

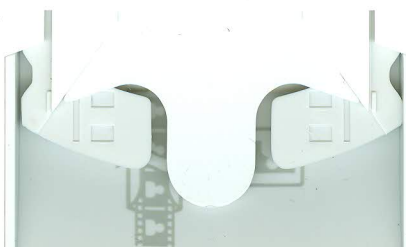
PSSA Math Playbook



Name: _____

Goal: _____

"Winning is a Habit!"



Whole Number Relationships

Lessons: 1.1, 1.2, 1.3

Highlighted Vocabulary: "out of", addend, decimals, difference, dividend, divisor, * place value, multiple (LCM), product (LCM), quotient, rational number, reasonable answer, remainder, repeating decimal, solution, sum, terminating decimal, cubed, squared, powers, exponents, base number, evaluate, solve, decimals, *whole number*, *difference*, *leading digit*, *compatible numbers*, *factor*

Adding Whole Numbers – align place values and carry when necessary

$$\begin{array}{r} \text{Ex. } 23 + 37 \\ +1 \\ 23 \\ + 37 \\ \hline 60 \end{array}$$

Subtracting Whole Numbers- align place values and rename when necessary

$$\begin{array}{r} \text{Ex. } 37 - 28 \\ 2 \cancel{3} 17 \\ - 28 \\ \hline 9 \end{array}$$

Dividing Whole Numbers – MSB Multiply, Subtract, Bring down

$$\begin{array}{r} \text{Ex. } 35 \div 5 \\ 07 \\ 5 \overline{) 35} \\ - 0 \\ \hline 35 \\ - 35 \\ \hline 0 \end{array}$$

Multiplying Whole Numbers – multiply each factor starting in the ones place value and when moving to the tens place value make sure you add a place holder of 0 etc.

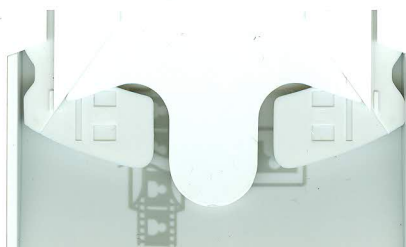
$$\begin{array}{r} \text{Ex. } 3333 \times 2 \\ 3333 \\ \times 2 \\ \hline 6666 \end{array}$$

Finding Patterns – take one step at a time and crack the code

$$\begin{array}{ccccccc} \text{Ex. } & 4 & 8 & 16 & 32 & 64 & 128 \\ & \swarrow & \swarrow & \swarrow & \swarrow & \swarrow & \swarrow \\ & \times 2 & \times 2 & \times 2 & \times 2 & \times 2 & \times 2 \end{array}$$

Estimating Sums – estimate to the nearest whole number then add

$$\begin{array}{r} \text{Ex. } 37 + 21 \\ 37 \rightarrow 40 \\ + 21 \rightarrow + 20 \\ \hline 60 \end{array}$$



Estimating Differences – estimate to the nearest whole number then subtract

Ex. $37 - 21$

$$\begin{array}{r} 37 \rightarrow 40 \\ - 21 \rightarrow -20 \\ \hline 20 \end{array}$$

Estimating Products – estimate to the nearest whole number then multiply

Ex. 37×12

$$\begin{array}{r} 37 \rightarrow 40 \\ \times 12 \rightarrow \times 10 \\ \hline 400 \end{array}$$

Estimating Quotients – estimate to the nearest whole number then divide

Ex. $37 \div 12$

$$\begin{array}{r} 12 \overline{)37} \rightarrow 10 \overline{)40} \\ \underline{-0} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

Writing a Power or Exponent – the base number is being multiplied according to the exponent

Ex. $2^3 = 2 \cdot 2 \cdot 2$

Ex. $4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

Ex. $5^7 = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

Reading Powers When powers have an exponent of 2, the base is “squared.” When powers have an exponent of 3, the base is “cubed.”

3^2 is read “3 to the second power,” or “3 squared.”

4^3 is read “4 to the third power,” or “4 cubed.”

2^5 is read “2 to the fifth power.”

Finding the Value of a Power or Exponent – the base number is multiplied by itself a number of times depending on the exponent value

Ex. $2^3 = 2 \cdot 2 \cdot 2$

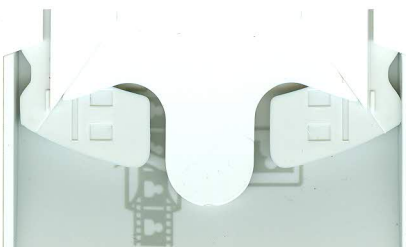
$$\begin{array}{r} 2 \\ \times 2 \\ \hline 4 \\ \times 2 \\ \hline 8 \\ \hline \boxed{2^3 = 8} \end{array}$$

Ex. $4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

$$\begin{array}{r} 4 \\ \times 4 \\ \hline 16 \\ \times 4 \\ \hline 64 \\ \times 4 \\ \hline 256 \\ \times 4 \\ \hline 1,024 \end{array}$$

$4^5 = 1,024$

* calc. = $2 \wedge 3 =$



Data Displays

Lessons: 2.4, 2.5, 2.6, 2.7, 2.8, 13.7

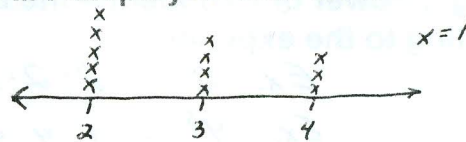
Highlighted Vocabulary: average, bar graph, circle graph, data, double bar graph, double line graph, frequency table, histogram, grid, line graph, mean, median, mode, prediction, range, scale, x axis, y axis, ordered pair, coordinates, coordinate plane, *line plot*, *stem-and-leaf plot*, *box-and-whisker plot*

Making a Frequency Table – use tally marks and then total them

Ex. 2, 3, 4, 2, 2, 3, 4, 2, 2, 3, 3, 4

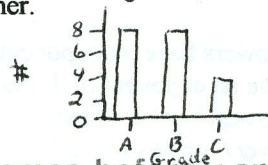
	Tally	Freq.
2		5
3		4
4		3

Making a Line Plot – a line plot uses the information collected in a frequency table and the frequencies are displayed with an X



Making a Bar Graph

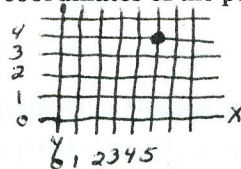
Double Bar Graphs - A is a bar graph that shows two sets of data on the same graph. The two bars for each category are drawn next to each other.



Graphing Points – (x,y) x always comes before y and x is on the horizontal axis and y is on the vertical axis

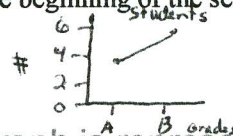
Coordinates The graph below shows a point on a coordinate grid. Each point is described by an of numbers. The numbers are the **coordinates** of the point.

(x, y)
(5, 4)



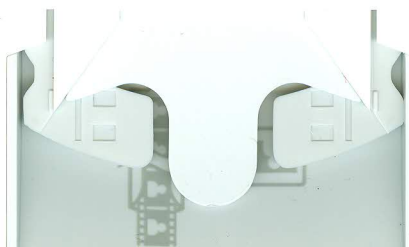
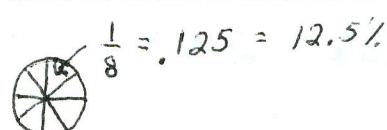
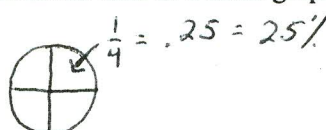
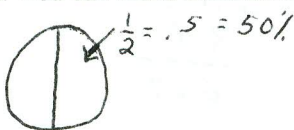
Making a Line Graph

Line Graphs A represents data using points connected by line segments. Line graphs are often used to show change over time. You can make a break at the beginning of the scale to focus on the interval where the data fall.



