Cobb County School District

7th Grade Mathematics Teaching & Learning Framework

Quarter 1		Quarter 2	Quarter 3		Quarter 4	
Unit 1 6 weeks	**Unit 2** 6 weeks	**Unit 3** 6 weeks	**Unit 4** 5 weeks	**Unit 5** 4 weeks	**Unit 6** 4 weeks	**Unit 7** 5 weeks
Operations with Rational Numbers	**Expressions & Equations**	**Ratios & Proportional Relationships**	**Geometry**	**Inferences**	**Probability**	**Review and Extend**
MGSE7.NS.1 (Add & subtract rationals) **MGSE7.NS.1a** (Additive inverses) **MGSE7.NS.1b** (p+q as a distance) **MGSE7.NS.1c** (subtracting rationals) **MGSE7.NS.1d** (Properties with rationals) **MGSE7.NS.2** (Multiply & divide rationals) **MGSE7.NS.2a** (Distributive property) **MGSE7.NS.2b** (Dividing rationals) **MGSE7.NS.2c** (Properties with rationals) **MGSE7.NS.2d** (Convert a rational to a decimal) **MGSE7.NS.3** (Solve real-world problems)	**MGSE7.EE.1** (Properties of operations) **MGSE7.EE.2** (Equivalent expressions) **MGSE7.EE.3** (Solve multi-step problems) **MGSE7.EE.4** (Construct equations & inequalities) **MGSE7.EE.4a** (Solve 2-step equations) **MGSE7.EE.4b** (Solve 2-step inequalities) **MGSE7.EE.4c** (Solve 1-step equations)	**MGSE7.RP.1** (Unit rates) **MGSE7.RP.2** (Proportional relationships) **MGSE7.RP.2a** (Table & graphing) **MGSE7.RP.2b** (Constant of proportionality) **MGSE7.RP.2c** (Equations) **MGSE7.RP.2d** (Coordinates) **MGSE7.RP.3** (Percent problems) **MGSE7.G.1** (Scale drawings)	**MGSE7.G.2** (Geometric shapes) **MGSE7.G.3** (Cross-sections) **MGSE7.G.4** (Area & circumference) **MGSE7.G.5** (Angles) **MGSE7.G.6** (Area, volume & surface area)	**MGSE7.SP.1** (Sampling & population) **MGSE7.SP.2** (Draw inferences) **MGSE7.SP.3** (Compare data) **MGSE7.SP.4** (Draw inferences)	**MGSE7.SP.5** (Probability of an event) **MGSE7.SP.6** (Approximate probability) **MGSE7.SP.7** (Probability models with experimental & theoretical) **MGSE7.SP.7a** (Uniform models) **MGSE7.SP.7b** (Different models) **MGSE7.SP.8a** (Compound events) **MGSE7.SP.8b** (Sample space methods) **MGSE7.SP.8c** (Simulations)	**Review: All standards by differentiating for student needs** **Extend:** **MGSE8.EE.7a** (Multi-step equations) **MGSE8.EE.3** (Estimate with scientific notation) **MGSE8.EE.4** (Compute with scientific notation)

These units were written to build upon concepts from prior units, so later units contain tasks that depend upon the concepts addressed in earlier units.
All units will include the Mathematical Practices and indicate skills to maintain.

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.

Grades 6-8 Key: NS = The Number System, RP = Ratios and Proportional Relationships, EE = Expressions and Equations, G = Geometry, SP = Statistics and Probability.

