Grade 7 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.

Powers of Ten

Power of Ten	Meaning	Value
10^5	$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$	100,000 *One hundred thousand*
10^4	$10 \cdot 10 \cdot 10 \cdot 10$	10,000 *Ten thousand*
10^3	$10 \cdot 10 \cdot 10$	1,000 *One thousand*
10^2	$10 \cdot 10$	100 *One hundred*
10^1	10	10 *Ten*
10^0	1	1 *One*

Scientific Notation

Coefficient

Exponent

$$a \text{ x } 10^{n}$$

Base

a = Coefficient (a number that is greater than or equal to 1 and less than 10)

10 = Base

n = Exponent (a number that is an integer)

Examples

$$17{,}500{,}000 = 1.75 \text{ x } 10^{7}$$

$$0.0000026 = 2.6 \text{ x } 10^{-6}$$

$$5.3 \text{ x } 10^{10} = 53{,}000{,}000{,}000$$

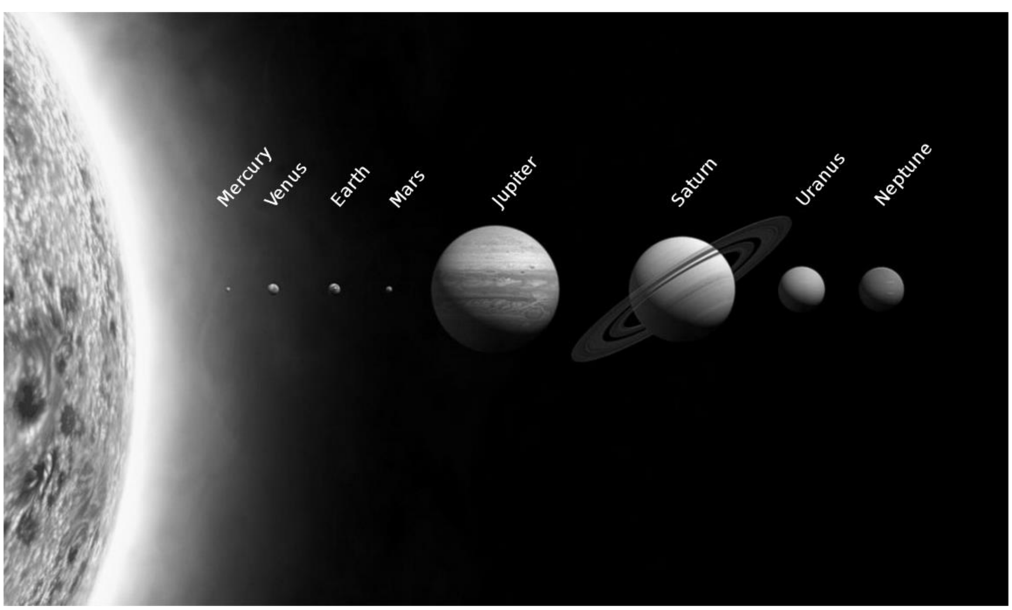
$$4{,}421.952 = 4.421952 \text{ x } 10^{3}$$

Comparing Numbers in Scientific Notation

Planet Diameter Table (km)

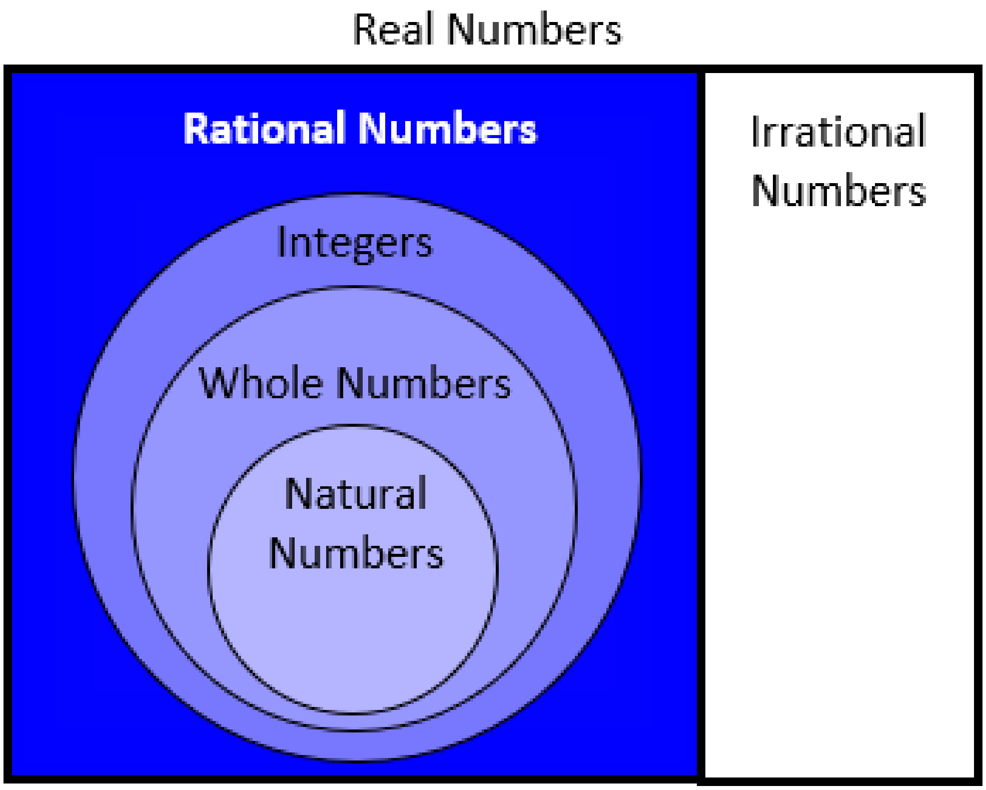
Planet	Diameter (km)	Scientific Notation
Mercury	4,879 km	4.879×10^3 km
Venus	12,104 km	1.2104×10^4 km
Earth	12,756 km	1.2756×10^4 km
Mars	6,792 km	6.792×10^3 km
Jupiter	142,984 km	1.42984×10^5 km
Saturn	120,536 km	1.20536×10^5 km
Uranus	51,118 km	5.1118×10^4 km
Neptune	49,528 km	4.9528×10^4 km

https://nssdc.gsfc.nasa.gov/planetary/factsheet/



https://en.wikipedia.org/wiki/Solar_System

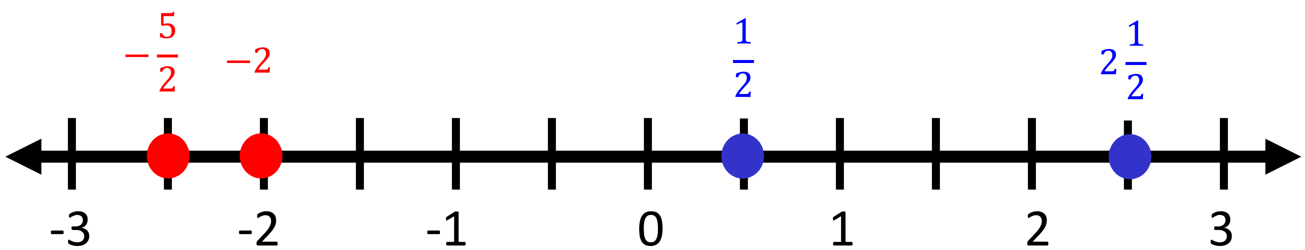
Rational Numbers



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, $\sqrt{16}$, $0.\overline{66}$, $\frac{13}{7}$

Comparing Rational 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

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

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

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

Perfect Squares

$$0^2 = 0 \cdot 0 = \mathbf{0}$$

$$1^2 = 1 \cdot 1 = \mathbf{1}$$

$$2^2 = 2 \cdot 2 = \mathbf{4}$$

$$3^2 = 3 \cdot 3 = \mathbf{9}$$

$$4^2 = 4 \cdot 4 = \mathbf{16}$$

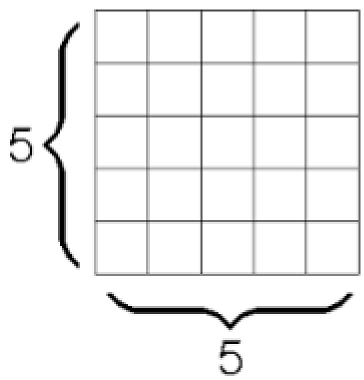
$$5^2 = 5 \cdot 5 = \mathbf{25}$$

$$\sqrt{16} = \sqrt{4 \cdot 4} = 4$$

perfect square

Square Root

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



radical symbol

$$\sqrt{25} = 5$$

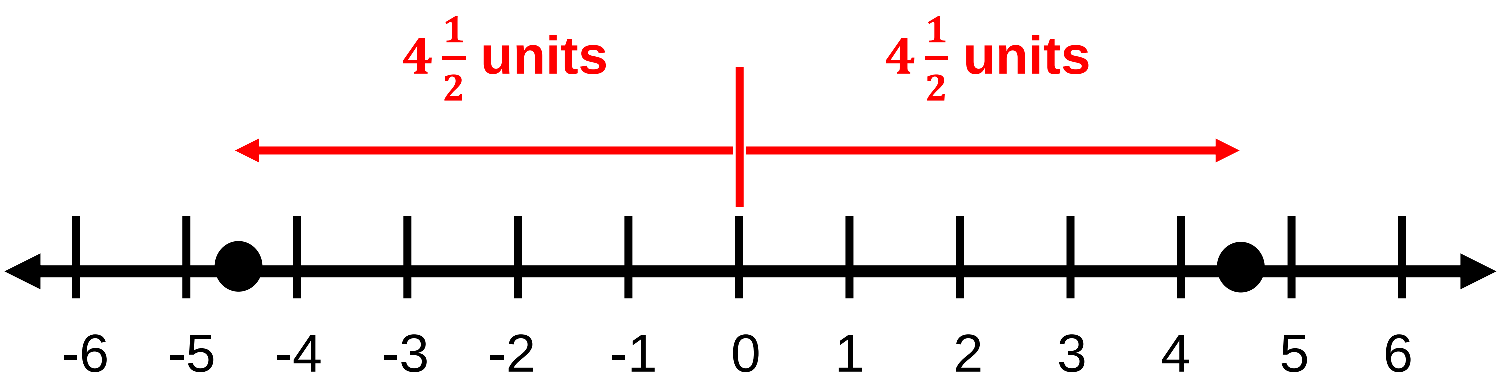
$$\sqrt{25} = \sqrt{5 \cdot 5} = \sqrt{5^2} = 5$$

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

Absolute Value

distance a number is from zero

$$\left|\frac{9}{2}\right| = \frac{9}{2} \qquad \left|-\frac{9}{2}\right| = \frac{9}{2}$$



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

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

2:5 = 4:10

2 is to 5 as
4 is to 10

Ratio Table

a table of values representing a proportional relationship that includes pairs of values that represent equivalent rates or ratios

Example

Terry's neighbor pays him \$17 for every 2 hours he works. Terry works for 8 hours on Saturday.

A ratio table represents the proportional relationship:

Hours	1	2	4	8
Pay in \$	?	17 $\cdot 8.5$	34 $\cdot 8.5$	?

How much does Terry earn per hour?

$\frac{\mathbf{17}}{\mathbf{2}} = \frac{?}{\mathbf{1}}$ Terry earns \$8.50 per hour

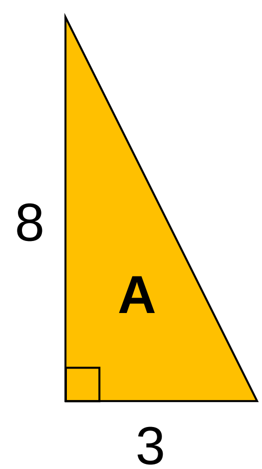
How much will Terry earn in 8 hours?