Interpreting a Circle Graph – a circle graph is represents all presented data and conclusions can be made depending on the size of each represented category

A **circle graph** is a graph that represents data as parts of a circle. The entire circle represents all of the data. You can make conclusions about the data in a circle graph based on the size of each section.



Using a Graph

Appropriate Data Displays

A **line plot** shows how often each number occurs.

A **bar graph** shows how different categories of data compare.

A **line graph** represents data that change over time.

A **circle graph** represents data as parts of a whole.

A **stem-and-leaf plot** displays all the data values and orders the data from least to greatest.

A **box-and-whisker plot** shows the spread of data using the median, the quartiles, and the extremes.

Finding a Mean, Median, Mode, and Range:

*Averages

*The **mean** of a data set is the sum of the values divided by the number of values.

*The **median** of a data set is the middle value when the values are written in numerical order. If a data set has an even number of values, the median is the mean of the two middle values.

*The **mode** of a data set is the value that occurs most often. A data set can have one mode, more than one mode, or no

The **range** of a data set is the difference between the greatest value and the least value.

Ex.

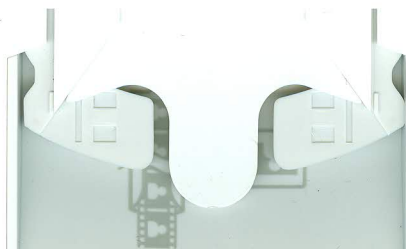
5, 4, 3, 2, 0, 5, 6, 7, 2, 3, 3

$$\begin{aligned}\text{mean (average)} &= 40 \div 11 \\ &= 3.\overline{636363}\end{aligned}$$

$$\begin{aligned}\text{median (middle)} &= 0, 2, 2, 3, 3, \boxed{3}, 4, 5, 5, 6, 7 \\ &= 3\end{aligned}$$

$$\text{mode (most)} = 3$$

$$\begin{aligned}\text{range} &= 7 - 0 \\ &= 7\end{aligned}$$



Fraction Concepts

Lessons: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8

Highlighted Vocabulary: common factor, equivalent, equivalent fractions, factor, factors, fractions, greatest common factor, improper fractions, least common denominator, least common multiple, lowest terms, mixed numbers, numerator, proper fraction, reduce, divisible, prime number, composite number, prime factorization, factor tree, simplest form multiple, terminating decimal, repeating decimals

Finding Factors – factors are two numbers multiplied together to equal a product

Ex. $\frac{10}{1 \times 10}$
 2×5
 5×2
 $= 1, 2, 5, 10$

Ex. $\frac{36}{1 \times 36}$
 2×18
 3×12
 4×9
 6×6
 $= 1, 2, 3, 4, 6, 9, 12, 18, 36$

Using Divisibility Rules – using these rules allows one to determine if a number is a factor of a larger number

Primes and Composites

A **prime number** is a whole number greater than 1 whose only factors are 1 and itself.

A **composite number** is a whole number greater than 1 that has factors other than 1 and itself.

The number 1 is neither prime nor composite.

Writing a Prime Factorization – factors should be listed from least to greatest

36
 2×18
 2×9
 3×3
 $2 \times 2 \times 3 \times 3$
 $= 2^2 \cdot 3^2$

* remember you can prime factors together to check your answer

Prime Factorization

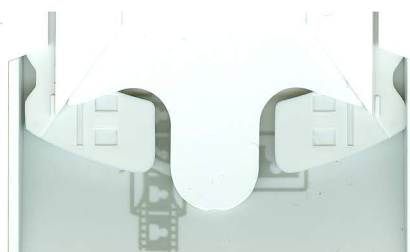
Writing the **prime factorization** of a number means writing the number as the product of prime numbers. You can use a diagram called a **factor tree** to write a factorization of a number. To write the prime factorization, continue factoring until only prime factors appear in the product.

Finding the GCF of Two Numbers – find the greatest common factor

$2 \times 3 = 6$
 factors → product or multiple

Ex. $\frac{12}{1 \times 12}$
 2×6
 3×4
 4×3
 6×6
 $GCF = 12$

or $\frac{36}{2 \times 18}$
 3×12
 4×9
 6×6
 $GCF = 12$
 - GCF is on the LEFT!!



Writing Equivalent Fractions – fractions are equal when you multiply or divide the numerator and denominator by the same value

Ex. $\frac{1}{2} = \frac{2}{4}$ or $\frac{5}{10} = \frac{1}{2}$

Simplifying Fractions – is an example of making equivalent fractions by dividing the numerator and denominator by the same value

Ex. $\frac{12}{24} = \frac{1}{2}$ or $\frac{12}{24} = \frac{6}{12} = \frac{3}{6} = \frac{1}{2}$

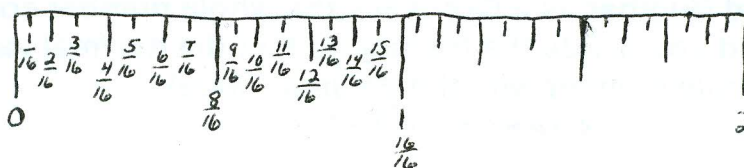
Finding a Common Multiple/ Finding the LCM/ Using Prime Factorization
- multiples are products of a number

Ex. 2 and 9
2: 2, 4, 6, 8, 10, 12, 14, 16, 18, ...
9: 9, 18, ...
LCM = 18

Ordering Fractions – in order to compare fractions they must have a common denominator and be written the same (all improper, mixed numbers, or decimals) Ex. $\frac{1}{4}, \frac{3}{8}, \frac{7}{16}$ L → G

$\frac{1}{4} = \frac{4}{16}$ $\frac{3}{8} = \frac{6}{16}$ $\frac{7}{16} = \frac{7}{16}$ $\boxed{\frac{1}{4}, \frac{3}{8}, \frac{7}{16}}$

Measuring to a Fraction of an Inch – inches is measured in 16th of an inch



Rewriting Mixed Numbers – work around the horn (multiply then add to find the numerator and remember the denominator stays the same)

Ex. $2\frac{3}{6} = \frac{15}{6}$ Ex. $1\frac{4}{5} = \frac{9}{5}$

Rewriting Improper Fractions – write it as you read it (the numerator is always divided by the denominator)

Ex. $\frac{15}{6} = 2\frac{3}{6}$ Ex. $\frac{9}{5} = 1\frac{4}{5}$

Ordering Numbers – make sure decimals and all place values are aligned (add zeros to assist with organization)

- compare from left to right

Ex. 2.1, 3.4, 2.01, 3.04

*Think of money

2.1
3.4
2.01
3.04

L → G

2.01, 2.1, 3.04, 3.4

Writing Decimals as Fractions – write it like you read it

Writing Decimals as Mixed Numbers – the whole number comes before the decimal and the decimal value is written like you read it

Ex. 3.5

$3\frac{5}{10}$

Ex. 4.55

$4\frac{55}{100}$

Ex. 2.001

$2\frac{1}{1000}$

Writing a Fraction as a Decimal – every fraction has a decimal value and you divide to find the decimal value (numerator divided by the denominator)

Ex. $3\frac{1}{2} = 3.5$

$$\begin{array}{r} 0.5 \\ 2 \overline{) 11.0} \\ \underline{-6} \\ 10 \\ \underline{-10} \\ 0 \end{array}$$