Cobb County School District

Accelerated 7/8 Mathematics Teaching & Learning Framework

Quarter 1			Quarter 2		Quarter 3			Quarter 4		
Unit 1 4 weeks	**Unit 2** 3 weeks	**Unit 3** 2 weeks	**Unit 4** 4 weeks	**Unit 5** 5 weeks	**Unit 6** 3 weeks	**Unit 7** 2 weeks	**Unit 8** 3 weeks	**Unit 9** 4 weeks	**Unit 10** 4 weeks	**Unit 11** 2 weeks
Geometry	**Inferences**	**Probability**	**Transformations, Congruence and Similarity**	**Exponents**	**Geometric Applications of Exponents**	**Functions**	**Linear Functions**	**Linear Models & Tables**	**Solving Systems of Equations**	**Review and Extend**
MGSE7.G.2 (Geometric shapes) **MGSE7.G.3** (Cross-sections) **MGSE7.G.4** (Area & circumference) **MGSE7.G.5** (Angles) **MGSE7.G.6** (Area, volume & surface area)	**MGSE7.SP.1** (Sampling & population) **MGSE7.SP.2** (Draw inferences) **MGSE7.SP.3** (Compare data) **MGSE7.SP.4** (Draw inferences)	**MGSE7.SP.5** (Probability of an event) **MGSE7.SP.6** (Approximate probability) **MGSE7.SP.7** (Probability models with experimental & theoretical) **MGSE7.SP.7a** (Uniform models) **MGSE7.SP.7b** (Different models) **MGSE7.SP.8a** (Compound events) **MGSE7.SP.8b** (Sample space methods) **MGSE7.SP.8c** (Simulations)	**MGSE8.G.1** (experiment with transformations) **MGSE8.G.2** (Congruence) **MGSE8.G.3** (Transformations on the coordinate plane) **MGSE8.G.4** (Similarity) **MGSE8.G.5** (Investigating angles)	**MGSE8.EE.1** (Integer exponents) **MGSE8.EE.2** (Square & cube roots & equations) **MGSE8.EE.3** (Estimate with scientific notation) **MGSE8.EE.4** (Compute with scientific notation) **MGSE8.EE.7** (Solve linear equations) **MGSE8.EE.7a** (Multi-step equations) **MGSE8.EE.7b** (Linear equations with rationals) **MGSE8.NS.1** (Irrational numbers) **MGSE8.NS.2** (Rational approximations)	**MGSE8.G.6** (Pythagorean Theorem & it's converse) **MGSE8.G.7** (Apply the Pythagorean Theorem) **MGSE8.G.8** (Pythagorean Theorem & distance) **MGSE8.G.9** (Volume formulas) **MGSE8.EE.2** (Square & cube roots & equations)	**MGSE8.F.1** (Understanding functions) **MGSE8.F.2** (Comparing functions)	**MGSE8.EE.5** (Graph proportional relationships-slope) **MGSE8.EE.6** (Similar triangles to derive y=mx & y=mx+b) **MGSE8.F.3** (Linear & non-linear functions)	**MGSE8.F.4** (Construct a function) **MGSE8.F.5** (Analyze & sketch functional relationships) **MGSE8.SP.1** (Scatterplots) **MGSE8.SP.2** (Best fit line) **MGSE8.SP.3** (Interpreting bivariate data) **MGSE8.SP.4** (2-way tables)	**MGSE8.EE.8** (Analyze & solve linear systems) **MGSE8.EE.8a** (Solutions to systems) **MGSE8.EE.8b** (Solve systems algebraically and graphically) **MGSE8.EE.8c** (Systems in context)	**Review:** **All standards by differentiating for student needs** **Extend:** **MGSE9-12.A.CED.3** (Constraints by equations & inequalities including systems) **MGSE9-12.A.CED.4** (Rearrange formulas to solve) **MGSE9-12.A.REI.3** (Solve equations & inequalities with letters as coefficients)

These units were written to build upon concepts from prior units, so later units contain tasks that depend upon the concepts addressed in earlier units.
All units will include the Mathematical Practices and indicate skills to maintain

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.
Grades 6-8 Key: NS = The Number System, RP = Ratios and Proportional Relationships, EE = Expressions and Equations, G = Geometry, SP = Statistics and Probability.

Volume 1 Issue 1

Math 7 Unit 1
Operations with Rational Numbers

Dear Parents,
Welcome to the new school year! We are eager to work with you and your students as we learn new mathematical concepts. Below is information for Unit 1, Operations with Rational Numbers. Look for additional newsletters for future units.

Operations with Rational Numbers

By the end of this unit, students will understand:

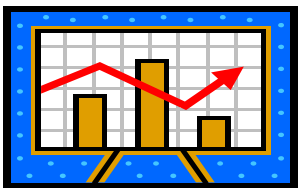
- Computation with positive and negative numbers is often necessary to determine relationships between quantities.
- Models, diagrams, manipulatives and patterns are useful in developing and remembering algorithms for computing with positive and negative numbers.
- Properties of real numbers hold for all rational numbers.
- Positive and negative numbers are often used to solve problems in everyday life.