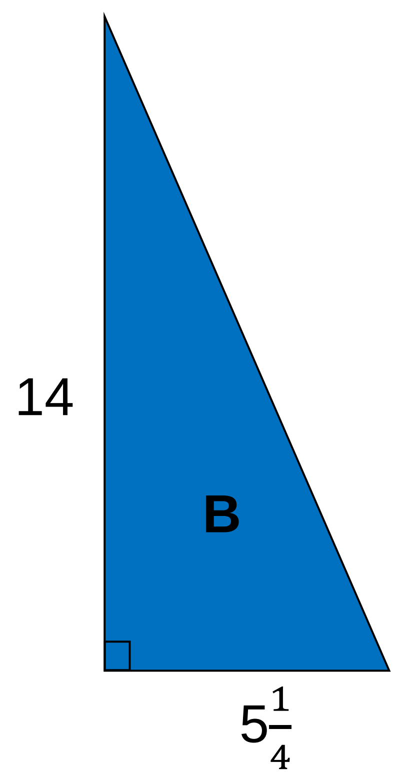
$\$8.50 \cdot 8 = 68.00$ He will earn \$68.00 in 8 hours.

Scale Factor

a number which scales, or multiplies, a quantity

Figures A and B are similar





What is the scale factor (scaling up) from figure A to figure B?

$$\text{Scale factor} = \frac{14}{8} = \frac{7}{4} = 1.75$$

What is the scale factor (scaling down) from figure B to figure A?

$$\text{Scale factor} = \frac{8}{14} = \frac{4}{7}$$

Proportional Reasoning

About how many centimeters are in 2 feet if 1 inch is about 2.5 centimeters?

2 feet = 24 inches

$$\frac{1}{2.5} = \frac{24}{x}$$

There are approximately 60 centimeters in 2 feet

About how many liters are in 3 gallons if 1 quart is approximately 0.95 liters?

3 gallons = 12 quarts

$$\frac{12}{y} = \frac{1}{0.95}$$

There are approximately 11.4 liters in 3 gallons.

Proportional Reasoning

Using benchmarks

A meal at a restaurant costs a total of $35.00. Sharon wants to leave a tip.

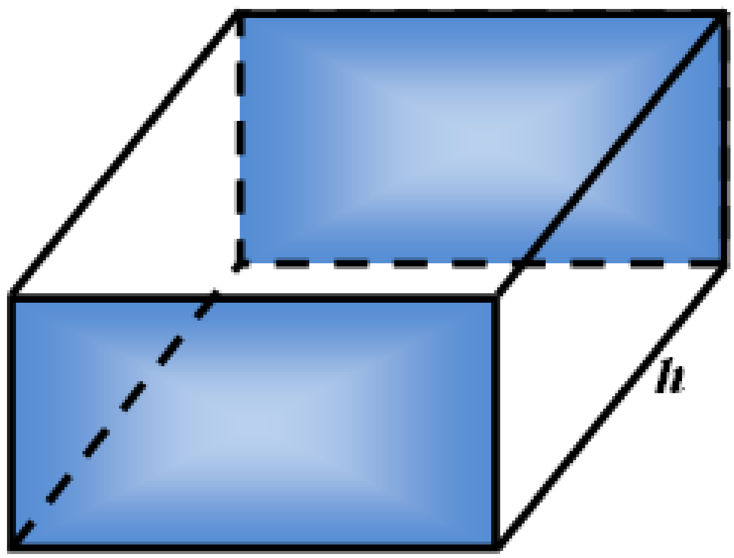
Percent	Cost of meal	Percentage or tip
5%	$35.00	$1.75
10%	$35.00	$3.50
15%	$35.00	$5.25
20%	$35.00	$7.00

To find 10% of $35.00 calculate 0.10($35.00) = $3.50

Using $3.50 as a benchmark, for example, we can then determine the 20% tip by doubling to $7.00 or the 5% tip by halving to $1.75.

Rectangular Prism

a polyhedron in which all six faces are rectangles



B = area of base
p = perimeter of base

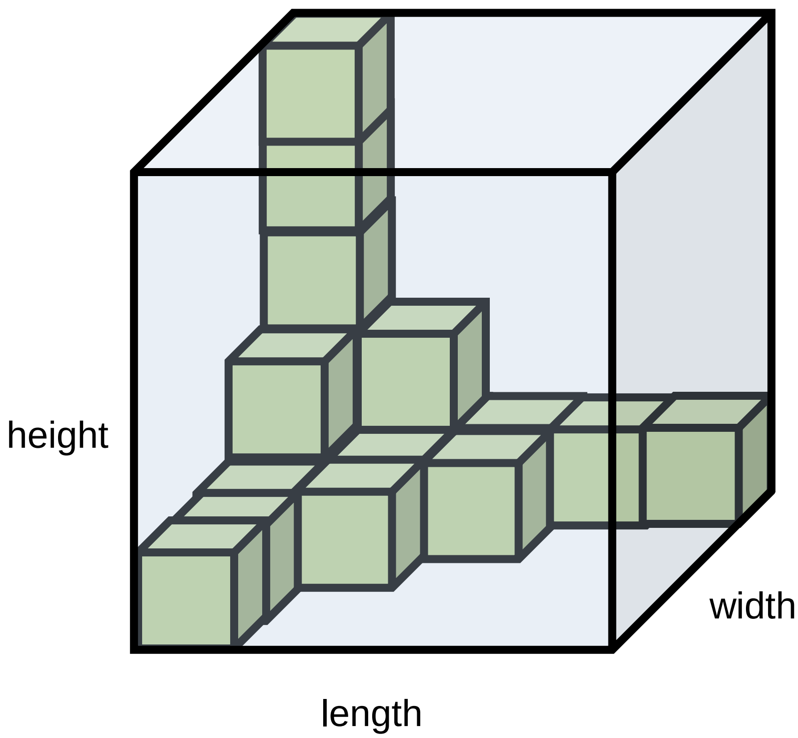
Volume = area of the base times the height

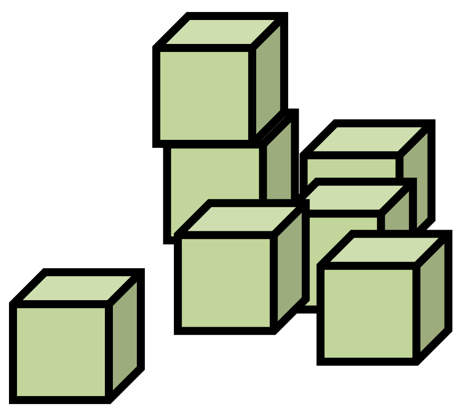
$$V = Bh$$

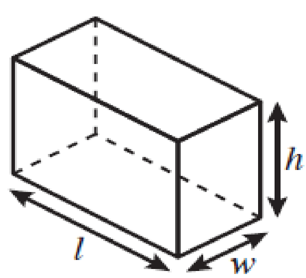
Surface area = height times the perimeter plus twice the area of the base

$$S.A. = hp + 2B$$

Volume of a Rectangular Prism



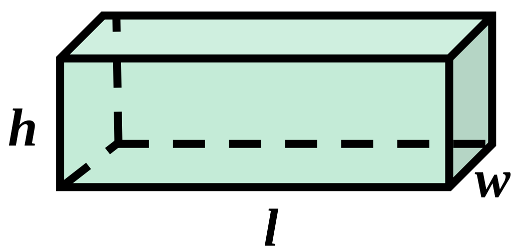


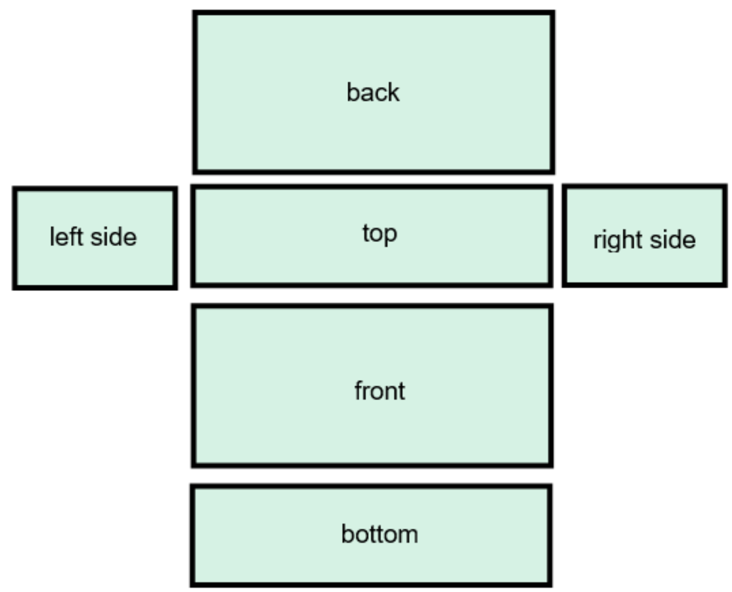


Volume = *length · width · height*

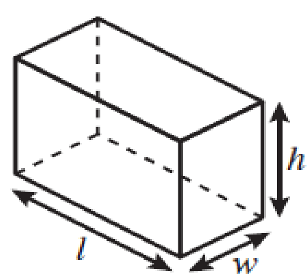
$V = lwh$

Surface Area of a Rectangular Prism





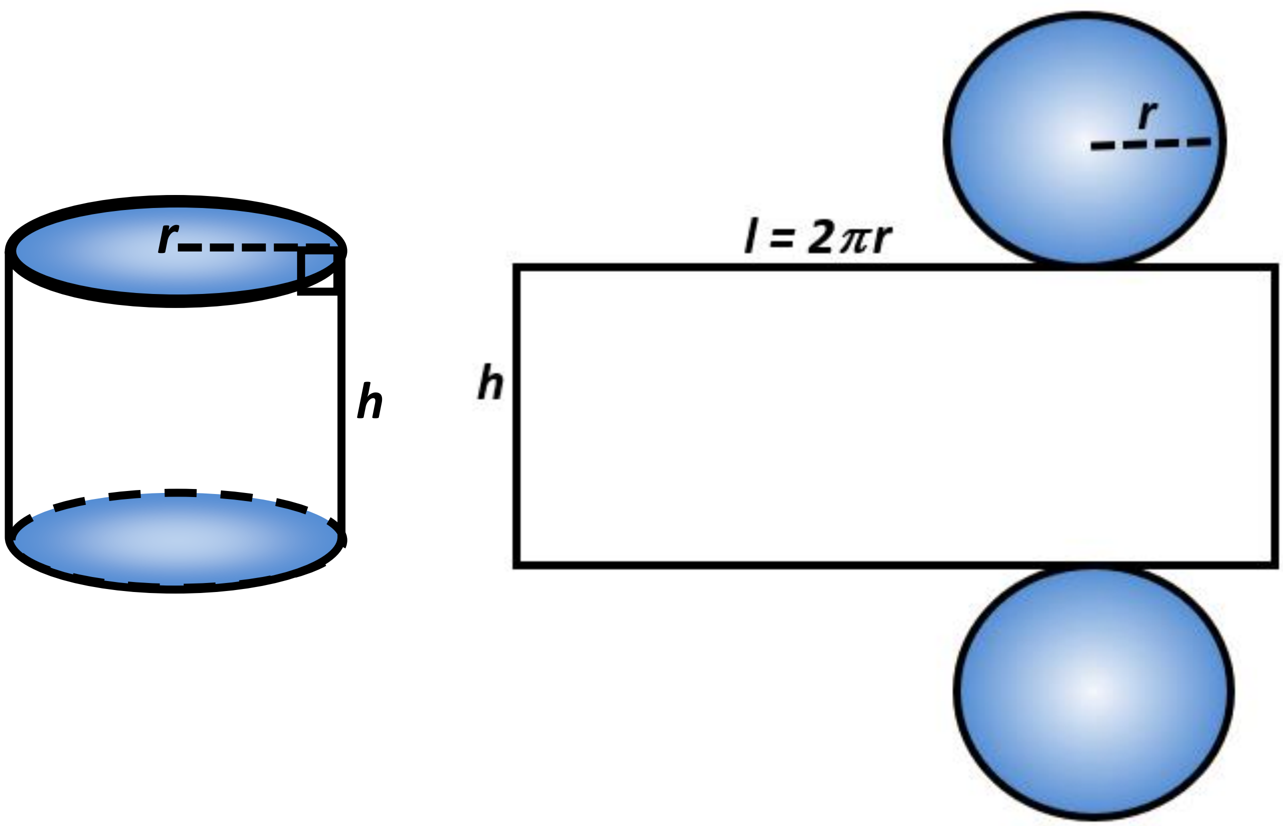
Surface Area (*S.A.*) = sum of areas of faces