Ex. $2\frac{1}{4} = 2.25$

$$\begin{array}{r} 0.25 \\ 4 \overline{) 11.00} \\ \underline{-8} \\ 30 \\ \underline{-20} \\ 10 \\ \underline{-8} \\ 20 \\ \underline{-20} \\ 0 \end{array}$$

Writing a Mixed Number as a Decimal – the whole number comes before the decimal and you divide the fraction to find the decimal value (include the whole number with the decimal value)

SEE Examples Above

Repeating Decimals – decimals that never end and you represent a repeating decimal with a line above only what repeats

Ex. $\frac{5}{6}$

$$\begin{array}{r} 0.8333 \\ 6 \overline{) 5.0000} \\ \underline{-0} \\ 50 \\ \underline{-48} \\ 20 \\ \underline{-18} \\ 20 \\ \underline{-18} \\ 20 \\ \underline{-18} \\ 2 \end{array}$$

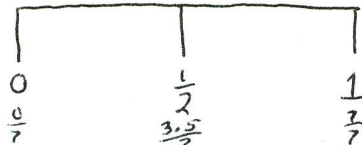
$= .8\overline{333}$

Addition and Subtraction of Fractions

Lessons: 6.1, 6.2, 6.3, 6.4, 6.5

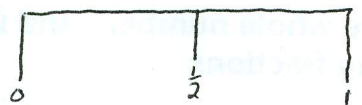
Highlighted Vocabulary: common denominator, denominator, simplify, round, least common denominator

Rounding Fractions – fractions are rounded to either 0, $\frac{1}{2}$, or 1



Ex. $\frac{5}{7} \approx 1$

Rounding Mixed Numbers – the whole number is not rounded but the fraction value is just like the technique above



Ex. $2\frac{5}{7}$

$2 + 1 = 3$

Estimating a Difference – use the technique from above then subtract

Ex. $2\frac{5}{7} - 1$

$2 + 1$

$3 - 1 = \boxed{2}$

Estimating a Sum – use the technique from above then add

Ex. $2\frac{5}{7} + 1$

$2 + 1$

$3 + 1 = 4$

Adding Fractions – find a common denominator, make equivalent fractions, rewrite, add the numerators, and remember the denominators stays the same

LCM

$8: 8, 16, 24$

$12: 12, 24$

Ex. $\frac{1}{8} + \frac{3}{12}$

$\frac{1 \times 3}{8 \times 3} = \frac{3}{24}$

$\frac{3 \times 2}{12 \times 2} = \frac{6}{24}$

calc.: $1 \times 12 = 12$ and $3 \times 4 = 12$

$\frac{3}{24} + \frac{6}{24} = \frac{9}{24} = \frac{3}{8}$

Subtracting Fractions – find a common denominator, make equivalent fractions, rewrite, subtract the numerators, and remember the denominators stays the same

LCM

$6: 6, 12$

$12: 12$

Ex. $\frac{7}{12} - \frac{1}{6}$

$\frac{7}{12} - \frac{1 \times 2}{6 \times 2} = \frac{7}{12} - \frac{2}{12}$

$\frac{7}{12} - \frac{2}{12} = \frac{5}{12}$

calc.: $7 \times 2 = 14$ and $1 \times 6 = 6$

Adding Mixed Numbers – add the whole numbers and use the technique presented above for adding fractions

LCM
12: 12
4: 4, 8, 12

Ex. $3\frac{1}{12} + 2\frac{1}{4}$

$\frac{1}{12} \xrightarrow{\times 1} \frac{1}{12}$ $\frac{1}{4} \xrightarrow{\times 3} \frac{3}{12}$

$3\frac{1}{12} + 2\frac{3}{12} = 5\frac{4}{12} = 5\frac{1}{3}$

Subtracting Mixed Numbers – subtract the whole numbers and use the technique presented above for subtracting fractions

LCM
6: 6
2: 2, 4, 6

Ex. $4\frac{5}{6} - 3\frac{1}{2}$

$\frac{5}{6} \xrightarrow{\times 1} \frac{5}{6}$ $\frac{1}{2} \xrightarrow{\times 3} \frac{3}{6}$

$4\frac{5}{6} - 3\frac{3}{6} = 1\frac{2}{6} = 1\frac{1}{3}$

Renaming a Whole Number Sometimes you need to rename a whole number as a mixed number. To do this, rename one whole part as a fraction equal to 1.

Subtracting from a Whole Number – renaming – take one away and use the common denominator to make a fraction that is equal to one

LCM
8: 8
4: 4, 8

Ex. $3\frac{5}{8} - 2\frac{3}{4}$

$\frac{5}{8} \xrightarrow{\times 1} \frac{5}{8}$ $\frac{3}{4} \xrightarrow{\times 2} \frac{6}{8}$

$2\frac{8}{8} + \frac{5}{8} - 2\frac{6}{8} = 2\frac{13}{8} - 2\frac{6}{8} = \frac{7}{8}$



Multiplication and Division of Fractions

Lessons: 7.1, 7.2, 7.3, 7.4, 7.5

Highlighted Vocabulary: cross multiplication, reciprocal, compatible numbers

Multiply Fractions by Whole Numbers and Multiply Whole Numbers by Fractions – put the whole number over one (when multiplying fractions they must fit into the form (fractions or improper fractions))

Ex. $5 \times \frac{3}{4}$ $\frac{\square}{\square} \cdot \frac{\square}{\square}$ $\begin{array}{r} 4 \overline{) 15} \\ \underline{8} \\ 7 \\ \underline{6} \\ 1 \end{array}$ calc: $5 \times 3 = 15$ $\frac{15}{4} = 3 \frac{3}{4}$

Multiplying Two Fractions – multiply the numerators together and the denominators together (reduce when possible)

Ex. $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$ calc: $1 \times 3 = 3$ $2 \times 4 = 8$

Simplifying Before Multiplying – technique for reducing (your choice)

Ex. $\frac{1}{2} \cdot \frac{4}{5} = \frac{2}{5}$

Multiplying Three Fractions – multiply two of them together then take your answer times the third fraction

Ex. $\frac{1}{2} \cdot \frac{4}{5} \cdot \frac{3}{4}$

$\frac{1}{2} \cdot \frac{4}{5} = \frac{4}{10}$ $\frac{4}{10} \cdot \frac{3}{4} = \frac{12}{40} = \frac{3}{10}$

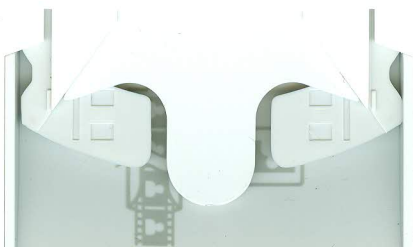
Multiplying with Mixed Numbers – change them into improper fractions then multiply

Ex. $3\frac{1}{2} \times 2\frac{4}{5}$

$\left(3\frac{1}{2}\right) \times \left(2\frac{4}{5}\right)$

$\frac{7}{2} \times \frac{14}{5} = \frac{98}{10} = 9\frac{8}{10} = 9\frac{4}{5}$

$\begin{array}{r} 10 \overline{) 98} \\ \underline{90} \\ 8 \end{array}$



Reciprocals

For each pair of fractions being multiplied, the numerator and denominator of the product are equal, so the product is 1. Notice the relationship between the two fractions in each pair.

