

COMPUTATION

0	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.

$\times \rightarrow$
 $\leftarrow \div$

$3.257 \times 100 = 325.7$
 $3.257 \div 10 = 0.3257$

AVERAGE

Average \rightarrow add numbers; then divide.
 Halfway is the average of two numbers.

ESTIMATE means to round off.

HALF OF A NUMBER

To find half of a number, divide by two.

TO SOLVE A PROPORTION PROBLEM

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

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

$3w = 30$
 $30 \div 3 = 10$

DIVISOR, DIVIDEND, AND QUOTIENT

$\frac{\text{quotient}}{\text{divisor}} = \frac{\text{dividend}}{\text{divisor}} = \text{quotient}$ $\text{dividend} \div \text{divisor} = \text{quotient}$

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

FACTORS AND MULTIPLES

Factors of 6: 1, 2, 3, 6
 Multiples of 6: 6, 12, 18, 24, 30, 36, ...

LCM of 2 and 5 \rightarrow 10
 GCF of 6 and 9 \rightarrow 3

FORMS OF DIVISION

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

"Twelve divided by four"
 Say the larger number (dividend) first.

NUMBERS

SPELLING NUMBERS

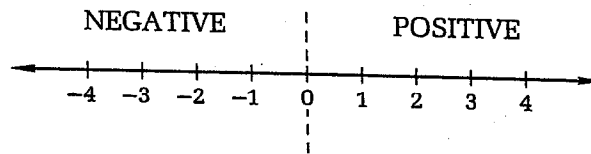
eleven	hundred thousand million
twelve	
thirteen	
fourteen	
fifteen	
twenty-one	half third fourth fifth
thirty-two	
forty-three	
fifty-four	tenth hundredth
sixty-five	
seventy-six	
eighty-seven	
ninety-eight	

PRIME NUMBERS

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, ...

NUMBER LINE

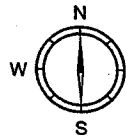


ORDER	MONTH	DAYS
First	January	31
Second	February	28 or 29
Third	March	31
Fourth	April	30
Fifth	May	31
Sixth	June	30
Seventh	July	31
Eighth	August	31
Ninth	September	30
Tenth	October	31
Eleventh	November	30
Twelfth	December	31

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

WHOLE NUMBERS				DECIMALS	
hundred-millions'	hundred-thousands'	hundreds'	tens'	tenths'	1/10
ten-millions'	ten-thousands'	ones'	ones'	hundredths'	1/100
millions'	thousands'				
Millions	Thousands	Units (Ones)			

ODD/EVEN

Odd numbers: 1, 3, 5, 7, 9, ...

Even numbers: 0, 2, 4, 6, 8, ...

LESS THAN/GREATER THAN

15 < 50

50 > 15

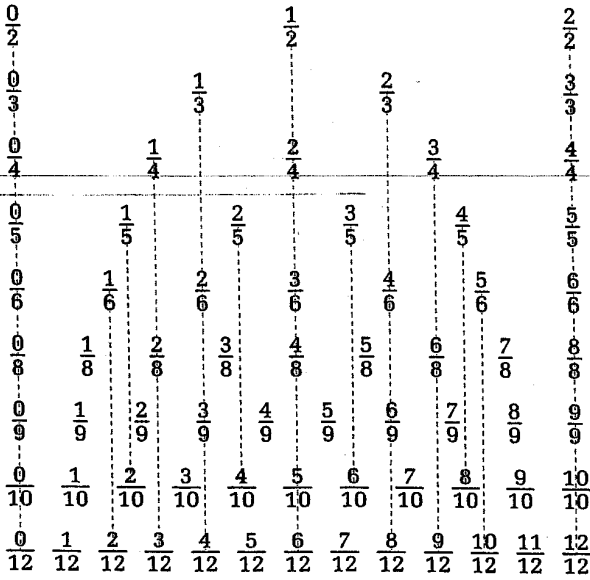
little < big

big > little

Simplify → reduce.

