Middle School Mathematics Vocabulary Word Wall Cards

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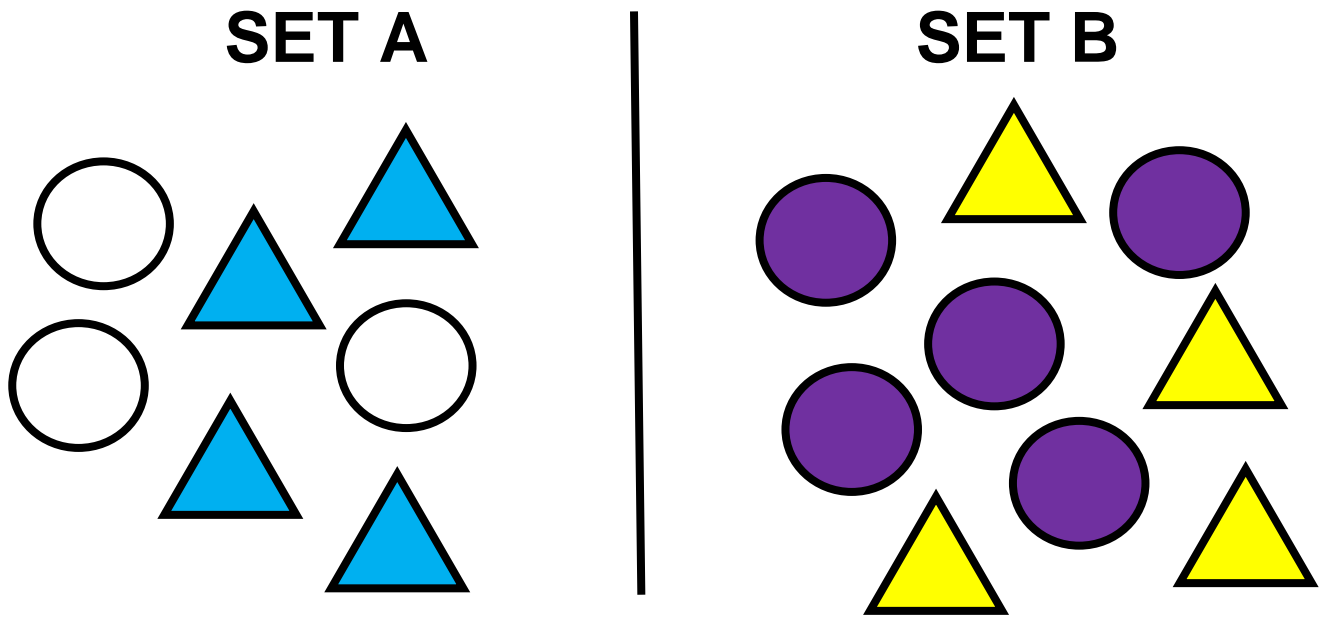Independent Variable
Dependent Variable
Connecting Representations
Multistep Equations
Multistep Equations
Unit Rate as Slope

Ratio

a comparison of any two quantities

SET A | **SET B**

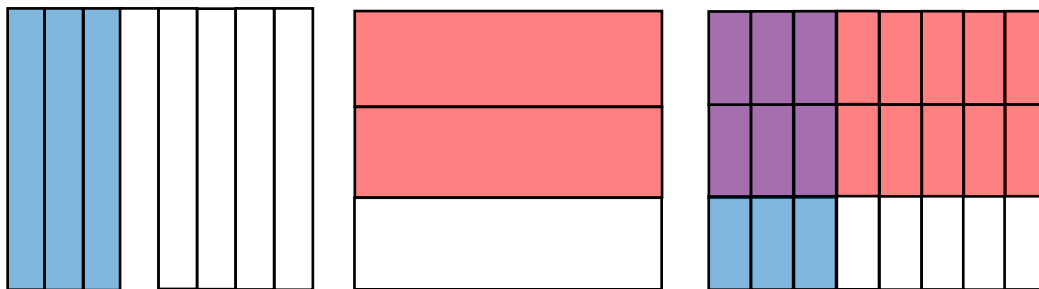|	
🔺 to ⚪	**4 to 3**
🔺 to all of set A	$\dfrac{4}{7}$
⚪ to 🟣	**3:5**
set B to set A	**9 to 7 or 9:7**

Absolute Value

$$|5| = 5 \quad |\text{-}5| = 5$$
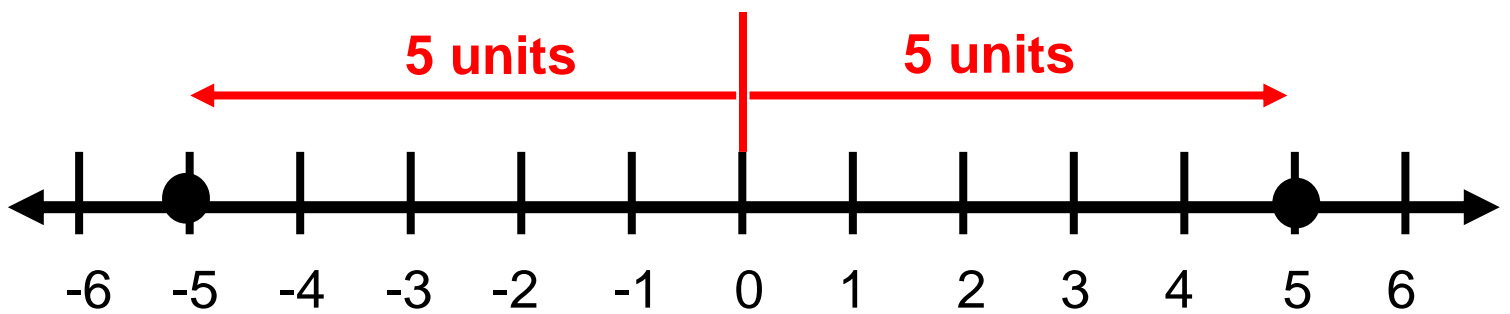
distance a number is from zero

Fraction Multiplication

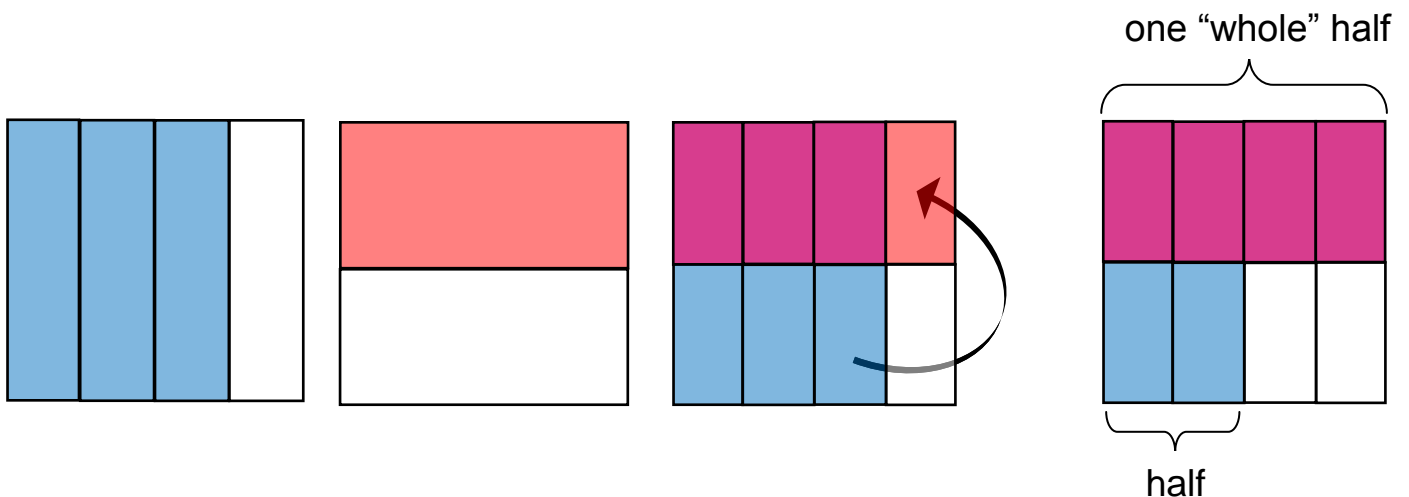How much is $\frac{3}{8}$ of $\frac{2}{3}$?

$$\frac{3}{8} \quad \times \quad \frac{2}{3} \quad = \quad \frac{6}{24}$$

$$\frac{3}{8} \times \frac{2}{3} = \frac{6}{24} = \frac{1}{4}$$

Fraction Division

$$\frac{3}{4} \div \frac{1}{2}$$

How many halves are in three-fourths?

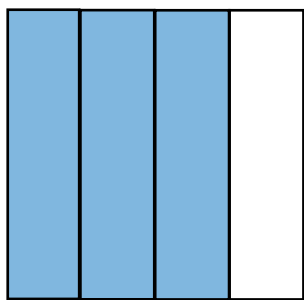one "whole" half

half

There are $1\frac{1}{2}$ halves in three-fourths.

$$\frac{3}{4} \div \frac{1}{2} = 1\frac{1}{2}$$

Fraction Division

$$\frac{3}{4} \div \frac{1}{2}$$

How many halves are in three-fourths?

three-fourths   one-half   1 "whole" one-half $\frac{1}{2}$ one-half
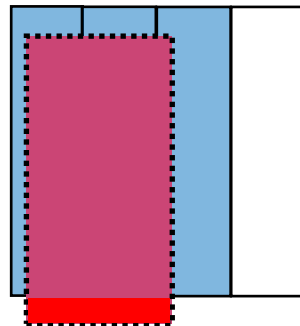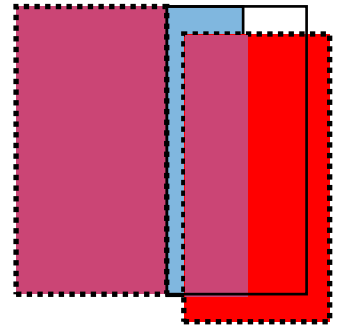
There are $1\frac{1}{2}$ halves in three-fourths.
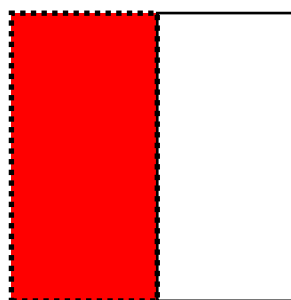
$$\frac{3}{4} \div \frac{1}{2} = 1\frac{1}{2}$$

Percent

Per hundred
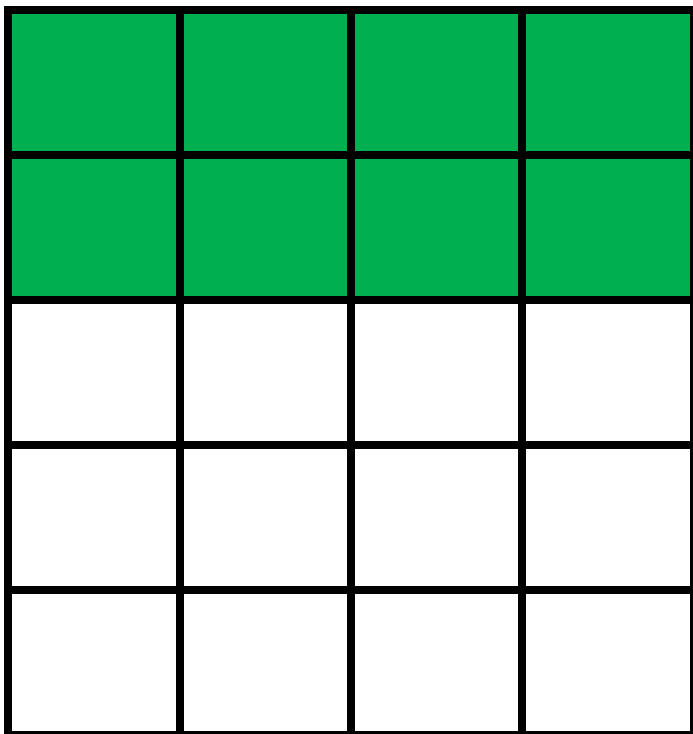
$$56\% = \frac{56}{100} = \frac{14}{25} = 0.56$$

Equivalent Relationships

Fraction: $\dfrac{2}{5}$

Decimal: 0.4

Percent: 40%

Exponential Form

$$2^3 = 2 \cdot 2 \cdot 2$$

exponent

base

$$n^4 = n \cdot n \cdot n \cdot n$$

factors
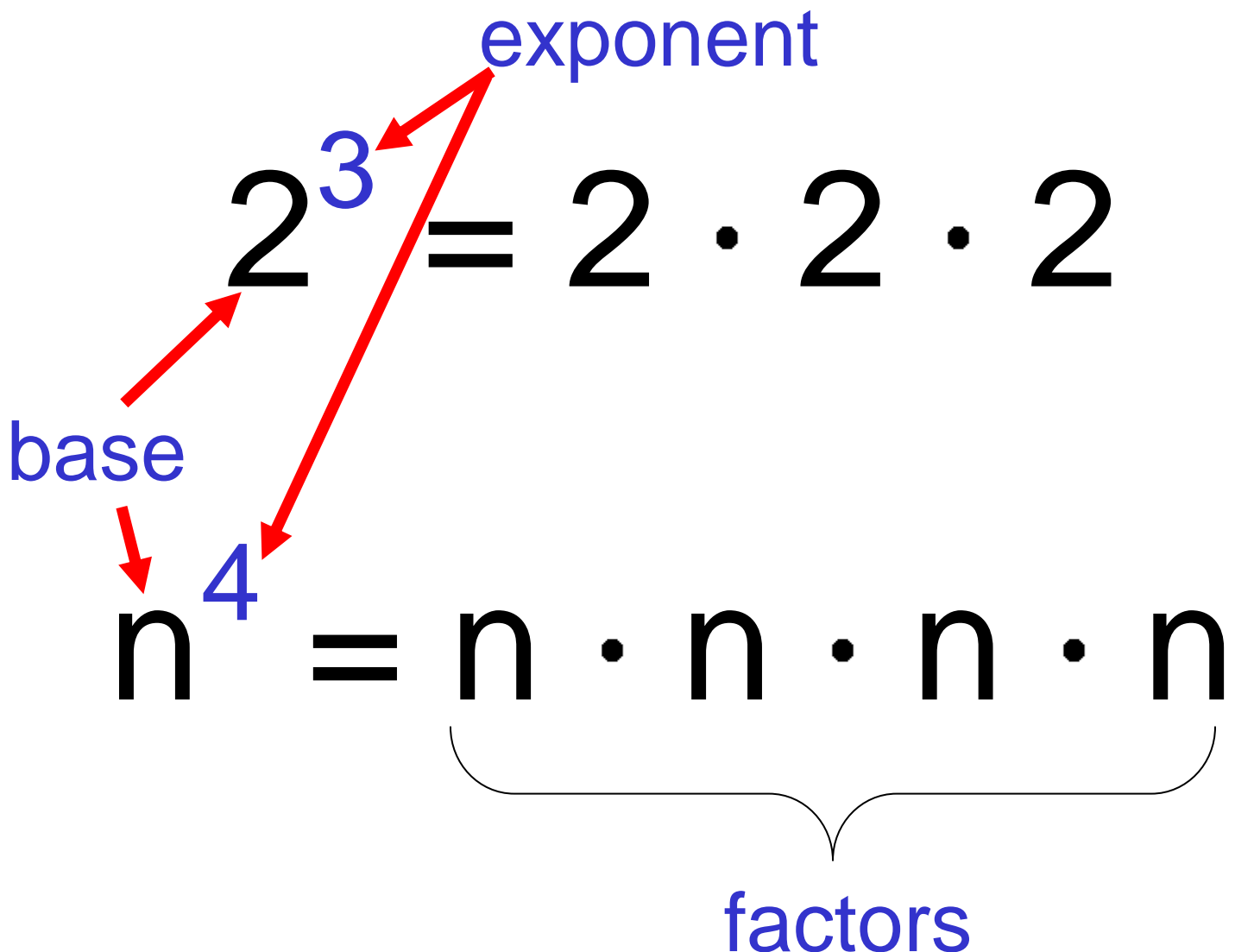
Perfect Squares

$$0^2 = 0 \cdot 0 = \textbf{0}$$
$$1^2 = 1 \cdot 1 = \textbf{1}$$
$$2^2 = 2 \cdot 2 = \textbf{4}$$
$$3^2 = 3 \cdot 3 = \textbf{9}$$
$$4^2 = 4 \cdot 4 = \textbf{16}$$
$$5^2 = 5 \cdot 5 = \textbf{25}$$

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

perfect square

Powers of Ten

	Meaning	**Value**
10^4	$10 \cdot 10 \cdot 10 \cdot 10$	10,000
10^3	$10 \cdot 10 \cdot 10$	1000
10^2	$10 \cdot 10$	100
10^1	10	10
10^0	1	1
10^{-1}	$\dfrac{1}{10}$	0.1
10^{-2}	$\dfrac{1}{10} \cdot \dfrac{1}{10}$	$\dfrac{1}{100} = 0.01$
10^{-3}	$\dfrac{1}{10} \cdot \dfrac{1}{10} \cdot \dfrac{1}{10}$	$\dfrac{1}{1000} = 0.001$
10^{-4}	$\dfrac{1}{10} \cdot \dfrac{1}{10} \cdot \dfrac{1}{10} \cdot \dfrac{1}{10}$	$\dfrac{1}{10,000} = 0.0001$

Scientific Notation

$$a \times 10^{n}$$

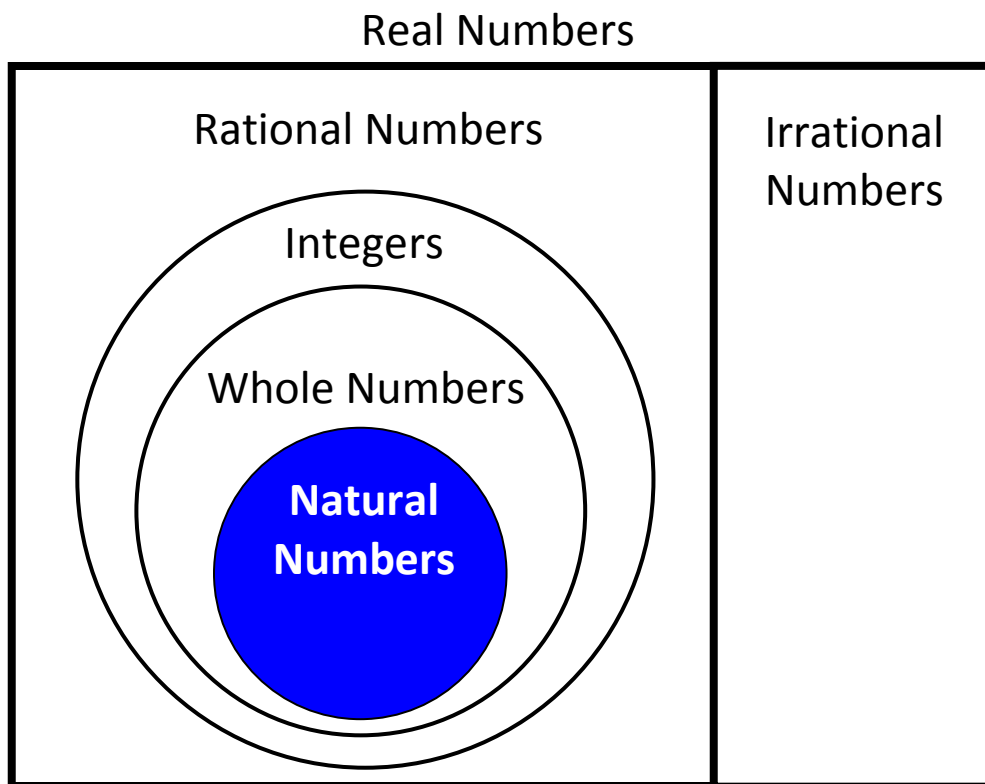a = number greater than or

equal to 1 and less than 10

n = integer

$$17{,}500{,}000 = 1.75 \times 10^{7}$$
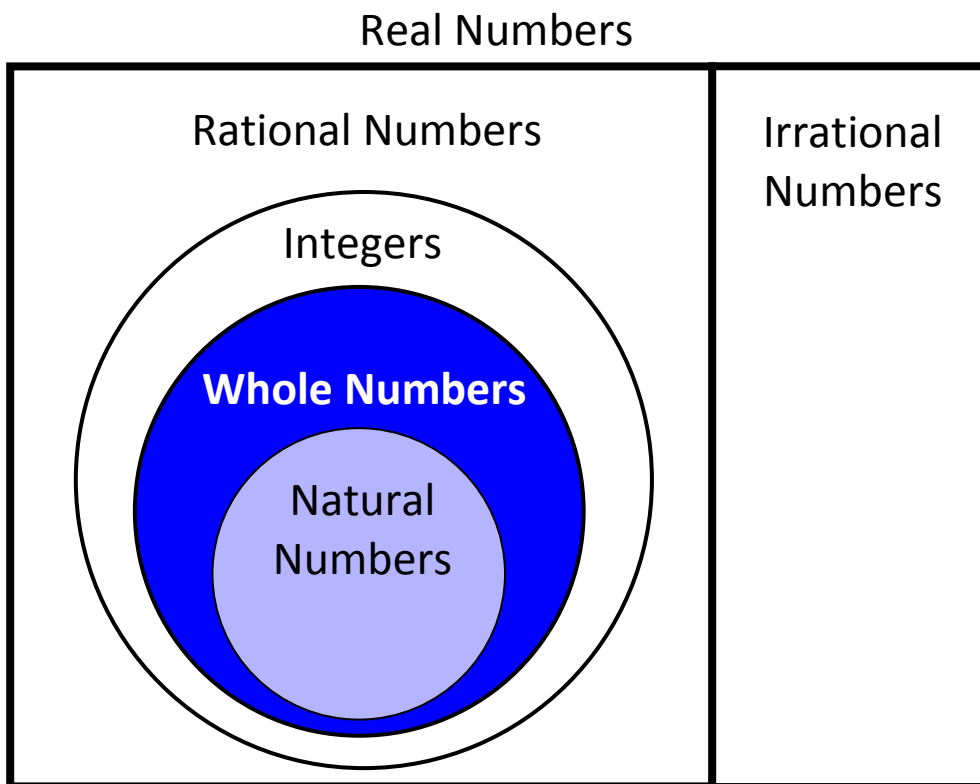
$$0.0000026 = 2.6 \times 10^{-6}$$