Dividing Two Fractions – apply the reciprocal rule which flips the sign and only the second fraction (then multiply)

calc: $3 \frac{1}{2} \div 4 \frac{5}{6} =$

Ex. $5 \div \frac{1}{2}$

$$\frac{5}{1} \div \frac{1}{2}$$

$$\frac{5}{1} \times \frac{2}{1} = \frac{10}{1} = 10$$

Ex. $3 \frac{1}{2} \div 4 \frac{5}{6}$

$$\frac{3 \frac{1}{2}}{\times 2} \div \frac{4 \frac{5}{6}}{\times 6}$$

$$\frac{7}{2} \div \frac{29}{6}$$

$$\frac{7}{2} \times \frac{6}{29} = \frac{42}{58} = \frac{21}{29}$$

Dividing a Fraction and a Whole Number – make all numbers of fractions fit the form apply the reciprocal rule and multiply

$$\frac{\square}{\square} \div \frac{\square}{\square}$$

Ex. $2 \frac{1}{2} \div 4$

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

$$\frac{5}{2} \div \frac{4}{1}$$

$$\frac{5}{2} \times \frac{1}{4} = \frac{5}{8}$$

Dividing a Mixed Number – make all mixed number fit the form (around the horn) apply the reciprocal rule and multiply

calc: $4 \frac{1}{2} \div 2 \frac{5}{8} =$

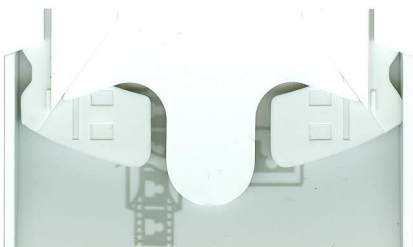
Ex. $4 \frac{1}{3} \div 2 \frac{5}{8}$

$$\frac{4 \frac{1}{3}}{\times 3} \div \frac{2 \frac{5}{8}}{\times 8}$$

$$\frac{13}{3} \div \frac{21}{8}$$

$$\frac{13}{3} \times \frac{8}{21} = \frac{104}{63} = 1 \frac{41}{63}$$

$$\begin{array}{r} 63 \overline{) 104} \frac{41}{63} \\ \underline{0} \\ 10 \\ \underline{63} \\ 41 \end{array}$$



Decimal Concepts & Addition/Subtraction of Decimals

Lessons: 3.1, 3.3, 3.4, 3.5, 3.6

Highlighted Vocabulary: decimals, common denominator, *number line*, *leading digit*, *round*, *front-end estimation*, *commutative property*, *associative property*

hundreds tens **ones** . tenths **hundredths** thousandths **ten thousandths** hundred thousandths

Remember we read the decimal as **AND**

Writing Decimals – write them just like you say them

Ex. *Three and five tenths*
3.5

Reading Decimals – read the whole number, and (for the decimal point), read the decimal as a whole number but make sure you state the place value of the last digit

Ex. 34.005
Thirty-four and five thousandths

Comparing Decimals – stack them making sure the decimal points are aligned and all other place values are aligned, include zeros for organizational purposes (think of money)

Ex. .06 < .6

$\begin{array}{r} 06 \\ 6 \end{array}$

* Think of money

Ordering Decimals – stack them making sure the decimal points are aligned and all other place values are aligned, include zeros for organizational purposes (think of money)

Ex. 3.4, 3.04, 3.14

$\begin{array}{r} 3.40 \\ 3.04 \\ 3.14 \end{array}$

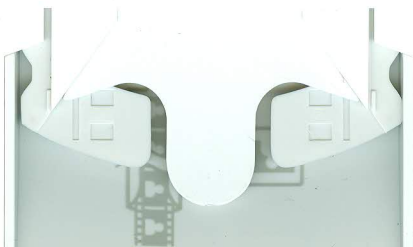
L → G

3.04, 3.14, 3.4

Rounding Decimals – underline the specified place value and draw an arrow back to the following digit (4 or less keep the underlined digit the same) (5 or higher move the underlined digit up one value)

Ex. 5.694 (hundredths)
 $\xrightarrow{\text{SAME Zeros}} 5.694 = 5.690$

Ex. 1.999 (hundredths)
 $\begin{array}{r} 1.999 \\ +1 \\ \hline = 2.000 \end{array}$



Rounding to the Leading Digit – underline the first digit that is not a zero

Ex. , 000654

, 000654 = 0.007

Ex. , 000005321

, 000005

Using Decimals for Large Numbers – pay attention to the stated place value

Ex. 5.5 billion

5,500,000,000

Ex. 5.25 billion

5,250,000,000

Estimating Sums and Differences – estimate to the nearest whole number

Ex. $\begin{array}{r} 2.25 \rightarrow 2 \\ + 1.75 \rightarrow +2 \\ \hline 4 \end{array}$

Ex. $\begin{array}{r} 3.85 \rightarrow 4 \\ - 1.92 \rightarrow -2 \\ \hline 2 \end{array}$

Using Front-End Estimation – add the whole numbers, combine the decimal values to make other groups of 1 (think of money)

Ex. $\begin{array}{r} 2.40 \\ 3.05 - 0 \\ + 2.60 \\ \hline 7 + 1 = 8 \end{array}$

Adding and Subtracting Decimals – align the decimals and place values and drop your decimal straight down into your answer (add zeros to organize and when subtracting)

Ex. $\begin{array}{r} 2.05 \\ + 1.01 \\ \hline 3.06 \end{array}$

Ex. $\begin{array}{r} 2.05 \\ - 1.01 \\ \hline 1.04 \end{array}$

Commutative Property You can add numbers in any order.

Numbers $2 + 5 = 5 + 2$

Algebra $a + b = b + a$

Associative Property The value of a sum does not depend on how the numbers are grouped.

Numbers $(2 + 5) + 4 = 2 + (5 + 4)$

Algebra $(a + b) + c = a + (b + c)$

Commutative Property In a product, you can multiply numbers in any order.

Numbers $2 \times 6.5 = 6.5 \times 2$ Algebra $a \times b = b \times a$

Associative Property The value of a product does not depend on how the numbers are grouped.

Numbers $(2 \times 6.5) \times 4 = 2 \times (6.5 \times 4)$

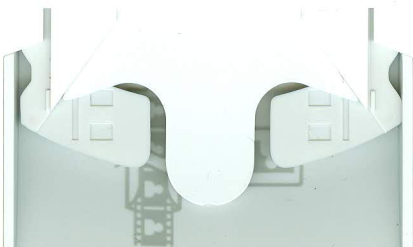
Algebra $(a \times b) \times c = a \times (b \times c)$

The Distributive Property

Words You can multiply a number and a sum by multiplying the number by each part of the sum and then adding these products. The same property applies with subtraction.

Numbers $3(4 - 6) = 3(4) - 3(6)$ or $2(8 + 5) = 2(8) + 2(5)$

Algebra $a(b + c) = ab + ac$ or $a(b - c) = ab - ac$



Multiplication and Division of Decimals

Lessons: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6

Highlighted Vocabulary: decimals, distributive property

Multiplying Decimals by Whole Numbers – count the decimal places in the problem and move the decimal point in your answer depending on the number of values in the problem

$$\begin{array}{r} \text{Ex. } 2.32 \\ \times 5 \\ \hline 11.60 \\ \hline 11.60 \end{array}$$

$$\text{Calc.: } 2.32 \times 5 =$$

Placing a Decimal Point in a Product – see example above

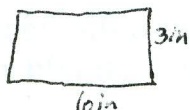
Multiplying Decimals - count the decimal places in the problem and move the decimal point in your answer depending on the number of values in the problem

$$\begin{array}{r} \text{Ex. } 4.9 \\ \times 5 \\ \hline 24.5 \\ \hline 24.5 \end{array}$$

$$\begin{array}{r} \text{Ex. } .99 \\ \times .9 \\ \hline .891 \\ \hline .891 \end{array}$$

Finding the Area of a Rectangle – Area = length x width

Ex.