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

Cylinder

a solid figure formed by two congruent parallel faces called bases joined by a curved surface

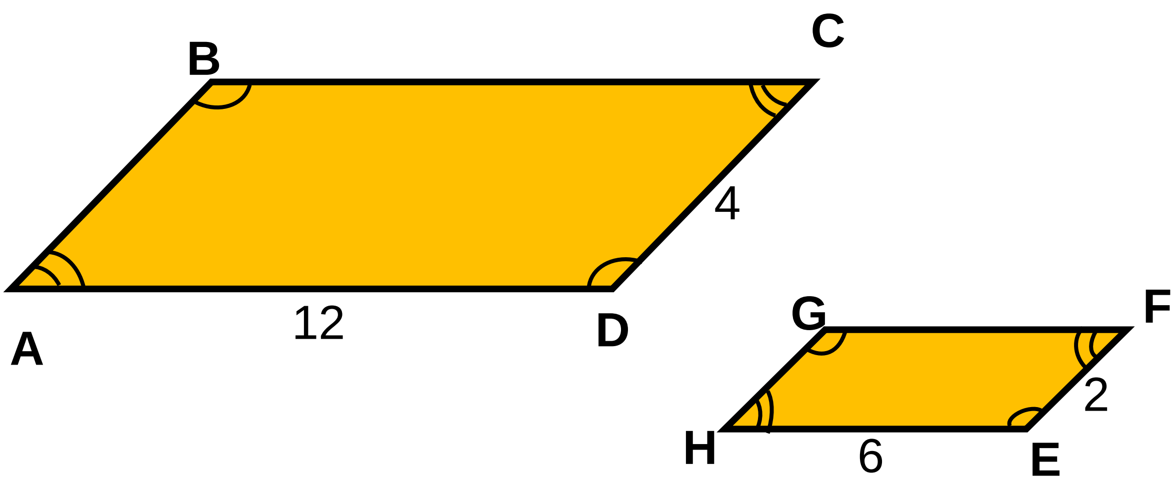


Volume = area of the base x height

$$V = \pi r^2 h$$

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

Similar Figures

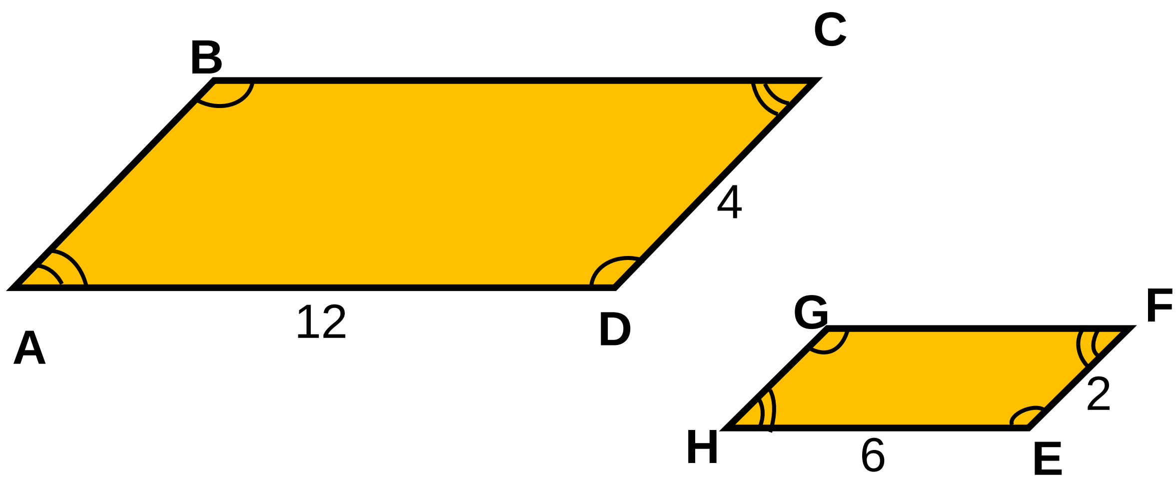


ABCD ~ HGFE	
Angles	**Sides**
$\angle A$ corresponds to $\angle H$	$\overline{AB}$ corresponds to $\overline{HG}$
$\angle B$ corresponds to $\angle G$	$\overline{BC}$ corresponds to $\overline{GF}$
$\angle C$ corresponds to $\angle F$	$\overline{CD}$ corresponds to $\overline{FE}$
$\angle D$ corresponds to $\angle E$	$\overline{DA}$ corresponds to $\overline{EH}$

Corresponding angles are congruent.

Corresponding sides are proportional.