Natural Numbers

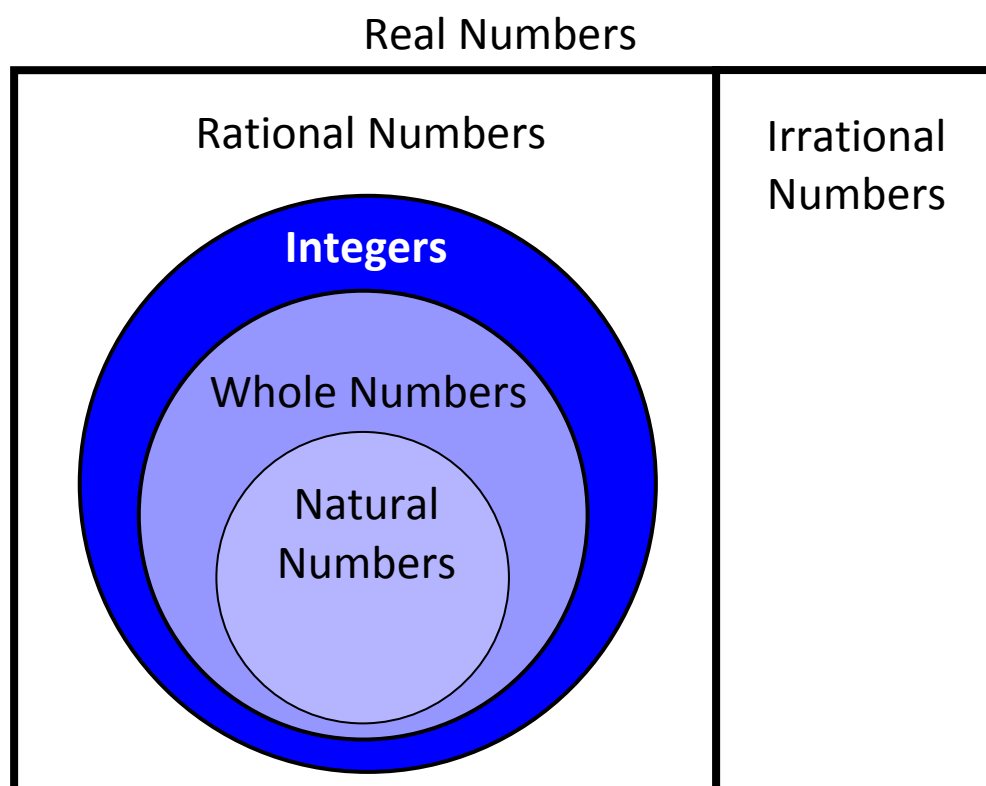# The set of numbers 1, 2, 3, 4…

Real Numbers

Rational Numbers	Irrational Numbers

Integers

Whole Numbers

Natural Numbers

Whole Numbers

The set of numbers 0, 1, 2, 3, 4…

Real Numbers

Rational Numbers	Irrational Numbers
Integers **Whole Numbers** Natural Numbers	

Integers

The set of numbers …-3, -2, -1, 0, 1, 2, 3…

Real Numbers

Rational Numbers	Irrational Numbers
Integers Whole Numbers Natural Numbers	

Rational Numbers

Real Numbers

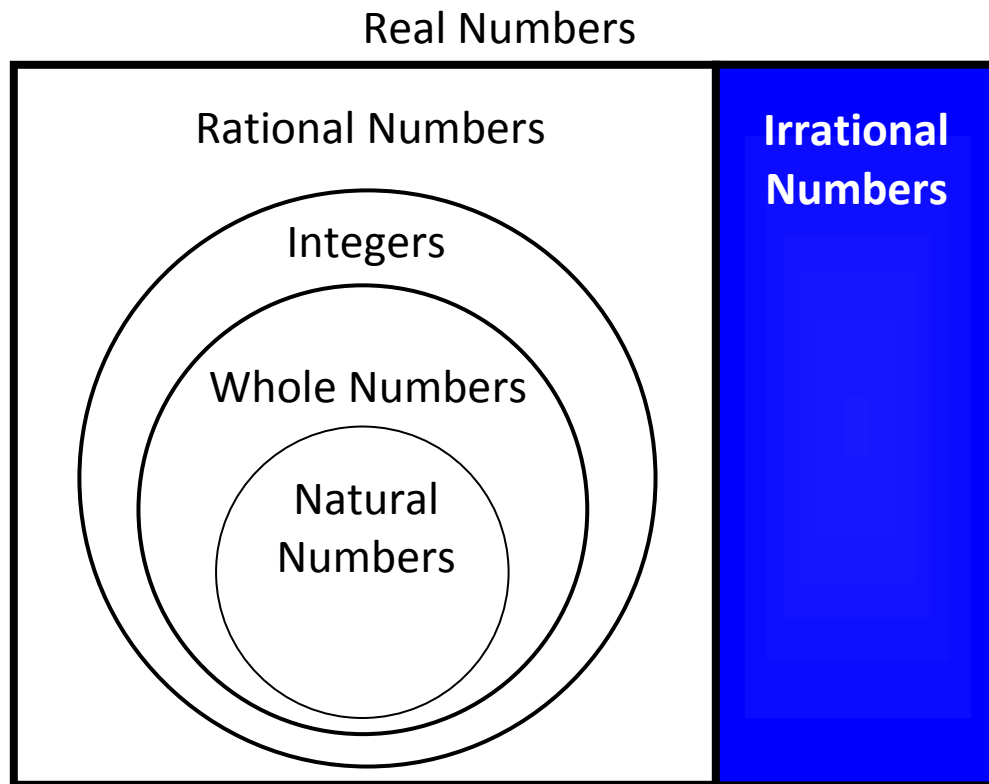| Rational Numbers	Irrational Numbers
Integers	
Whole Numbers	
Natural Numbers	
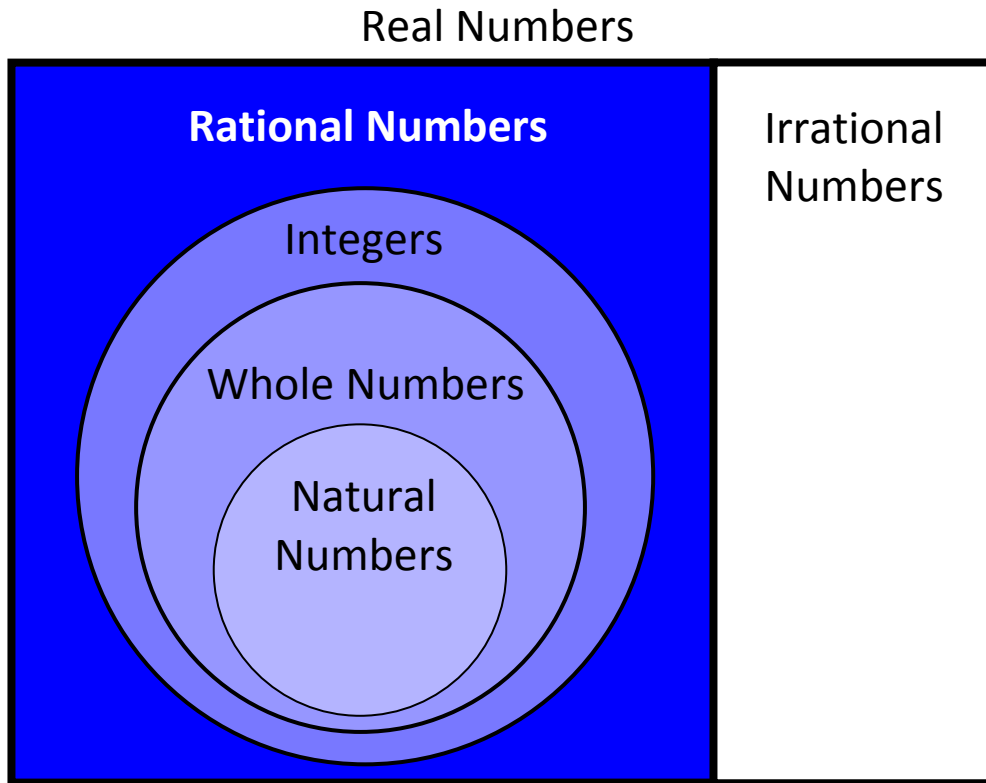
The set of all numbers that can be written as the ratio of two integers with a non-zero denominator

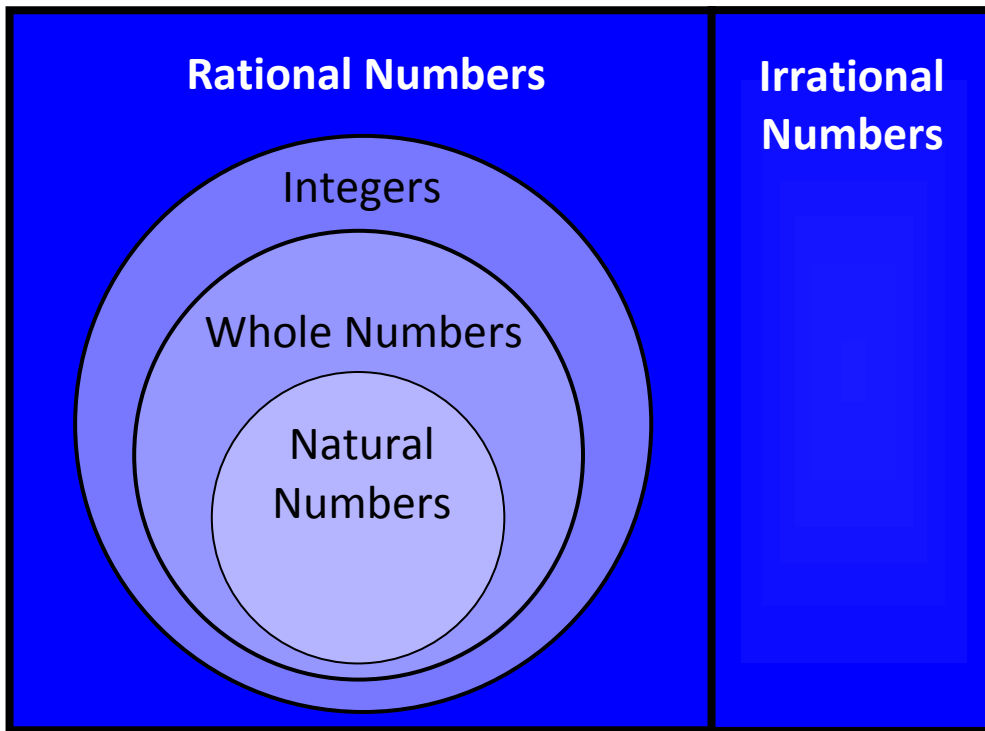$$2\frac{3}{5} \; , \quad -5 \; , \quad 0.3, \quad \sqrt{16} \; , \quad \frac{13}{7}$$

Irrational Numbers

Real Numbers

Rational Numbers	Irrational Numbers
Integers Whole Numbers Natural Numbers	

The set of all numbers that cannot be expressed as the ratio of integers
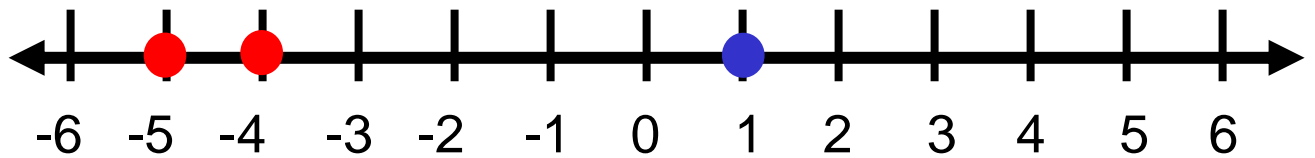
$\sqrt{7}$, π , -0.23223222322223…

Real Numbers

The set of all rational and irrational numbers

Comparing Integers

-5 < 1 or 1 > -5

-4 > -5 or -5 < -4

Order of Operations

Grouping Symbols ⎧ ( )
{ }
[ ]
|abs|
Fraction bar

Exponents

Multiplication

Division ⎫ Left to right

Addition

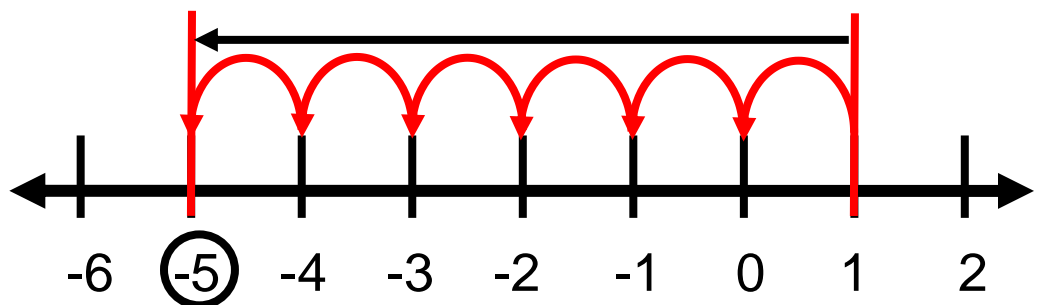**S**ubtraction ⎫ Left to right

Integer Operations

Addition

-5 + 6 = 1

Subtraction

1 − 6 = -5
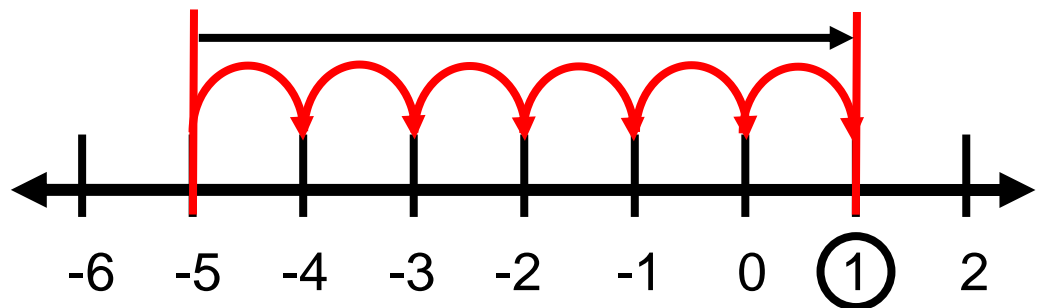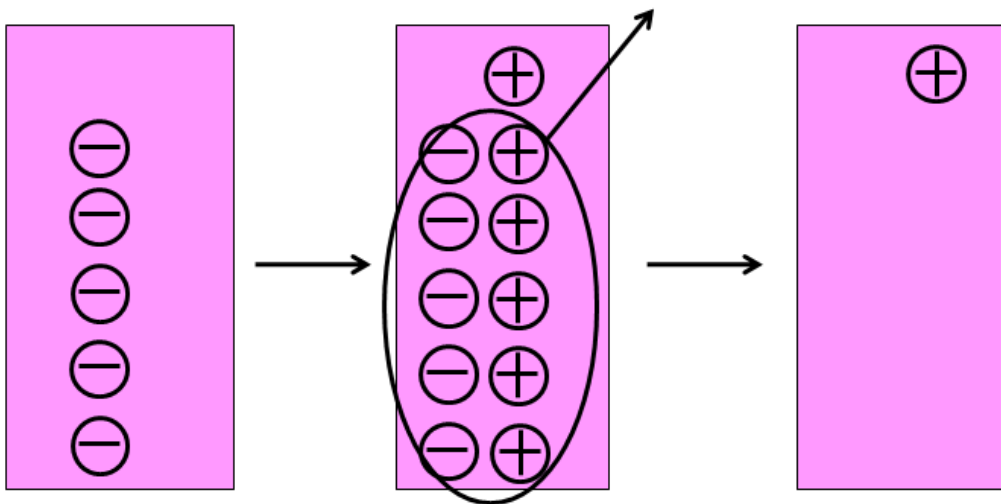
Integer Operations

Addition
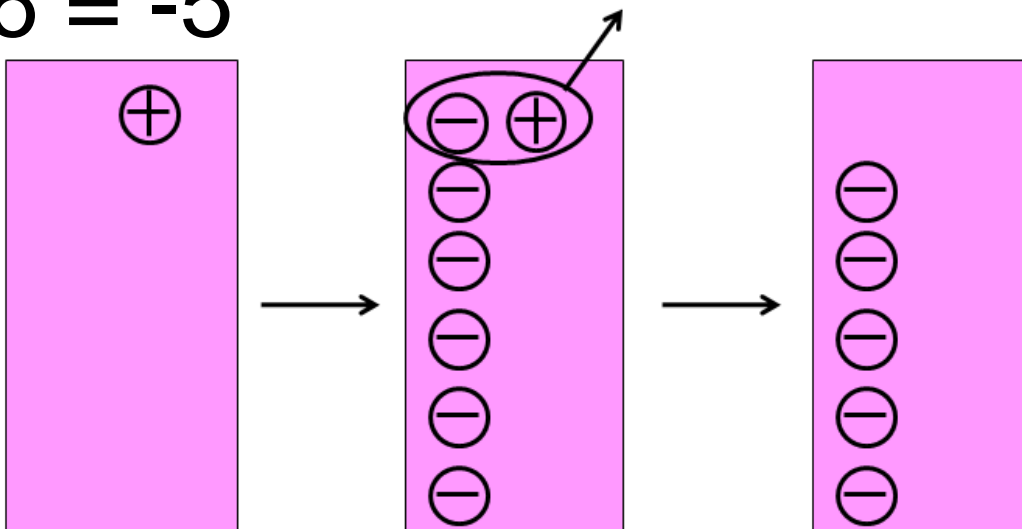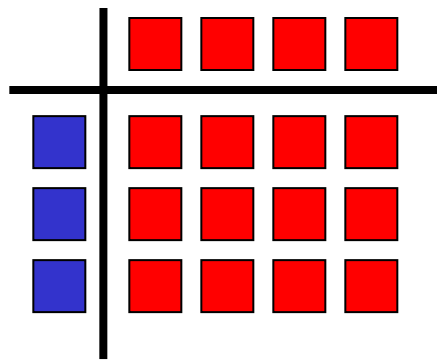-5 + 6 = 1

$\bigoplus = 1$ $\bigominus = -1$

Subtraction
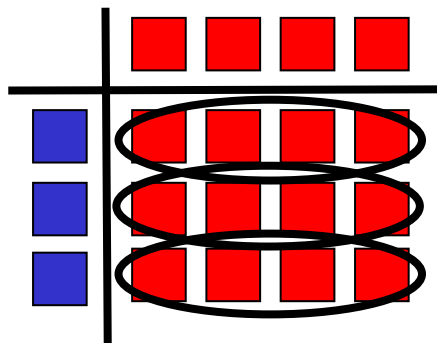1 − 6 = -5

Integer Operations

Multiplication

$3 \cdot (-4) = -12$

How many tiles are in 3 groups of -4 tiles?

Division

$-12 \div -4 = 3$

How many groups of -4 tiles are in -12 tiles?
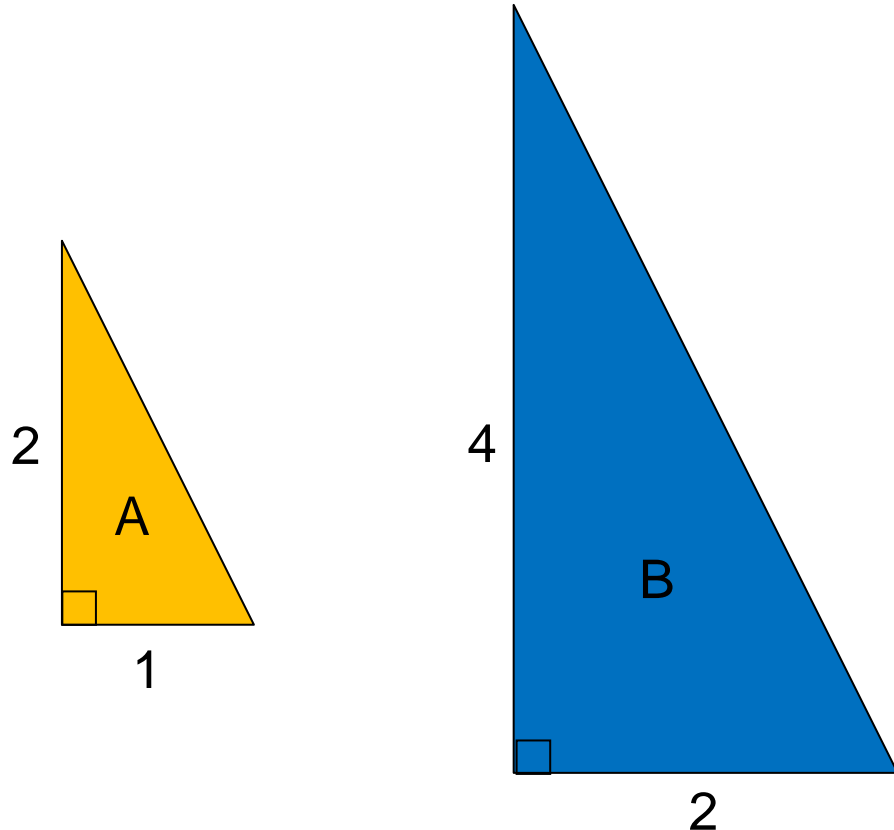
Proportion

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

$$a:b = c:d$$

a is to b as c is to d

Scale Factor

Figures A and B are similar.

What is the scale factor from A to B?

Scale factor = 2

What is the scale factor from B to A?

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

Unit Rate

$4 per gallon = $\dfrac{\$4}{1\ \text{gallon}}$

70 miles per hour = $\dfrac{70\ \text{miles}}{1\ \text{hour}}$

Percent of Increase

Percent of change = $\dfrac{\text{new} - \text{original}}{\text{original}}$

Was $3.25
per gallon

Now $3.85
per gallon

What is the percent of increase?

$$\dfrac{3.85 - 3.25}{3.25}$$

$\dfrac{0.60}{3.25} = 0.18$

increase of 18%

Percent of Decrease

Percent of change = $\dfrac{\text{new} - \text{original}}{\text{original}}$

Was $1200
Now only $900

What is the percent of decrease?

$$\dfrac{900 - 1200}{1200}$$

$$\dfrac{-300}{1200} = -0.25$$

decrease of 25%

Square Root

radical symbol

$$\sqrt{36} = 6$$

$$\sqrt{36} = \sqrt{6 \cdot 6} = \sqrt{6^2} = 6$$

Squaring a number and taking a square root are inverse operations.
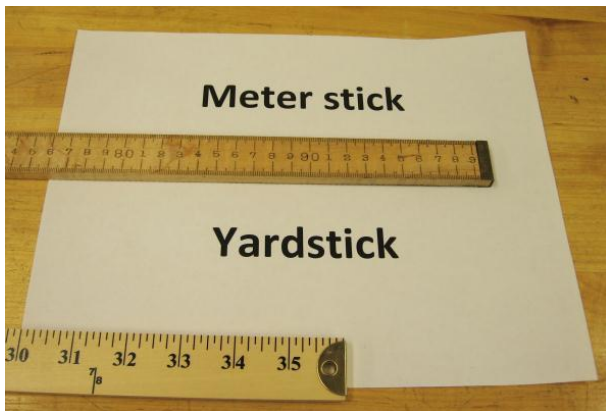
$$-\sqrt{36} = -6$$

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

Square Root

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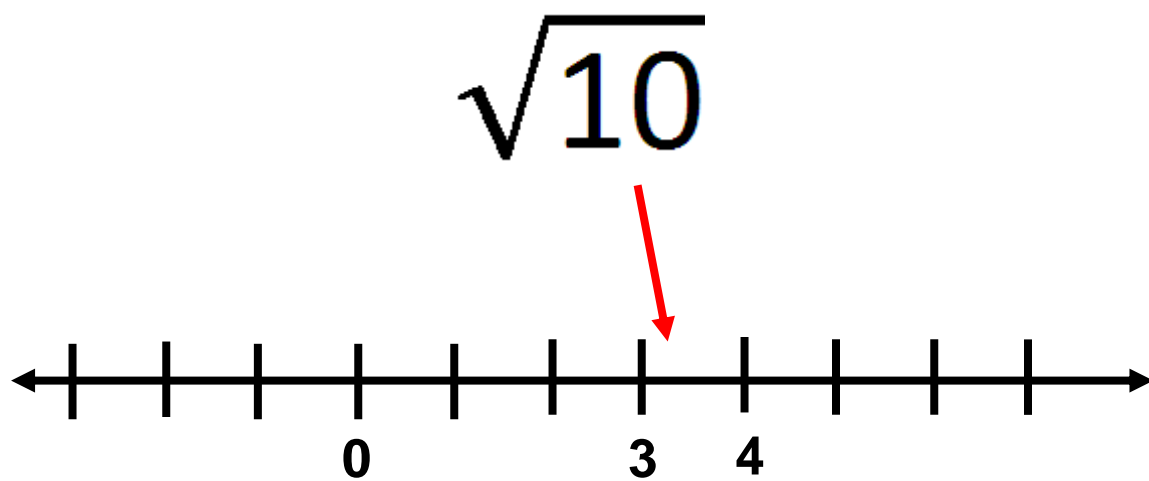
between $\sqrt{9}$ and $\sqrt{16}$

Ballpark Comparisons Length

1 inch or
2.5 centimeter

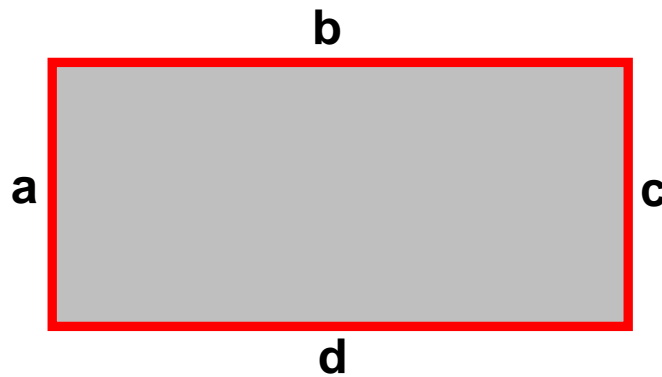1 yard < 1 meter

Ballpark Comparisons
Weight/Mass

 ≈ 1 gram

 ≈ (nickel)