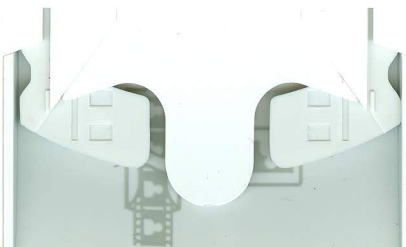


$$A = 6 \times 3$$

$$A = 18 \text{ in}^2$$

Dividing a Decimal by a Whole Number – move the decimal straight up in your answer

$$\begin{array}{r} \text{Ex. } 3 \overline{) 49.2} \\ \underline{3} \\ 19 \\ \underline{18} \\ 12 \\ \underline{12} \\ 0 \end{array}$$



Writing Additional Zeros – when all numbers in the dividend have been used check for a decimal point then add a zero and continue the problem

Ex. $3 \overline{) 16.4333}$

$$\begin{array}{r}
 3 \overline{) 16.4333} \\
 \underline{-3} \\
 19 \\
 \underline{-18} \\
 13 \\
 \underline{-12} \\
 10 \\
 \underline{-9} \\
 10 \\
 \underline{-9} \\
 10 \\
 \underline{-9} \\
 1
 \end{array}$$

$16.4\overline{333}$

Writing Divisors as Whole Numbers – move the bug on the windshield as many places as you need to in order to get rid of it (move it the same number of times in the dividend)

Ex. $5 \overline{) 0.25}$

$$\begin{array}{r}
 5 \overline{) 0.25} \\
 \underline{-0} \\
 25 \\
 \underline{-25} \\
 0
 \end{array}$$

Ex. $25 \overline{) 5.00}$

$$\begin{array}{r}
 25 \overline{) 5.00} \\
 \underline{-0} \\
 50 \\
 \underline{-50} \\
 00 \\
 \underline{-0} \\
 0
 \end{array}$$

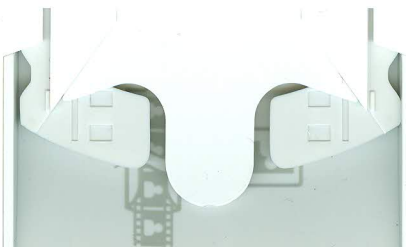
* Remember every digit in the dividend must have a number above it.

Using Zeros While Dividing – when moving the decimal in the dividend if you need more numbers to move the decimal add zeros

Ex. $4 \div .4$

$.4 \overline{) 4.0}$

$$\begin{array}{r}
 .4 \overline{) 4.0} \\
 \underline{-4} \\
 00 \\
 \underline{-0} \\
 0
 \end{array}$$



Fraction, Decimal, Percent Relationships and Applications

Lessons: 8.5, 8.6

Highlighted Vocabulary: percent

Modeling Percents

A **percent** is a ratio that compares a number to 100. The word *percent* means “per hundred,” or “out of 100.” The symbol for percent is %.

Writing Ratios in Different Forms

Percent: 7%

Decimal: 0.07

Fraction: 7/100

Writing Percents – (picture) divide the numerator by the denominator to get the decimal value then multiply by 100

Ex.   What percent of the marbles are black?

$$\frac{3}{9} = \frac{44.4}{100} = 44.4\%$$

Writing Percents as Decimals and Fractions

To write a percent as a *decimal*: Divide the value by 100.

$$57\% = 57 / 100 = 0.57$$

To write a percent as a *fraction*: Rewrite the percent using a denominator of 100. Simplify if possible.

$$35\% = 35/100 = 7/20$$

percent to decimal
 $35\% \div 100 = .35$

percent to ~~denom~~ fraction

$$52\% = \frac{52}{100} \xrightarrow{\div 4} \frac{13}{25}$$

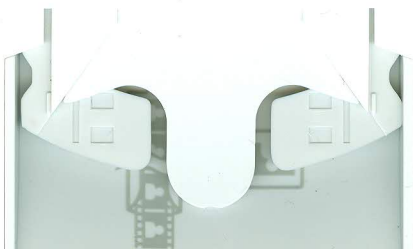
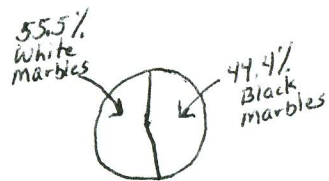
Circle Graphs with Percents – the complete graph is equal to 100

Ex. White and Black Marbles






Black = $\frac{4}{9} = \frac{444}{\times 100} = 44.4\%$
 White = $\frac{5}{9} = \frac{555}{\times 100} = 55.5\%$



Writing Fractions as Percents - divide the numerator by the denominator to get the decimal value then multiply by 100

$$\text{Ex. } \frac{3}{11} = \frac{.272727}{\times 100} = 27.2\%$$

$$\text{Calc.: } 3 \div 11 = \times 100 =$$

$$\text{Ex. } \frac{4}{5} = \frac{.8}{\times 100} = 80\%$$

Writing Decimals as Percents - multiply by 100

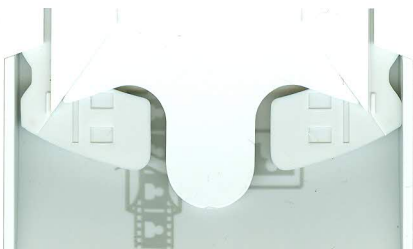
$$\text{Ex. } .56 = \frac{}{\times 100} = 56\%$$

$$\text{Calc.: } .56 \times 100 =$$

$$\text{Ex. } 22.45 = \frac{}{\times 100} = 2245\%$$

Using Decimals to Write Percents - divide the numerator by the denominator to get the decimal value then multiply by 100

$$\text{Ex. } \frac{2}{5} = \frac{.4}{\times 100} = 40\%$$



Probability

Lessons: 13.1, 13.2, 13.3

Highlighted Vocabulary: combinations, event, probability, simple event (reduce fractions), table, tree diagram, trend, *outcome*, *complementary events*, *permutation*, *independent events*

Tossing a coin is an example of an *experiment*. An **outcome**, such as “heads,” is a possible result of an experiment. An **event** is a collection of outcomes. Once you specify an event, the outcomes for that event are called favorable outcomes. You can find *probabilities* by counting favorable outcomes.

Finding Probabilities

The **probability** that an event will occur when all outcomes of an experiment are equally likely is as follows.

Probability of event = Number of favorable outcomes / Number of possible outcomes

Written as a fraction- **NUMERATOR** = the number of possibilities for what you want

DENOMINATOR = total possible outcomes

Example: rolling an odd number when rolling a dice $3/6 = .5 = 50\%$

Example: rolling a whole number $6/6 = 1 = 100\%$

Example: rolling less than a three $2/6 = .3 \text{ repeating} = 33\%$

Describing Probabilities

Complementary Events Two events are complementary events, or *complements* of each other, if they have no outcomes in common and if together they contain all the outcomes of the experiment.

