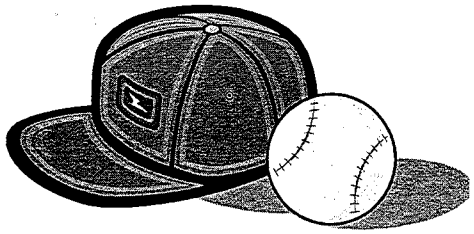
Grand Slam the Math Test

2nd Base

Read the Question AGAIN
Pick A Strategy (like "draw a picture")
Show Your Work



3rd Base

X Eliminate Wrong Answers
o Circle Correct Answer

1st Base

o Circle Important Numbers & Words
X Mark Out Extra Numbers & Words

Homerun

✓ Check ALL your wo
✓ Check to make sure you answered ALL questions
✓ Put an X at the bottom of each sheet if the questions are all answered on that page
✓ do the "2 finger check" with your bubble sheet and each question

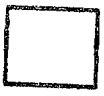
Batter's Box

Read the Problem
Underline the Question

Geometry Study Sheet

Two-Dimensional Figures

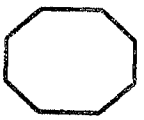

Circle


Square


Rectangle


Triangle


Hexagon


Octagon


Quadrilateral


Pentagon


Polygon


Trapezoid


Rhombus


Parallelogram

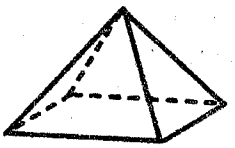

Regular Polygon

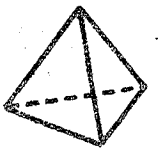
Three-Dimensional Figures


Sphere


Cube


Square Pyramid


Rectangular Pyramid


Triangular Pyramid


Square Prism


Rectangular Prism

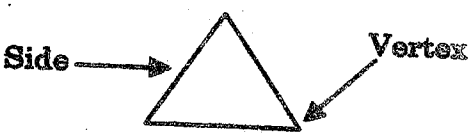

Triangular Prism


Cone

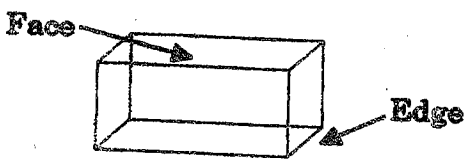

Cylinder

Terms:

Two-Dimensional

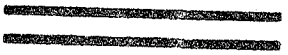


Three-Dimensional



Intersecting Lines

Parallel Lines



Perpendicular Lines


Acute Angle


Obtuse Angle


Right Angle

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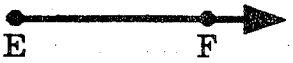
Definitions

A line continues in both directions without an endpoint. $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$

A line segment has a definite length. $\overline{CD}$ or $\overline{DC}$

A ray has only one endpoint. Notice the importance of the order of the letters for a ray.

$\overrightarrow{EF}$



$\overrightarrow{HG}$

Parallel lines are lines that never cross, no matter how far they are extended.

Intersecting lines are lines that cross at some point.

Perpendicular lines are intersecting lines that form "square corners" or right angles where they cross.

A polygon is a plane figure made up of 3 or more straight lines.

A triangle is a polygon with 3 sides.

An equilateral triangle is a triangle with 3 equal sides.

An isosceles triangle is a triangle with only 2 sides the same length.

A scalene triangle is a triangle where none of the sides are the same length.

A right triangle is a triangle where one of the angles in the triangle is a right or 90° angle.

A quadrilateral is a polygon with 4 sides.

A parallelogram is a quadrilateral where the opposite sides are parallel.

A rectangle is a parallelogram with 4 right angles.

A square is a rectangle where all 4 sides are the same length.

A pentagon is a polygon with 5 sides.

A hexagon is a polygon with 6 sides.

An octagon is a polygon with 8 sides.

Vertices are where two sides of a polygon come together.

A diagonal is a straight line connecting two non adjoining vertices of a polygon.

Definitions

Average - a number that is used to describe a set of numbers

Mean - represents the middle point between extremes, this is what we normally refer to as the average

Median - the middle value of a set of numbers that have been arranged in order from least to greatest

Mode - the value that occurs most often in a set of numbers

Sample data - test results, 10 children, 30 question test

12, 13, 14, 16, 18, 21, 22, 22, 22, 28

Mean 12 + 13 + 14 + 16 + 18 + 21 + 22 + 22 + 22 + 28 = 188
188 ÷ 10 = 18.8
Mean = 18.8

Median 12 13 14 16 18 21 22 22 22 28

5 scores are to the right of the arrow, 5 scores are to the left. The mid point between 18 and 21 is 19.5. (18 + 21) ÷ 2 = 19.5
Median is 19.5.