Similar Figures and Proportions

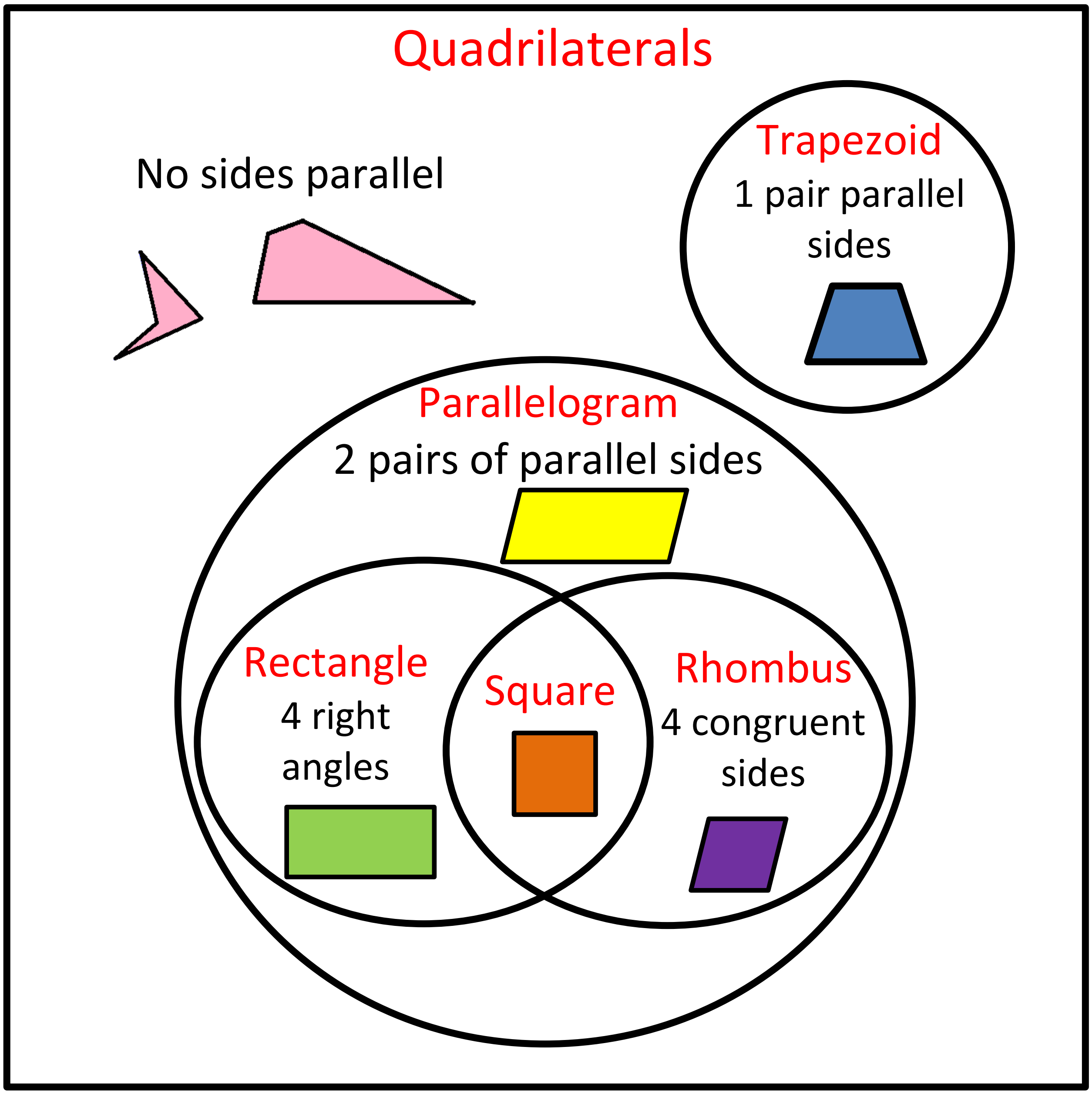


$$ABCD \sim HGFE$$

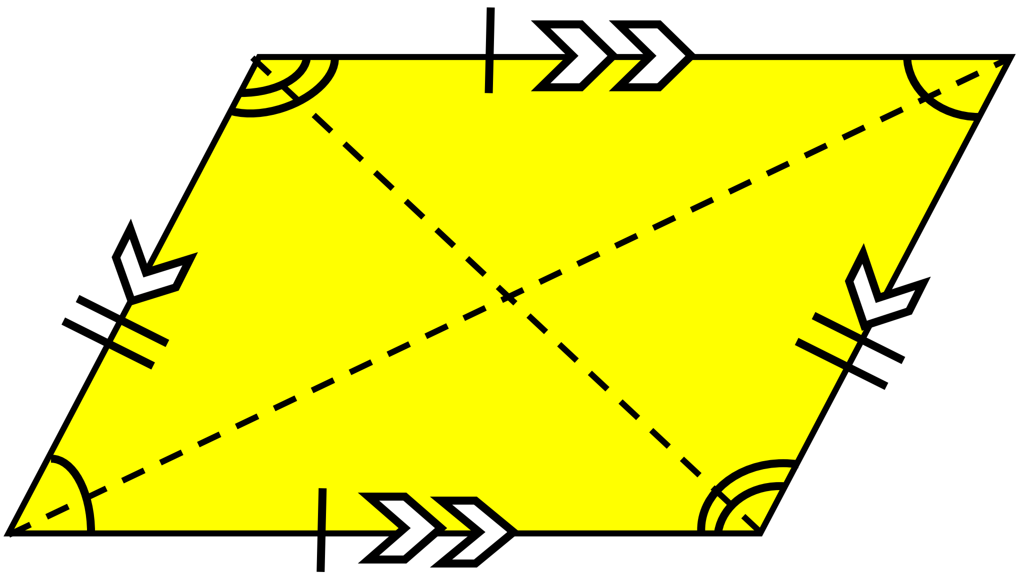
$$\frac{DC}{EF} = \frac{AD}{HE}$$

$$\frac{4}{2} = \frac{12}{6}$$

Quadrilaterals Relationships

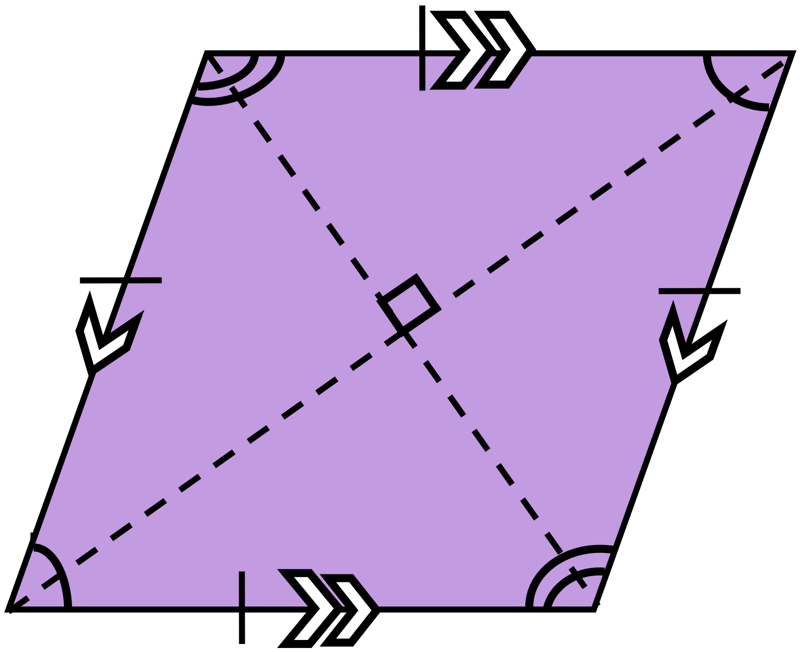


Parallelogram



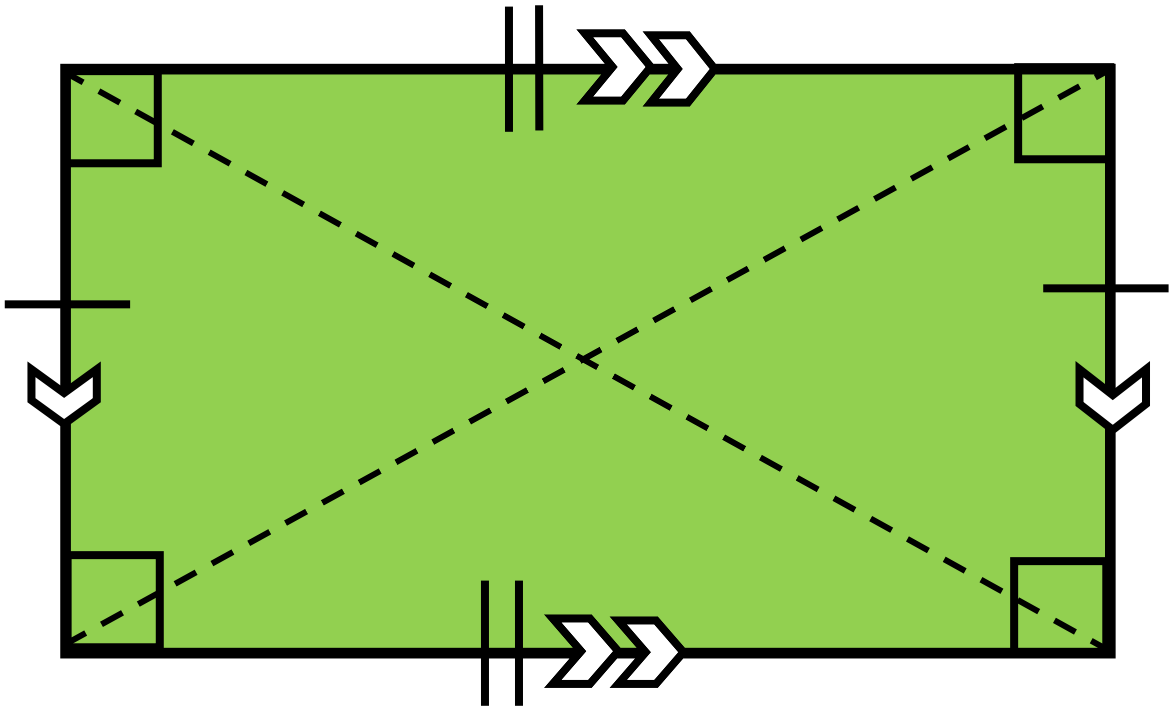
- opposite angles are congruent
- opposite sides are parallel and congruent
- diagonals bisect each other

Rhombus



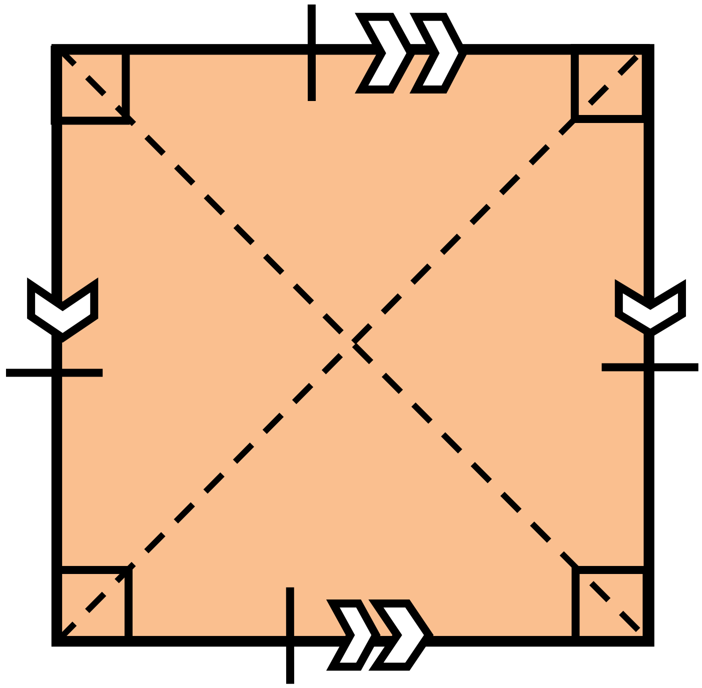
- 4 congruent sides
- 2 pairs of parallel sides
- opposite angles are congruent
- diagonals bisect each other at right angles

Rectangle



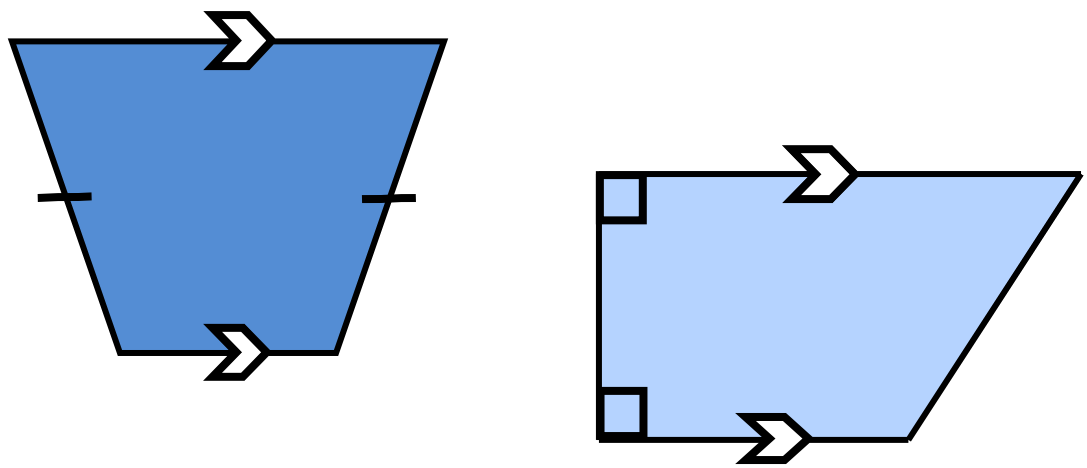
- 4 right angles
- opposite sides are parallel and congruent
- diagonals are congruent and bisect each other

Square



- regular polygon
- 4 right angles
- 4 congruent sides
- 2 pairs of parallel sides
- diagonals are congruent and bisect each other at right angles

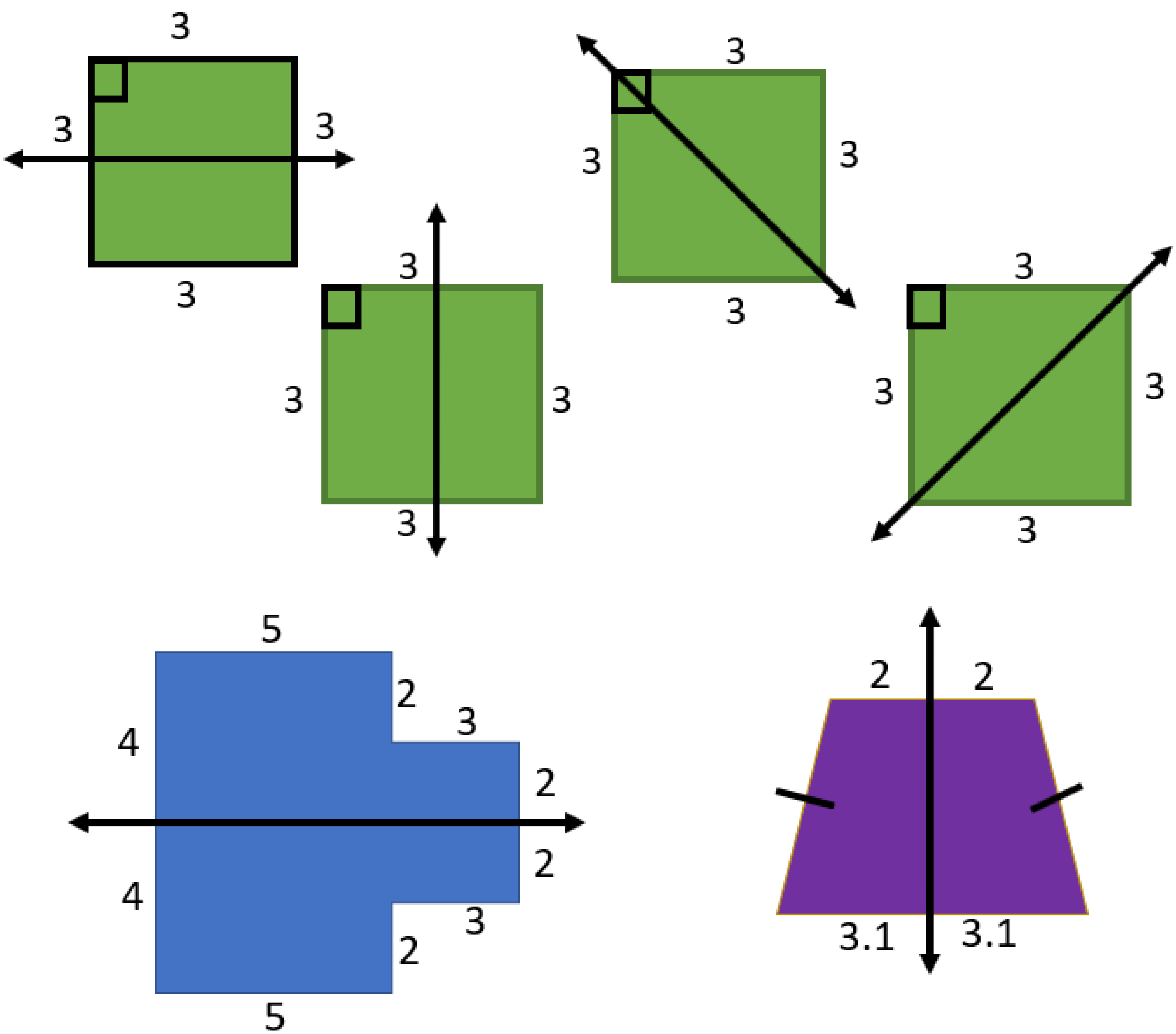
Trapezoid



- exactly one pair of parallel sides
- may have zero or two right angles
- may have zero or one pair of congruent sides