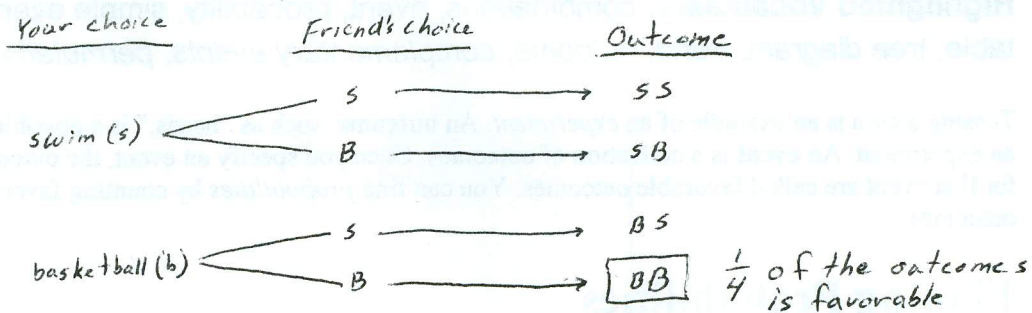
A **tree diagram** can help you organize a list of possible outcomes by placing different choices on different branches of the “tree.” **Page 636**

Combinations and Permutations To choose outcomes, you need to decide whether the order of the objects matters. A **combination** is a grouping of objects in which order is not important. A **permutation** is an arrangement of objects in which order is important. **Page 637**

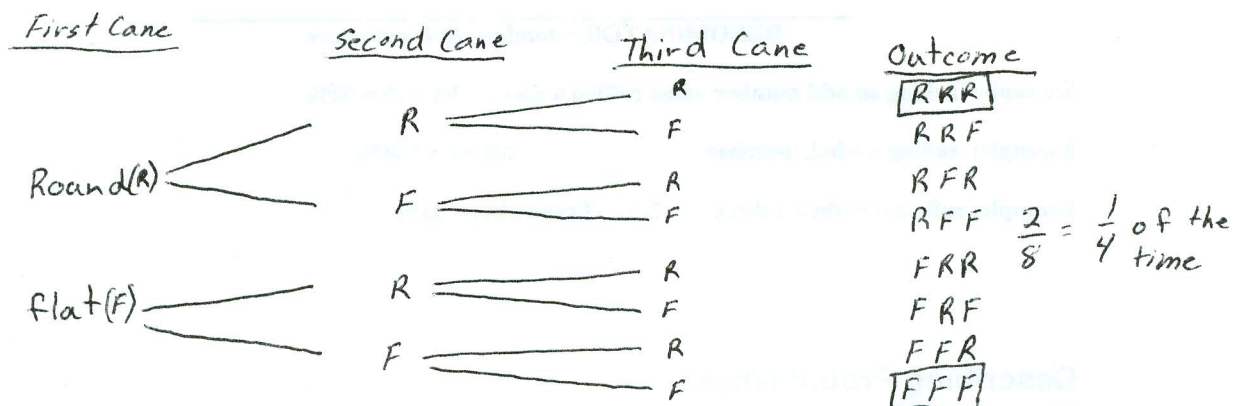


Two events are **independent** if the occurrence of one event does not affect the likelihood that the other event will occur.

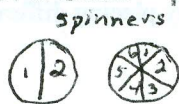
Two Independent Events – page 642 – use a tree diagram to predict the affected outcome
 Ex. Find the probability that both of you choose ~~the same activity~~ basketball.



Three Independent Events – page 643 – use a tree diagram to predict the affected outcome
 Ex. The probability that all 3 canes land the same side up.



Probability of a Sum – page 643 - use a table of sums to make a prediction



What is the probability that the sum is at least 4?

	1	2	3	4	5	6
1	2	3	^x 4	^x 5	^x 6	^x 7
2	3	^x 4	^x 5	^x 6	^x 7	^x 8

$\frac{9}{12} \div 3 = \frac{3}{4}$ of the time the outcome is favorable



Geometry Concepts

Lessons: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 10.3

Highlighted Vocabulary: 360 degrees, acute angle, acute triangle, area(not tested), circle, equilateral triangle, decagon, degrees, heptagon/septagon, hexagon, hypotenuse, isosceles triangle, legs, nonagon, obtuse, angle, obtuse triangle, octagon, parallelogram, polygon, protractor, quadrilateral, rectangle, rhombus, right angle, right triangle, scalene triangle, square, straight angle, trapezoid, triangle, vertex, base, center, chord, circumference, complementary angles, cone, congruent, cube, cubic units, cylinder, diameter, dimension, distance, edges, endpoint, exterior, faces, formula, infinite, interior, intersecting, line, line segment, linear, parallel, perimeter, perpendicular, pi, plane, point, radius, ray, series of points, skew, sphere, square units, supplementary angles, symmetry

Lines/Rays/Line Segments

A line extends without end in two *opposite* directions.

A ray has one endpoint and extends without end in *one* direction.

A line segment has two segment endpoints.

Naming Lines, Rays, and Segments –

- a line is named with two capital letters with a line above (any order)

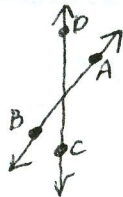
- a ray is named with two capital letters and the endpoint must be listed first

- a line segment is named with two capital letters with a line and two endpoints above (any order)

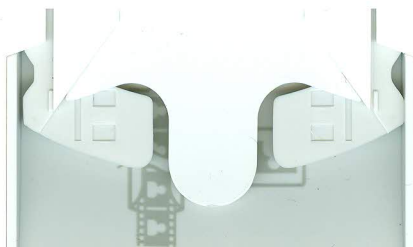
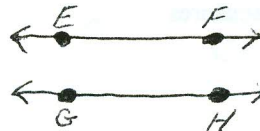

Intersecting and Parallel Lines

Planes and Lines A plane is a flat surface that extends without end in all directions. You can represent a plane by a figure that looks like a floor or a wall. In a plane, two different lines will either *intersect* or be *parallel*. Intersecting lines meet at a point. Parallel lines never meet.

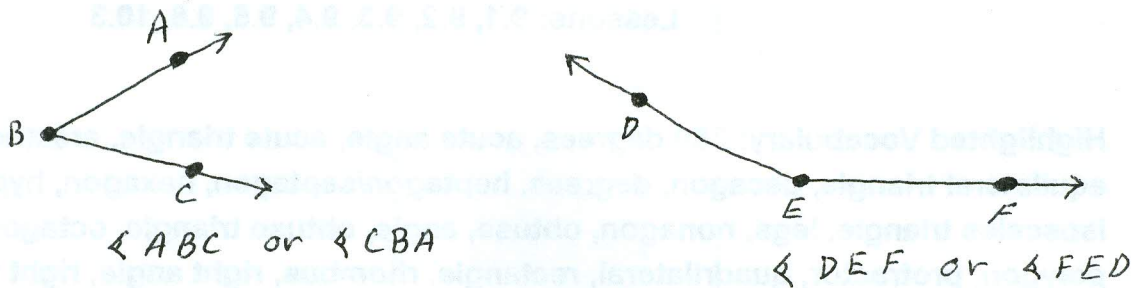
Intersecting Lines



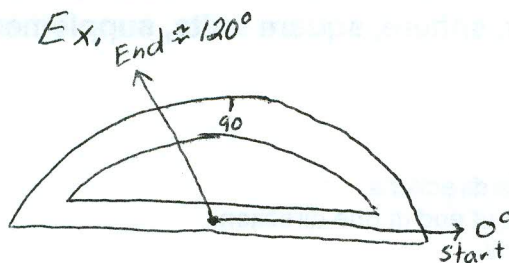
Parallel Lines



Naming Angles – list one of the points on the ray followed by the vertex (meeting point of the two rays) followed by a point of the other ray



Using a Protractor A protractor is a tool you can use to draw and measure angles. Angles are measured in units called degrees. To measure an angle, place the center of the protractor on the vertex of the angle and line up one ray with the 0 degree line. Then read the measure where the other ray crosses the protractor.