Mode The mode is 22 because that is the value that occurs most often.

Range - Difference (subtract) of the largest and the smallest number in a set.

COMPUTATION

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	(1)	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0	2	(4)	6	8	10	12	14	16	18	20	22	24	26	28	30
3	0	3	6	(9)	12	15	18	21	24	27	30	33	36	39	42	45
4	0	4	8	12	(16)	20	24	28	32	36	40	44	48	52	56	60
5	0	5	10	15	20	(25)	30	35	40	45	50	55	60	65	70	75
6	0	6	12	18	24	30	(36)	42	48	54	60	66	72	78	84	90
7	0	7	14	21	28	35	42	(49)	56	63	70	77	84	91	98	105
8	0	8	16	24	32	40	48	56	(64)	72	80	88	96	104	112	120
9	0	9	18	27	36	45	54	63	72	(81)	90	99	108	117	126	135
10	0	10	20	30	40	50	60	70	80	90	(100)	110	120	130	140	150
11	0	11	22	33	44	55	66	77	88	99	110	(121)	132	143	154	165
12	0	12	24	36	48	60	72	84	96	108	120	132	(144)	156	168	180
13	0	13	26	39	52	65	78	91	104	117	130	143	156	(169)	182	195
14	0	14	28	42	56	70	84	98	112	126	140	154	168	182	(196)	210
15	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	(225)
16	0	16	32	48	64	80	96	112	128							
17	0	17	34	51	68	85	102	119	136							
18	0	18	36	54	72	90	108	126	144							
19	0	19	38	57	76	95	114	133	152							
20	0	20	40	60	80	100	120	140	160							
21	0	21	42	63	84	105	126	147	168							
22	0	22	44	66	88	110	132	154	176							
23	0	23	46	69	92	115	138	161	184							
24	0	24	48	72	96	120	144	168	192							
25	0	25	50	75	100	125	150	175	200							
26	0	26	52	78	104	130	156	182	208							
27	0	27	54	81	108	135	162	189	216							
28	0	28	56	84	112	140	168	196	224							

MULTIPLICATION AND DIVISION OF DECIMAL NUMBERS BY 10, 100, 1000

Shift the decimal point **one** place for **each zero.**

$\times$ ⟶

⟵ $\div$

$3.257 \times 100 = 325.7$

$3.257 \div 10 = 0.3257$

ESTIMATE

ESTIMATE means to **round off.**

IMPORTANT!

AVERAGE

IMPORTANT!

Average ⟶ add numbers; then divide.

Halfway is the average of two numbers.

HALF OF A NUMBER

To find **half of a number,** divide by two.

TO SOLVE A PROPORTION PROBLEM

IMPORTANT!

- First, cross-multiply.
- Then divide by known factor.

$\frac{3}{5} = \frac{6}{w}$

$3w = 30$

$30 \div 3 = 10$

DIVISOR, DIVIDEND, AND QUOTIENT

$$\begin{array}{r} \text{quotient} \\ \textit{divisor}\,\overline{)\,\textbf{dividend}} \end{array} \qquad \frac{\textbf{dividend}}{\textit{divisor}} = \text{quotient} \qquad \textbf{dividend} \div \textit{divisor} = \text{quotient}$$

To find a **missing dividend, multiply** the divisor and the quotient.

FACTORS AND MULTIPLES

IMPORTANT!

Factors of 6: 1, 2, 3, 6

Multiples of 6: 6, 12, 18, 24, 30, 36, ...

LCM of 2 and 5 ⟶ 10

GCF of 6 and 9 ⟶ 3

FORMS OF DIVISION

$4\overline{)12}$ $\quad 12 \div 4 \quad$ $\frac{12}{4}$

"Twelve divided by four"

Say the larger number (dividend) first.

NUMBERS

SPELLING NUMBERS

eleven
twelve
thirteen
fourteen
fifteen

twenty-one
thirty-two
forty-three
fifty-four
sixty-five
seventy-six
eighty-seven
ninety-eight

hundred
thousand
million

half
third
fourth
fifth

tenth
hundredth

PRIME NUMBERS

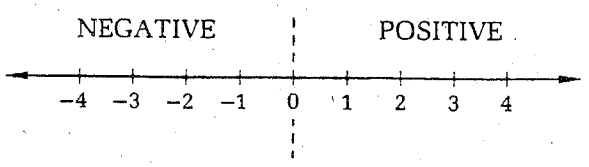
IMPORTANT!

A prime number has **exactly** two factors, itself and one.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, ...

COMPOSITE NUMBERS - ANY NUMBER THAT IS NOT PRIME.