1 lb ≈ kg
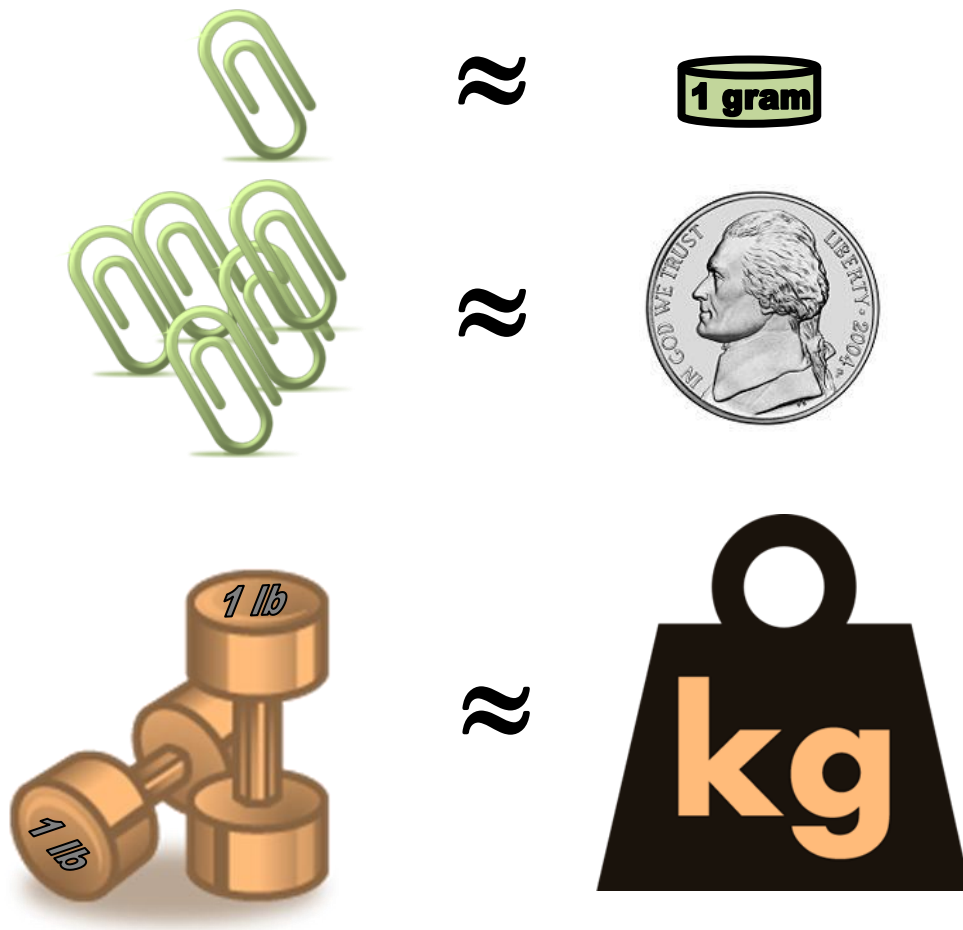
Ballpark Comparisons
Volume

1 quart

MILK

≈

1 liter

Ballpark Comparisons
Temperature

	Fahrenheit	Celsius
Water freezes	32°F	0°C
Water boils	212°F	100°C
Body Temperature	98°F	37°C
Room Temperature	70°F	20°C

Perimeter

the measure of the distance around a figure

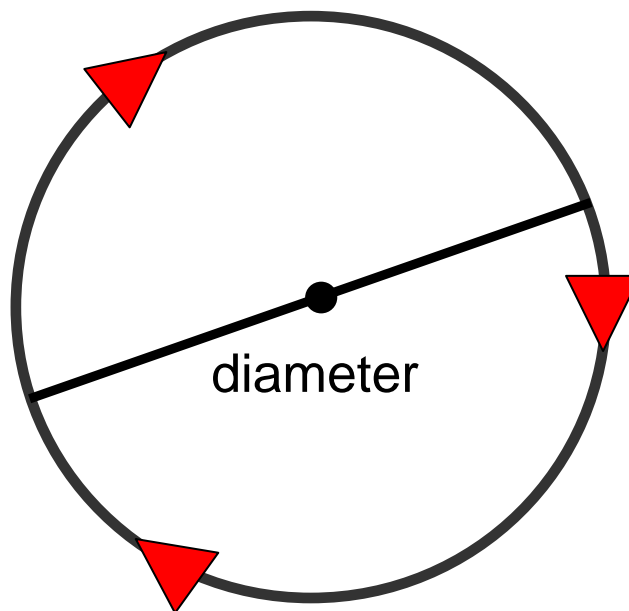$$P = a + b + c + d$$
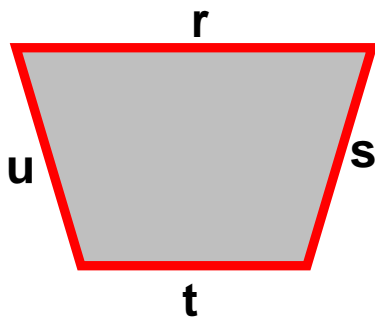
$$P = r + s + t + u$$
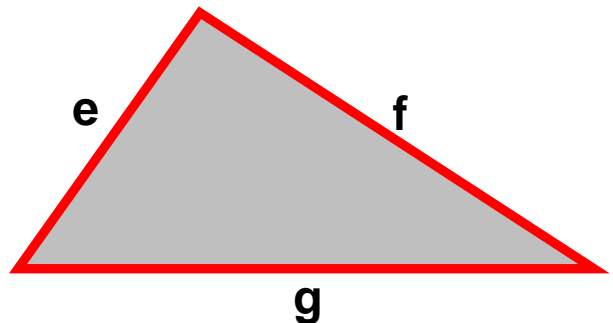
$$P = e + f + g$$

Area

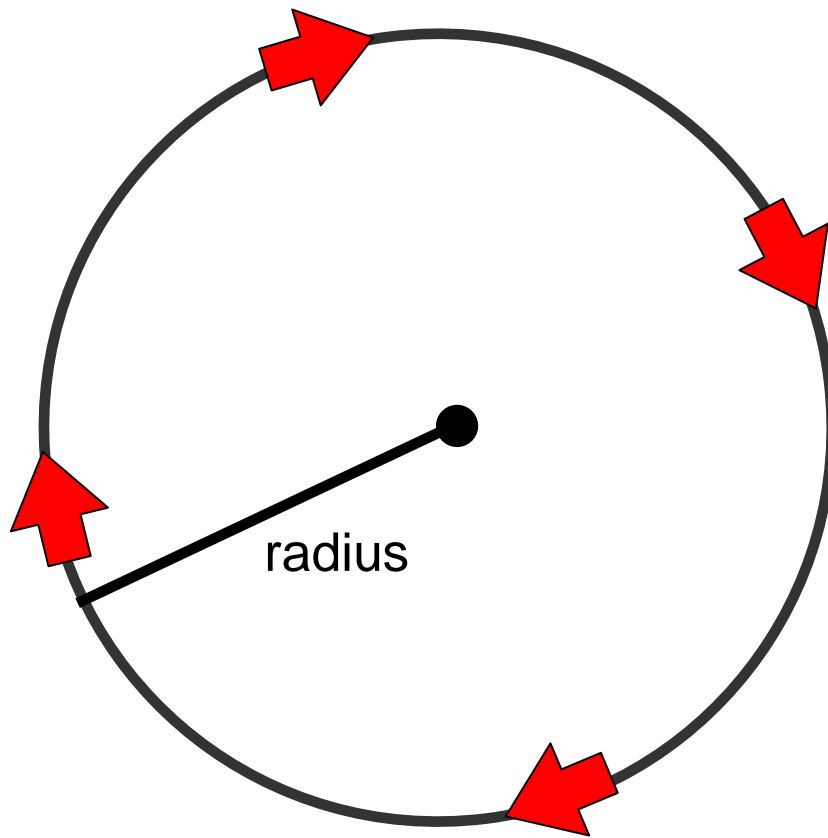the number of square units needed to cover a surface or figure
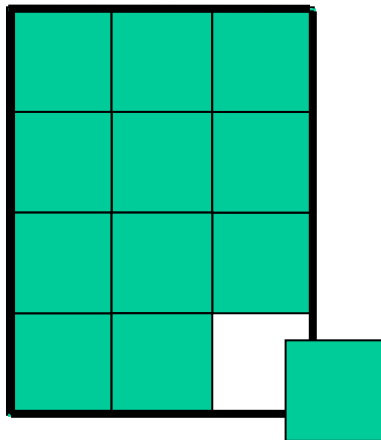
Area = 12 Square Units

Pi

$$\pi \approx 3.14159\ldots$$

diameter

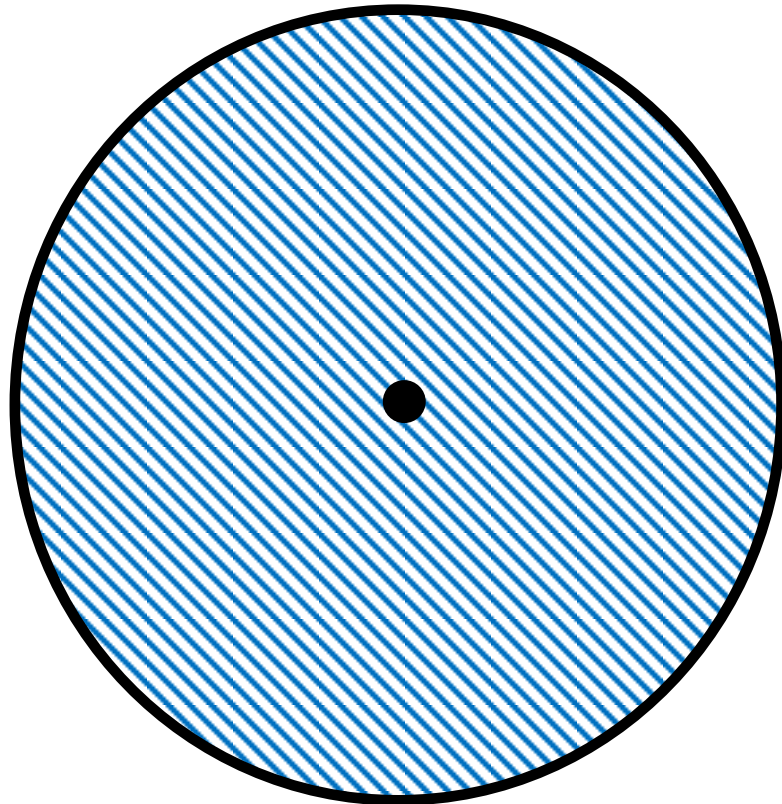$$\pi = \frac{\text{circumference}}{\text{diameter}}$$

Circumference
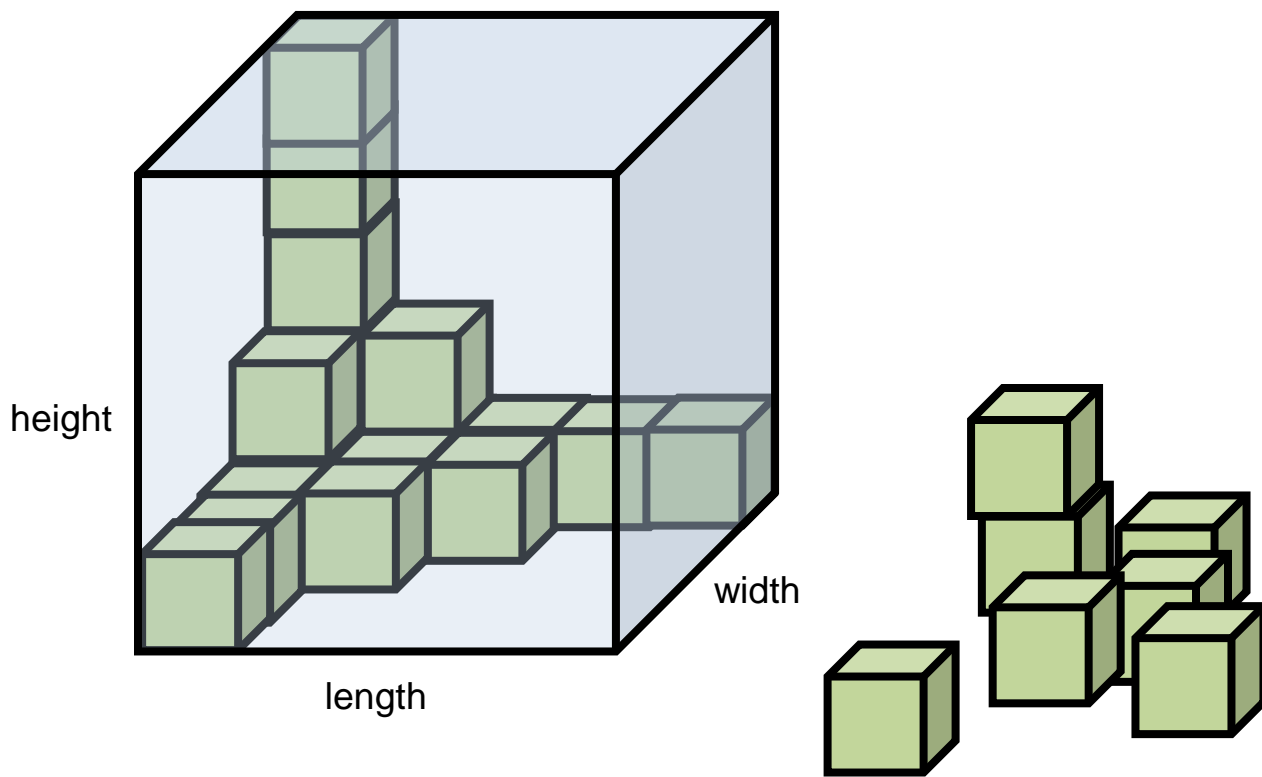

$$C = 2\pi r$$

C = perimeter of a circle
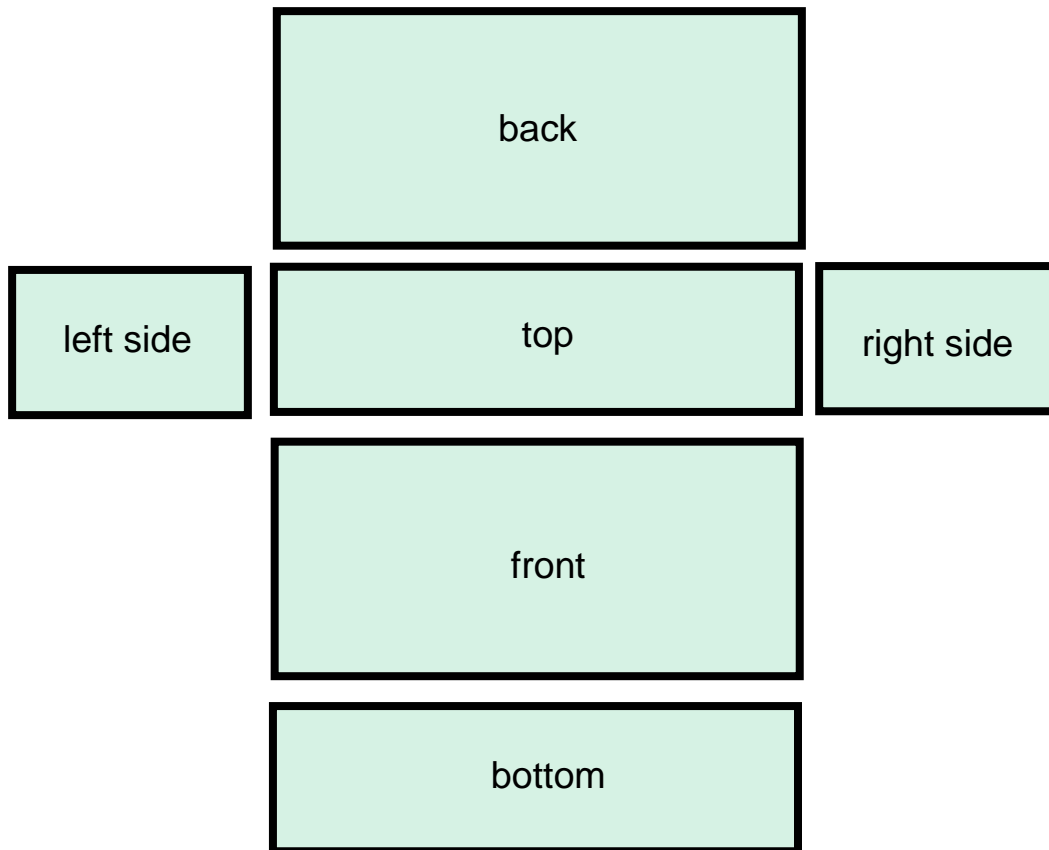
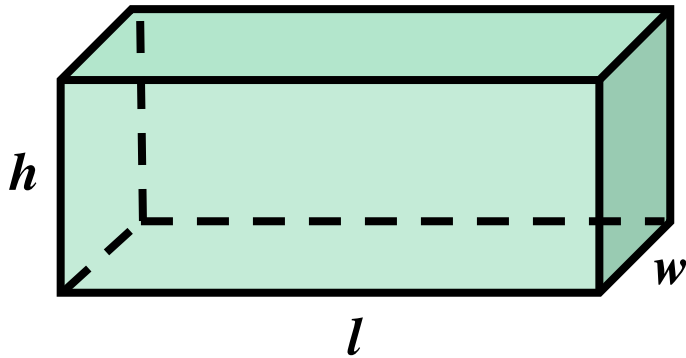# Area of a Circle

$$A = \pi r^2$$

Volume of a Prism

Volume = length x width x height
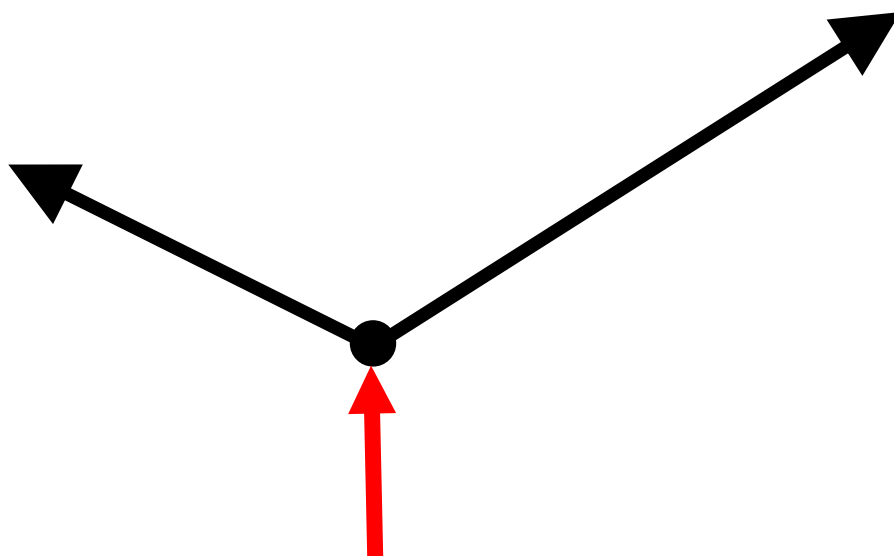
V = lwh

measured in cubic units

Surface Area
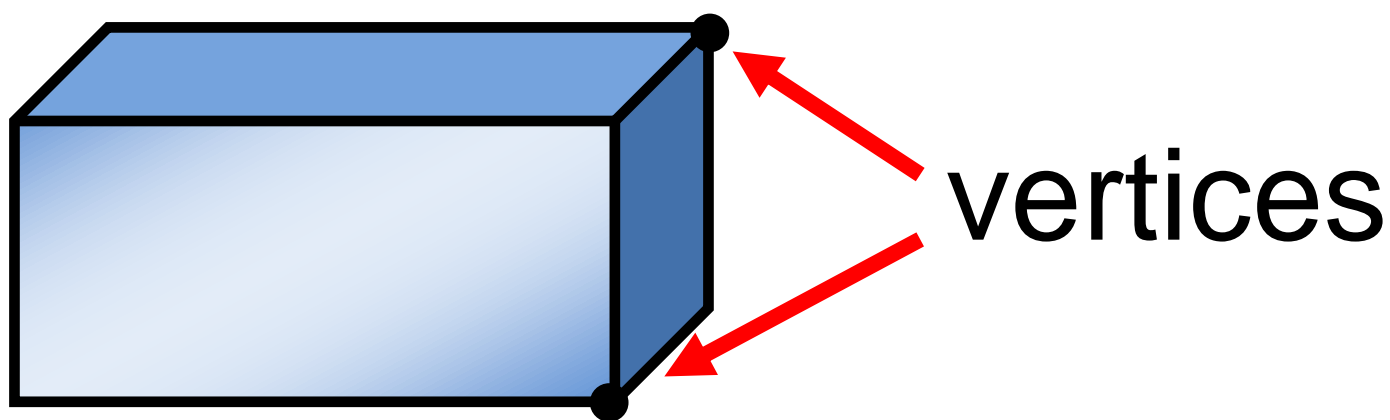

Surface Area (*S.A.*) = sum of areas of faces

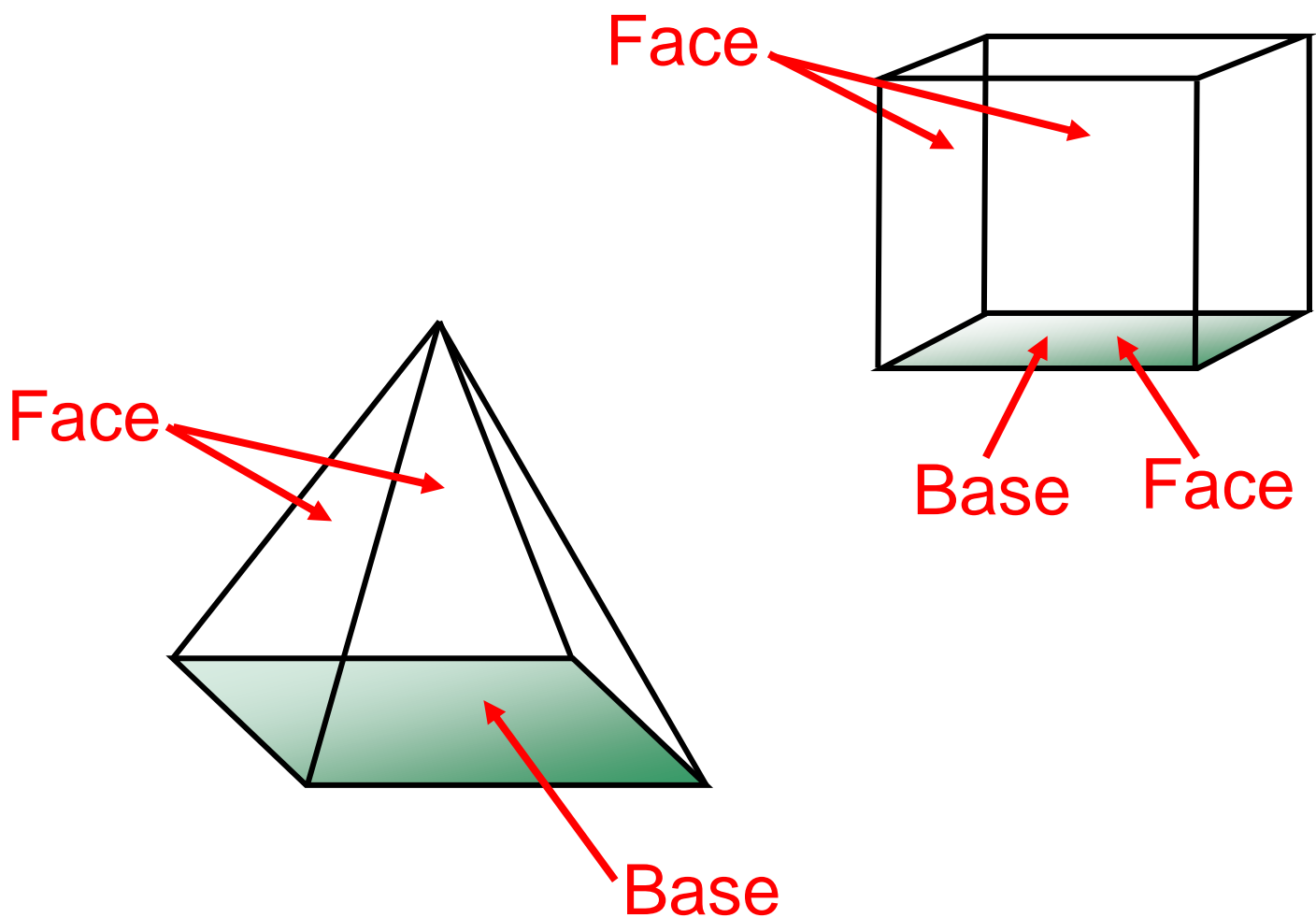# Vertex
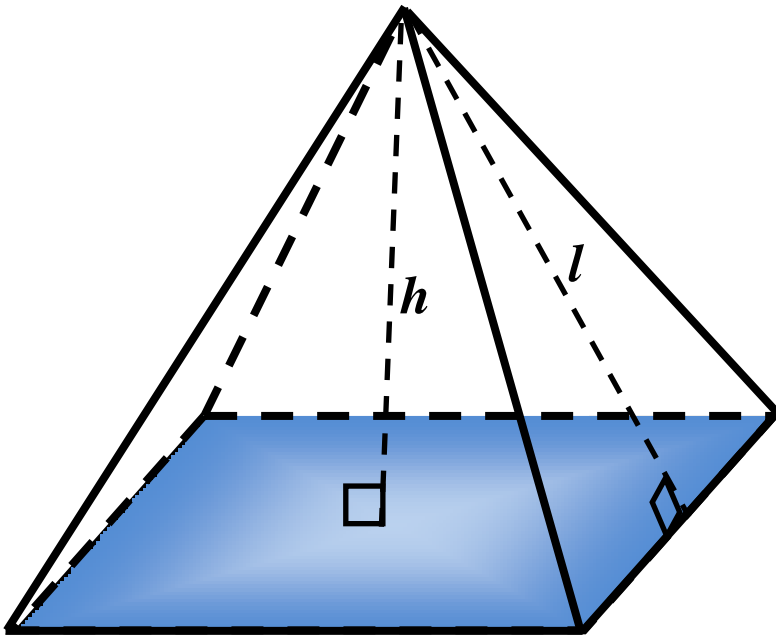