Estimating Angle Measures – refer to definition listed below

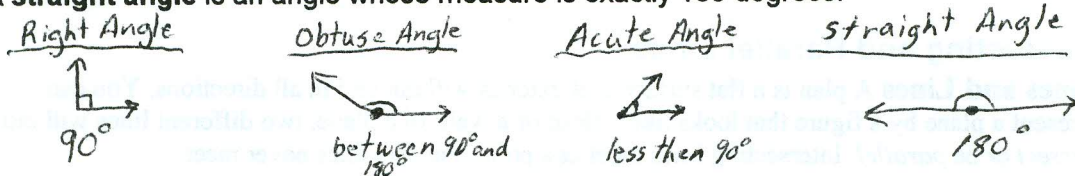
Classifying Angles

A **right angle** is an angle whose measure is exactly 90 degrees.

An **obtuse angle** is an angle whose measure is between 90 degrees and 180 degrees.

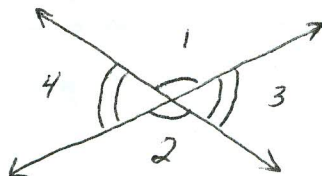
An **acute angle** is an angle whose measure is less than 90 degrees.

A **straight angle** is an angle whose measure is exactly 180 degrees.



Vertical Angles When two lines intersect, the angles opposite each other are called vertical angles. In the diagram at the right, $\angle 1$ and $\angle 3$ are vertical angles, and $\angle 2$ and $\angle 4$ are vertical angles. Vertical angles have equal measures.

Ex.



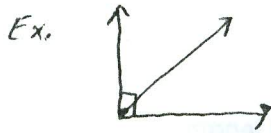
$$\begin{aligned} \text{Equal} &= 1 \neq 2 \\ &= 3 \neq 4 \end{aligned}$$

Complementary and Supplementary Angles

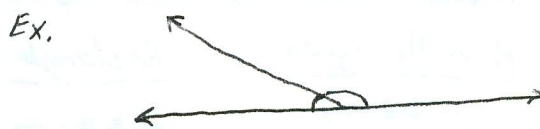
Complementary angles - Two angles are complementary if the sum of their measures is **90 degrees**.

Supplementary angles - Two angles are supplementary if the sum of their measures is **180 degrees**.

Complementary



Supplementary



Classifying Triangles by Angles

Angles of Triangles

An **acute triangle** has three acute angles.

A **right triangle** has one right angle.

An **obtuse triangle** has one obtuse angle.

Acute



Right



Obtuse



Classifying Triangles by Sides

An **equilateral triangle** has three sides of the same length.

An **isosceles triangle** has at least two sides of the same length.

A **scalene triangle** has three sides of different lengths.

Equilateral



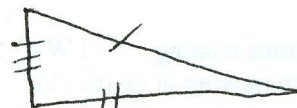
- All the same

Isosceles



- Two are the same

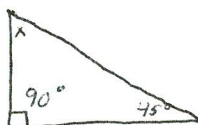
Scalene



- All different

Finding Angle Measures of Triangles

Angles of a Triangle As you may have noticed in the activity on page 435, the measures of the angles of any triangle add up to **180 degrees**.



$$90^\circ + 45^\circ + \underline{\hspace{1cm}} = 180^\circ$$

$$90^\circ + 45^\circ + \boxed{45^\circ} = 180^\circ$$

$$x = 45^\circ$$



Quadrilaterals - A quadrilateral is a plane figure formed by 4 segments called *sides*. Each side intersects exactly 2 other sides, one at each endpoint, and no two sides are part of the same line. The chart below shows some types of quadrilaterals.

Classifying Quadrilaterals

Sides of Quadrilateral

A **parallelogram** is a quadrilateral with 2 pairs of parallel sides.

A **rectangle** is a parallelogram with 4 right angles.

A **rhombus** is a parallelogram with 4 sides of equal length.

A **square** is a parallelogram with 4 right angles and 4 sides of equal length.

Parallelogram



Rectangle



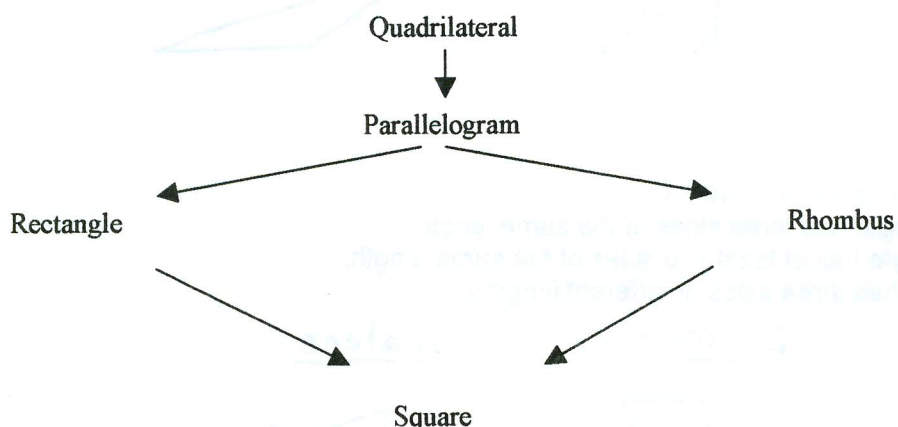
Rhombus



Square



Classify Parallelograms You need to look at all the marks and labels on a parallelogram to decide how to classify it. Some parallelograms can be classified in more than one way.



For questions relating to: ALWAYS, SOMETIMES, and NEVER

Key: when moving in on the chart

- if you move up the answer is ALWAYS
- if you move down the answer is SOMETIMES
- if you move across the answer is NEVER

A **polygon** is a closed plane figure that is formed by three or more segments called sides. Each side intersects exactly two other sides at a vertex .

Number of sides

Triangle – 3 sides

Quadrilateral – 4 sides

Pentagon – 5 sides

Hexagon – 6 sides

Heptagon – 7 sides

Octagon – 8 sides

Nonagon – 9 sides

Decagon – 10 sides

Finding Circumference A circle is the set of all points in a plane that are the same distance from a point called the center . The radius, is the distance from the center to any point on the circle. The distance across the circle through its center is the diameter. The distance around a circle is called the circumference. The ratio of any circle's circumference to its diameter is always the same. This ratio is 3.14159 It is represented by the Greek letter π , or pi. You can use 3.14 as a value for pi.

Finding the Circumference of a Circle – ^{formula} $C = 3.14 \text{ times diameter}$

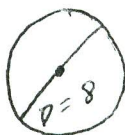


Using Radius to Find Circumference – ^{formula} $C = 3.14 \text{ times } 2 \text{ times the radius}$



Applying Circumference

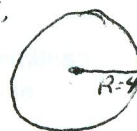
Ex.



$$C = 3.14(8)$$

$$C = 25.12$$

Ex.



$$C = 3.14(2)(4)$$

$$C = 25.12$$

Measurement Concepts and Applications

Lessons: 2.1, 2.2, 3.2, 6.6, 7.6

Highlighted Vocabulary: capacity, centimeter, century, cup, day, decade, foot, gallon, gram, height, hour, inch, kilogram, kilometer, length, liter, meter, mile, milligram, milliliter, millimeter, minute, month, ounce, pint, pound, quart, rate, second, ton, volume(?tested/or not), week, weight, width, yard, year

Customary Units A small paper clip is about one inch long. An inch (in.) is a customary unit of length. Three other customary units of length are the foot (ft), the yard (yd), and the mile (mi). Inches, feet, yards, and miles are related to each other.

$$1 \text{ ft} = 12 \text{ in.} \quad 1 \text{ yd} = 3 \text{ ft} = 36 \text{ in.} \quad 1 \text{ mi} = 1760 \text{ yd} = 5280 \text{ ft}$$

Customary Length Units

Inch - length of a small paper clip

foot - distance from elbow to knuckle

yard - width of a door

Customary Weight Units

1 ounce
about the weight of a slice of bread

1 pound
about the weight of a soccer ball

1 ton
about the weight of a compact car

Customary Capacity Units - Five customary units of capacity are the fluid ounce (fl oz), The cup (c), the pint (pt), the quart (qt), and the gallon (gal).

