent Variable

Determine the distance (d) a car will travel going 55 mph.

$$d = 55h$$

independent

h	d
0	0
1	55
2	110
3	165

dependent

Independent Variable

$y = 2x + 7$

x represents the independent variable (input values or domain)

Dependent Variable

$y = 2x + 7$

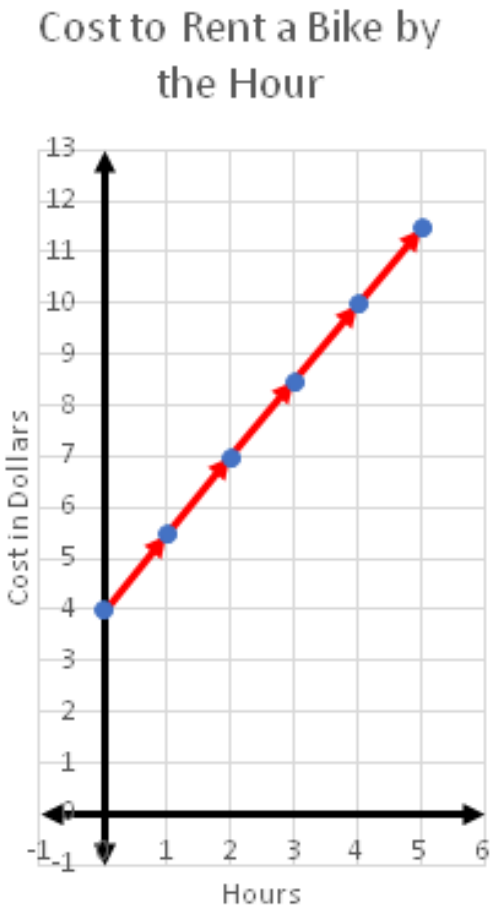
y represents the dependent variable (output values or range)

Connecting Representations

A bike rents for $4 plus $1.50 per hour.

$$c = 1.5h + 4$$

h	c
0	4
1	5.5
2	7
3	8.5
4	10
5	11.5



Multistep Equations

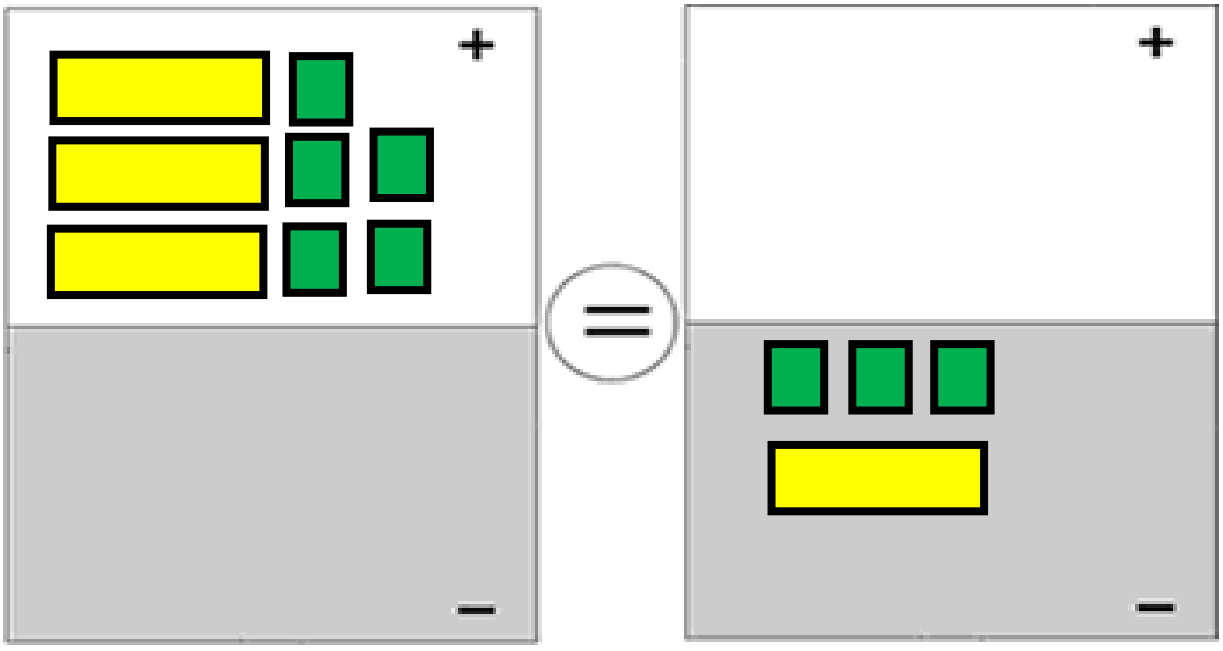
$$2x - 5.7 = -3.4x + 11.04$$

$$\frac{2}{3}(n + 9) = -\frac{5}{6}n$$

$$25 = \frac{6p - 5}{-4}$$

Multistep Equation

$$3x + 5 = -3 - x$$



Verbal and Algebraic Expressions and Equations

Verbal	Algebraic
A number multiplied by five	$5n$
The sum of negative two and a number	$-2 + n$
The sum of half a number and two is five times the number	$\frac{1}{2}y + 2 = 5y$
Negative three times a number is one-fifth the difference of four times the number and ten	$-3x = \frac{1}{5}(4x - 10)$

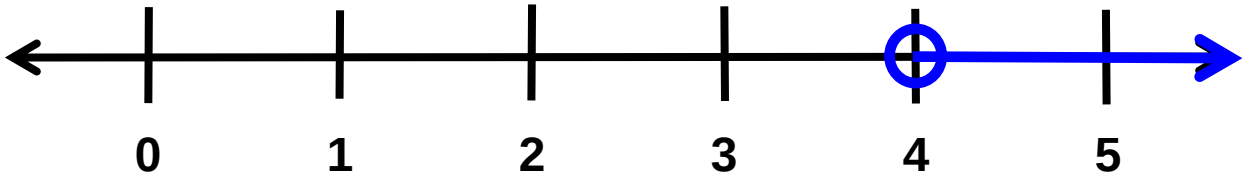
Inequality

$-3(n - 4) < 0$

$-3n + 12 < 0$

$-3n < -12$

$n > 4$



$$y - \frac{9}{2} > 3(y - \frac{7}{2})$$

$$y - \frac{9}{2} > 3y - \frac{21}{2}$$

$$y - 3y > -\frac{21}{2} + \frac{9}{2}$$

$$-2y > -6$$

$$y < 3$$