Vocabulary

Absolute Value: The distance between a number and zero on a number line. The symbol for absolute value is| |
Associative Property: In addition or multiplication, the result of the expression will remain the same regardless of grouping: a+(b+c)=(a+b)+c
Commutative Property: The sum or product of numbers is the same no matter how the numbers are arranged: a+b=b+a
Distributive Property: The sum of two addends multiplied by a number will be the sum of the product of each addend and the number: a(b+c)=ab+ac
Integer: The set of whole numbers & their opposites Example:{…-2, -1, 0, 1, 2,…}
Inverse Operation: Operations that undo each other or are opposite, such as addition and subtraction
Natural numbers: Counting numbers that begin with 1. Example: {1, 2, 3, 4, …}
Rational numbers: The set of numbers that can be written in the form of $\frac{a}{b}$ where a & b are integers and $b \neq 0$.
Whole numbers: The set of all natural numbers and zero

For examples & help with vocabulary, visit:

http://intermath.coe.uga.edu/



Textbook Connection

McGraw Hill Georgia Math Grade 7: Pg. 3-156

Web Resources

http://mathbitsnotebook.com/Algebra1/RealNumbers/RNSignedNumbers.html

http://mathbitsnotebook.com/Algebra1/RealNumbers/RNSignedNumbersPractice.html

http://www.sheppardsoftware.com/mathgames/fruitshoot/FS_Mixed_Integers.htm

http://www.mathplayground.com/ASB_OrbitIntegers.html

http://www.mathgoodies.com/games/integer_game/

http://www.math-play.com/math-racing-subtracting-integers-game/math-racing-subtracting-integers-game.html

http://www.mathplayground.com/ASB_IntegerWarp.html

Practice Problems

1. Evaluate: $3c + (7 - a)^2 - 5b$ when a = -3, b = 5, c = -4

2. Simplify: 9(4j - 6)

3. You have $4 and you need to pay a friend $3. What will you have after paying your friend? Represent your answer on a number line.

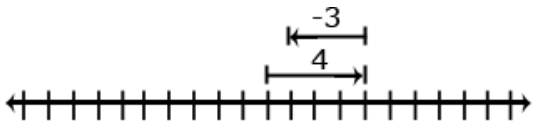
4. Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year?

5. It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent?

Answers:

1. $3(-4) + (7 - -3)^2 - 5(5) = -12+10^2-25 = -12+100-25 = 63$

2. 36j – 54

3. 

4 + (-3) = 1 or (-3) + 4 = 1

4. -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 = 12 ($-32) = $-384

5. $\frac{-100 \text{ feet}}{20 \text{ seconds}} = \frac{-5 \text{ feet}}{1 \text{ second}} = -5$ ft/sec

Volume 1, Issue 2

Math 7 Unit 2
Expressions & Equations

Dear Parents,
Below is information regarding Unit 2, Expressions & Equations. Look for additional information for future units.

Expressions & Equations

By the end of this unit, students will understand that:

- Variables can be used to represent numbers in any type mathematical problem.
- Understand the difference between an expression, an equation, and an inequality.
- Expressions are simplified and equations are solved for the variable's value.
- Write and solve multi-step equations including all rational numbers.
- Expressions, equations, and inequalities can be used to represent and solve real world problems

Vocabulary

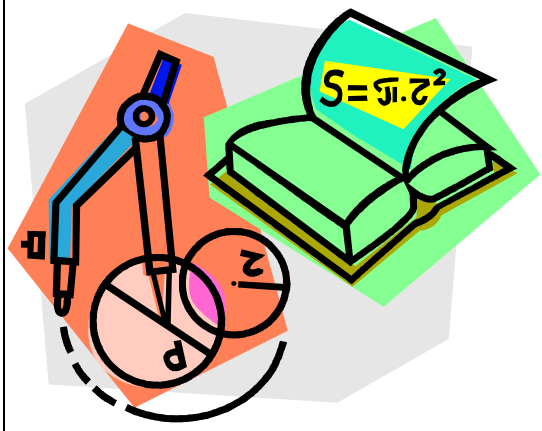
Algebraic Expression: an expression consisting of at least one variable and also consists of numbers and operations
Numerical Expression: an expression consisting of numbers and operations
Coefficient: the number part of a term that includes a variable. For example, *3* is the coefficient of the term *3x*
Constant: a quantity having a fixed value that does not change or vary, such as a number. For example, *5* is the constant of *x + 5*
Equation: a mathematical sentence formed by setting two expressions equal
Inequality: a mathematical sentence formed by placing inequality symbols (>,<,≥,or ≤) between two expressions.
Term: a number, a variable, or a product and a number and variable.
Variable: a symbol, usually a letter, which is used to represent one or more numbers.
Try: http://intermath.coe.uga.edu/