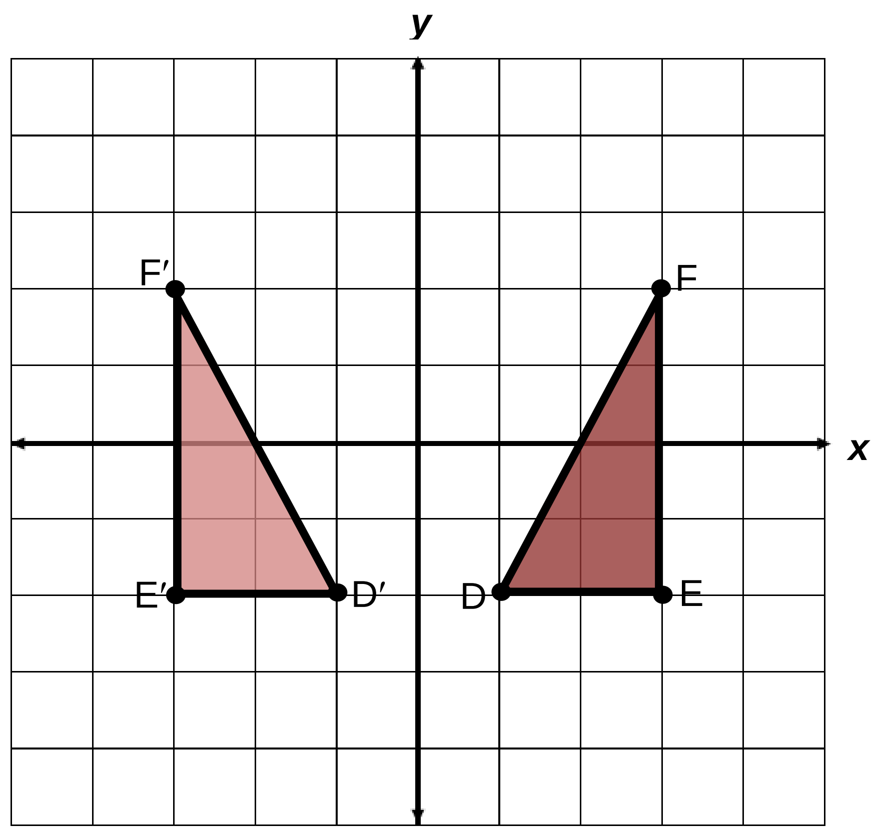
Line of Symmetry

divides a figure into two congruent parts, each of which are mirror images of the other



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)

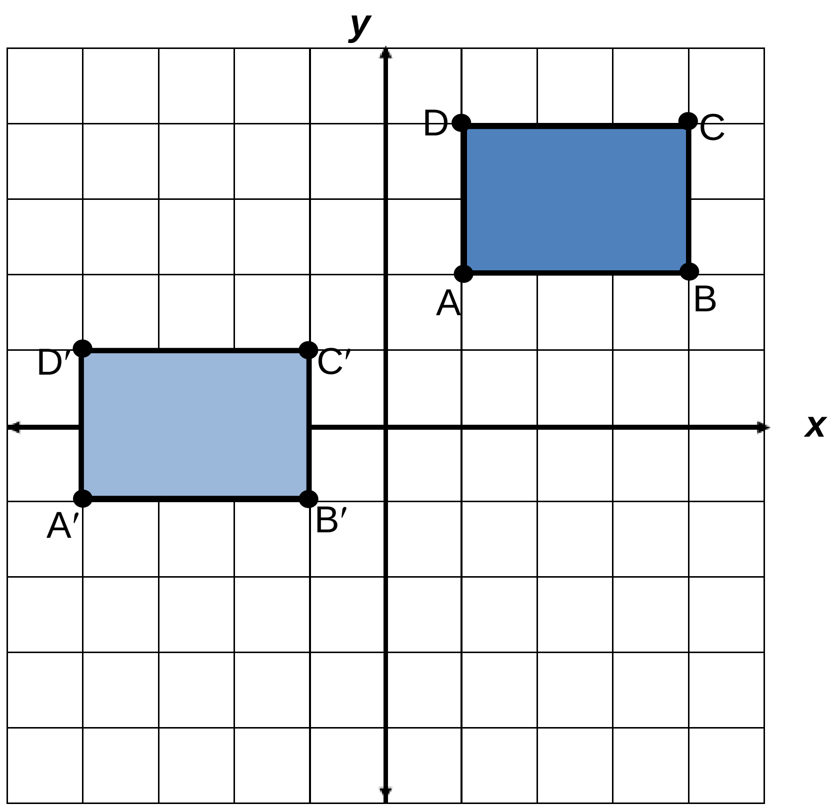


The preimage of triangle DEF is reflected across the *y*-axis to create the image D’E’F’

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

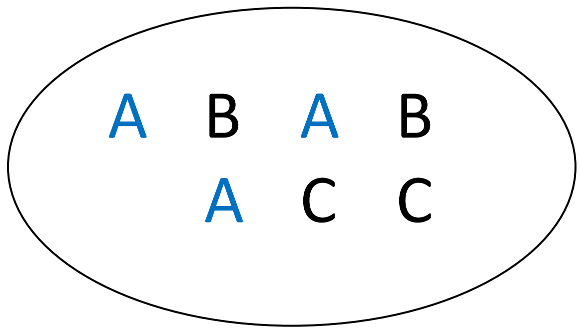


The preimage of rectangle ABCD is translated 5 units to the left and 3 units down to create the image A'B'C'D'

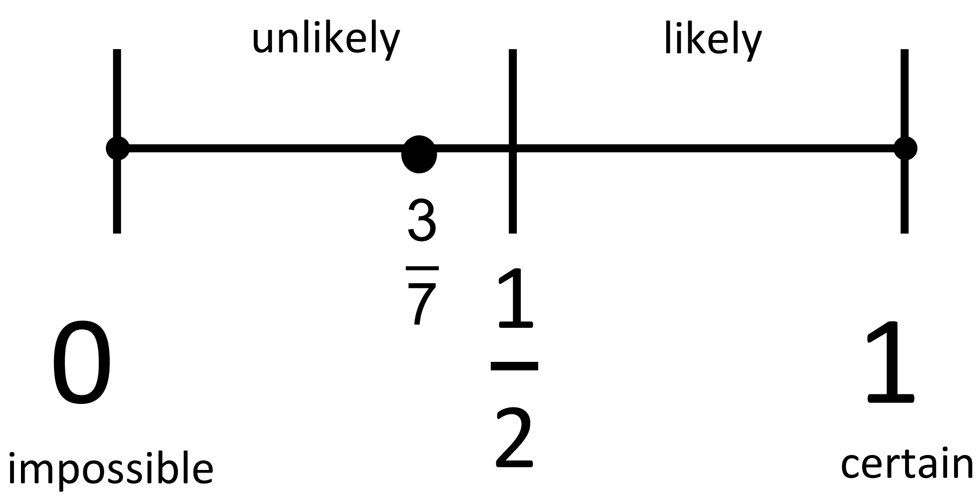
Preimage	Image
A(1,2)	A′(-4,-1)
B(4,2)	B′(-1,-1)
C(4,4)	C′(1, 1)
D(1,4)	D′(-4, 1)

Probability

if all outcomes of an event are equally likely, the probability of an event occurring is equal to the ratio (between 0 and 1) of desired outcomes to the total number of possible outcomes in the sample space

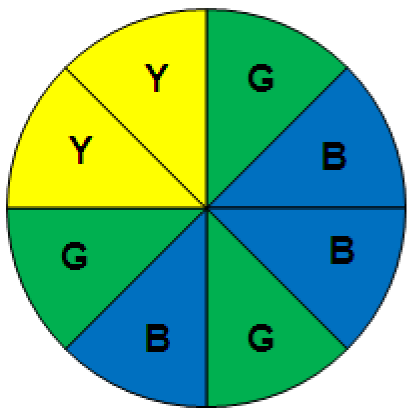


$$P(A) = \frac{3}{7}$$



Theoretical Probability

the expected probability of an event

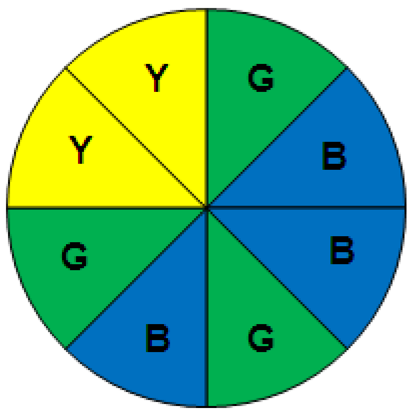


Theoretical probability of spinning the spinner and landing on blue (B) =

$$P(B) = \frac{\text{number of possible blue outcomes}}{\text{total number of possible outcomes}} = \frac{3}{8}$$

Experimental Probability

the probability of an event determined by carrying out a simulation or experiment



Jane spun the spinner 20 times. Her result is shown in the table.

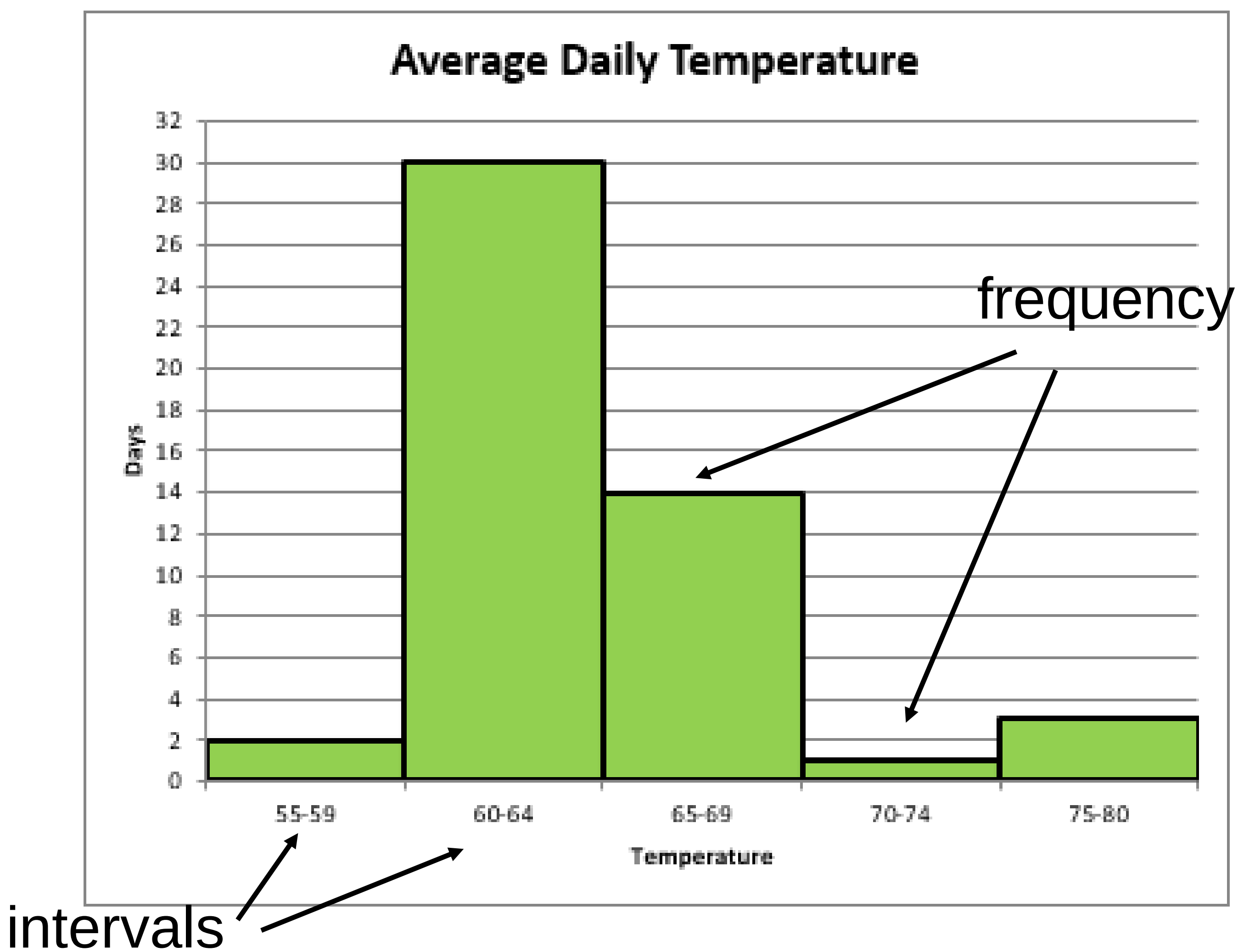
Color	Number
Yellow (Y)	4
Green (G)	6
Blue (B)	10