vertex
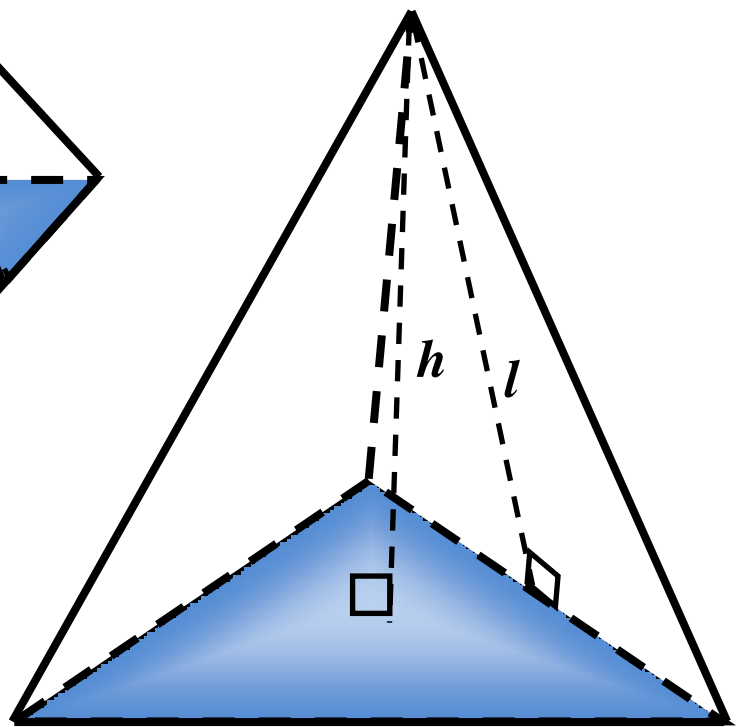

vertices

Face and Base

Face

Face

Base

Face

Face
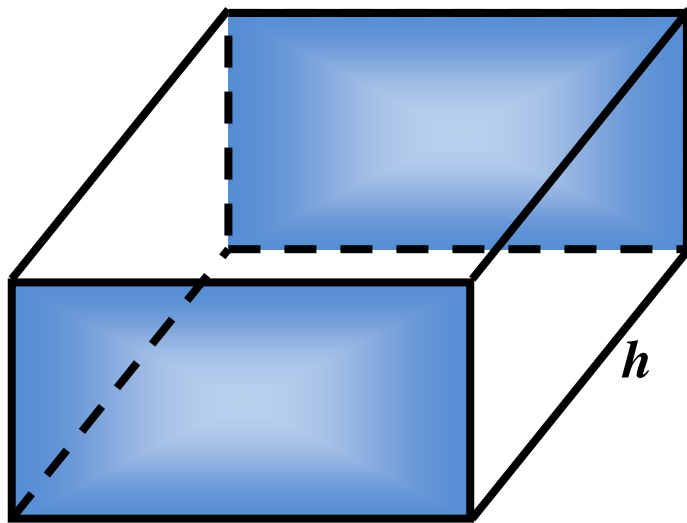
Base

Pyramid

B = area of base
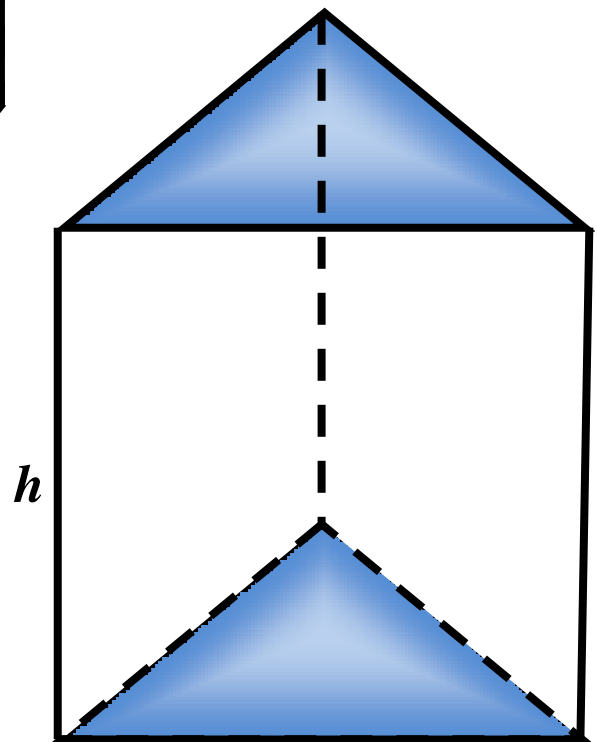
p = perimeter of base

B = area of base

p = perimeter of base

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

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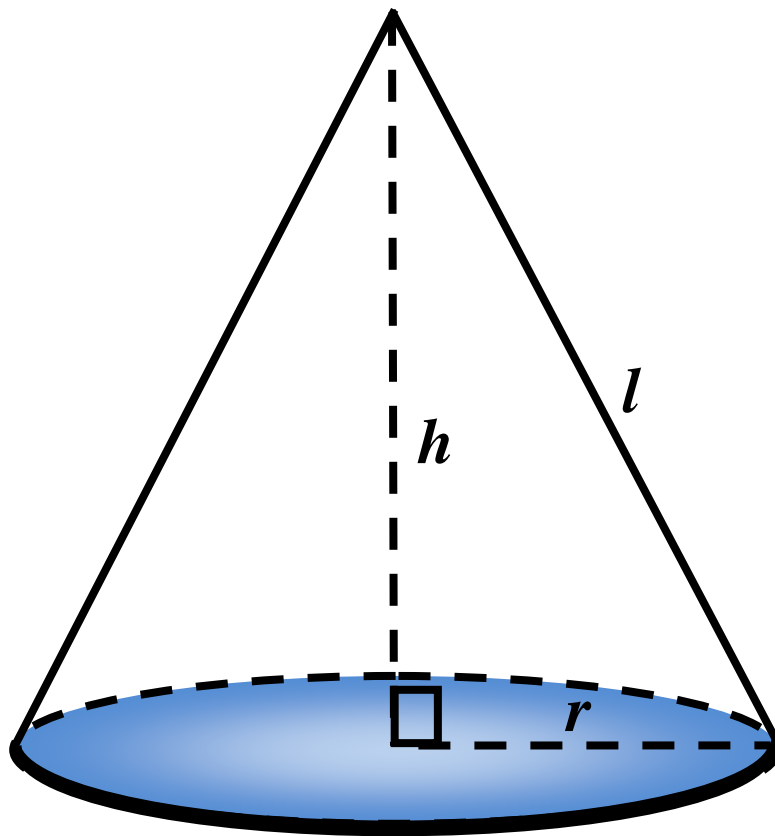
Prism

B = area of base
p = perimeter of base

B = area of base
p = perimeter of base

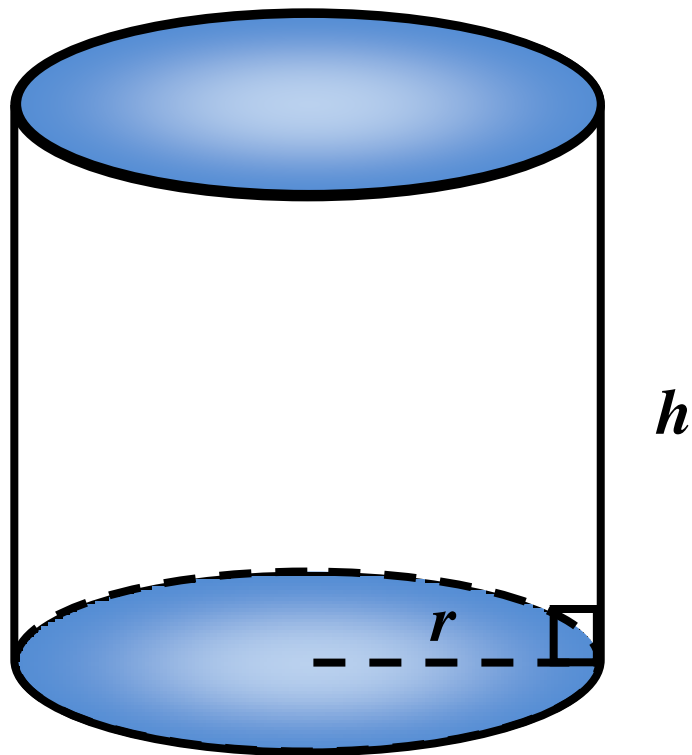$$V = Bh$$

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

Cone

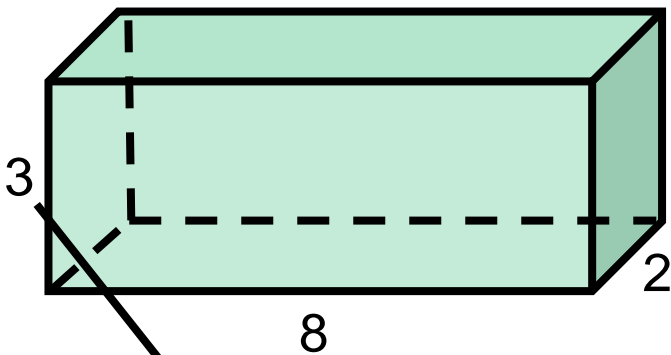$$V = \frac{1}{3}\pi r^2 h$$

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

Cylinder

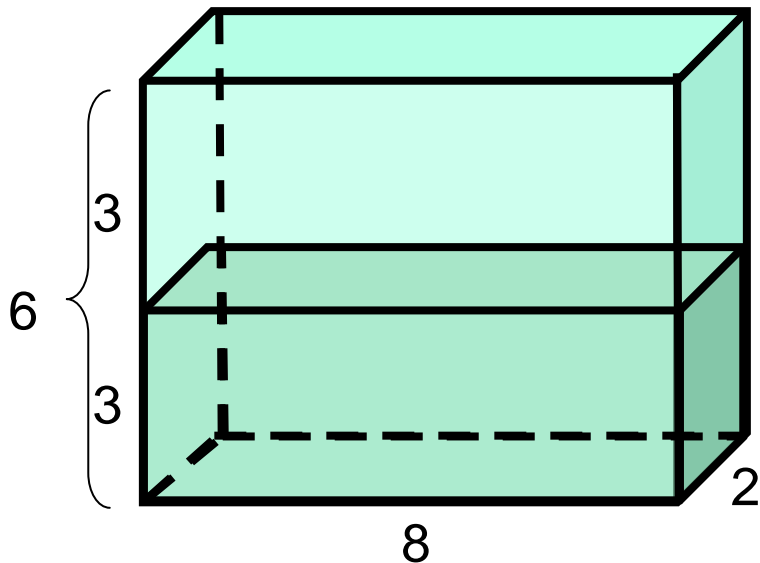$$V = \pi r^2 h$$

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

Volume
Changing one attribute

3

8

2

Height increases to 6
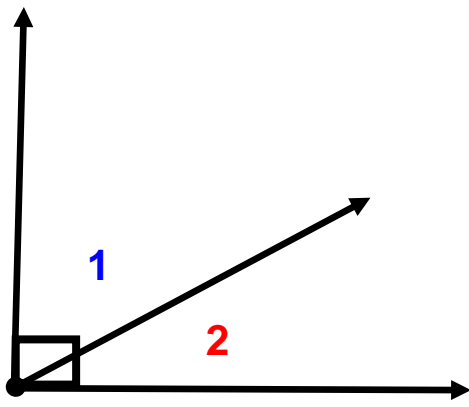
6

3

3

8

2

What happens to the volume?

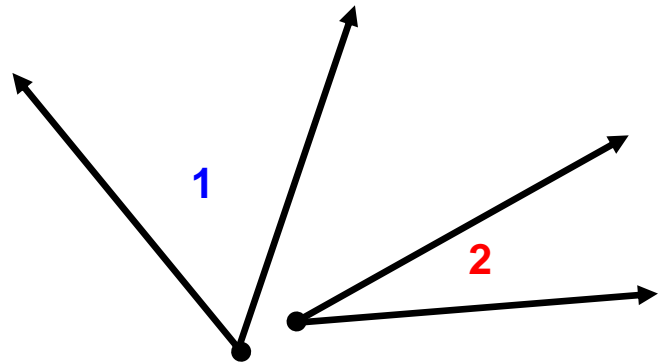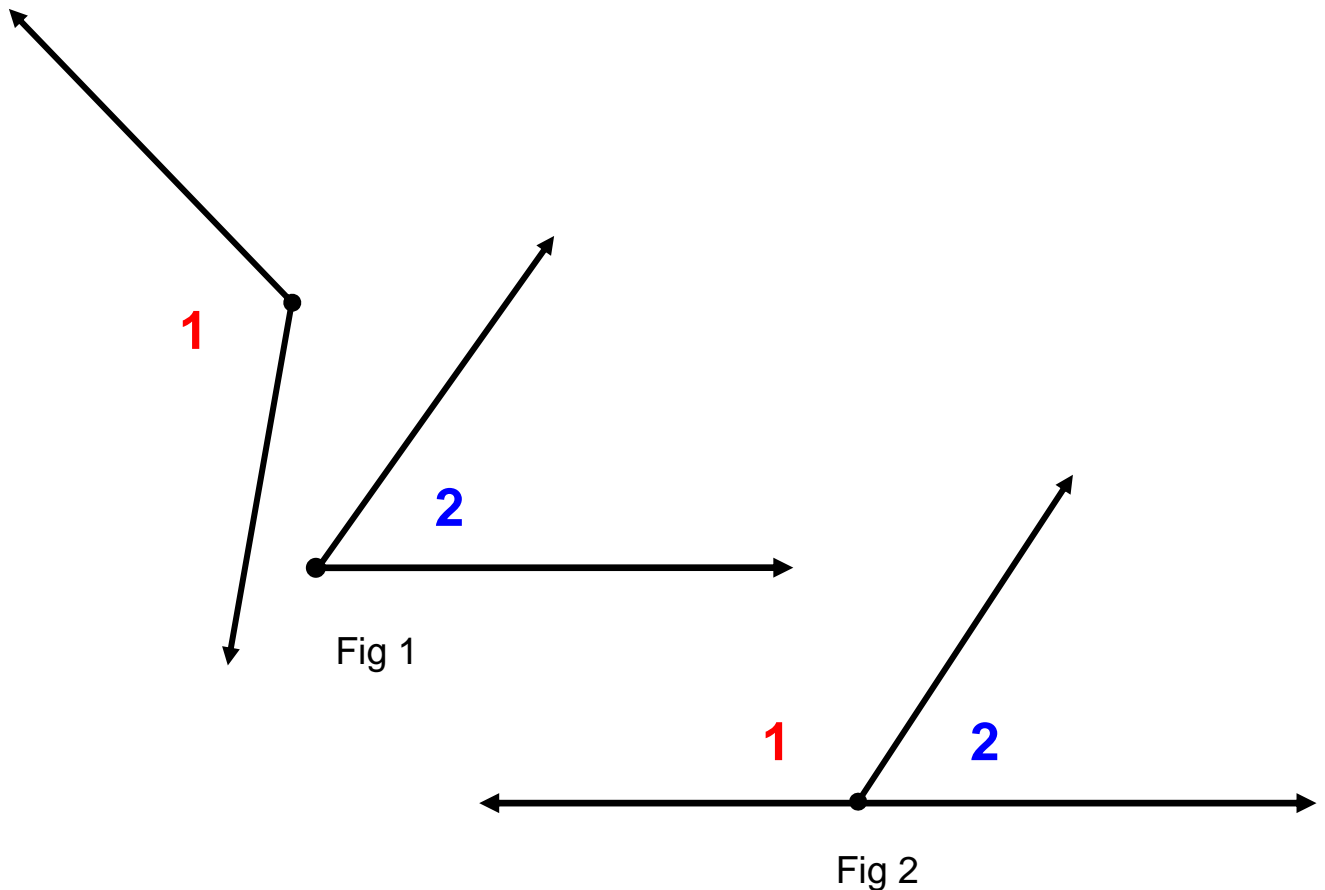# Complementary Angles

Fig 1

Fig 2

$$m\angle 1 + m\angle 2 = 90°$$
in each figure

Supplementary Angles
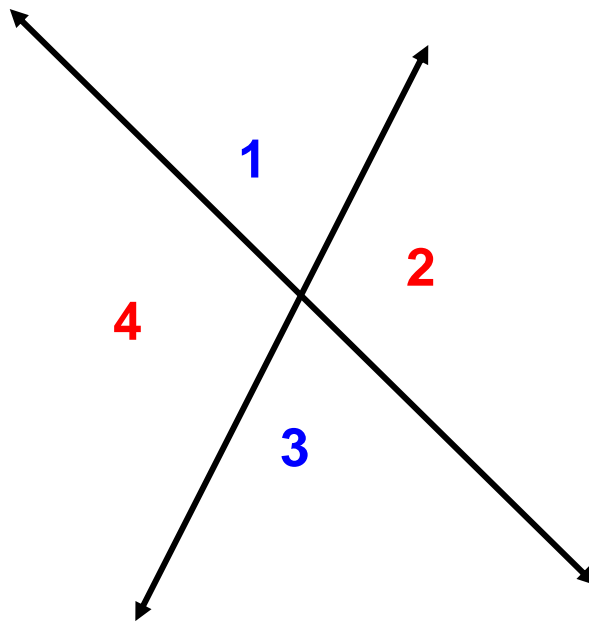

Fig 1

Fig 2

$$m\angle 1 + m\angle 2 = 180°$$
in each figure

Vertical Angles
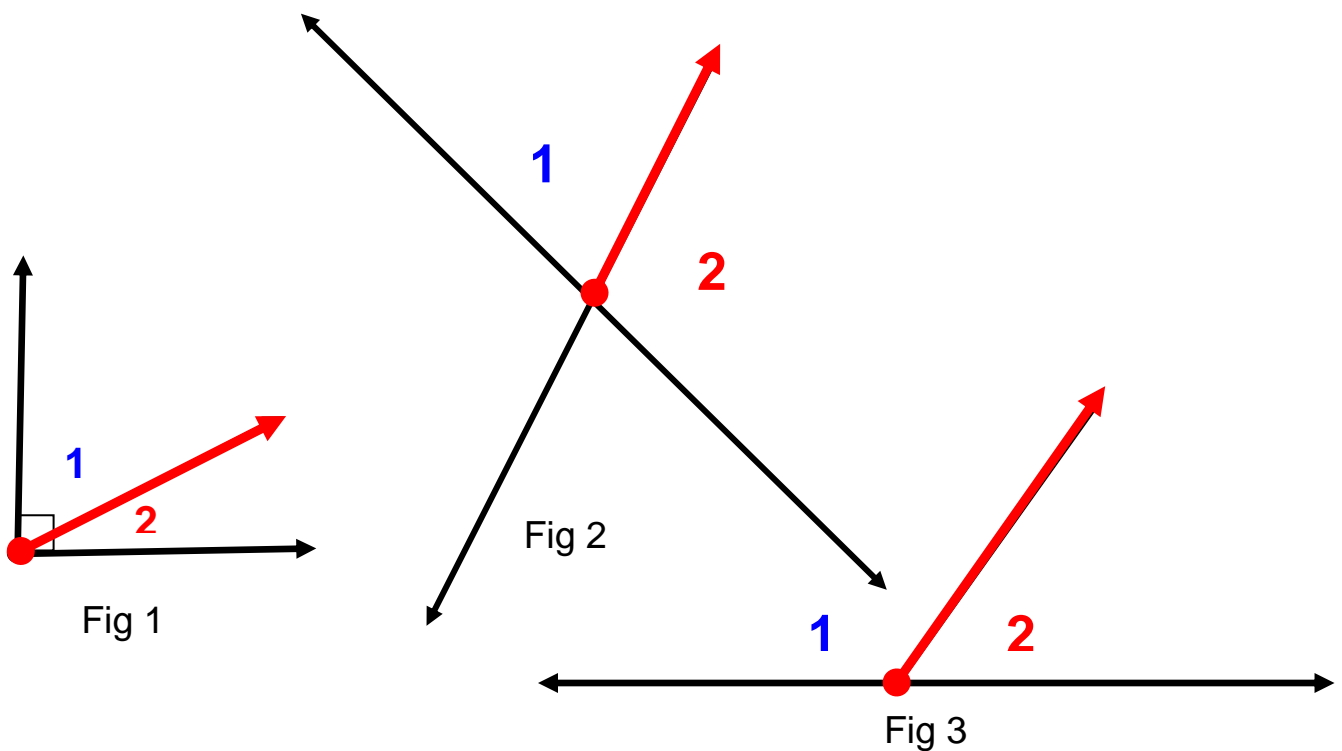

∠1 and ∠3 are vertical angles.
∠2 and ∠4 are vertical angles.

∠1 ≅ ∠3 and ∠2 ≅ ∠4

Adjacent Angles

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

1

2

Fig 1

1

2

Fig 2

1

2

Fig 3

Share a common side and a common vertex

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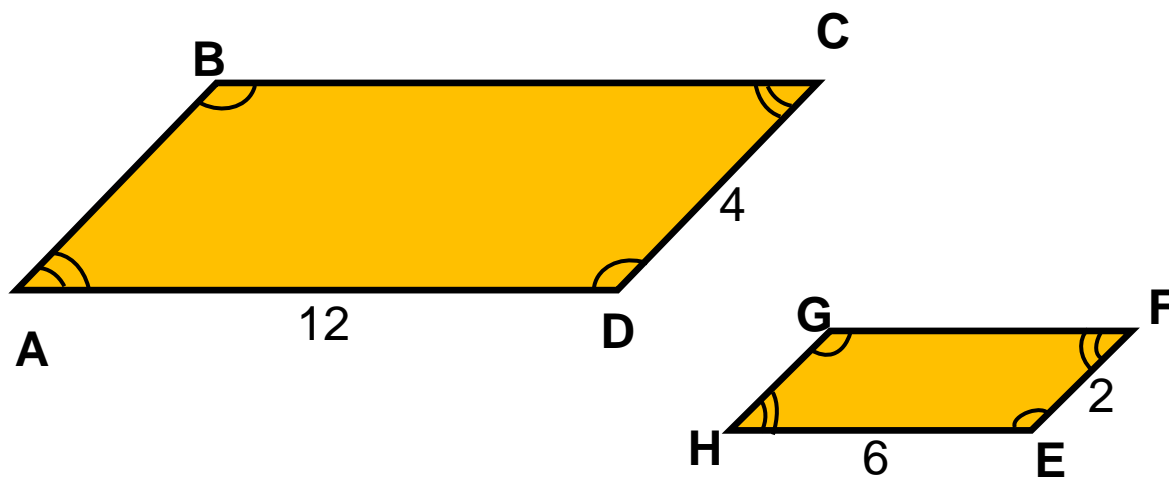
ABCD ~ HGFE	
Angles	**Sides**
∠A corresponds to ∠H	$\overline{AB}$ corresponds to $\overline{HG}$
∠B corresponds to ∠G	$\overline{BC}$ corresponds to $\overline{GF}$
∠C corresponds to ∠F	$\overline{CD}$ corresponds to $\overline{FE}$
∠D corresponds to ∠E	$\overline{DA}$ corresponds to $\overline{EH}$

Corresponding angles are congruent.
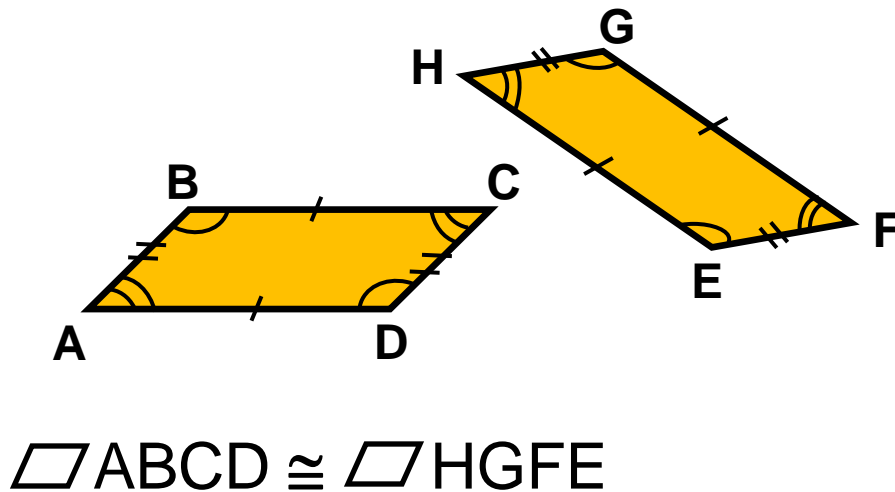Corresponding sides are proportional.