Textbook Connection

McGraw Hill Georgia Math 7: Chapter 3 Lessons 3-8; Chapter 4 Lessons 1-8

Web Resources

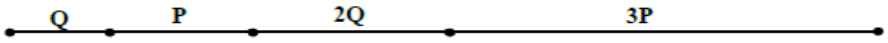
http://www.purplemath.com/modules/solvelin.htm
http://www.algebralab.org/lessons/lesson.aspx?file=algebra_onevariableetwostep.xml
https://www.ixl.com/math/grade-7/solve-two-step-equations
http://www.mathgoodies.com/lessons/vol7/equations.html
http://www.math.com/school/subject2/lessons/S2U1L3GL.html
http://www.math.com/school/subject2/practice/S2U1L3/S2U1L3Pract.html
http://www.homeschoolmath.net/teaching/teach-solve-word-problems.php
http://www.aaamath.com/equ725x7.htm
http://education.jlab.org/sminequality/index.html



USING ALGEBRAIC PROPERTIES

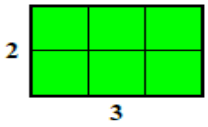
Models for addition and subtracting of variables (combining like terms).

- Picture model ☼☼☼ + ✈✈ + ☼☼☼☼ = 7☼ + 2✈
- Linear model



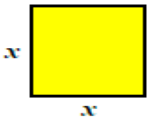
The length of the line is **q + p + 2q + 3p = 3q + 4p** in length.

Models for multiplication of variables



$(2)(3) = 6$ *sq units*

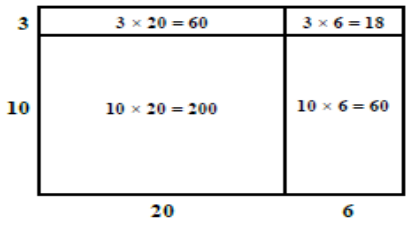
$(x)(y) = xy$



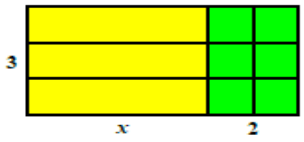
$(x)(x) = x^2$

Models for the distributive property/factoring

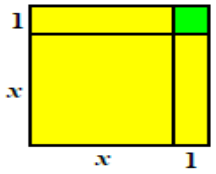
$$\begin{array}{r} 13 \\ \times\ 26 \\ \hline 78 \\ 260 \\ \hline 338 \end{array}$$



Examine the distributive shown above.
13 × 6 = 6(10 + 3) or 60 + 18
13 × 20 = 20(10 + 3) or 200 + 60



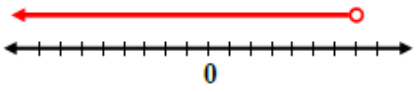
…and now with symbols
$3(x+2) = 3x+6$



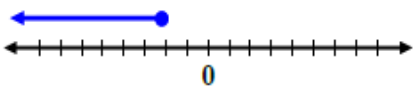
$(x+1)(x+1) = x^2 + 2x + 1$

Graphing Inequalities on a Number Line:

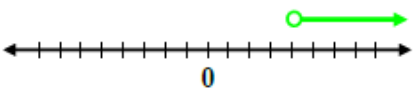
The following are examples of graphing the inequalities <, ≤, >, and ≥ on a number line.



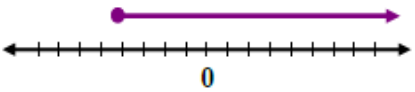
$x < 7$



$x \leq -2$



$x > 4$



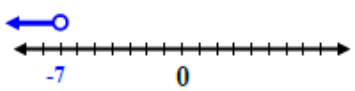
$x \geq -4$

Solve and graph the following inequalities.