NUMBER LINE



TESTS FOR DIVISIBILITY

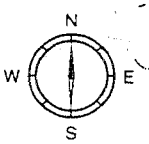
A number is able to be divided by ...

- 2 if the last digit is even.
- 4 if the last two digits can be divided by 4.
- 8 if the last three digits can be divided by 8.
- 5 if the last digit is 0 or 5.
- 10 if the last digit is 0.
- 3 if the **sum of the digits** can be divided by 3.
- 6 if the number can be divided by 2 **and** by 3.
- 9 if the **sum of the digits** can be divided by 9.

ROMAN NUMERALS

NUMERAL	I	V	X	L	C	D	M
VALUE	1	5	10	50	100	500	1000

Add the values [VIII = 8] unless a numeral of smaller value is written in front of a numeral of greater value [IV = 4].



The sun **rises in the east** and **sets in the west.**

PLACE VALUE CHART

IMPORTANT!

WHOLE NUMBERS									DECIMALS		
hundred millions'	ten millions'	millions'	,	hundred thousands'	ten thousands'	thousands'	,	hundreds'	tens'	ones'	tenths'	hundredths'	thousandths'
Millions				Thousands				Units (Ones)	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1,000}$

ODD/EVEN

Odd numbers: 1, 3, 5, 7, 9, ...
Even numbers: 0, 2, 4, 6, 8, ...

LESS THAN/GREATER THAN

15 < 50 50 > 15
little < big big > little

Simplify → reduce. IMPORTANT!

Ex. $\frac{4 \div 4}{16 \div 4} = \frac{1}{4}$

MEASUREMENT

ORDER	MONTH	DAYS
First	January	31
Second	February	28 or 29
Third	March	31
Fourth	April	30
Fifth	May	31
Sixth	June	30
Seventh	July	31
Eighth	August	31
Ninth	September	30
Tenth	October	31
Eleventh	November	30
Twelfth	December	31

EQUIVALENCE TABLE FOR UNITS

LENGTH IMPORTANT!	
U.S. Customary	Metric
12 in. = 1 ft 3 ft = 1 yd 5280 ft = 1 mi 1760 yd = 1 mi	10 mm = 1 cm 1000 mm = 1 m 100 cm = 1 m 1000 m = 1 km
WEIGHT	**MASS**
U.S. Customary	Metric
16 oz = 1 lb 2000 lb = 1 ton	1000 g = 1 kg
LIQUID MEASURE	
U.S. Customary	Metric
16 oz = 1 pt 2 pt = 1 qt 4 qt = 1 gal	1000 mL = 1 L

There are **no common fractions** in the **metric system.** Use **decimals.**

LENGTH

1 foot = 12 inches

1 yard = 3 feet
1 yard = 36 inches

1 mile = 5280 feet

1 mile = 1760 yards

TIME

1 minute = 60 seconds
1 hour = 60 minutes
1 day = 24 hours
1 year = 52 weeks
1 year = 12 months
1 common year = 365 days
1 leap year = 366 days
1 decade = 10 years
1 century = 100 years
1 millennium = 1000 years