Experimental probability of spinning the spinner and landing on blue =

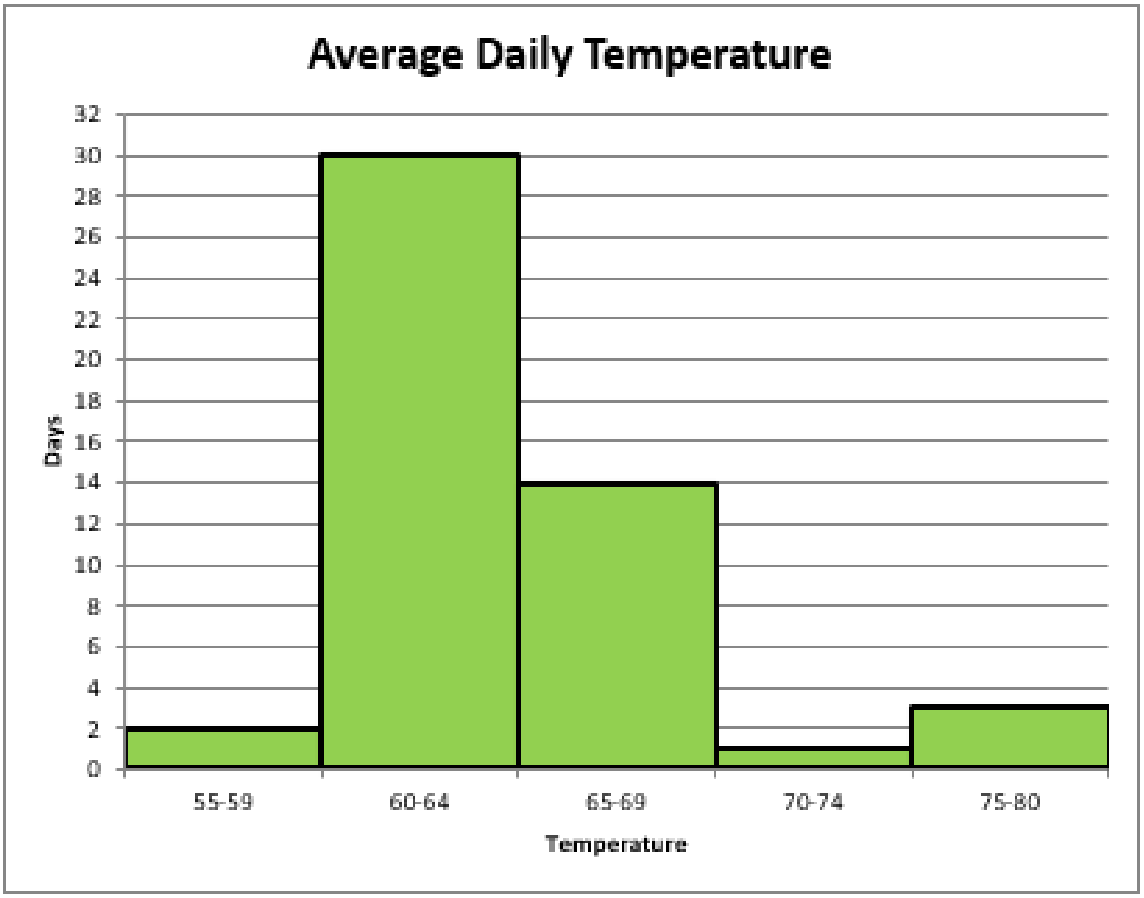
$$\frac{\textit{number of possible blue outcomes}}{\textit{total number of possible outcomes}} = \frac{10}{20} = \frac{1}{2}$$

Histogram

a graph that provides a visual interpretation of numerical data by indicating the number of data points that lie within a range of values, called a class or a bin (the frequency of the data that falls in each class or bin is depicted by the use of a bar)



Comparing Graphs



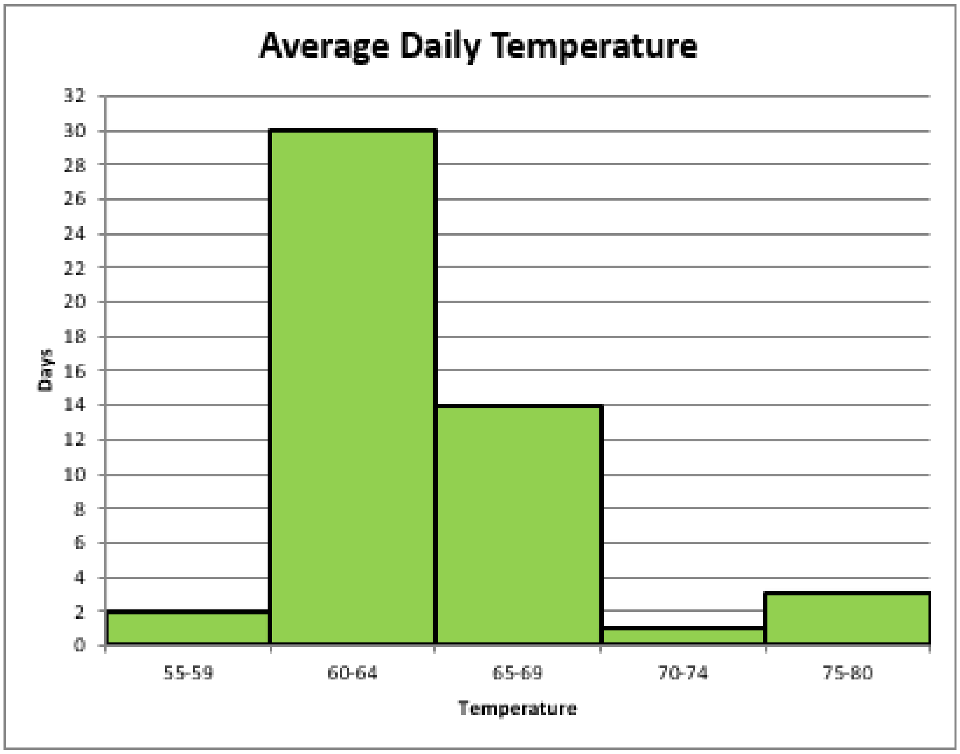
Average Daily Temperature

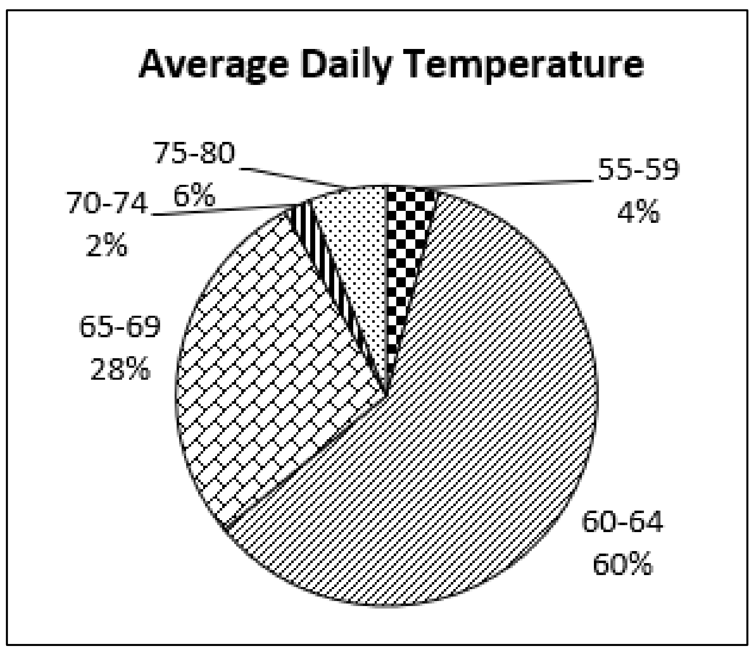
Stem	Leaf
5	5 9
6	0 0 0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 3 3 3 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 7 7 8 9 9 9 9
7	2 6 6 7

42 = 4|2

The histogram provides a visual interpretation of numerical data.
The stem and leaf chart shows all the data in a set.
The stem and leaf chart can be used to find the mean, median or mode.