1. $2b + 4 < -10$

$$\begin{array}{r} -4 \quad -4 \\ \hline \frac{2b}{2} < \frac{-14}{2} \end{array}$$

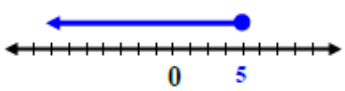
$b < -7$



2. $12 \leq 3b - 3$

$$\begin{array}{r} +3 \quad +3 \\ \hline \frac{15}{3} \leq \frac{3b}{3} \end{array}$$

$5 \leq b$

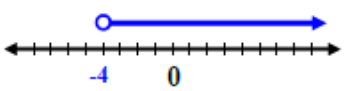


3. $-b - 6 < -2$

$$\begin{array}{r} +6 \quad +6 \\ \hline \frac{-b}{-1} > \frac{4}{-1} \end{array}$$

divide by −, change the sign

$b > -4$



Volume 1 Issue 3

Math 7
Unit 3 Ratios and Proportional Relationships

Dear Parents,
Below is information regarding Unit 3, Ratios and Proportional Relationships. Look for additional newsletters for future units.

By the end of this unit, students will:

- Compute the unit rate.
- Solve unit rate problems that have fractional quantities.
- Determine if two ratios are in proportion (equivalent).
- Write and solve an equation from a proportional relationship.
- Solve multistep ratio problems using proportions. Focus on simple interest, tax, markups/downs, gratuities and commissions, and fees.
- Compute the actual size of a figure from a scale drawing.

Vocabulary

Constant of proportionality: The constant value of the ratio of two proportional quantities x and y; usually written y = kx, where k is the constant of proportionality. In a proportional relationship, y=kx, k is the constant of proportionality, which is the value of the ratio between y and x.

Direct Proportion (Direct Variation): The relation between two quantities whose ratio remains constant. When one variable increases the other increases proportionally: When one variable doubles the other doubles, when one variable triples the other triples, and so on. When A changes by some factor, then B changes by the same factor: *A=kB*, where k is the constant of proportionality.

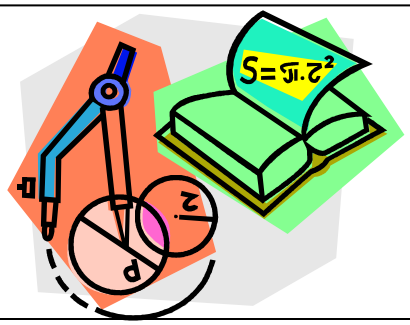
Multiplicative inverse: Two numbers whose product is 1. Example: $(3/4)$ and $(4/3)$ are multiplicative inverses of one another because $(3/4) \times (4/3) = (4/3) \times (3/4) = 1$.

Proportion: An equation stating that two ratios are equivalent.

Ratio: A comparison of two numbers using division. The ratio of a to b (where b ≠ 0) can be written as a to b, as (a/b), or as a:b.

Scale factor: A ratio between two sets of measurements.

Unit Rate: the ratio or comparison of two measurements in which the denominator or 2nd measurement is equal to one.
http://intermath.coe.uga.edu/



Textbook Connection

McGraw Hill Georgia Math Grade 7: Chapter 5 Lessons 1-7, 9 and Chapter 6
McGraw Hill Textbook Online:
connected.mcgraw-hill.com

Web Resources

- Dividing decimals
- Ratios
- Rates
- Solving Proportions
- Math Dictionary for Kids (online)
- Intermath (Interactive Mathematics Dictionary for middle school)
- Simple Interest
- Tax

Instructional Videos:

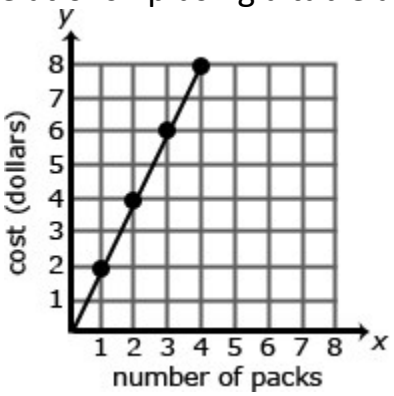
- Unit Rates and Unit Ratios
- Fraction Tutorials
- Similar Figures and Proportions

Written Tutorials:

- Word Problems - Proportions

Practice Problems

1) Find the unit rate & explain what it represents: 5 gallons of gas cost $17.50.
2) A meal at Applebee's came to $17.50. How much would a 15% tip be for the server?
3) A scale drawing of a room measures 5" x 6". If 1 inch = 2 feet, then what are the actual dimensions of the room?
4) The graph below represents the cost of gum packs as a unit rate of $2 dollars for every pack of gum. The unit rate is represented as $2 per pack. Represent the relationship using a table and an equation.