COUNTS

1 dozen → 12 items
1 score → 20 items

WEIGHT

1 lb = 16 oz
1 ton = 2000 lb

MONTHS

JAN	MAY	SEP*
FEB	JUN*	OCT
MAR	JUL	NOV*
APR*	AUG	DEC

*30 days

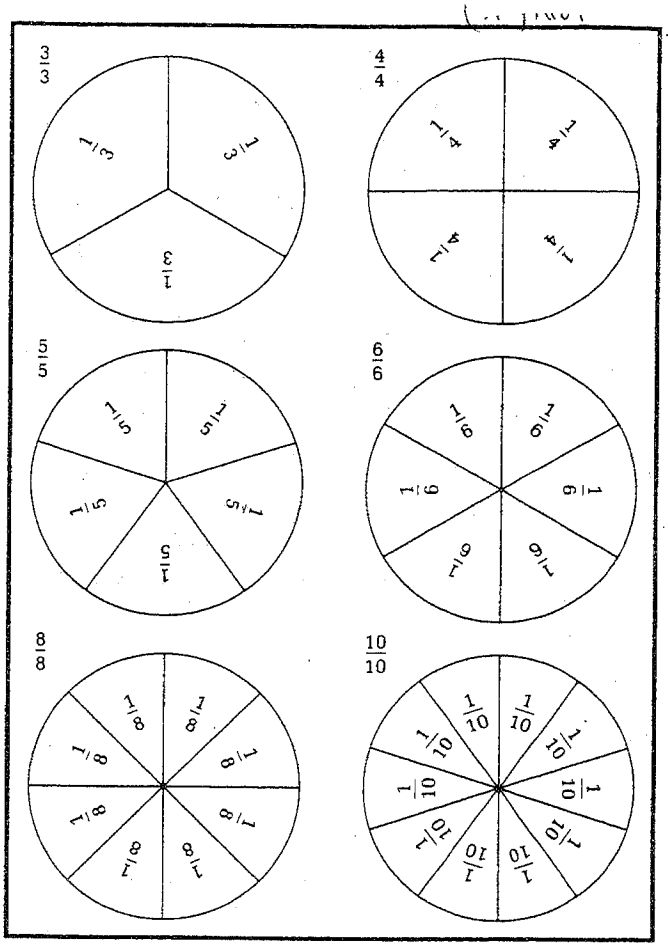
DAYS OF WEEK

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

FRACTIONS • DECIMALS • PERCENTS

FRACTION FAMILIES EQUIVALENT FRACTIONS

$\frac{0}{2}$					$\frac{1}{2}$						$\frac{2}{2}$
$\frac{0}{3}$				$\frac{1}{3}$				$\frac{2}{3}$			$\frac{3}{3}$
$\frac{0}{4}$			$\frac{1}{4}$			$\frac{2}{4}$			$\frac{3}{4}$		$\frac{4}{4}$
$\frac{0}{5}$		$\frac{1}{5}$			$\frac{2}{5}$			$\frac{3}{5}$		$\frac{4}{5}$	$\frac{5}{5}$
$\frac{0}{6}$		$\frac{1}{6}$		$\frac{2}{6}$		$\frac{3}{6}$		$\frac{4}{6}$		$\frac{5}{6}$	$\frac{6}{6}$
$\frac{0}{8}$	$\frac{1}{8}$		$\frac{2}{8}$		$\frac{3}{8}$		$\frac{4}{8}$		$\frac{5}{8}$		$\frac{6}{8}$		$\frac{7}{8}$		$\frac{8}{8}$
$\frac{0}{9}$	$\frac{1}{9}$		$\frac{2}{9}$		$\frac{3}{9}$		$\frac{4}{9}$		$\frac{5}{9}$		$\frac{6}{9}$		$\frac{7}{9}$		$\frac{8}{9}$		$\frac{9}{9}$
$\frac{0}{10}$	$\frac{1}{10}$		$\frac{2}{10}$		$\frac{3}{10}$		$\frac{4}{10}$		$\frac{5}{10}$		$\frac{6}{10}$		$\frac{7}{10}$		$\frac{8}{10}$		$\frac{9}{10}$		$\frac{10}{10}$
$\frac{0}{12}$	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	$\frac{12}{12}$



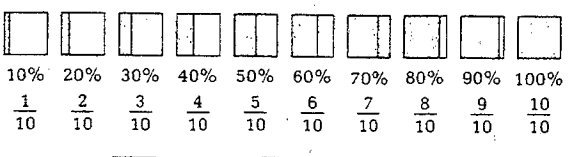
EQUIVALENTS IMPORTANT!

PERCENT	FRACTION	DECIMAL
1%	$\frac{1}{100}$	0.01
2%	$\frac{1}{50}$	0.02
4%	$\frac{1}{25}$	0.04
5%	$\frac{1}{20}$	0.05
$33\frac{1}{3}\%$	$\frac{1}{3}$	$0.\overline{3}$
$66\frac{2}{3}\%$	$\frac{2}{3}$	$0.\overline{6}$
25%	$\frac{1}{4}$	0.25
50%	$\frac{2}{4} = \frac{1}{2}$	0.5
75%	$\frac{3}{4}$	0.75
10%	$\frac{1}{10}$	0.1
20%	$\frac{1}{5}$	0.2
30%	$\frac{3}{10}$	0.3
40%	$\frac{2}{5}$	0.4
50%	$\frac{1}{2}$	0.5
60%	$\frac{3}{5}$	0.6
70%	$\frac{7}{10}$	0.7
80%	$\frac{4}{5}$	0.8
90%	$\frac{9}{10}$	0.9
100%	1	1.0
125%	$1\frac{1}{4}$	1.25
150%	$1\frac{1}{2}$	1.5
250%	$2\frac{1}{2}$	2.5

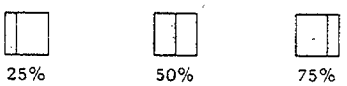
FRACTION TERMS IMPORTANT!