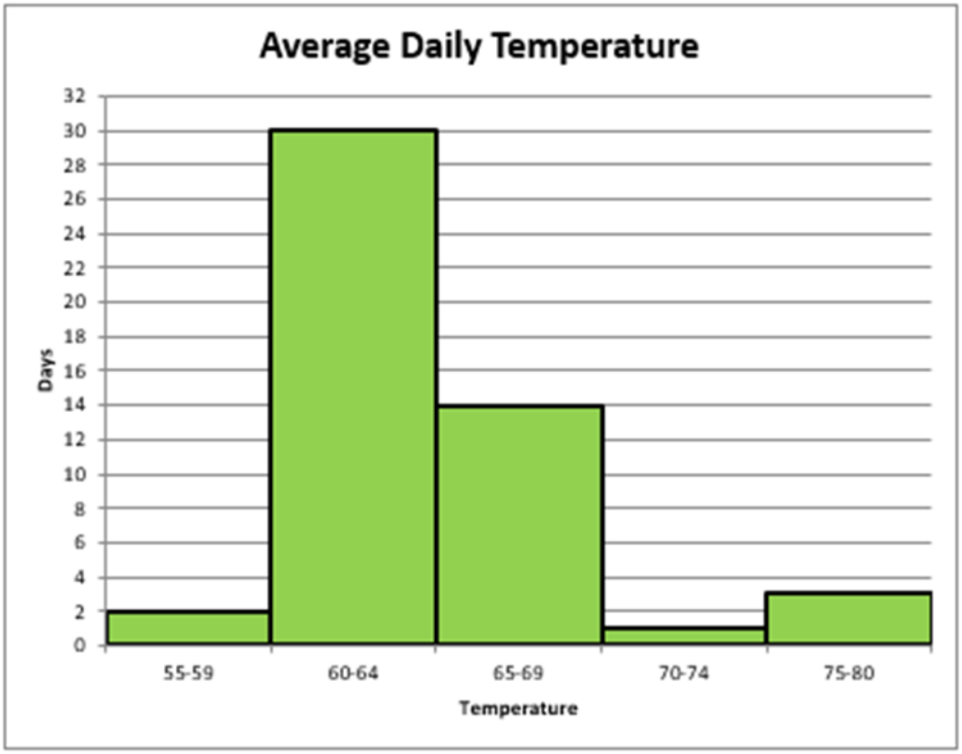
Comparing Graphs

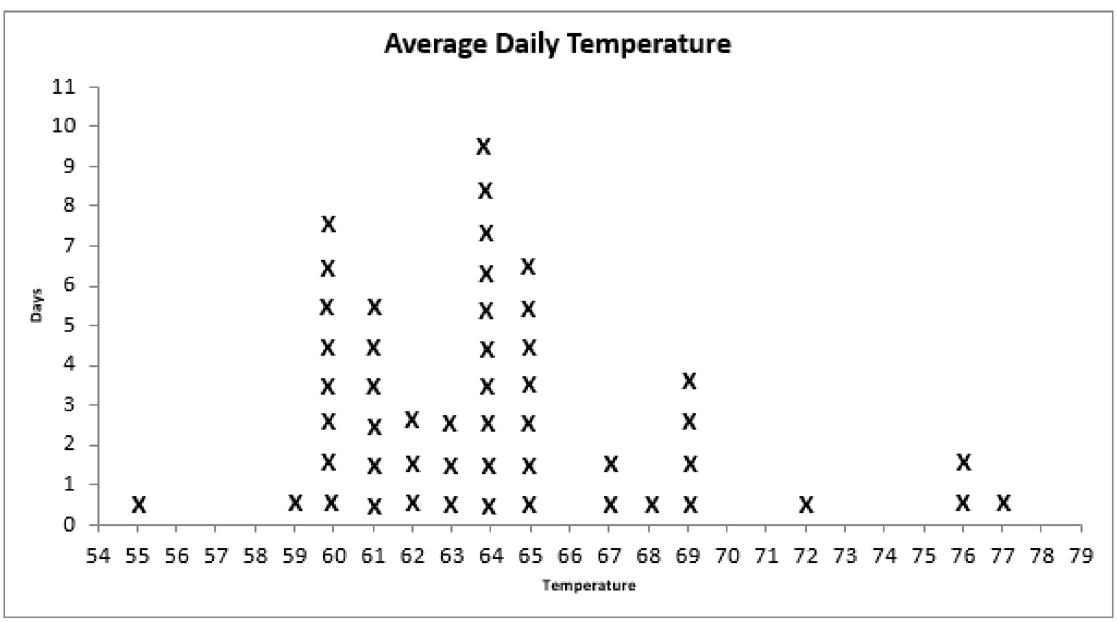




Neither chart displays the entire data set.
The mode and the median can not be found without knowing all the data in a set.
The histogram displays trends. The circle graph shows parts to the whole.

Comparing Graphs

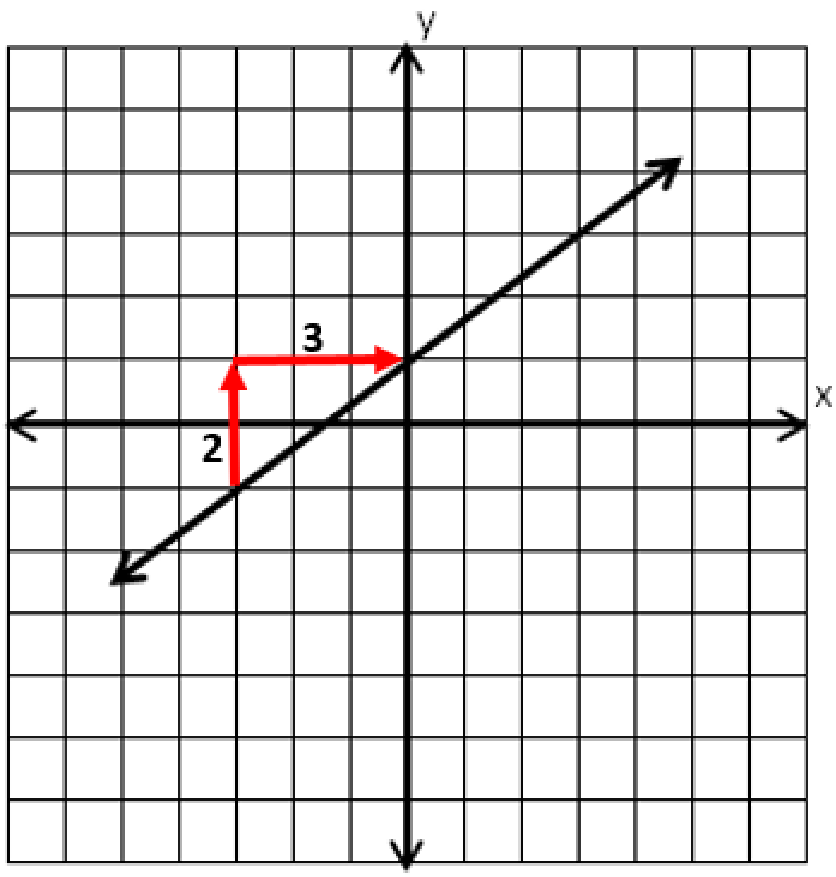




The histogram provides a visual interpretation of numerical data.
The line plot displays all data in the set.
The line plot can be used to find the mean, median, or mode.

Slope

a rate of change in a proportional relationship between two quantities



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

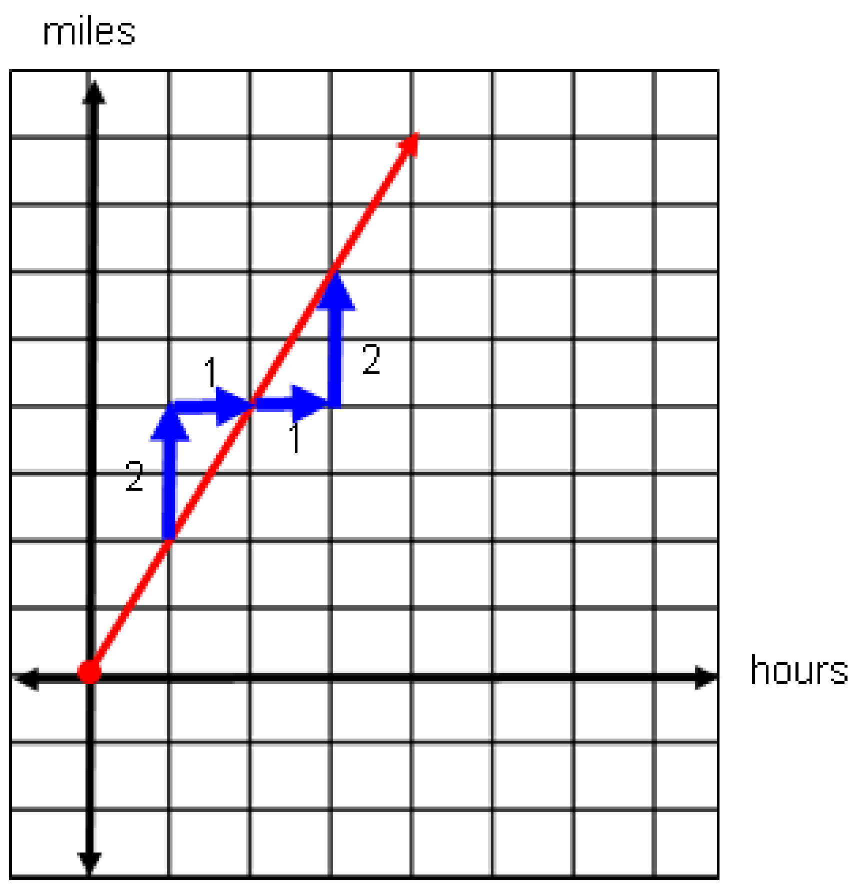
$$Slope = \frac{change\ in\ y}{change\ in\ x} = \frac{vertical\ change}{horizontal\ change}$$

Unit Rate

number of units of the first quantity of a ratio compared to 1 unit of the second quantity
(also called the constant of proportionality)

A student walks 2 miles per hour

$$\text{Unit rate} = \frac{2\ \textit{miles}}{1\ \textit{hour}} = \frac{\textit{vertical change}}{\textit{horizontal change}}$$



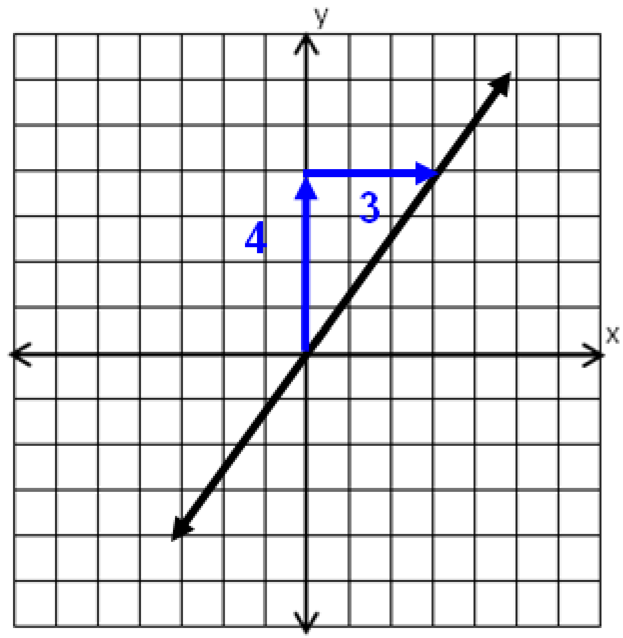
Proportional Relationship

$$y = mx$$

(m is the slope)

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

$m = \frac{4}{3}$



Proportional Relationship

Points representing a proportional relationship: {(0, 0), (6, 1.5), (10, 2.5), (20, 5), and (24, 6)}.

x	0	6	10	20	24
y	0	1.5	2.5	5	6

The slope, rate of change, or ratio of y to x is

$$\frac{y}{x} = \frac{1.5}{6} = \frac{2.5}{10} = \frac{5}{20} = \frac{6}{24} = \frac{1}{4} = 0.25$$

The equation representing the proportional relationship of y to x is

$y = mx$ or $y = \frac{1}{4}x$ or $y = 0.25x$.

Additive Relationship

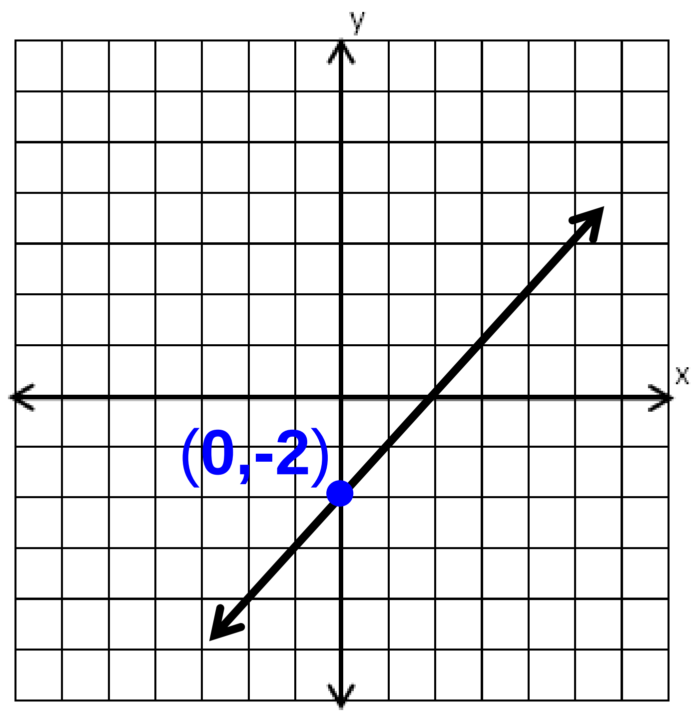
a relationship between two quantities in which one quantity is a result of adding a value to the other quantity

$$y = x + b$$

(b is the y-intercept)

Example: $y = x + (-2)$ $b = -2$

x	y
-3	-5
-2	-4
-1	-3
0	**-2**
1	-1
2	0
3	1



Additive Relationship

Tomas is three years younger than his sister, Maria. The table represents their ages at various times.