Similar Figures and Proportions
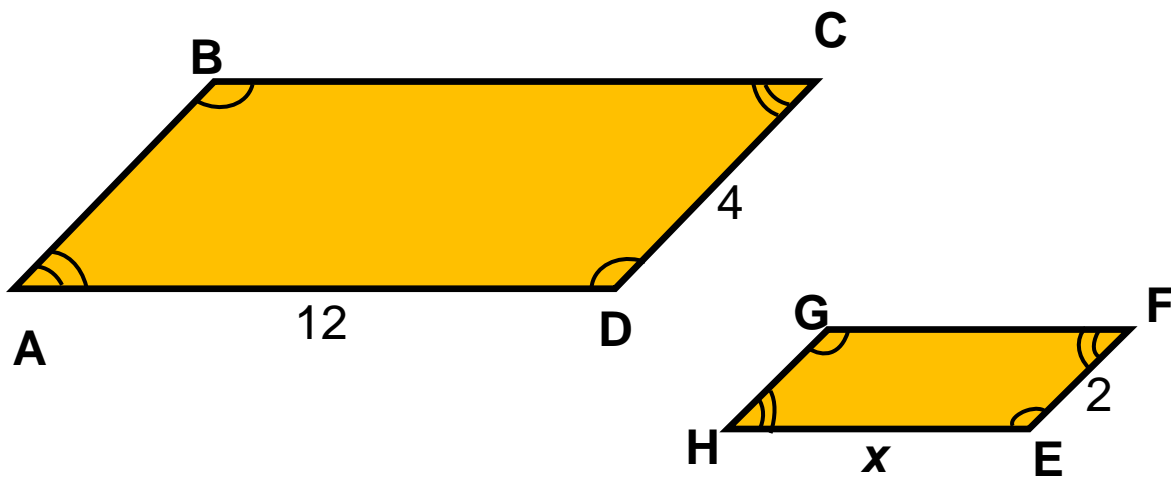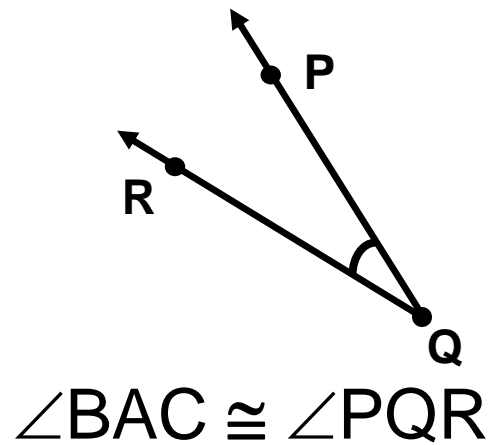

ABCD ~ HGFE

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

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

Congruent Figures

have exactly the same shape and size

$$\overline{AB} \cong \overline{CD}$$

$$\angle BAC \cong \angle PQR$$

$$\square ABCD \cong \square HGFE$$

Triangles

Quadrilaterals

rhombus

parallelogram

rectangle

kite

square

trapezoid
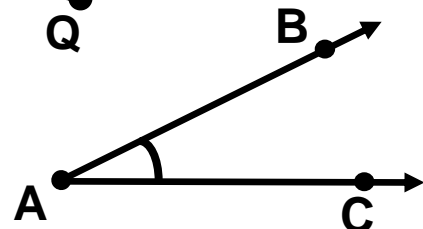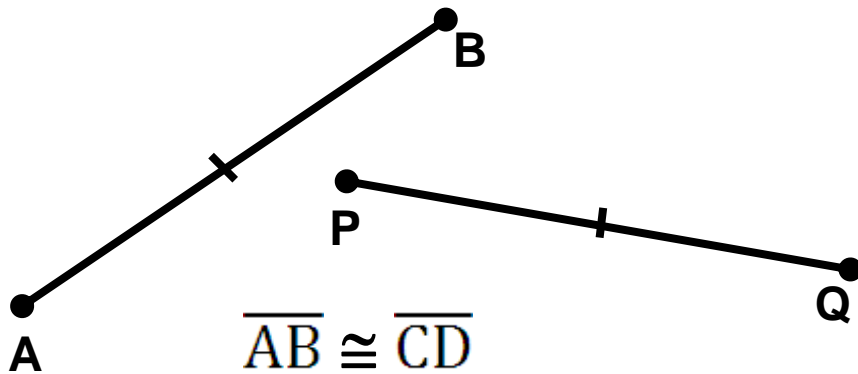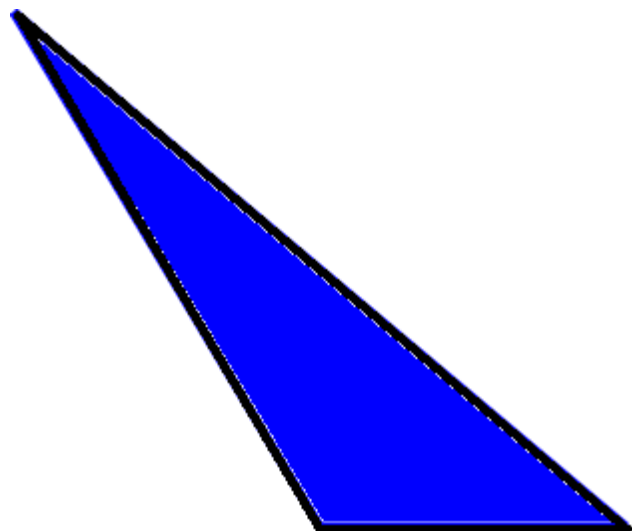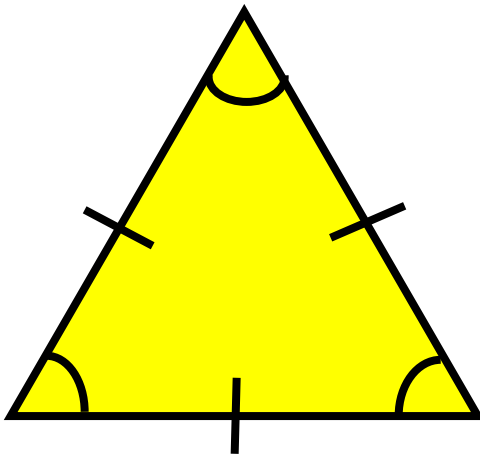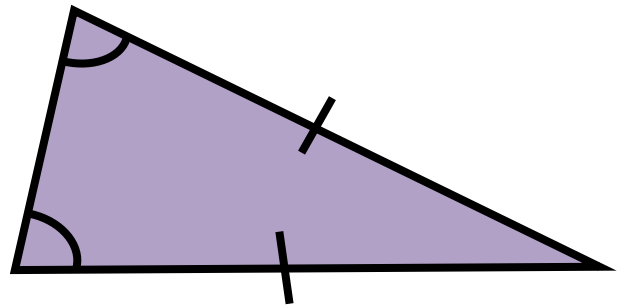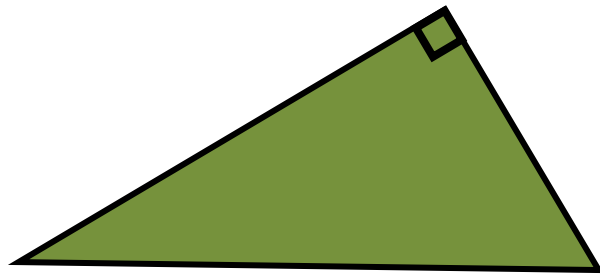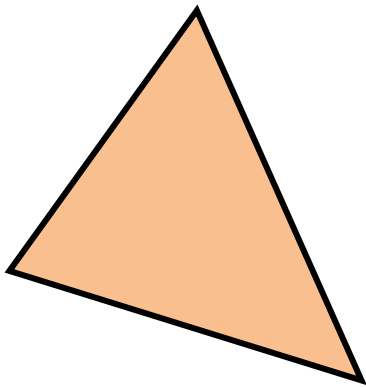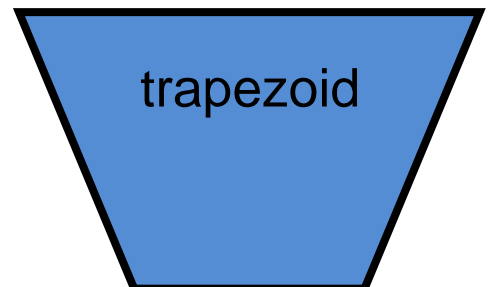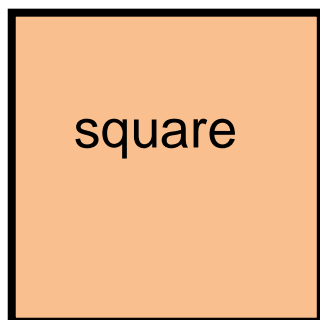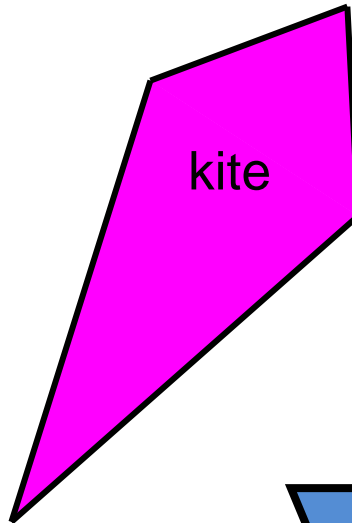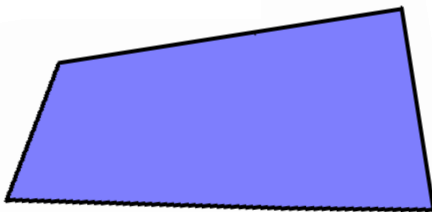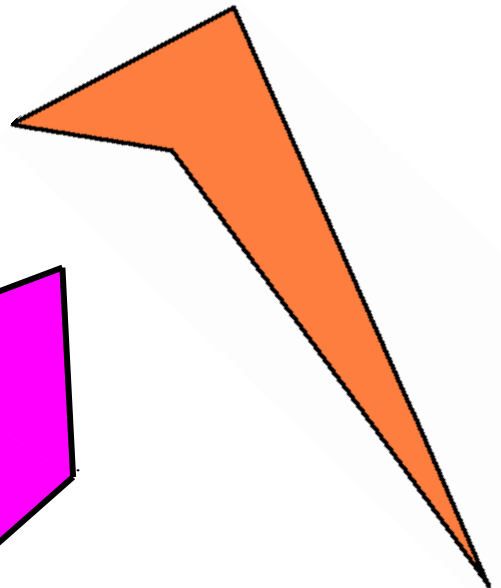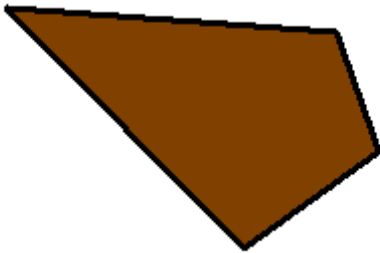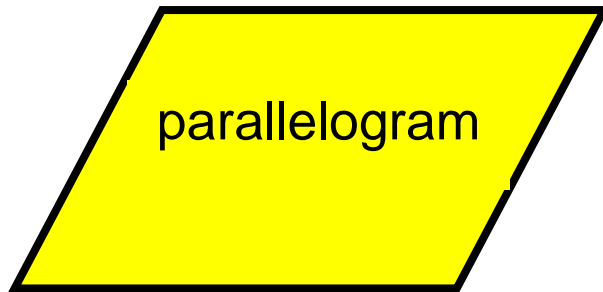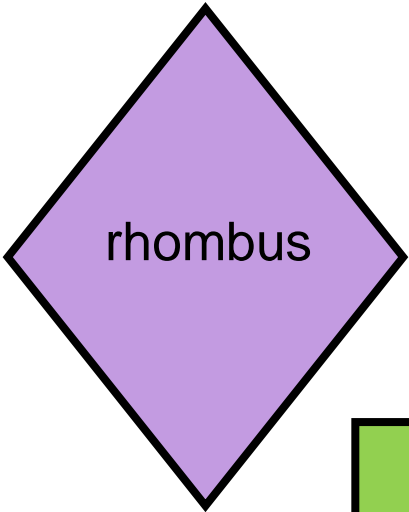
Quadrilaterals Relationships
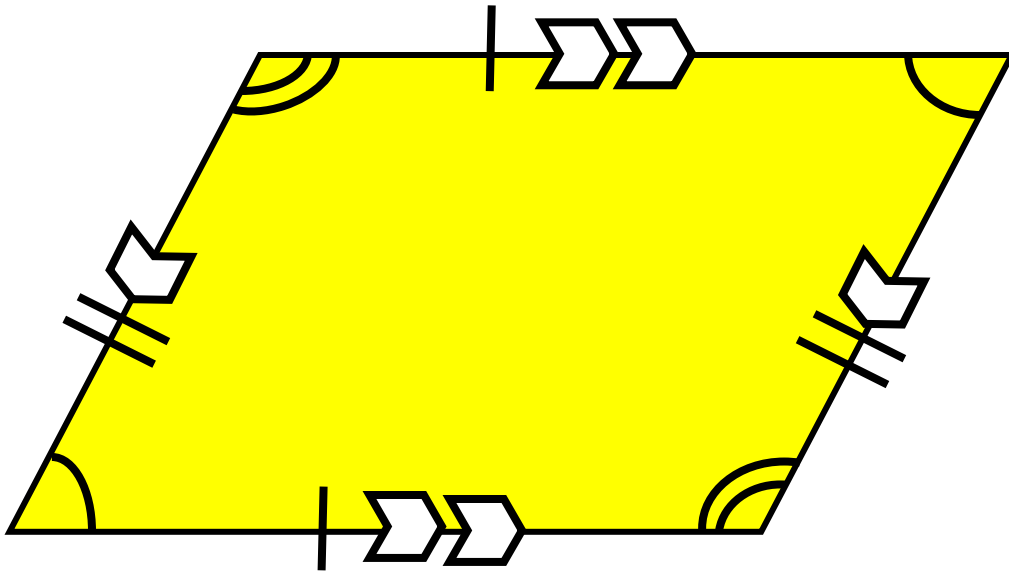
Quadrilateral

Kite Parallelogram Trapezoid

Rhombus Rectangle

Square

Parallelogram

- opposite angles are congruent
- 2 pairs of parallel sides
- 2 pairs of opposite sides congruent

Rhombus
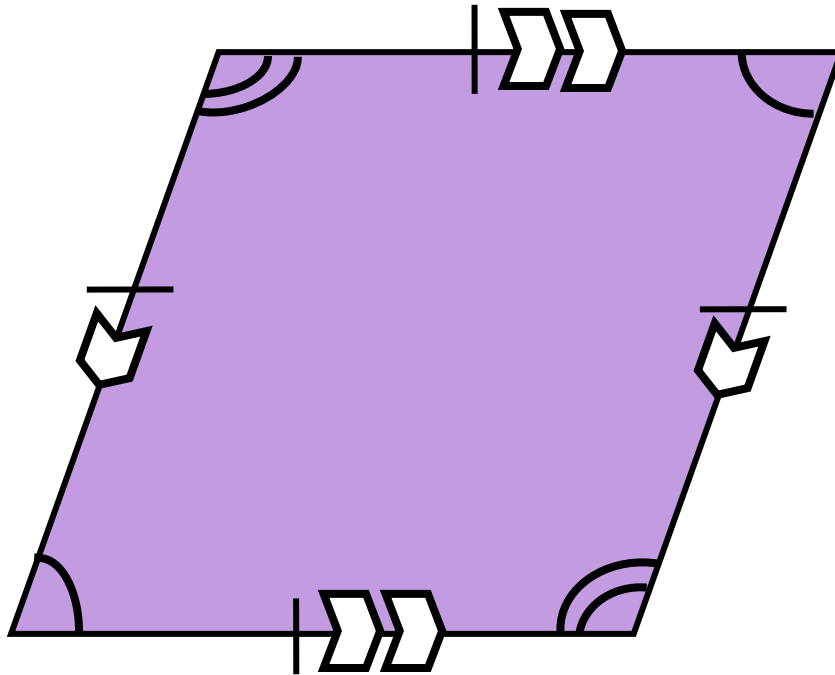
- opposite angles are congruent
- 2 pairs of parallel sides
- 4 congruent sides

Rectangle
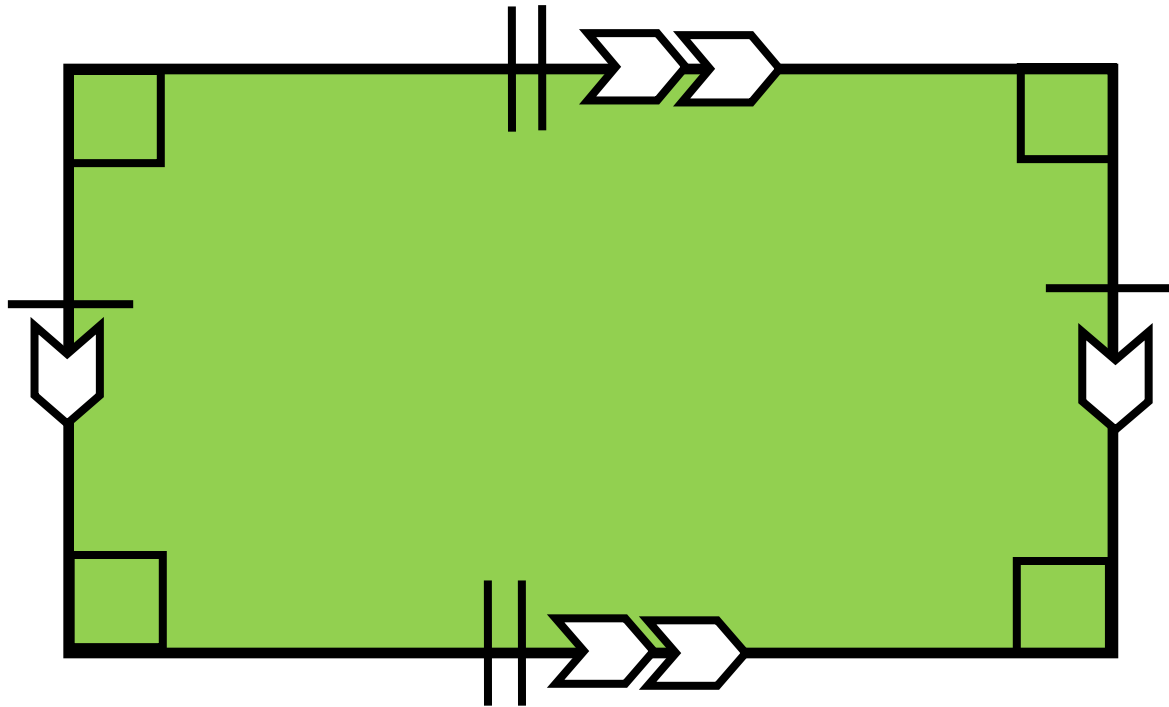
- 4 right angles
- 2 pairs of parallel sides
- 2 pairs of opposite sides congruent

Square
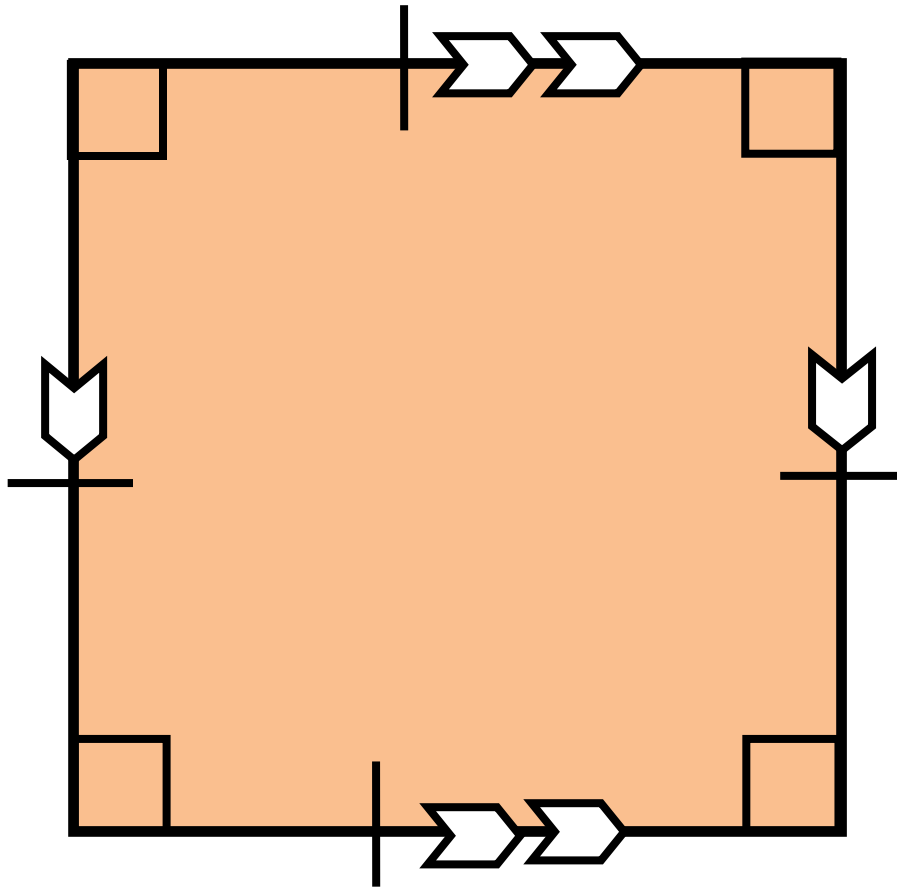
- 4 right angles
- 2 pairs of parallel sides
- 4 congruent sides

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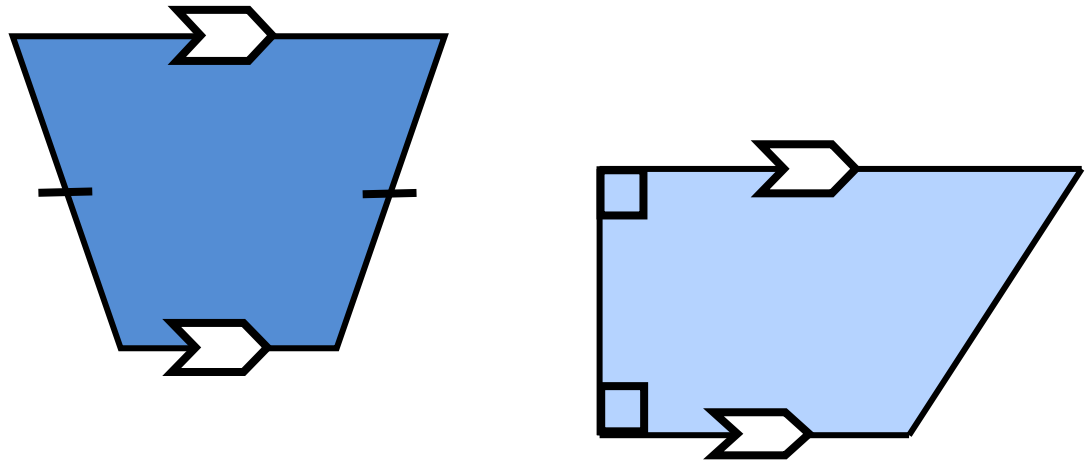
- may have zero or two right angles
- exactly one pair of parallel sides
- may have one pair of congruent sides

Kite
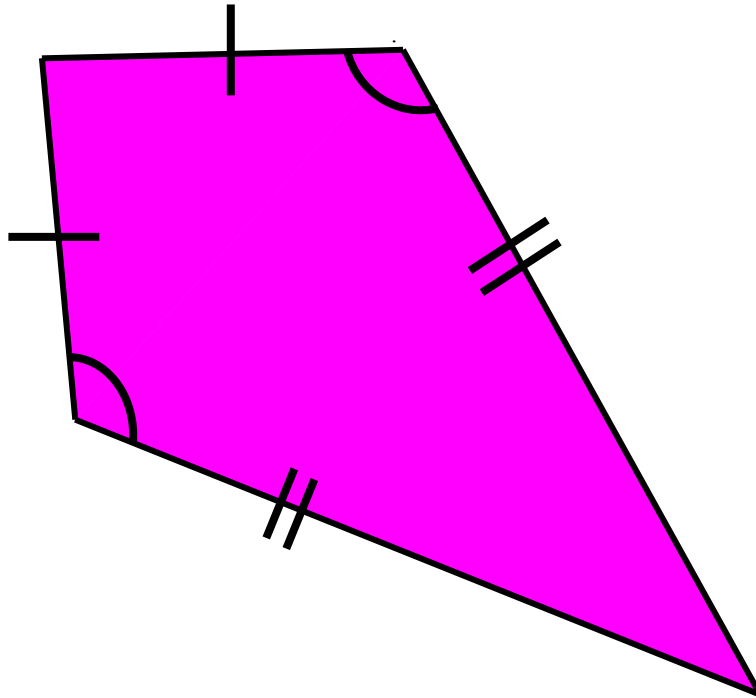
- one pair of opposite congruent angles
- 2 pairs of adjacent congruent sides

Composite Figures

20 cm

14 cm
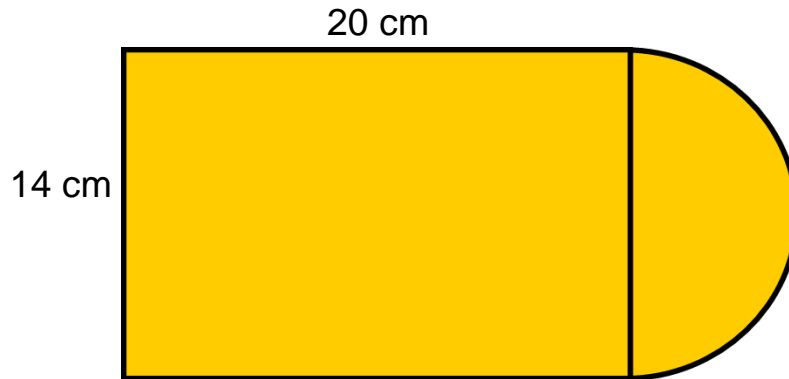
Subdivide into other figures then determine the perimeter.