1 fluid ounce 1 cup 1 pint 1 quart 1 gallon

The units of capacity are related to each other.

$$1 \text{ c} = 8 \text{ fl oz}$$

$$1 \text{ pt} = 2 \text{ c}$$

$$1 \text{ qt} = 2 \text{ pt}$$

$$1 \text{ gal} = 4 \text{ qt}$$

Metric Units Your little finger is about one centimeter wide. The commonly used metric units of length are the millimeter (mm), the centimeter (cm), the meter (m), and the kilometer (km). Here are some common metric unit relationships.

$$1 \text{ cm} = 10 \text{ mm} \quad 1 \text{ m} = 100 \text{ cm} = 1000 \text{ mm} \quad 1 \text{ km} = 1000 \text{ m}$$

Metric Units

Millimeter - thickness of a dime

centimeter - width of your little finger

meter - height of a chair

Finding the Perimeter of a Rectangle

The **perimeter** of a figure is the distance around the figure. Perimeter is measured in linear units such as feet, inches, or meters.



$$P = \text{side} + \text{side} + \text{side} + \text{side}$$

$$P = 6 + 3 + 6 + 3$$

$$P = 18 \text{ in.}$$



Finding the Area of a Rectangle

The **area** of a figure is the amount of surface the figure covers. Area is measured in square units such as square feet (ft²) or square meters (m²).

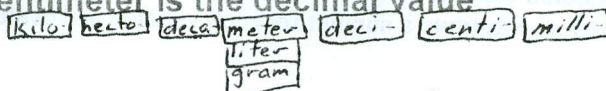


$$A = L \times W$$

$$A = 6 \times 3$$

$$A = 18 \text{ in}^2$$

Writing Measurements as Decimals – 10 millimeters equals 1 centimeter
- what part of a centimeter is the decimal value



Ex. $3.4 \text{ cm} = ? \text{ mm}$

$$3.4$$

$$3.4 \text{ cm} = 34 \text{ mm}$$

Ex. $3.4 \text{ cm} = ? \text{ m}$

$$0.034$$

$$3.4 \text{ cm} = .034 \text{ m}$$

Adding Measures of Time – add all values then regroup when possible

Ex. $4 \text{ h } 45 \text{ min}$

$$+ 4 \text{ h } 22 \text{ min}$$

$$8 \text{ h } 67 \text{ min}$$

convert

$$9 \text{ h } 7 \text{ min}$$

Subtracting Measures of Time – subtract all values be very careful when renaming (1 day = 24 hours, 1 hour = 60 min., 1 min. = 60 sec.)

Ex. $2 \text{ h } 3 \text{ min } 86 \text{ sec}$

$$- 1 \text{ min } 40 \text{ sec}$$

$$1 \text{ min } 46 \text{ sec}$$

Finding Elapsed Time

Elapsed Time The amount of time between a start time and an end time is called elapsed time. To find elapsed time, think about the number of hours that pass, then the number of minutes that pass.

Ex. Start: 7:15 A.M. End: 4:22 P.M.

$$7:15 \text{ to } 8:15 \text{ AM}$$

$$8:15 \text{ to } 9:15 \text{ AM}$$

$$9:15 \text{ to } 10:15 \text{ AM}$$

$$10:15 \text{ to } 11:15 \text{ AM}$$

$$11:15 \text{ to } 12:15 \text{ PM}$$

$$12:15 \text{ to } 1:15 \text{ PM}$$

$$1:15 \text{ to } 2:15 \text{ PM}$$

$$2:15 \text{ to } 3:15 \text{ PM}$$

$$3:15 \text{ to } 4:15 \text{ PM}$$

$$+ 7 \text{ min} =$$

$$9 \text{ hours } 7 \text{ min.}$$



Algebra Concepts

Lessons: 1.5, 1.6, 1.7, 12.1, 12.2, 12.3, 12.4, 12.5

Highlighted Vocabulary: algebra, equality, equation, evaluate, expression, function table, identity property, inequality, input-output, pattern, relationship, variable

Variable Expressions - A variable is a symbol, usually a letter, that represents one or more numbers. A variable expression consists of numbers, variables, and the operations to be performed. To evaluate a variable expression, substitute a number for each variable and evaluate the resulting numerical expression.

Evaluating Expressions - the value is provided just substitute the value for the variable and solve *key: $n = 5$*

Ex. $2n - 4$
 $2 \times 5 - 4$
 $10 - 4$
 (6)

Evaluating Multiplication Expressions - the value is provided just substitute the value for the variable and solve

Ex. *key: $x = 7$*
 $9 + x$
 $9 + 7$
 (16)

Ex. *key: $d = 5$*
 $d^2 - 8$
 $5^2 - 8$
 $5 \times 5 - 8$
 $25 - 8$
 (17)

Equations - You can use *equations* to answer questions like the one above. An equation is a mathematical sentence formed by placing an equal sign (=) between two expressions. A solution of an equation is a number that, when substituted for a variable, makes the equation true.

Solving an Addition Equation - use the opposite operation (subtraction) to free the variable

Ex. $p + 24 = 88$
 $-24 \quad -24$
 $p = 64$

Solving Subtraction Equations - use the opposite operation (addition) to free the variable

Ex. $x - 7 = 2$
 $+7 \quad +7$
 $x = 9$



Solving a Multiplication Equation - use the opposite operation (division) to free the variable

$$\text{Ex. } 5 \cdot \frac{b}{5} = 6 \cdot 5$$

$$b = 30$$

Solving a Division Equation - use the opposite operation (multiplication) to free the variable

$$\text{Ex. } \frac{7x}{7} = \frac{63}{7}$$

$$x = 9$$

Evaluating a Function/Using a Table to Write a Rule/ Making a Table to Write a Rule – remember you will need to perform some kind of operation on the X variable in order to get the answer for the Y variable

X (plus, minus, times, divide) _____ = Y

Ex.

X	Y
0	0
3	1
6	2
9	3

$$x \div 3 = y$$

$$0 \div 3 = 0$$

$$3 \div 3 = 1$$

$$6 \div 3 = 2$$

$$\text{Rule} = x \div 3 = y$$

Ex.

X	Y
1	12
2	24
3	36
4	48

$$x \cdot 12 = y$$

$$1 \cdot 12 = 12$$

$$2 \cdot 12 = 24$$

$$\text{Rule} = x \cdot 12 = y$$



A Problem Solving Plan

Read and Understand
Make a Plan
Solve the Problem
Look Back

Addition

Plus
the sum of
increased by
total
more than
added to

Subtraction

minus
the difference of
decreased by
fewer than
less than
subtracted from

Multiplication

times
the product of
multiplied by
of

Division

divided by
the quotient of

YOU HAVE A CHANCE TO BE PART OF SOMETHING SPECIAL!!
"WINNING IS A HABIT"
GOOD LUCK!