Maria (*x*)	4	5	6	11
Tomas (*y*)	1	2	3	8

−3

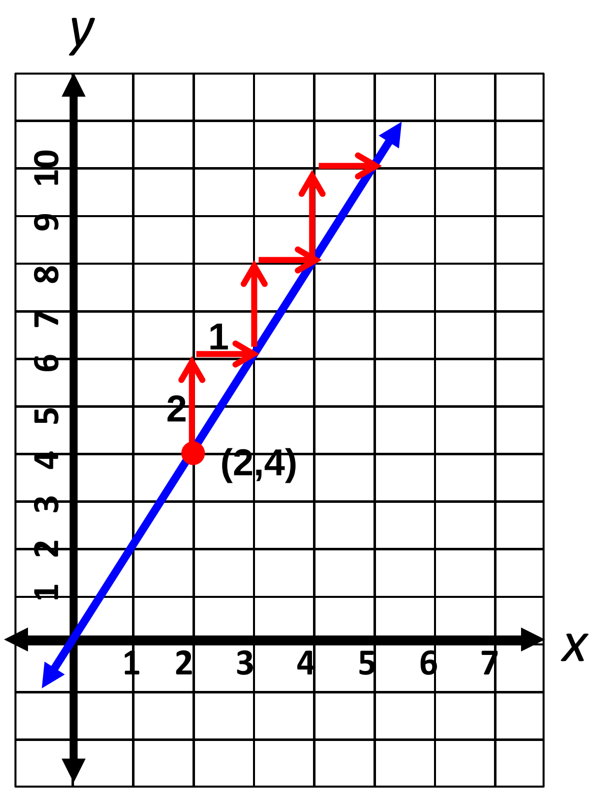
The difference in their ages is always -3.

The equation representing the relationship between their ages is

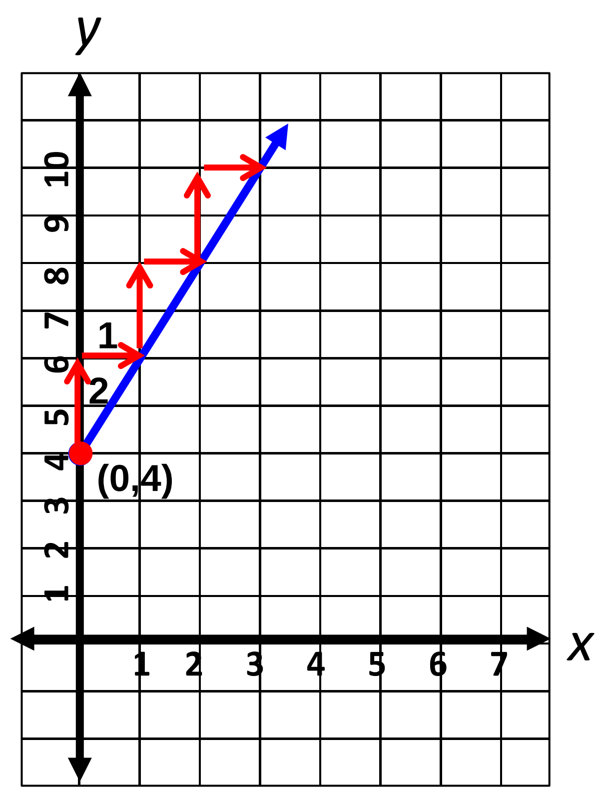
$$y = x + (-3) \quad \text{or} \quad y = x - 3$$

Graphing Linear Relationships

Graph the line representing the proportional relationship with slope of 2 and passing through the point (2,4).



Graph the line representing the additive relationship with slope of 2 and passing through the point (0,4).

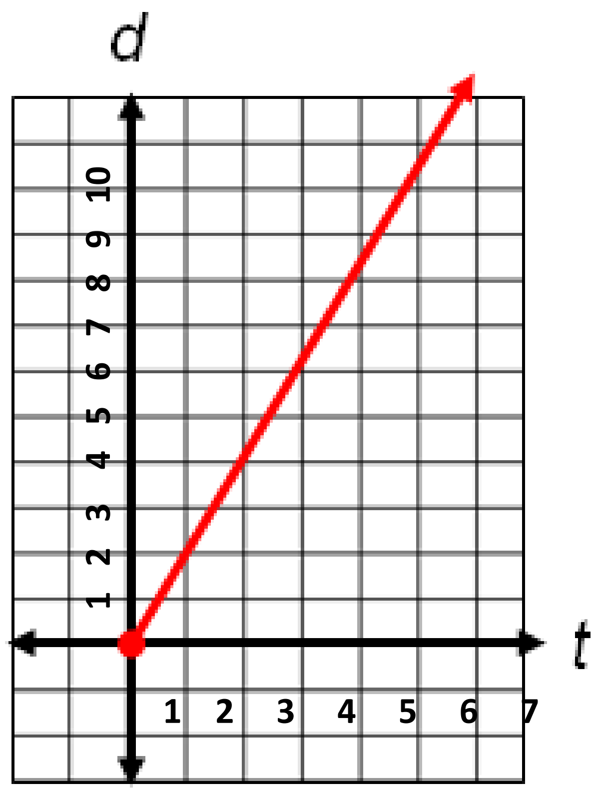


$$\text{Slope} = 2 = \frac{\textit{vertical change}}{\textit{horizontal change}} = \frac{2}{1}$$

Connecting Representations

Proportional Relationship

The total distance Sam walks depends on how long he walks. If he walks at a rate of 2.1 mph, show multiple representations of the relationship.



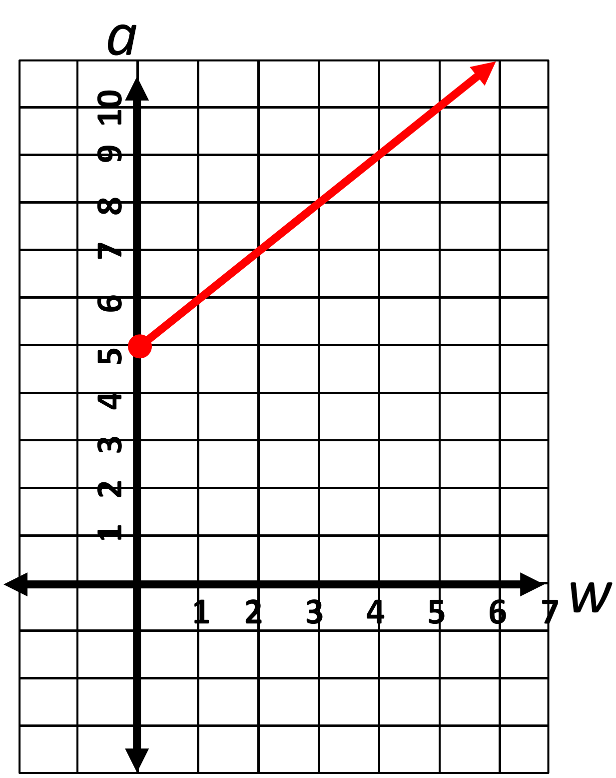
t	d
0	0
1	2.1
2	4.2
5	10.5

$$d = 2.1t$$

Connecting Representations

Additive Relationship

Janice started with $5 in her piggybank. If she adds $1 each week, show the total amount in her piggybank any week using multiple representations.



w	a
0	5
1	6
2	7
5	10

$$a = w + 5$$

Order of Operations

Grouping Symbols — ( ) $\sqrt{\square}$ $|\square|$ [ ] $\frac{\square}{\square}$

Exponents

Multiplication or **D**ivision — Left to right

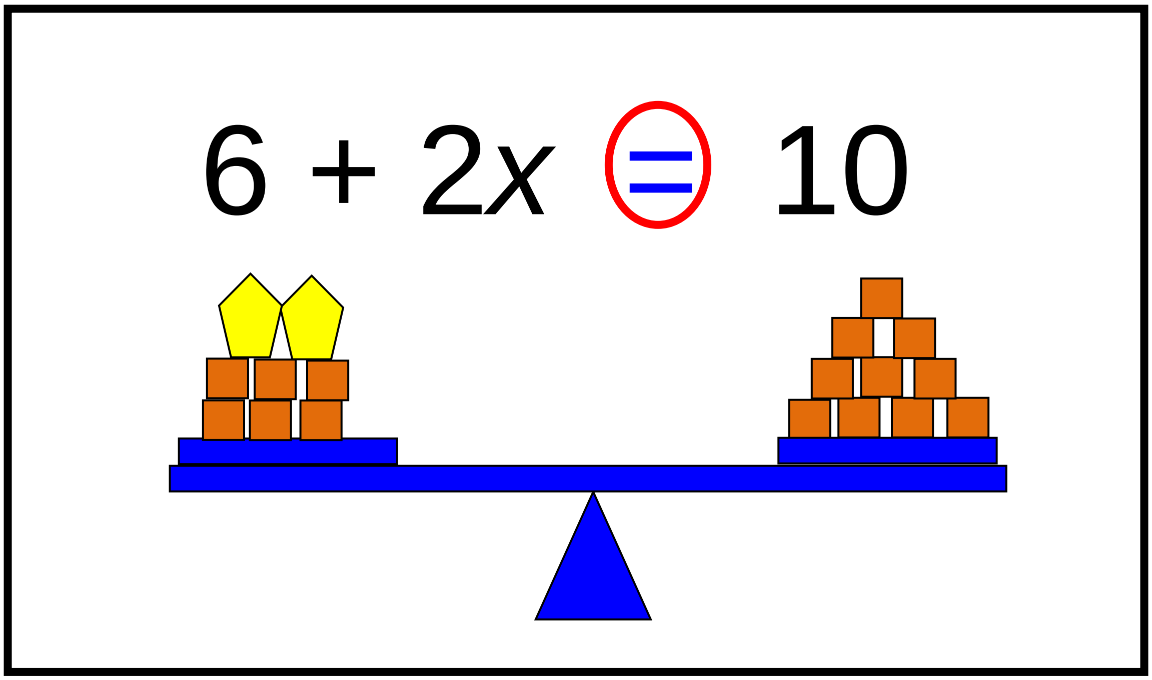
Addition **S**ubtraction — Left to right

Verbal and Algebraic Expressions and Equations

Verbal	Algebraic
A number multiplied by 5	$5n$
The sum of negative two and a number	$-2 + n$
The sum of five times a number and two is five	$5y + 2 = 5$
Negative three is one-fifth of a number increased by negative three fifths	$-3 = \frac{1}{5}x + \left(-\frac{3}{5}\right)$

Equation

a mathematical sentence stating that two expressions are equal



$$2.76 + 3 = n + 2.76$$

$$3x + (-5.1) = 3\frac{3}{4}$$

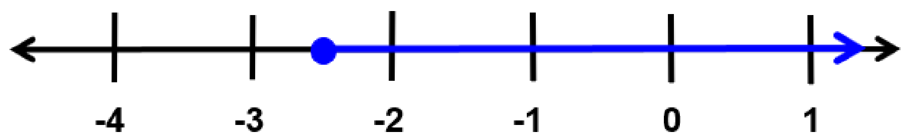
Inequality

Example 1

$$-3r \leq 7.5$$

$$\frac{-3r}{-3} \geq \frac{7.5}{-3}$$

$$r \geq -2.5$$



Example 2

$$-3(n-4) < 0$$

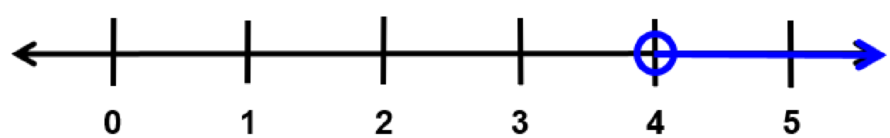
$$-3n + 12 < 0$$

$$-3n + 12 - 12 < 0 - 12$$

$$-3n < -12$$

$$\frac{-3n}{-3} > \frac{-12}{-3}$$

$$n > 4$$



Example 3

$$\frac{x-7}{-3} \geq 4$$

$$-3 \cdot \frac{x-7}{-3} \leq -3 \cdot 4$$

$$x - 7 \leq -12$$

$$x - 7 + 7 \leq -12 + 7$$

$$x \leq -5$$