22.5′

5′

5′

5′

10′

25′
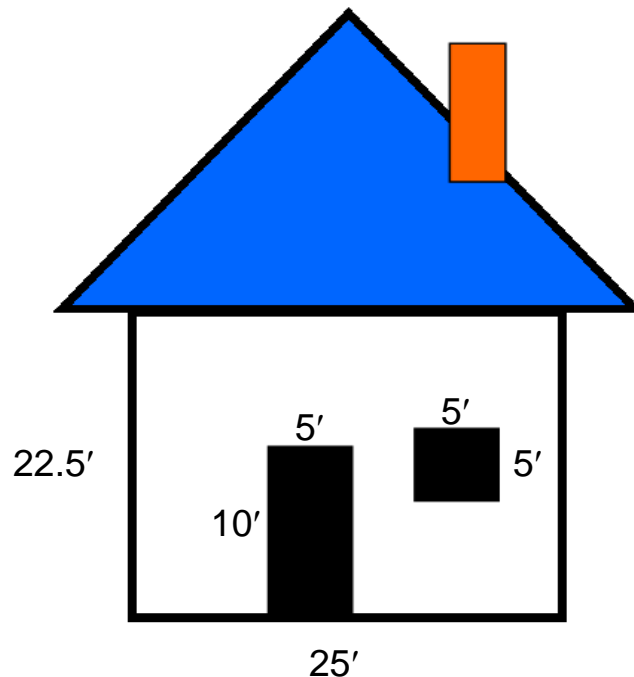
Subdivide into other figures then determine the area.

Right Triangle

leg
a

leg
b

C

B

c
hypotenuse

A
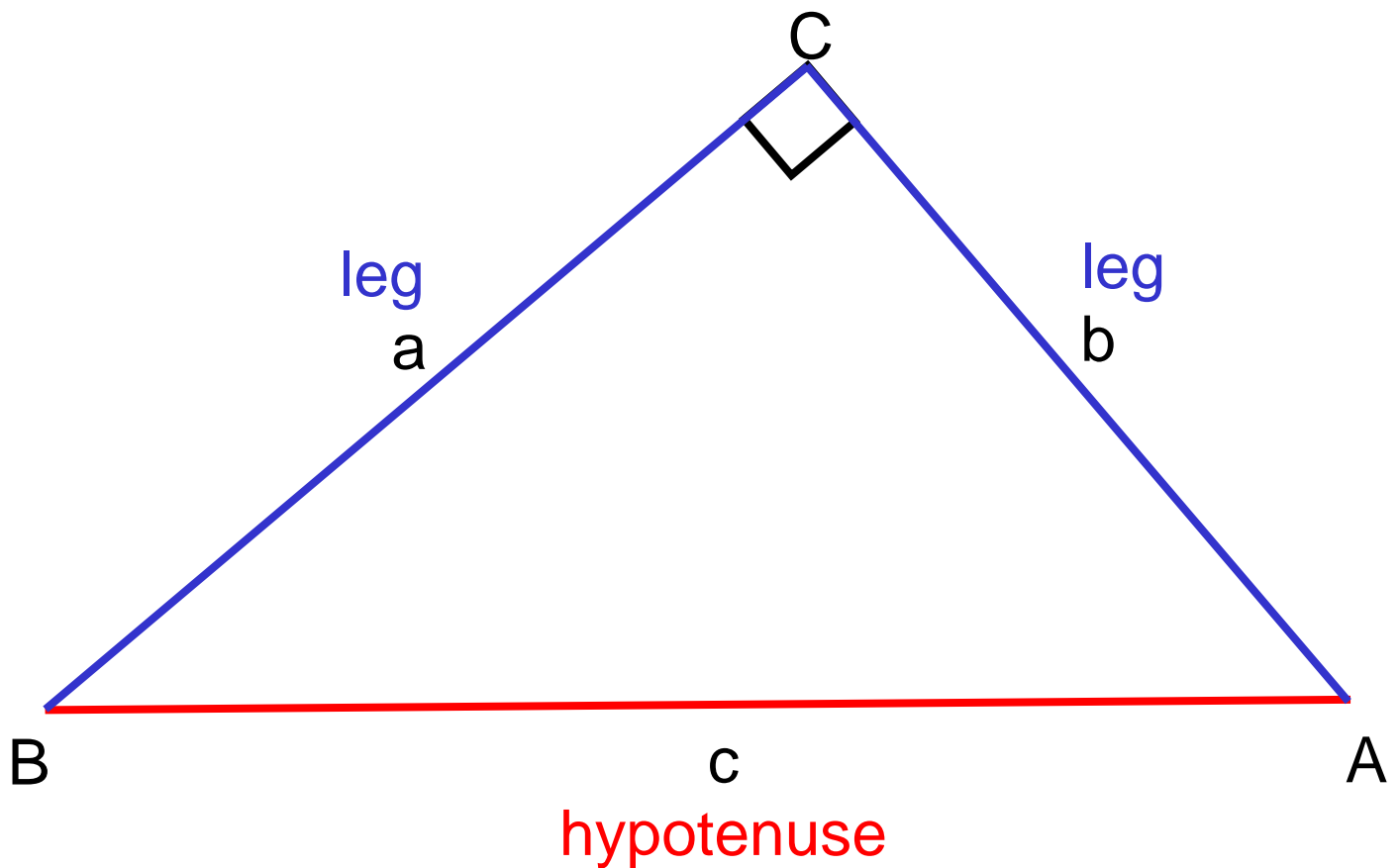
Pythagorean Theorem
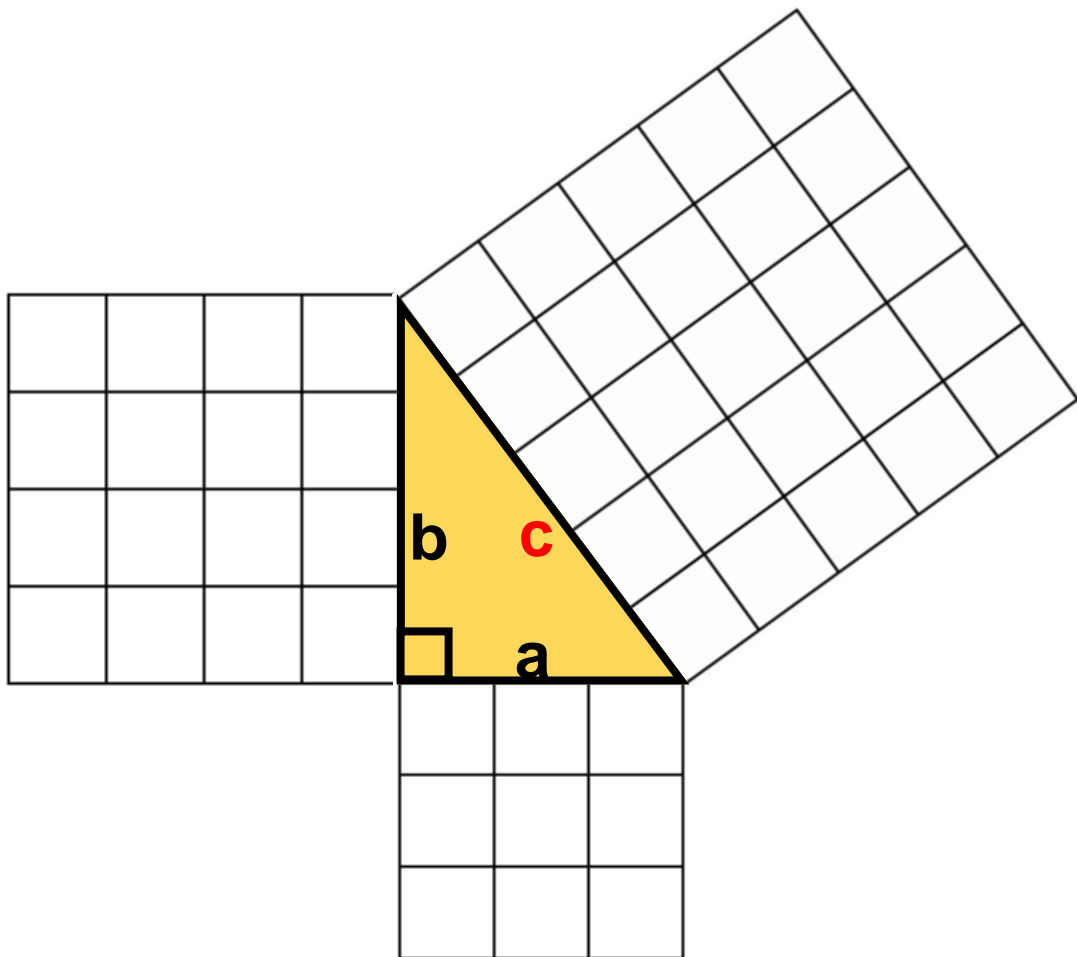
$$a^2 + b^2 = c^2$$

Three Dimensional Models
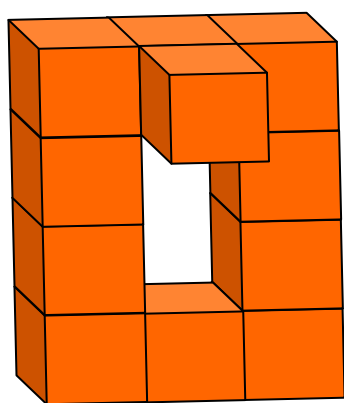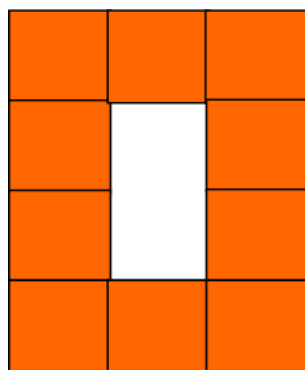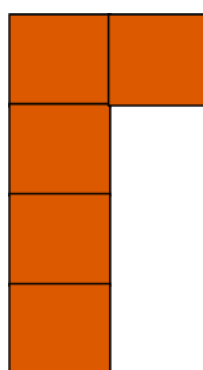
front   side   top
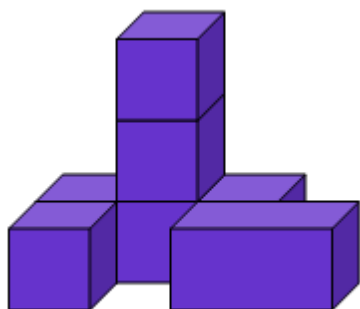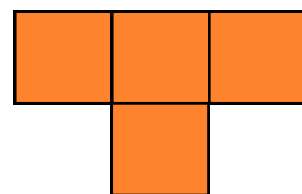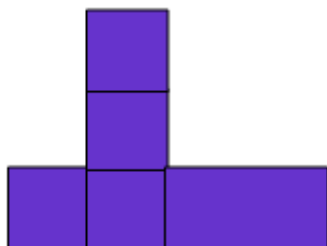
front   side   top
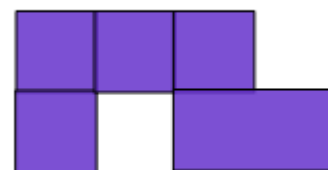
Coordinate Plane
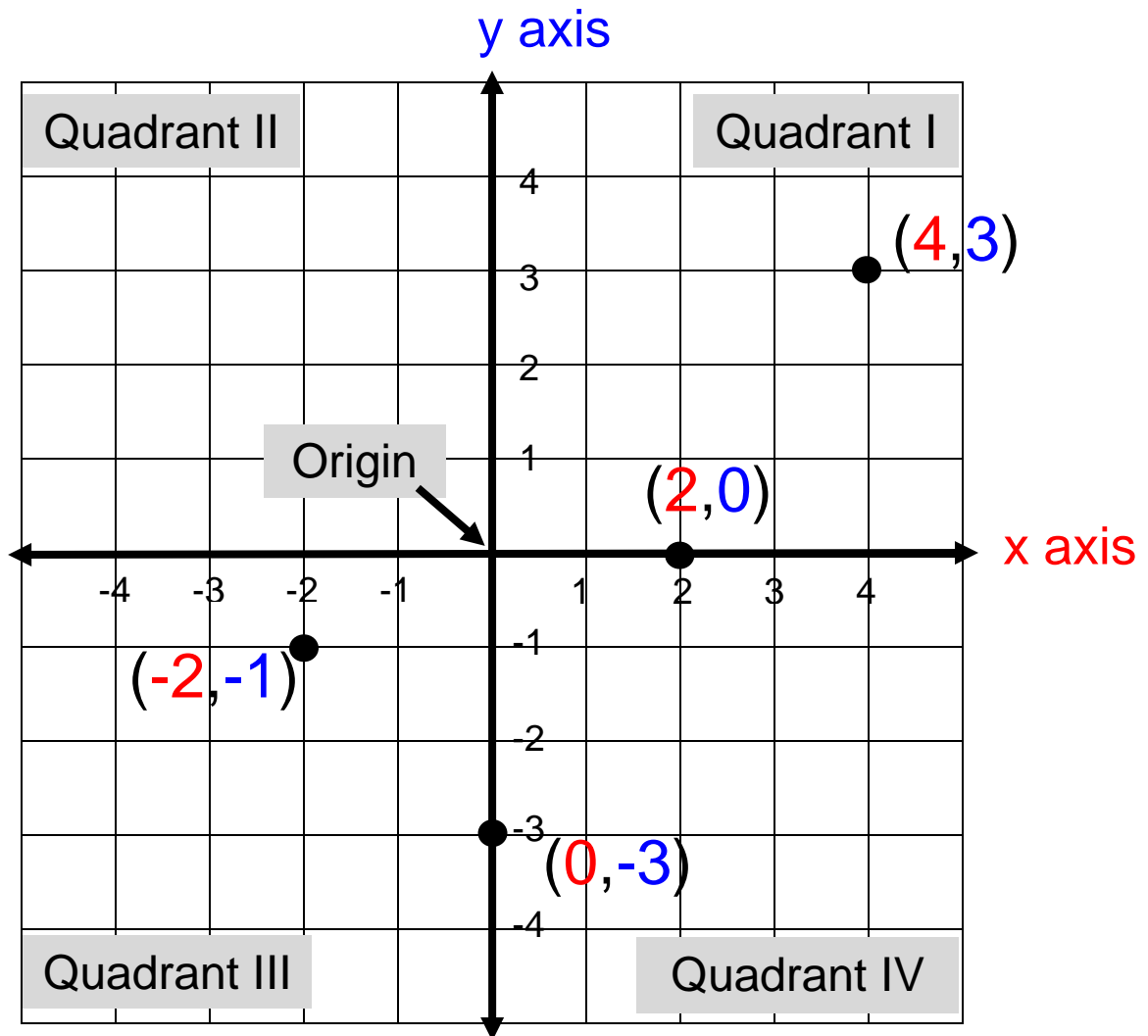
ordered pair (x,y)

Rotation

center of rotation
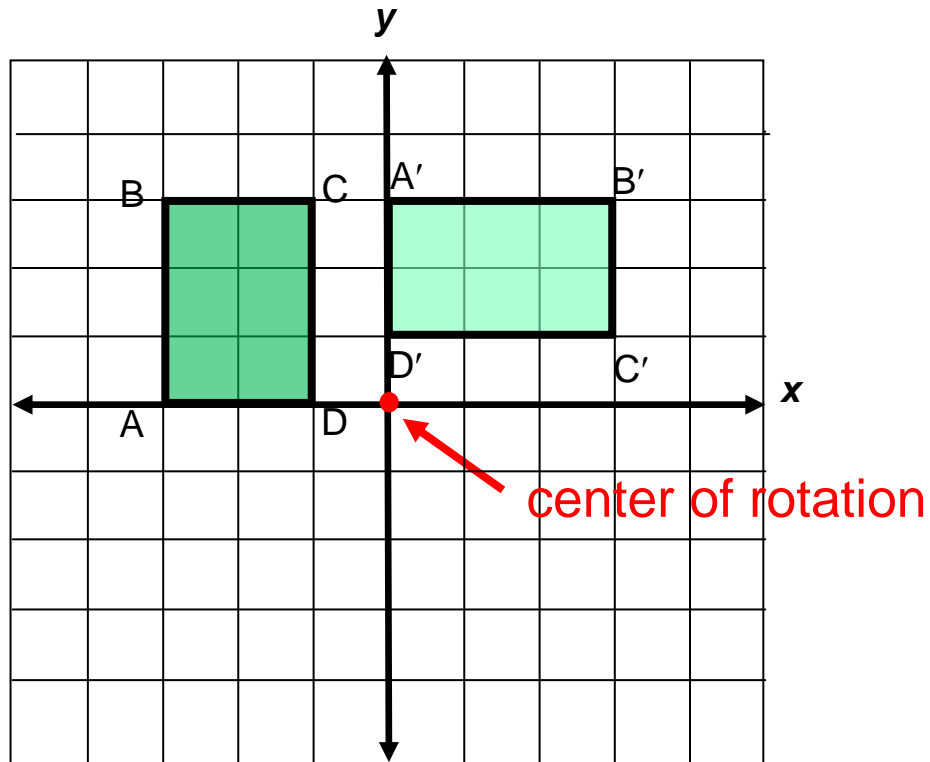
Preimage	Image
A(-3,0)	A′(0,3)
B(-3,3)	B′(3,3)
C(-1,3)	C′(3,1)
D(-1,0)	D′(0,1)

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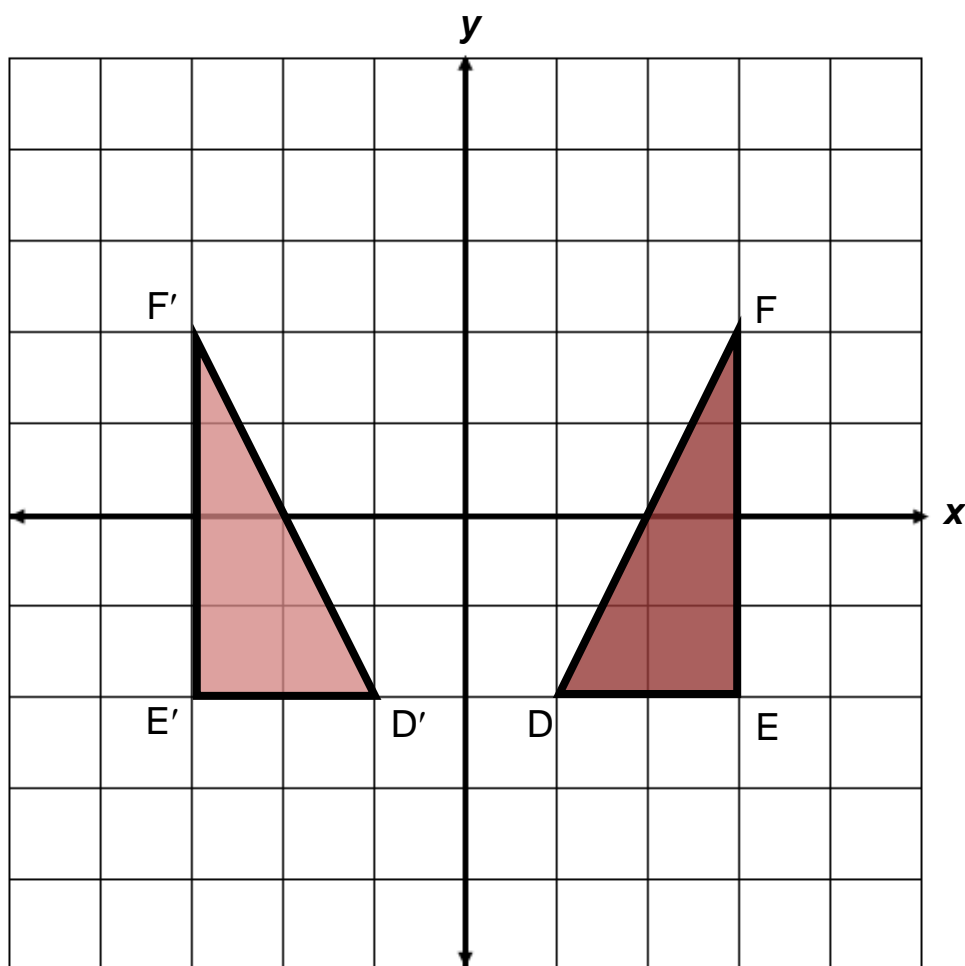
Preimage	Image
D(1,-2)	D′(-1,-2)
E(3,-2)	E′(-3,-2)
F(3,2)	F′(-3,2)

Translation
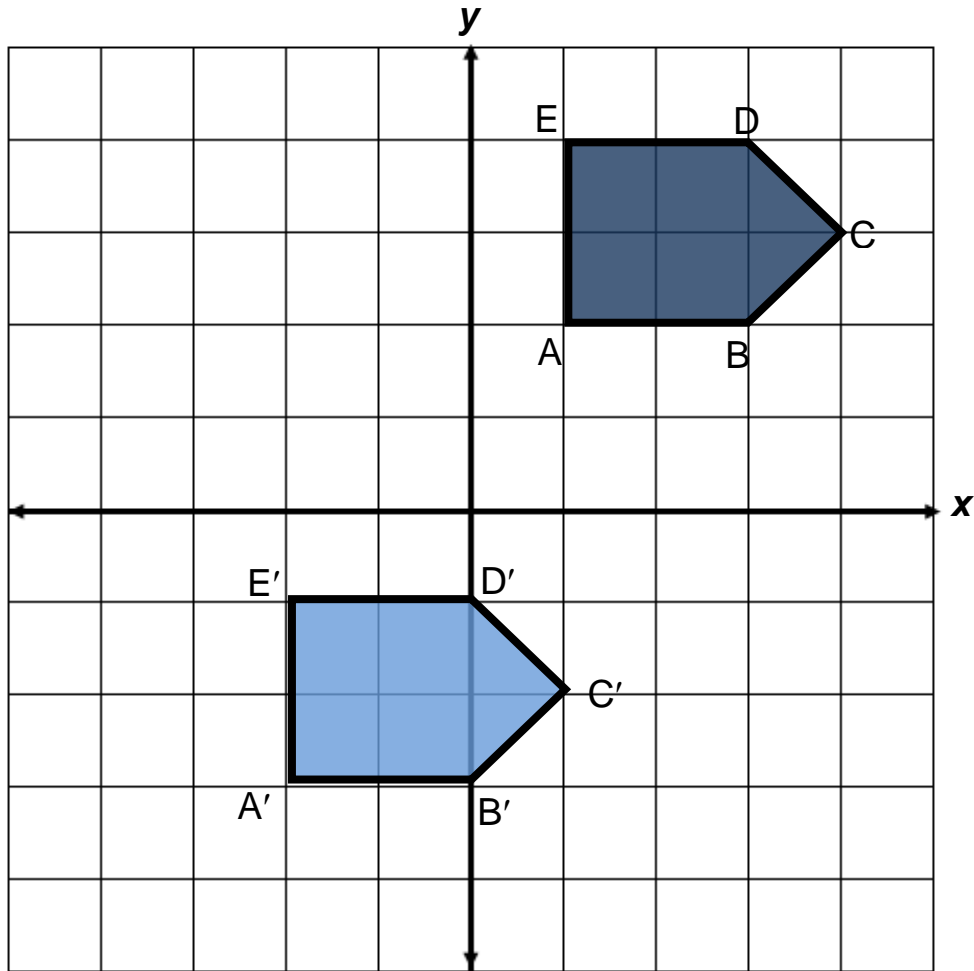
Preimage	Image
A(1,2)	A′(-2,-3)
B(3,2)	B′(0,-3)
C(4,3)	C′(1,-2)
D(3,4)	D′(0,-1)
E(1,4)	E′(-2,-1)