Answers

1) $\frac{5 \text{ gallons}}{\$17.50} = \frac{1 \text{ gallon}}{\$3.50}$; 1 gallon of gas costs $3.50
2) $17.50(0.15) ≈ $2.63
3) $\frac{1 \text{ inch}}{2 \text{ feet}} = \frac{5 \text{ inches}}{x \text{ feet}}$, x = 10 feet; $\frac{1 \text{ inch}}{2 \text{ feet}} = \frac{6 \text{ inches}}{x \text{ feet}}$, x = 12 feet; the actual room dimensions are 10' x 12'
4)

Number of Packs of Gum	Cost in Dollars
0	0
1	2
2	4
3	6
4	8

Equation: $d = 2g$, where *d* is the cost in dollars and g is the packs of gum.

Volume 1 Issue 4

Math 7
Unit 4 Geometry

Dear Parents,
Below is information regarding Unit 4, Geometry. Look for additional newsletters for future units.

Geometry

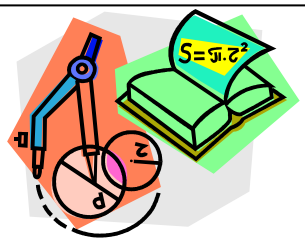
By the end of this unit, students will be able to:

- Draw geometric shapes with given conditions (focus on triangles).
- Describe 2-D figures that result from slicing 3-D figures (prisms, pyramids, cones, cylinders & spheres).
- Use the formulas for the area and circumference of a circle to solve problems.
- Use facts about supplementary, complementary, vertical and adjacent angles in a multi-step problem to find an unknown angle measure.
- Solve real-world problems involving area, volume and surface area of 2-D & 3-D objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

Vocabulary

- **Adjacent Angle:** Angles in the same plane that have a common vertex and a common side, but no common interior points.
- **Circumference:** The distance around a circle.
- **Complementary Angle:** Two angles whose sum is 90 degrees.
- **Congruent:** Having the same size, shape and measure. $\angle A \cong \angle B$ denotes that $\angle A$ is congruent to $\angle B$.
- **Cross- section:** A plane figure obtained by slicing a solid with a plane.
- **Irregular Polygon:** A polygon with sides not equal and/or angles not equal.
- **Parallel Lines:** Two lines are parallel if they lie in the same plane and they do not intersect. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ denotes that $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$.
- **Pi:** The relationship of the circle's circumference to its diameter, when used in calculations, pi is typically approximated as 3.14; the relationship between the circumference (C) and diameter (d), $\frac{C}{d} \approx 3\frac{1}{7}$ or 3.14
- **Regular Polygon:** A polygon with all sides equal (equilateral) and all angles equal (equiangular).
- **Supplementary Angle:** Two angles whose sum is 180 degrees.
- **Vertical Angles:** Two nonadjacent angles formed by intersecting lines or segments. Also called opposite angles.

http://intermath.coe.uga.edu/dictnary/homepg.asp
http://www.teachers.ash.org.au/jeather/maths/dictionary.html



Textbook Connection

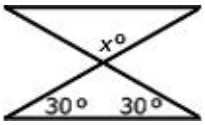
McGraw Hill Georgia Math Grade 7: Chapter 8 Lessons 1-5; Chapter 9 Lessons 1-4, 6-8
Textbook Online: connected.mcgraw-hill.com

Web Resources

- http://www.mathsisfun.com/geometry/construct-ruler-compass-1.html
- http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7i5/bk7_5i5.htm
- www.learner.org/channel/courses/learningmath/geometry/session9/part_c/index.html
- http://illuminations.nctm.org/LessonDetail.aspx?id=U166
- http://illuminations.nctm.org/ActivityDetail.aspx?ID=116 circumference
- http://www.uen.org/Lessonplan/preview.cgi?LPid=23360 entire lesson plan area/circum.
- http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/
- http://www.learner.org/interactives/geometry/area.html surface area/volume
- http://www.analyzemath.com/Geometry/angles.html
- http://www.mathsisfun.com/geometry/vertical-angles.html
- http://www.mathsisfun.com/geometry/adjacent-angles.html

Practice Problems

1) Find the measure of angle *x*.



2) Draw an isosceles triangle with only one eighty degree angle. Is this the only possibility or can another triangle be drawn that will meet these conditions?

3) A triangle has an area of 6 square feet. The height is four feet. What is the length of the base?