Fraction	→	Numerator / Denominator
Reciprocal	→	"Flip" the fraction (reverse numerator and denominator)
Mixed Number	→	Whole number and a fraction: $(3\frac{1}{2})$
Equal fractions	↔	Equivalent fractions

WE CAN USE SHADED SQUARES TO ILLUSTRATE PERCENTAGES



10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$	$\frac{10}{10}$



25%	50%	75%
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$

$\frac{3}{8}$ OF THE 40 ENGINES COULD

40 engines

$\frac{3}{8}$ could	5 engines
	5 engines
	5 engines
$\frac{5}{8}$ could not	5 engines
	5 engines
	5 engines
	5 engines
	5 engines

8 parts in all

GEOMETRY

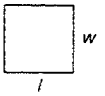
PERIMETER, AREA, VOLUME

Perimeter is the distance around a figure. (Fence)
Label units.

P → **add all sides**

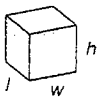
Area is the enclosed surface of the figure. (Lawn)
Label square units. Keyword is "cover."

$A = l \times w$



Volume is the amount of space a figure occupies.
Label cubic units.

$V = l \times w \times h$



A **polygon** is a closed, straight-sided shape on a flat surface.

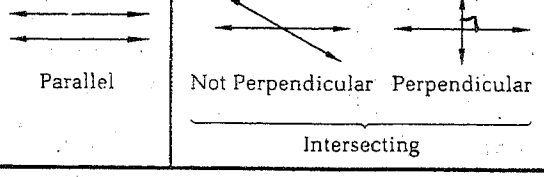
CLASSIFYING QUADRILATERALS

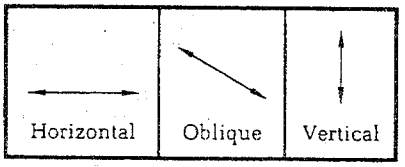
NAME	CHARACTERISTIC	SHAPE
Trapezium	No sides parallel	
Trapezoid	One pair of parallel sides	
Parallelogram	Two pairs of parallel sides	
Rhombus	Parallelogram with equal sides	
Rectangle	Parallelogram with right angles	
Square	Rectangle with equal sides	

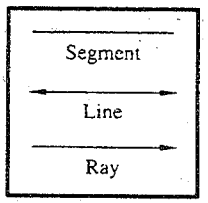
GEOMETRIC SOLIDS

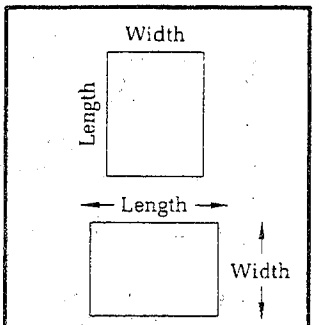
NAME	SHAPE
Cube	
Rectangular solid	
Pyramid	
Cylinder	
Sphere	
Cone	

LINES









Length (longer side)
Width (shorter side)

CIRCLES

The **diameter** is the distance across a circle through the center.
The diameter is twice the radius.

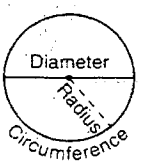
$D = 2r$

The **radius** is the distance from the center to the edge of the circle.
The radius is half the diameter.

$r = \frac{1}{2}D$

The **circumference** is the distance around the circle.
The circumference is pi (π) times the diameter.

$C = \pi D$ or $C = 2\pi r$



$A = \pi r^2$ or $A = 1/2\ \pi\ r^2$

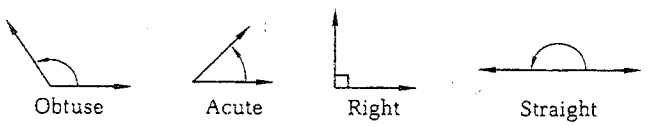
COMMON POLYGONS

NAME	NUMBER OF SIDES	SHAPE
Triangle	3	
Quadrilateral	4	
Pentagon	5	
Hexagon	6	
Octagon	8	

CLASSIFYING TRIANGLES BY ANGLES

CHARACTERISTIC	TYPE	EXAMPLE
All acute angles	Acute triangle	
One right angle	Right triangle	
One obtuse angle	Obtuse triangle	

TYPES OF ANGLES



HIGHER-LEVEL NUMBERS

RATIONAL NUMBERS

Counting numbers, their opposites, Zero, Fractions, and Decimals

Examples of rational numbers:

$-3, -\frac{3}{2}, -1, -\frac{3}{4}, -0.25, 0, \frac{1}{2}, 0.75, 2, \frac{9}{4}$

INTEGERS

Counting numbers, their opposites, and Zero

..., −4, −3, −2, −1, 0, 1, 2, 3, 4, ...

WHOLE NUMBERS

Counting numbers and Zero

0, 1, 2, 3, 4, 5, ...