Dilation
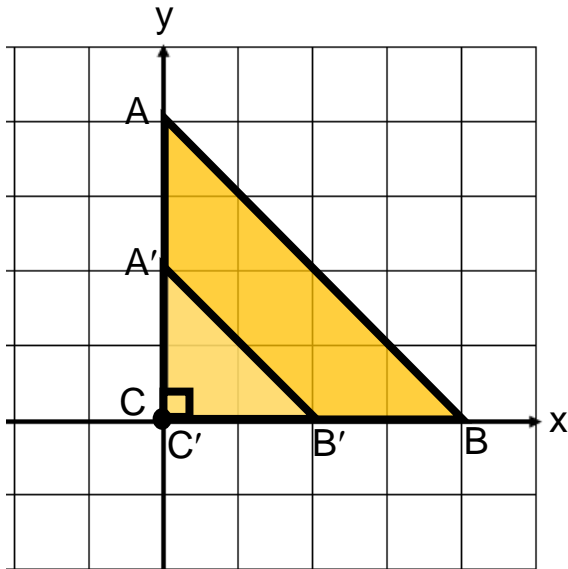
center of dilation = (0,0)

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 = (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)
K(2, -1)	K′(4,-2)
L(1, -2)	L′(2,-4)

Probability

A B A B
A C C

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

unlikely   likely

$\frac{3}{7}$

0          $\frac{1}{2}$ 1

impossible   certain
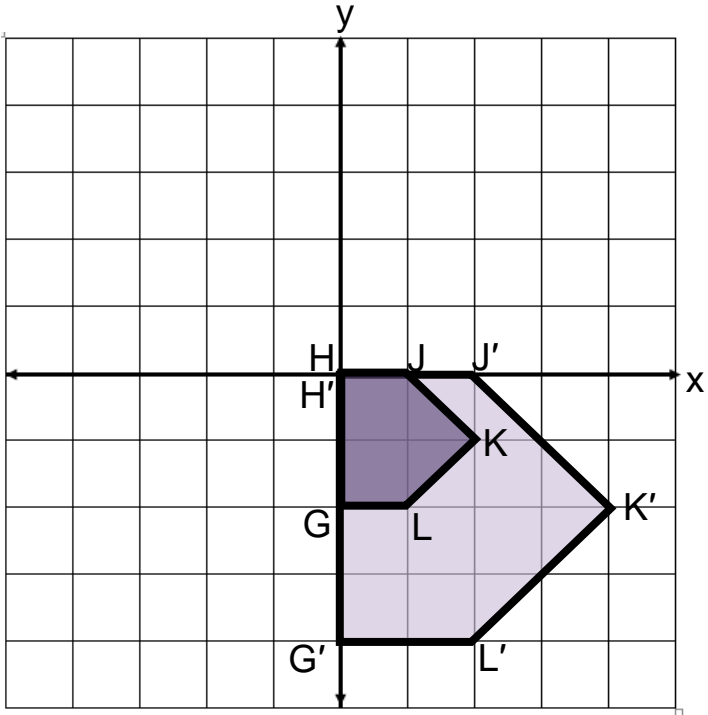
Probability of Independent Events
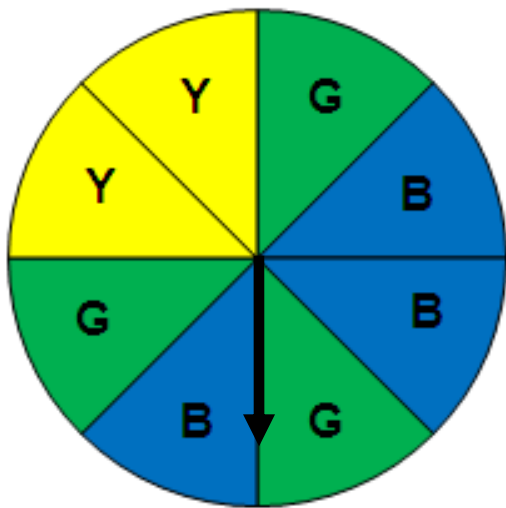
What is the probability of landing on green on the first spin and then landing on yellow on the second spin?

P(green and yellow) =

P(green) • P(yellow) = $\frac{3}{8} \cdot \frac{1}{4} = \frac{3}{32}$

Probability of Dependent Events

What is the probability of getting a red jelly bean on first pick and then without replacing it, getting a green jelly bean on the second pick?

Candy Jar
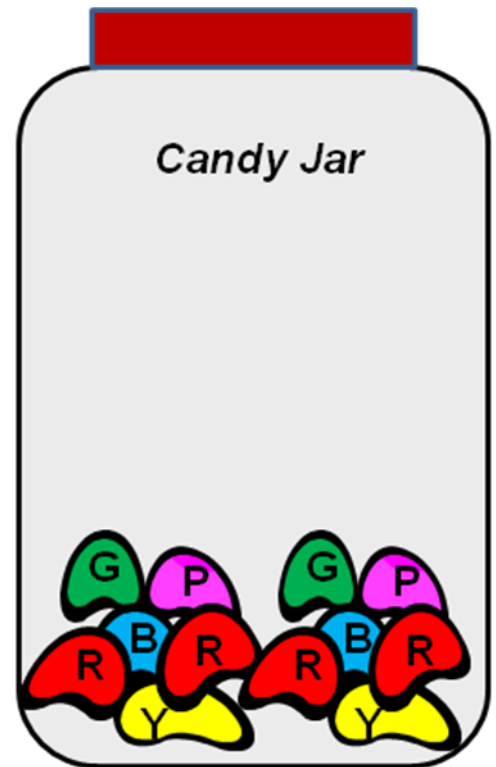
P(red) · P(green after red) =

$$\frac{4}{12} \cdot \frac{2}{11} = \frac{8}{132} = \frac{2}{33}$$

Fundamental Counting Principle

If there are *m* ways for one event to occur and *n* ways for a second event to occur, then there are *m · n* ways for both events to occur.

Tree Diagram

Joe has two pairs of pants (blue and tan). He also has three shirts (red, green and white). List the possible outfits that Joe can make.

PANTS   SHIRTS   POSSIBLE OUTCOMES

blue
- **red** → **blue pants with red shirt**
- **green** → **blue pants with green shirt**
- **white** → **blue pants with white shirt**

tan
- **red** → **tan pants with red shirt**
- **green** → **tan pants with green shirt**
- **white** → **tan pants with white shirt**
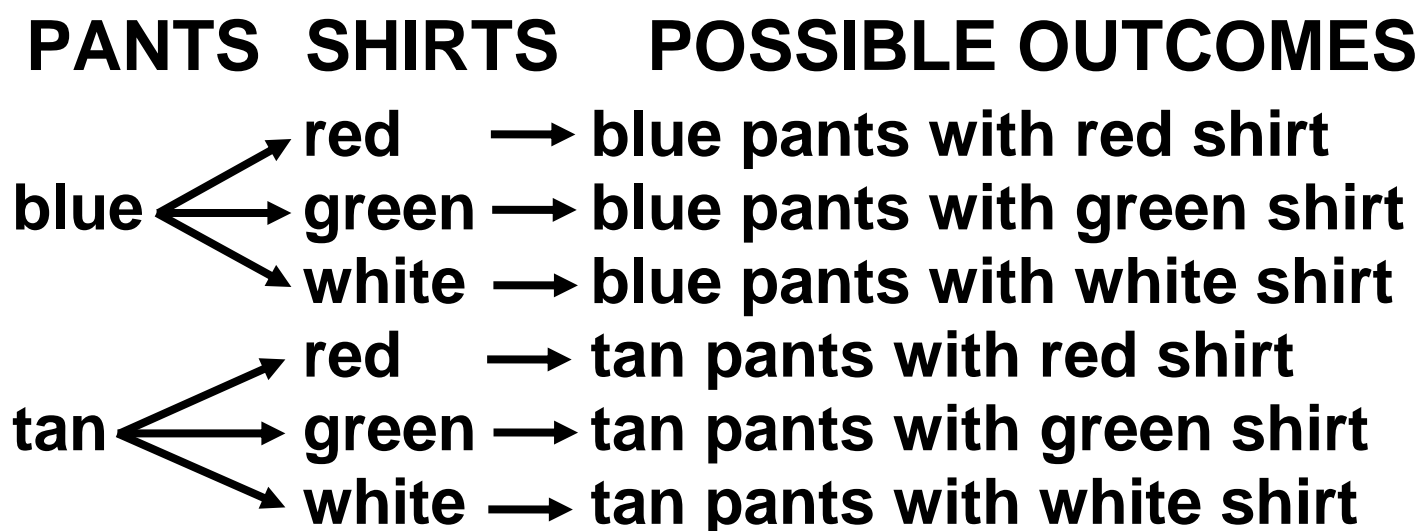
2 · 3 or 6 possible outcomes

Mean

a measure of central tendency

2, 3, 4, 7

Balance Point
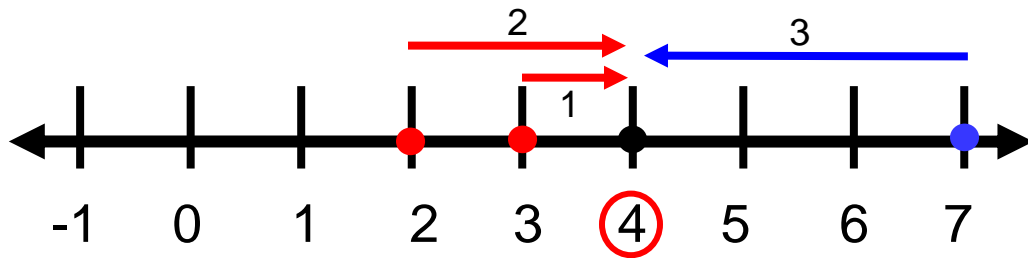
Numerical Average

$$\frac{2+3+4+7}{4} = \frac{16}{4} = 4$$

Median

a measure of central tendency

6, 7, 8, 9, 9

8 = median

5, 6, 8, 9, 11, 12

8.5 = median

Mode

a measure of central tendency

Data Sets	Mode
2, 3, 3, 3, 5, 5, 9, 10	3
5.2, 5.4, 5.5, 5.6, 5.8, 5.9, 6.0	none
1, 1, 2, 5, 6, 7, 7, 9, 11, 12	1, 7
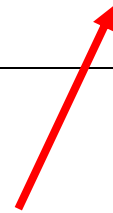
bimodal

Range

Data set

$$2\frac{1}{2}, \; 3, \; 3\frac{3}{4}, \; 3\frac{7}{8}, \; 5, \; 5\frac{1}{2}, \; 9\frac{1}{6}, \; 10\frac{4}{5}, \; 15\frac{1}{2}, \; 20$$

$$20 - 2\frac{1}{2} = \color{red}{17\frac{1}{2}}$$

$$\text{Range} = \color{red}{17\frac{1}{2}}$$

Bar Graph

Pounds of Newspapers Recycled by Lexington Middle School Students
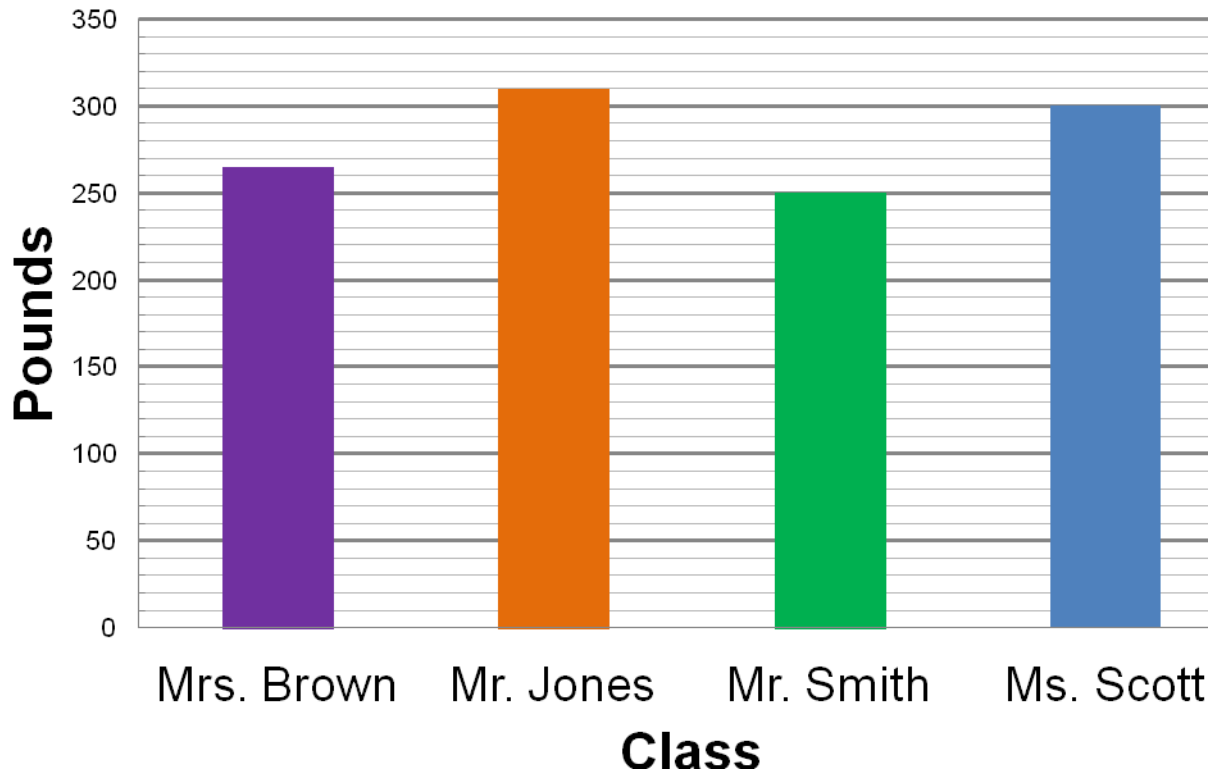
Line Graph

Value of Sarah's Car
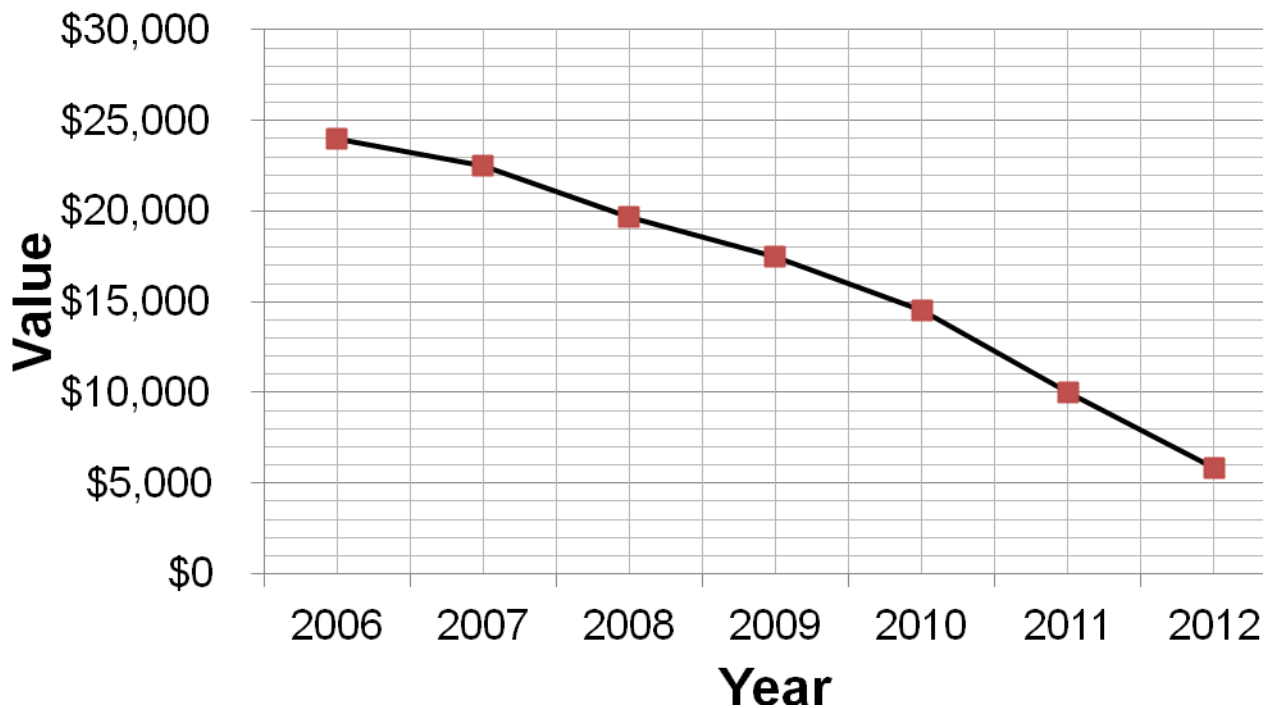
Stem-and-Leaf Plot

Math Test Scores
56, 65, 98, 82, 64, 71, 78, 86, 95, 91,
59, 70, 80, 92, 76, 82, 85, 91, 92, 73

STEM	LEAF
5	6 9
6	4 5
7	0 1 3 6 8
8	0 2 2 5 6
9	1 1 2 2 5 8

Key: 5|6 means 56

Circle Graph

Favorite Ice Cream

Butter
Pecan
$1/15 \approx 7\%$

Chocolate
Chip
$1/30 \approx 3\%$

Chocolate
$1/5 = 20\%$

Strawberry
$1/5 = 20\%$

Vanilla
$1/2 = 50\%$

Histogram

Exam Scores of Students
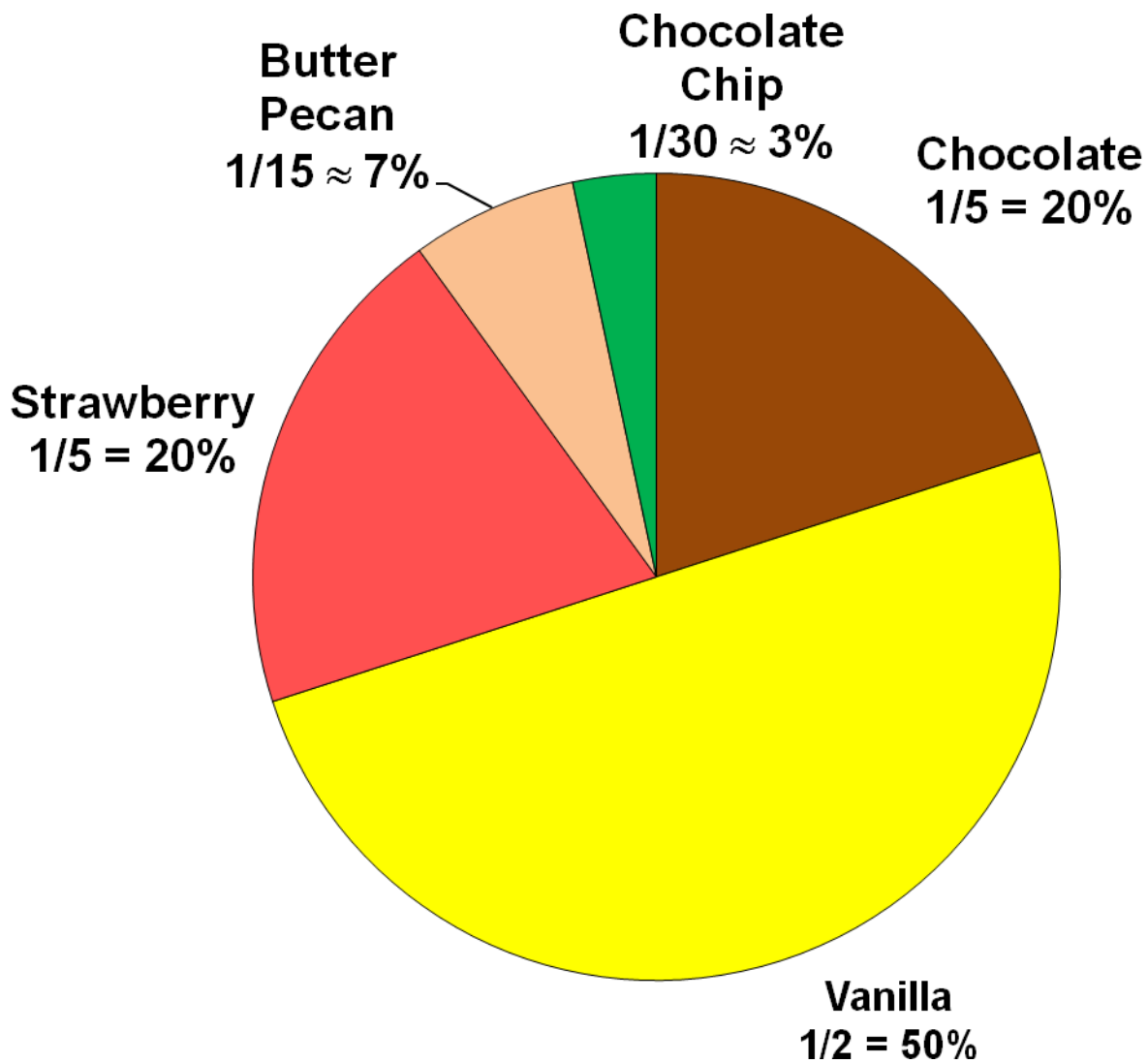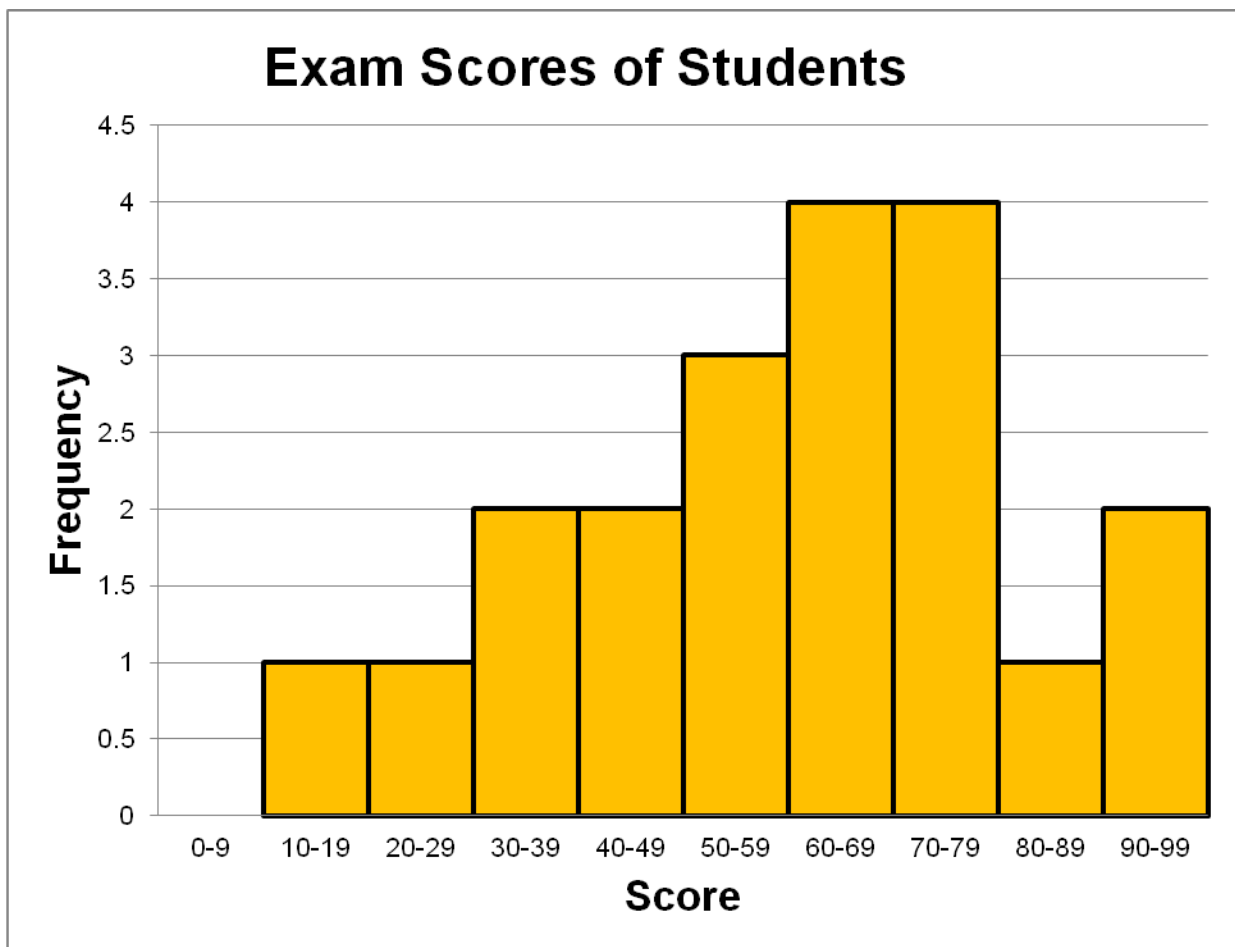
Scatterplot