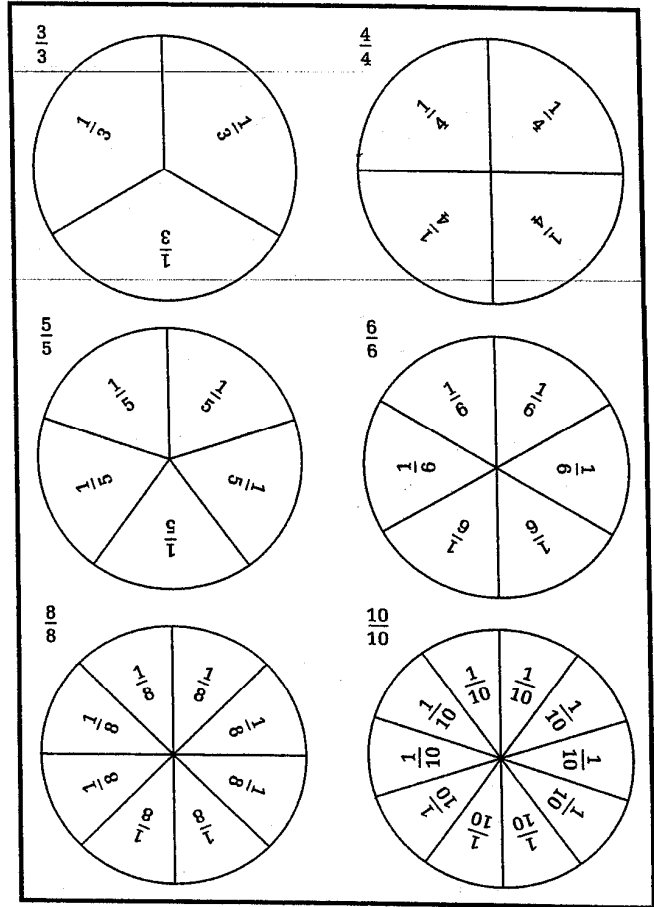
FRACTIONS-DECIMALS-PERCENTS

FRACTION FAMILIES EQUIVALENT FRACTIONS



EQUIVALENTS

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. $\bar{3}$
$66\frac{2}{3}\%$	$\frac{2}{3}$	0. $\bar{6}$
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

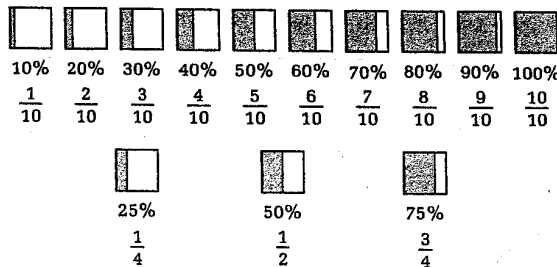
Fraction \rightarrow $\frac{\text{Numerator}}{\text{Denominator}}$

Reciprocal \rightarrow "Flip" the fraction (reverse numerator and denominator)

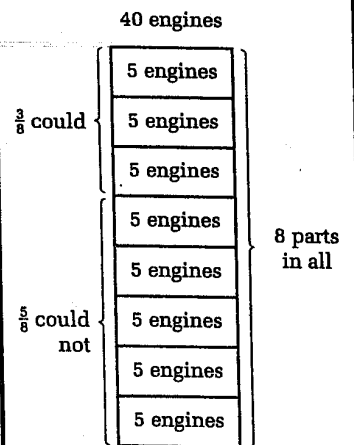
Mixed Number \rightarrow Whole number and a fraction:
 $(3\frac{1}{2})$

Equal fractions \leftrightarrow Equivalent fractions

WE CAN USE SHADED SQUARES TO ILLUSTRATE PERCENTAGES

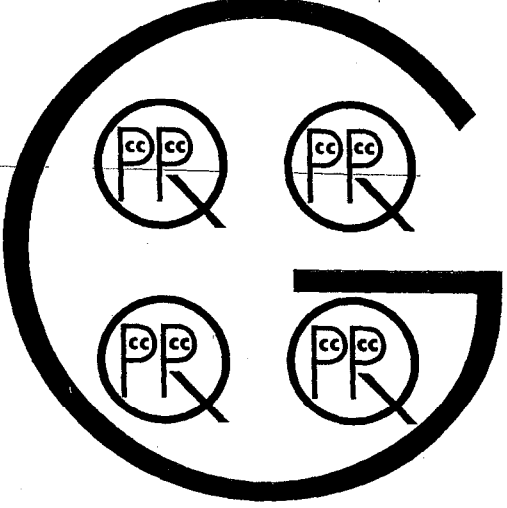


$\frac{3}{8}$ OF THE 40 ENGINES COULD



MEASUREMENT


LIQUIDS



$1 \text{ c} = 8 \text{ oz}$
 $1 \text{ pt} = 16 \text{ oz}$
 $768 \text{ tsp} = 1 \text{ gal}$

EQUIVALENCE TABLE FOR UNITS	
LENGTH	
U.S. Customary	Metric
12 in. = 1 ft	10 mm = 1 cm
3 ft = 1 yd	1000 mm = 1 m
5280 ft = 1 mi	100 cm = 1 m
1760 yd = 1 mi	1000 m = 1 km
WEIGHT	MASS
U.S. Customary	Metric
16 oz = 1 lb	1000 g = 1 kg
2000 lb = 1 ton	
LIQUID MEASURE	
U.S. Customary	Metric
16 oz = 1 pt	1000 mL = 1 L
2 pt = 1 qt	
4 qt = 1 gal	
There are no common fractions in the metric system. Use decimals.	

LENGTH



$1 \text{ foot} = 12 \text{ inches}$ $1 \text{ yard} = 3 \text{ feet}$
 $1 \text{ mile} = 5280 \text{ feet}$ $1 \text{ mile} = 1760 \text{ yards}$
 $1 \text{ yard} = 36 \text{ inches}$

TIME

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

COUNTS

$1 \text{ dozen} \rightarrow 12 \text{ items}$
 $1 \text{ score} \rightarrow 20 \text{ items}$

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

WEIGHT

$1 \text{ lb} = 16 \text{ oz}$
 $1 \text{ ton} = 2000 \text{ lb}$

GEOMETRY

PERIMETER, AREA, VOLUME

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

$$P \rightarrow \text{add all sides}$$



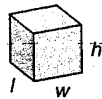
Area is the enclosed surface of the figure. (Lawn)
Label square units. Keyword is "cover."

$$A = l \times w$$



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.