COUNTING NUMBERS

Numbers we use to count (no Zero)

1, 2, 3, 4, 5, ...

Integers: all counting numbers, their opposites, and zero (does not include decimals or fractions)

Signed numbers: all integers except zero

Zero: neither positive nor negative (The sum of two opposites is always zero.)

Absolute value: a number's distance from zero. Absolute value is shown by writing a vertical bar on each side of a number.

$|3| = 3 \qquad |-3| = 3$

ORDER OF OPERATIONS IMPORTANT!

1. Parentheses, brackets, or braces
2. Exponents (powers) and roots
3. Multiply and divide, in order, left to right.
4. Add and subtract, in order, left to right.

P
E
M
D
A
S

EXPRESSION	MEANING
$a + b$	b is added to a
$a - b$	b is subtracted from a
ab	b is multiplied by a
$\frac{a}{b}$	a is divided by b

WORD PROBLEM KEYWORDS

⊕	⊖	⊗	÷
sum total, together, joined (after)	**difference** profit, before, minus; comparisons such as: more than, less than	**product** times, of, cover, double	**quotient** each, per, average

HIGHER-LEVEL COMPUTATION

ADDING TWO SIGNED NUMBERS

- If the signs are the **same, add** the absolute values and keep the same sign.

  $(-5) + (-4) = -9$

- If the signs are **different, subtract** the absolute values and keep the sign of the number with the greater absolute value.

  $(-5) + (+4) = -1$

MULTIPLYING OR DIVIDING TWO SIGNED NUMBERS

1. Multiply or divide as with whole numbers.
2. Place a sign on the answer.
   - If the signs are the **same,** the answer is **positive.**
   - If the signs are **different,** the answer is **negative.**

SUBTRACTING SIGNED NUMBERS

Instead of subtracting a number, we may **add** its **opposite.**

$$-5 - (-3)$$
$$\downarrow \quad \downarrow$$
$$-5 + (+3) = -2$$

MULTIPLYING THREE OR MORE SIGNED NUMBERS • POWERS OF NEGATIVE NUMBERS

- Multiply the numbers disregarding the signs.
- Count the **negative signs.**
- An **even** number of **negative signs** gives a **positive** product.
- An **odd** number of **negative signs** gives a **negative** product.
- Signs of positive factors do not affect the sign of the product.

Simplify: $(-2)(-3)(+2)$ — $(-2)(-3)(+2) = +12$

Simplify: $(-2)^5$ — $(-2)(-2)(-2)(-2)(-2) = -32$

RATIO

Ratio is a way to describe a relationship between two numbers.

The ratio 3 to 4 can be written several ways:

with the word "to"	3 to 4
as a fraction	$\frac{3}{4}$
as a decimal number	0.75
with a colon	3:4

Example: Ratio of boys to girls is 12 to 16.

boys $\frac{12}{16}$ girls reduce to $\frac{3}{4}$

MULTIPLE UNIT MULTIPLIERS IMPORTANT!

Convert 5 hours to seconds:

Multiply 5 hours times the two equivalents:

60 minutes = 1 hour 60 seconds = 1 minute

$$5 \text{ hr} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{60 \text{ s}}{1 \text{ min}} = (5 \times 60 \times 60) \text{ s} = 18{,}000 \text{ s}$$

The units you change **to** are in the numerator.
The units you change **from** are in the denominator.

PROBABILITY • CHANCE • ODDS

IMPORTANT!

	EXPRESSED
PROBABILITY	Fraction of $\frac{\text{favorable outcomes}}{\text{possible outcomes}}$
CHANCE	Percent
ODDS	Ratio of favorable **to** unfavorable or favorable:unfavorable

EXPONENTS IMPORTANT!

exponent → 3^4 ← base means: $3 \times 3 \times 3 \times 3 = 81$

reads: three to the fourth power

2^5 reads: two to the fifth power

10^3 reads: ten to the third power (or ten cubed)

5^2 reads: five squared

MULTIPLYING BY POWERS OF TEN

$$6.2 \times 10^2 = 6.20 = 620$$

The decimal point of the product is shifted the number of places shown by the exponent.

SEQUENCE

An ordered list of numbers that follow a pattern

1, 3, 5, 7, 9, ...

STATISTICS IMPORTANT!

Mean: the average of a set of numbers
Median: the middle number of a set of numbers arranged in order
Mode: the number that appears the most often in a set of numbers
Range: the difference between the least and the greatest numbers in a set of numbers

HIGHER-LEVEL GEOMETRY

GEOMETRIC FORMULAS

IMPORTANT!