illustrates the relationship between two sets of data.
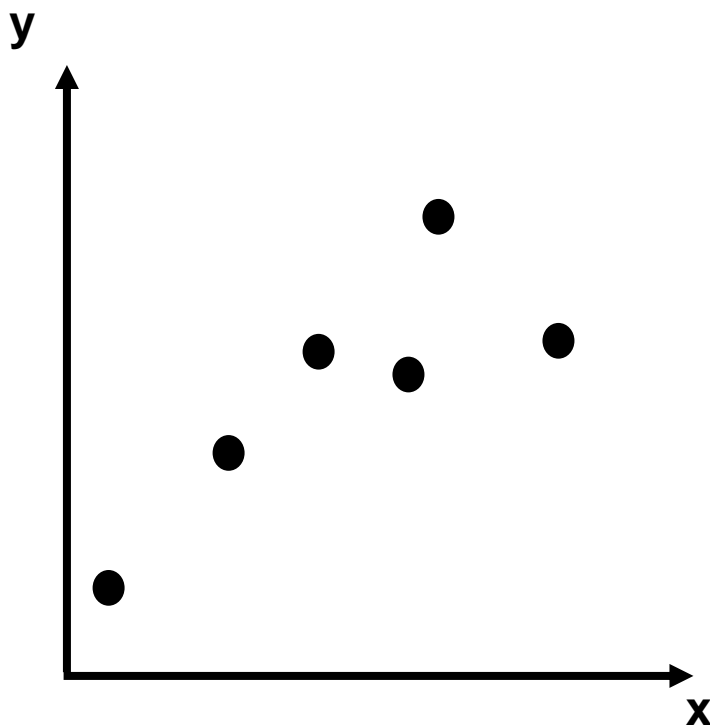
Positive Correlation

y-coordinates increase as x-coordinates increase
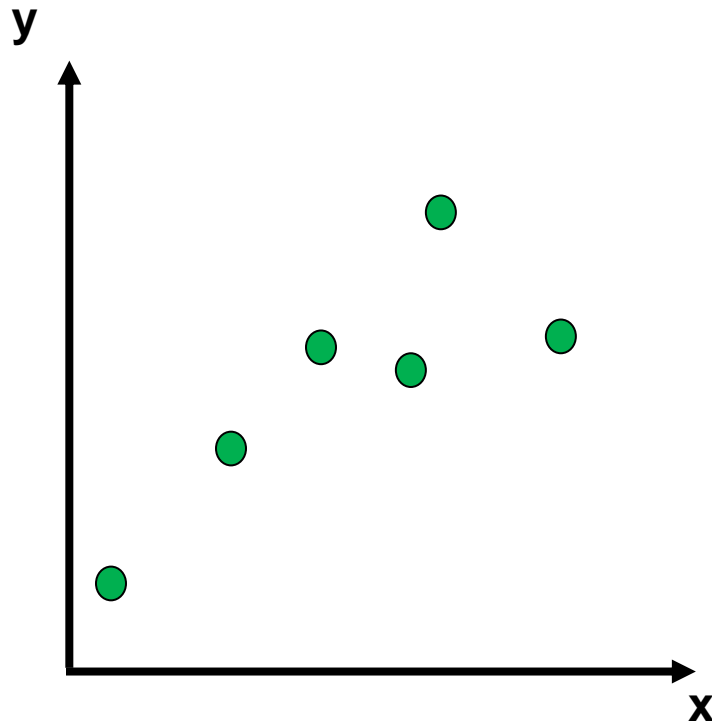
Negative Correlation

y-coordinates decrease as x-coordinates increase
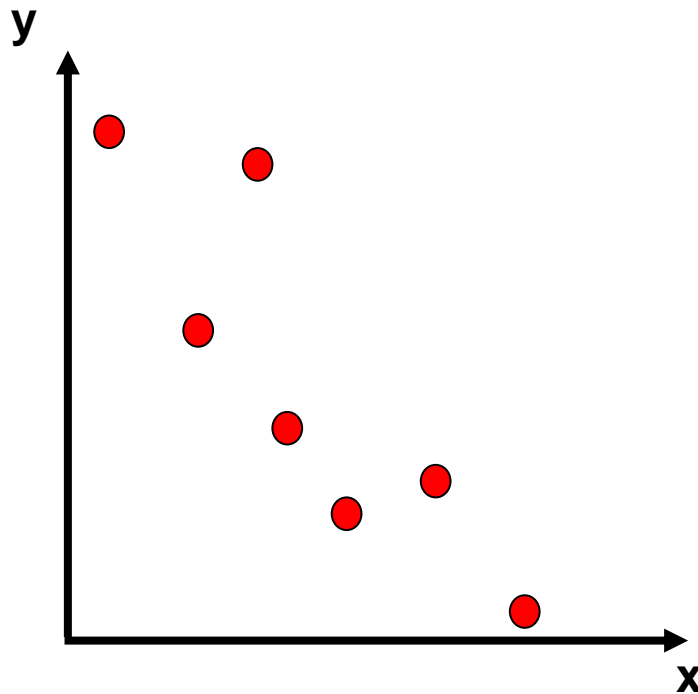
No Correlation

no relationship exists between the x- and y-coordinates
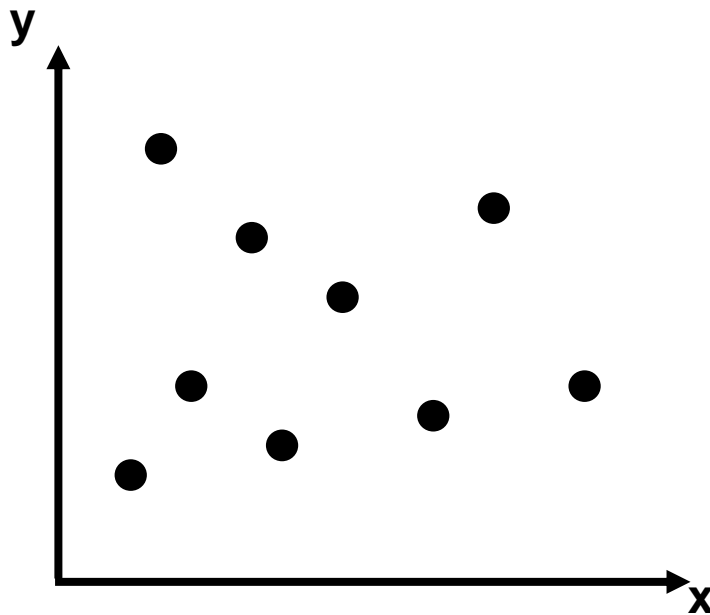
Arithmetic Sequences

What is the next term?

+6   +6   +6

4, 10, 16, 22 ...

common difference

$+\frac{1}{2}$ $+\frac{1}{2}$ $+\frac{1}{2}$ $+\frac{1}{2}$
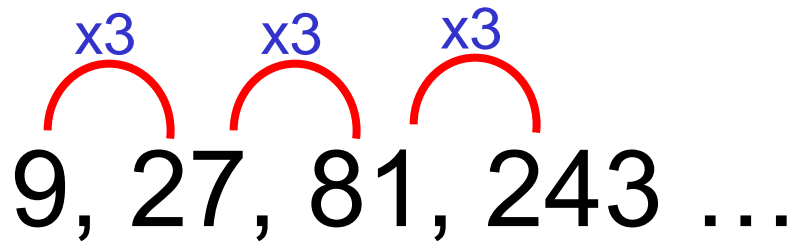
3, 3 $\frac{1}{2}$, 4, 4 $\frac{1}{2}$, 5 ...

Geometric Sequences

What is the next term?

x3 x3 x3
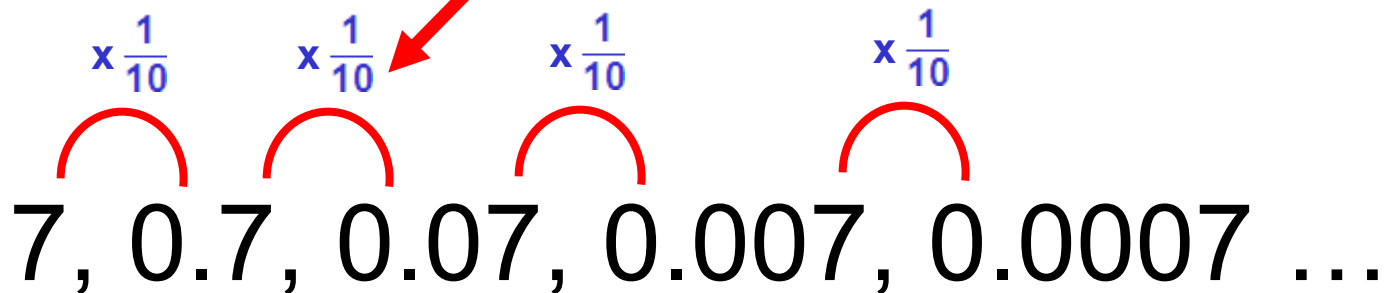
9, 27, 81, 243 …

common ratio

$x\frac{1}{10}$ $x\frac{1}{10}$ $x\frac{1}{10}$ $x\frac{1}{10}$

7, 0.7, 0.07, 0.007, 0.0007 …

Additive Identity Property

$$0.3 + 0 = 0.3$$

$$0 + (-7) = -7$$

$$\frac{4}{7} = 0 + \frac{4}{7}$$

$$w + 0 = w$$

Additive Inverse Property

$$1.4 + (-1.4) = 0$$

$$(-9) + 9 = 0$$

$$0 = \frac{4}{7} + (-\frac{4}{7})$$

$$x + (-x) = 0$$

Associative Property

Addition:

$$(4 + 2) + 8 = 4 + (2 + 8)$$

$$x + (3x + \frac{1}{2}) = (x + 3x) + \frac{1}{2}$$

Multiplication:

$$(3 \cdot 1.5) \cdot 6 = 3 \cdot (1.5 \cdot 6)$$

$$2(3x) = (2 \cdot 3)x$$

Commutative Property

Addition:

$$2.76 + 3 = 3 + 2.76$$

$$(a + 5) + 7 = (5 + a) + 7$$

Multiplication:

$$-8 \cdot \frac{2}{3} = \frac{2}{3} \cdot (-8)$$

$$y \cdot 9 = 9y$$

Multiplicative Identity Property

$$9 \cdot \textcolor{red}{1} = 9$$

$$\textcolor{red}{1} \cdot (-10) = -10$$

$$\frac{3}{2} = \frac{3}{2} \cdot \textcolor{red}{1}$$

Multiplicative Inverse Property

$$2 \cdot \frac{1}{2} = 1$$

$$1 = \left(-\frac{1}{9}\right) \cdot -9$$

$$x \cdot \frac{1}{x} = 1 \ (x \neq 0)$$
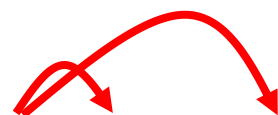
Multiplicative Property of Zero

$$0 = 8 \cdot 0$$

$$0(\text{-}13) = 0$$

$$\frac{5}{6}\,x \cdot 0 = 0$$

Distributive Property

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

$$5 \cdot (y - 7) = (5 \cdot y) - (5 \cdot 7)$$

$$\left(2 \cdot \frac{1}{3}\right) + (2 \cdot 5) = 2\left(\frac{1}{3} + 5\right)$$

Equation

$$6 + 2x = 10$$
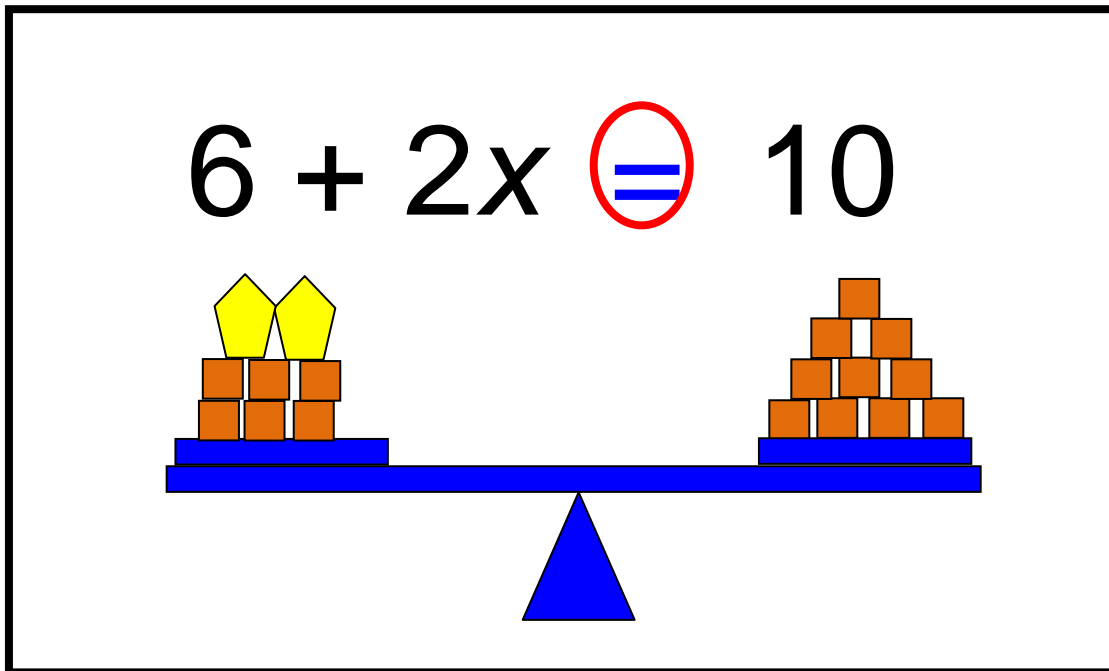
A mathematical sentence stating that two expressions are equal.

$$2.76 + 3 = 3 + 2.76$$

$$3x = 6.9$$

Expression

x

$-\sqrt{26}$

$2x + 3^4$

$3(y + 3.9) - \dfrac{8}{9}$

Variable

$$2(y + 3)$$

$$3 + x = 2.08$$

$$A = \pi r^2$$

Coefficient

$$(-4) + \textcolor{blue}{2}x$$

$$\textcolor{blue}{-7}y^2$$

$$\textcolor{blue}{\frac{2}{3}}ab - \frac{1}{2}$$

Term

$3x + 2y - 8$

3 terms
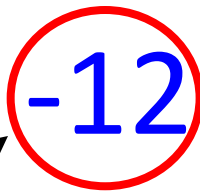
$-5x^2 + (-2x)$

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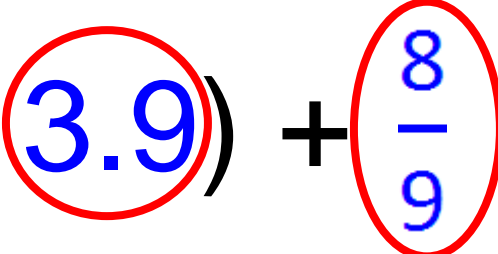
$\frac{2}{3}ab$

1 term

Constant

$$4x - 12 \overset{\nearrow}{} \boxed{-12}$$

$$\boxed{7} - 2y + x - 6x^2$$

$$3(x + \boxed{3.9}) + \boxed{\frac{8}{9}}$$

Inequality

$y < 4$
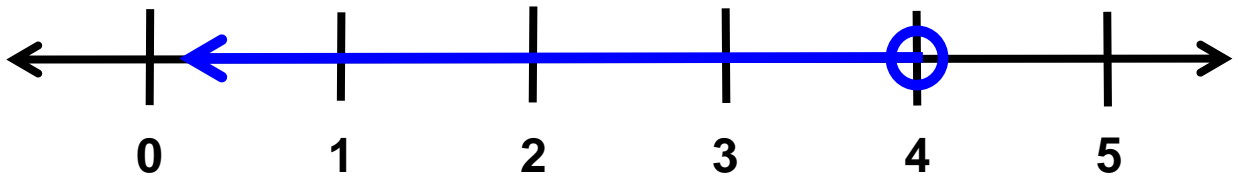
$3r \geq -7.5$
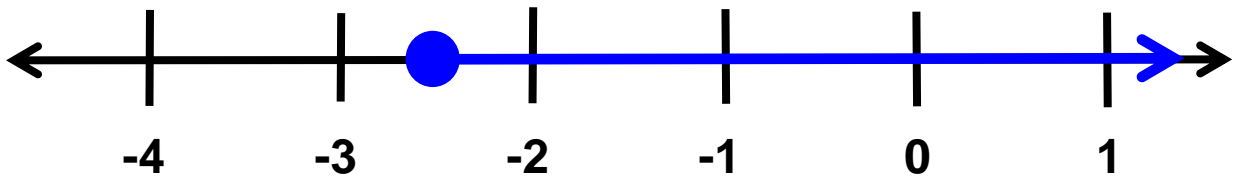
$-3(n - 4) < 0$
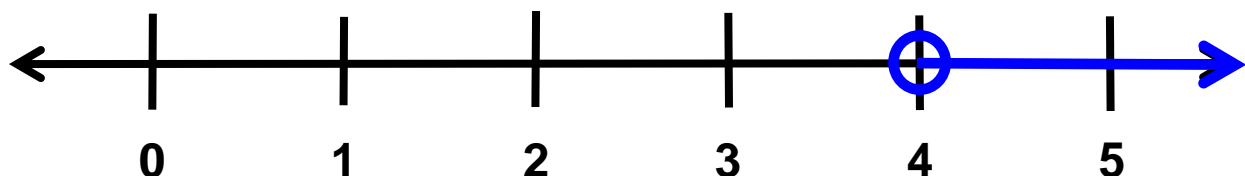
Like Terms

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

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

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

Relations

{(2,3), (4,1), (2,5)}

x	y
2	2
-3	4
5	-1
0	4
1	-6

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

Functions

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

x	y
3	2
2	4
0	2
-1	2
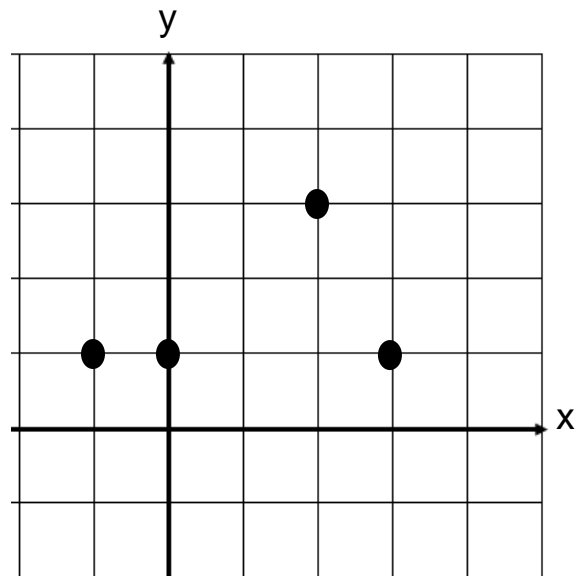
Table of Values

x	y
0	1
1	2
2	5
3	10
4	17

a	1	2	3	4
b	22,500	22,000	21,500	21,000

Domain

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

x	y
-2	0
-1	1
0	2
1	3

{-2,-1, 0, 1}

Range

$$\{(-2,0), (-1,1), (0,2), (1,3)\}$$

x	y
-2	0
-1	1
0	2
1	3

$$\{0, 1, 2, 3\}$$

Dependent/ Independent Variable

Determine the distance 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)
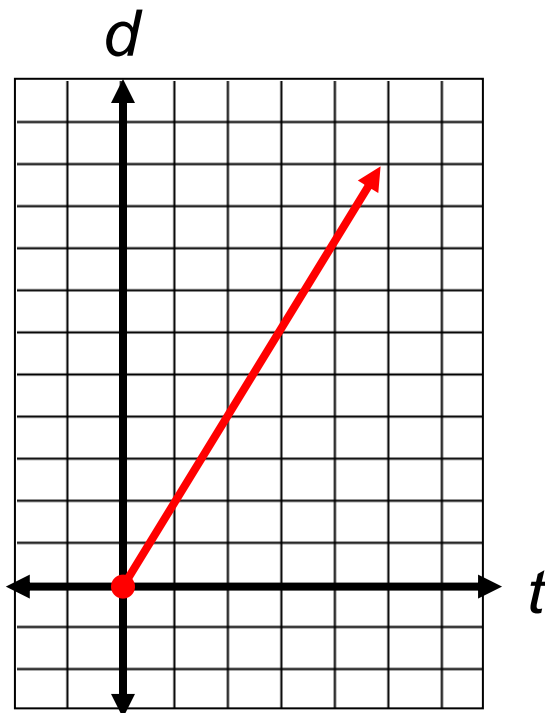
Dependent Variable

$$y = 2x + 7$$

y represents the dependent variable (output values or range)

Connecting Representations

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

t	d
0	0
1	2.1
2	4.2
4	8.4

$$d = 2.1t$$

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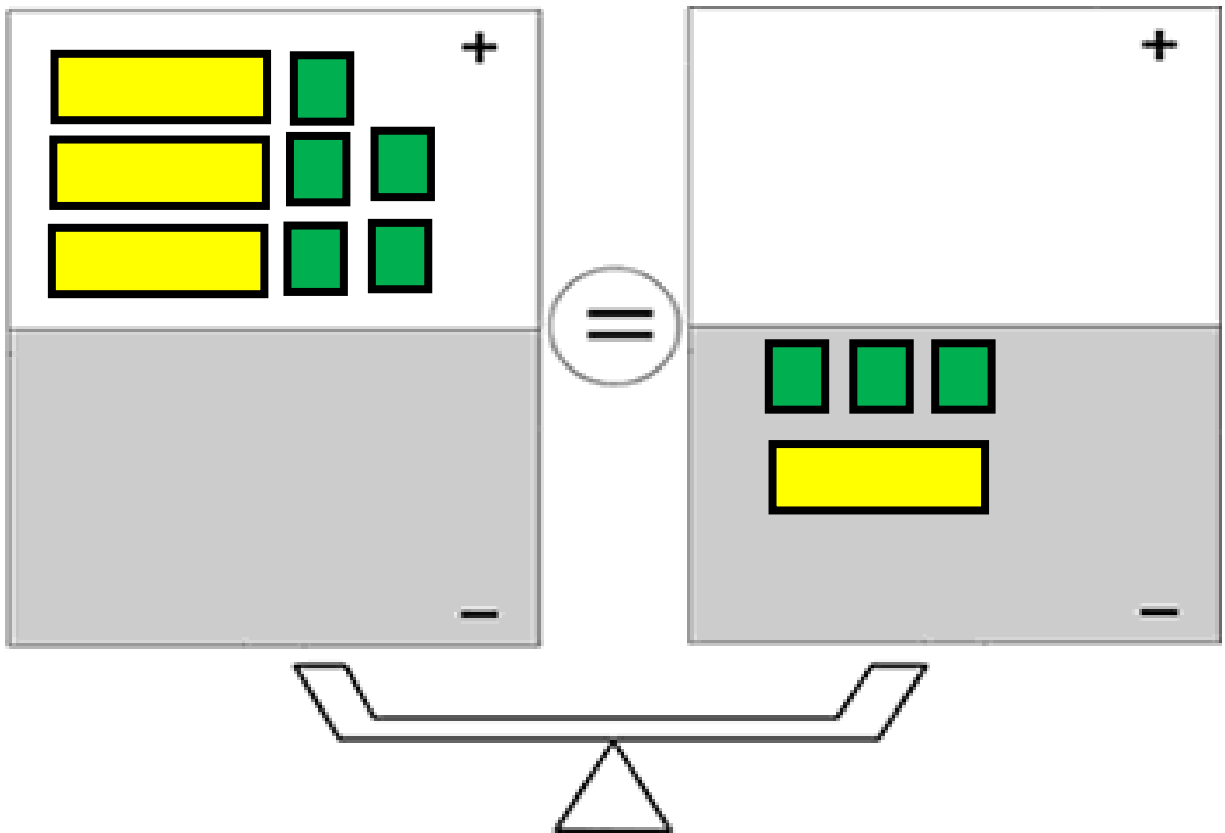
$$2x - 5.7 = -3.4x + 11.04$$

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

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

Multistep Equation

$$3x + 5 = \text{-}3 - x$$

Unit Rate as Slope

A student walks 2 miles per hour

$$\frac{2 \text{ miles}}{1 \text{ hour}}$$