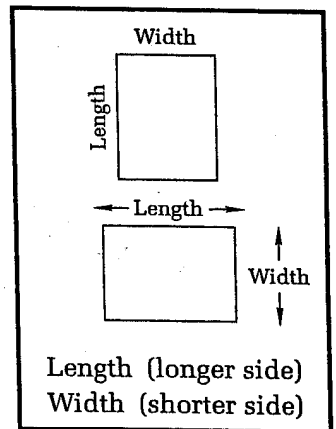
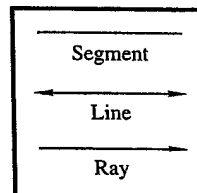
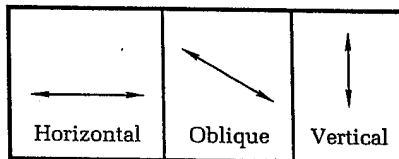
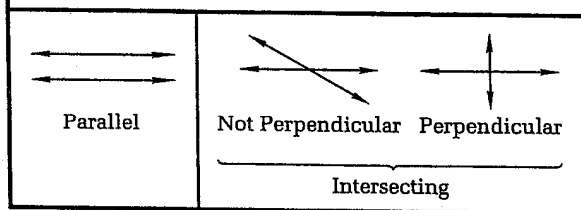
CLASSIFYING QUADRILATERALS

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



CIRCLES

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

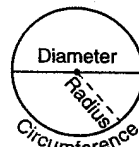
$$D = 2r$$

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.

$$C = \pi D$$



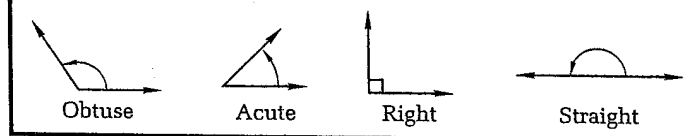
COMMON POLYGONS

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



WORD PROBLEMS

MISSING NUMBERS	
ADDITION: To find the <u>missing addend</u> → subtract	$\begin{array}{r} 2 \\ + A \\ \hline 5 \end{array} \quad \begin{array}{r} B \\ + 3 \\ \hline 5 \end{array}$
SUBTRACTION: (1) To find the <u>missing top</u> number (minuend) → add	$\begin{array}{r} N \\ - 3 \\ \hline 2 \end{array}$
(2) To find the <u>missing bottom</u> number (subtrahend) → subtract	$\begin{array}{r} 5 \\ - Y \\ \hline 2 \end{array}$
MULTIPLICATION: To find the <u>missing factor</u> → divide	$\begin{array}{r} 3 \\ \times N \\ \hline 6 \end{array} \quad \begin{array}{r} N \\ \times 2 \\ \hline 6 \end{array}$
DIVISION: To find the <u>missing dividend</u> → multiply	$2 \overline{)N}^8$

WORD PROBLEM KEYWORDS			
\oplus sum total, together, joined (after)	\ominus difference profit, before, minus; comparisons such as: more than, less than	\otimes product times, of, cover, double	\oslash quotient each, per, average

FIND THE MISSING NUMBERS	
(Word Problem Thinking Patterns: Sketch the pattern. Record the information.)	
SOME, SOME MORE	$\begin{array}{r} \text{Some} \leftarrow \text{If missing, subtract.} \\ + \text{Some more} \leftarrow \text{If missing, subtract.} \\ \hline \text{Total} \leftarrow \text{If missing, add.} \end{array}$
SOME WENT AWAY	$\begin{array}{r} \text{Some} \leftarrow \text{If missing, add.} \\ - \text{Some went away} \leftarrow \text{If missing, subtract.} \\ \hline \text{What's left} \leftarrow \text{If missing, subtract.} \end{array}$
LARGER, SMALLER, DIFFERENCE	$\begin{array}{r} \text{Larger} \leftarrow \text{If missing, add.} \\ - \text{Smaller} \leftarrow \text{If missing, subtract.} \\ \hline \text{Difference} \leftarrow \text{If missing, subtract.} \end{array}$
LATER, EARLIER, DIFFERENCE	$\begin{array}{r} \text{Later} \leftarrow \text{If missing, add.} \\ - \text{Earlier} \leftarrow \text{If missing, subtract.} \\ \hline \text{Difference} \leftarrow \text{If missing, subtract.} \end{array}$
EQUAL GROUPS	$\begin{array}{r} \text{Number in each group} \leftarrow \text{If missing, divide.} \\ \times \text{Number of groups} \leftarrow \text{If missing, divide.} \\ \hline \text{Number in all groups} \leftarrow \text{If missing, multiply.} \end{array}$