SHAPE	PERIMETER	AREA
Square	P = add lengths of all sides	$A = s^2$
Rectangle		$A = lw$
Parallelogram		$A = bh$
Triangle		$A = \frac{1}{2}bh$
Circle	$C = \pi d$	$A = \pi r^2$
*Semicircle	length = $\frac{1}{2}C$	$A = \frac{1}{2}\pi r^2$

A	area
b	base
C	circumference
d	diameter
h	height
l	length
P	perimeter
r	radius
s	side
w	width
π	pi ($\approx$ 3.14)

Note that the height of a figure is perpendicular to its base.

Volume of a Right Solid (Prisms and Cylinders)
area of base × height

***Volume of a Pyramid**
1/3 of volume of prism of same base and height

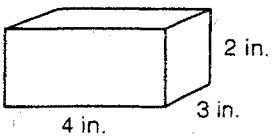
***Volume of a Cone**
1/3 of volume of cylinder of same base and height

***Volume of a Sphere**
2/3 of volume of cylinder of same diameter and height

Volume is measured in cubic units which can be shown with an exponent of 3.
64 cubic inches = 64 in.^{3}

*SURFACE AREA OF A PRISM

1. Count the number of faces.
2. Find the area of each face.
3. Add the areas of all faces.



"front"	4 in. × 2 in. =	8 sq. in.
"back"	4 in. × 2 in. =	8 sq. in.
"top"	4 in. × 3 in. =	12 sq. in.
"bottom"	4 in. × 3 in. =	12 sq. in.
"left"	3 in. × 2 in. =	6 sq. in.
"right"	3 in. × 2 in. =	6 sq. in.
TOTAL		52 sq. in.

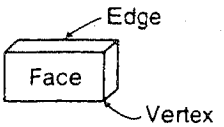
Square units can be shown with an exponent of 2.
52 sq. in. = 52 in.^{2}

PARTS OF A POLYHEDRON

Face:
any of the flat **surfaces** of a geometric solid

Edge:
a line **segment** where two *faces* meet

Vertex:
a **point** where three or more *edges* meet



*SURFACE AREA OF A SPHERE = $4\pi r^2$

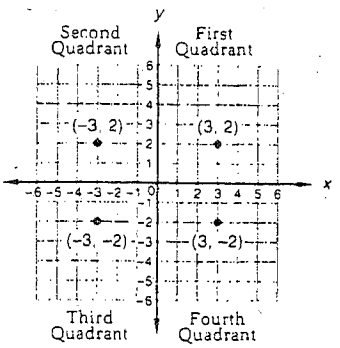
RECTANGULAR COORDINATES

Horizontal line is called the ***x*-axis.**
Vertical line is called the ***y*-axis.**

Point where *x*-axis and *y*-axis **intersect** is called the **origin.**

The two axes divide the plane into four regions called **quadrants.**

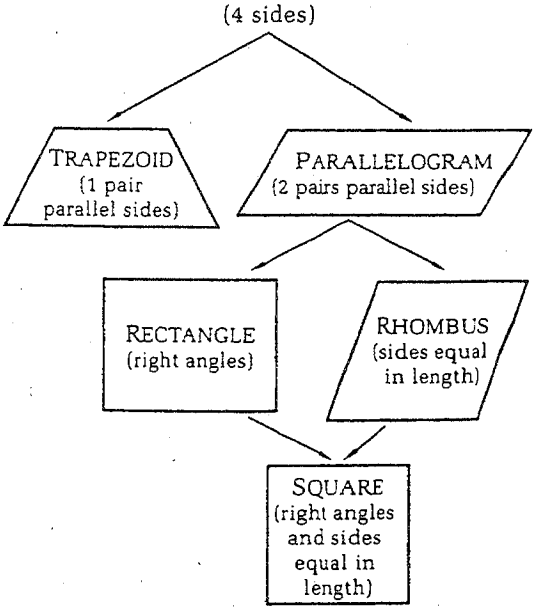
We can **name** any point on a coordinate plane with **two numbers** (coordinates).



Graph each point with a **dot** and a **label.**
Always **begin** at the **origin.**

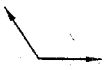
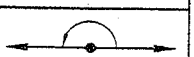
The two numbers that name a point are called **coordinates.**
Coordinates are written in parentheses: (3, 2)
First number shows the **horizontal** direction and distance from the origin.
Second number shows the **vertical** direction and distance from the origin.

QUADRILATERALS
(4 sides)



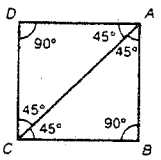
HIGHER-LEVEL GEOMETRY (CONTINUED)

ANGLES IMPORTANT!

TYPE	MEASURE	EXAMPLE
Right angle	90°	
Obtuse angle	more than 90°, less than 180°	
Acute angle	less than 90°	
Straight angle	180°	
Full circle	360°	

The sum of the angles of a triangle is 180°.

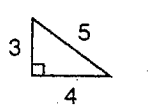
A square has four angles and each one measures 90°.



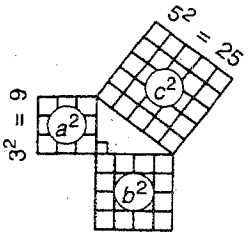
✱ PYTHAGOREAN THEOREM

The area of the square drawn on the hypotenuse of a right triangle equals the sum of the areas of the squares drawn on the other two sides.

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

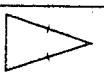
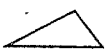


$9 + 16 = 25$

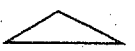


CLASSIFYING TRIANGLES IMPORTANT!

BY SIDES

CHARACTERISTIC	TYPE	EXAMPLE
Three sides of equal length	Equilateral triangle	
Two sides of equal length	Isosceles triangle	
Three sides of unequal length	Scalene triangle	

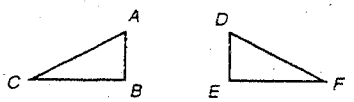
BY ANGLES

CHARACTERISTIC	TYPE	EXAMPLE
All acute angles	Acute triangle	
One right angle	Right triangle	
One obtuse angle	Obtuse triangle	

SIMILAR AND CONGRUENT TRIANGLES

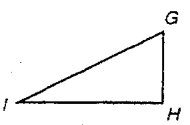
Congruent Triangles are the same shape and size. Angles and sides match. (ΔABC and ΔDEF)

Similar Triangles are the same shape, have matching angles, but are not necessarily the same size. (ΔABC and ΔGHI)



Corresponding Angles of similar triangles are the matching angles. ($\angle C$ to $\angle I$)

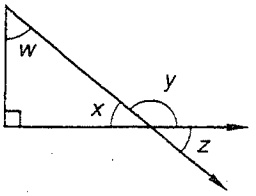
Corresponding Sides of similar triangles are the sides opposite corresponding angles. ($\overline{AB}$ to $\overline{GH}$) The lengths of corresponding sides are proportional.



ANGLE PAIRS

Adjacent Angles share a common side. ($\angle y$ and $\angle z$)

Vertical Angles are a pair of non-adjacent angles formed by intersecting lines. ($\angle x$ and $\angle z$) Vertical angles have the same measure.



Complementary Angles are two angles whose measures total 90°. ($\angle w$ and $\angle x$)

Supplementary Angles are two angles whose measures total 180°. ($\angle x$ and $\angle y$)

HIGHER-LEVEL FRACTIONS • DECIMALS • PERCENTS

FRACTION ⟷ DECIMAL ⟷ PERCENT

IMPORTANT!

- To write a **number as a percent,** multiply by 100%.
  - For a **decimal,** move the decimal point two places to the **right:**

$$0.75 \times 100\% = 75\%$$

  - For a **fraction,** multiply the numerator by 100%, then divide by the denominator:

$$\frac{3}{4} \times 100\% = \frac{300\%}{4} = 75\%$$

- To write a **percent as a decimal or a fraction,** divide by 100%.
  - For a **decimal,** move the decimal point two places to the **left:**

$$75\% \div 100\% = 0.75$$

  - For a **fraction,** write the percent over 100% and reduce:

$$\frac{75\%}{100\%} = \frac{75}{100} = \frac{3}{4}$$

FINDING THE WHOLE WHEN A FRACTION IS KNOWN

Example: Fifteen of the dogs bite. If $\frac{3}{4}$ of the dogs bite, how many dogs are there?

Method I

1. Draw a diagram showing total number of parts (denominator).
2. Mark off the parts required (numerator).
3. Divide the known number by the numerator to find the number in each part.
4. Multiply the number in each part by the number of parts to find the total.

$\frac{3}{4}$ of 20

20
5
5
5
5

Method II

Set up a loop problem using the words "is" and "of."

is 3 — 15
of 4 — ?

$(15 \times 4) \div 3 = 20$

FINDING A PART WHEN THE WHOLE IS KNOWN

If the number is a percent, change it to a decimal or a fraction.

Example: 30% of 20 is what number?

Method I

Translate: Replace *is* with =
Replace *of* with ×

$0.3 \times 20 = N$ or $\frac{3}{10} \times 20 = N$

$6 = N$ $\qquad$ $6 = N$

Method II

$30\% = \frac{30}{100} = \frac{3}{10}$

Set up a loop problem using the words "is" and "of."

is 3 — ?
of 10 — 20

$(20 \times 3) \div 10 = 6$