4) What is the face shape created from cuts made parallel to the base of a rectangular pyramid?

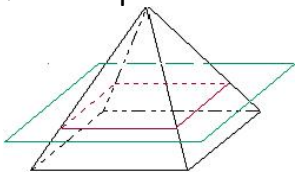
Answers

1) First, find the missing angle measure of the bottom triangle (180 – 30 – 30 = 120). Since the 120 is a vertical angle to *x*, the measure of *x* is also 120°.

2) Through exploration, students recognize that the sum of the angles of any triangle will be 180 degrees.

3) One possible solution is to use the formula for the area of a triangle and substitute in the known values, then solve for the missing dimension. The length of the base is 3 ft.

4) If the pyramid shown is cut parallel to the base, the resulting face shape is a rectangle.



Volume 1 Issue 5

Math 7
Unit 5: Inferences

Dear Parents,
In this unit your child will learn how to quantify data, and how to organize and display it in different ways. Your child will also learn about **populations** and **samples**. When information is being gathered about a group, such as all registered voters, that entire group is called a population. Because it can be difficult or impossible to research all members of a population, we often choose a part of a population, called a sample, to study. The way a sample is chosen affects how well it represents the entire population. A **random sample**, in which each member of the population has an equal chance of being chosen, is more representative than a **biased sample**. Students will also make use of the box and whiskers plot which displays the upper and lower extreme, the upper and lower quartile, and the median to enable them to make inferences.

Inferences

By the end of this unit, students will:

- Understand how statistics is used to gain information about populations.
- Use data from a random sample to draw inferences about populations.
- Assess the degree of visual overlap of 2 numerical data distributions with similar variability.
- Use measures of center & measures of variability to draw informal comparative inferences about 2 populations.

Vocabulary

- **Box and Whisker Plot**: A diagram that summarizes data using the median, the upper and lowers quartiles, and the extreme values (minimum and maximum). Box and whisker plots are also known as box plots. It is constructed from the five-number summary of the data: Minimum, Q1 (lower quartile), Q2 (median), Q3 (upper quartile), Maximum.
- **Frequency**: the number of times an item, number, or event occurs in a set of data
- **Grouped Frequency Table**: The organization of raw data in table form with classes and frequencies.
- **Histogram**: a way of displaying numeric data using horizontal or vertical bars so that the height or length of the bars indicates frequency
- **Inter-Quartile Range (IQR)**: The difference between the first and third quartiles. (Note that the first quartile and third quartiles are sometimes called upper and lower quartiles.)
- **Maximum value**: The largest value in a set of data.
- **Mean Absolute Deviation:** the average distance of each data value from the mean. The MAD is a gauge of "on average" how different the data values are form the mean value.

$$MAD = \frac{total\ distance\ from\ the\ mean\ for\ all\ values}{number\ of\ data\ values}$$

- **Mean**: The "average" or "fair share" value for the data. The mean is also the balance point of the corresponding data distribution.

$$arithmetic\ mean = \bar{x} = \frac{x_1 + x_2 + x_3 + \cdots x_n}{n}$$

- **Measures of Center**: The mean and the median are both ways to measure the center for a set of data.
- **Measures of Spread**: The range and the mean absolute deviation are both common ways to measure the spread for a set of data.
- **Median**: The value for which half the numbers are larger and half are smaller. If there are two middle numbers, the median is the arithmetic mean of the two middle numbers. Note: The median is a good choice to represent the center of a distribution when the distribution is skewed or outliers are present.
- **Minimum value**: The smallest value in a set of data.

- **Mutually Exclusive**: two events are mutually exclusive if they cannot occur at the same time (i.e., they have not outcomes in common).
- **Outlier**: A value that is very far away from most of the values in a data set.
- **Range**: A measure of spread for a set of data. To find the range, subtract the smallest value from the largest value in a set of data.
- **Sample:** A part of the population that we actually examine in order to gather information.
- **Simple Random Sampling**: Consists of individuals from the population chosen in such a way that every set of individuals has an equal chance to be a part of the sample actually selected. Poor sampling methods, that are not random and do not represent the population well, can lead to misleading conclusions.

Textbook Connection

McGraw Hill Georgia Math Grade 7: Chapter 7
McGraw Hill Textbook Online: connected.mcgraw-hill.com

Web Resources

Vocabulary Online: List One List Two Online Quiz Measures of Center
Instructional Videos:

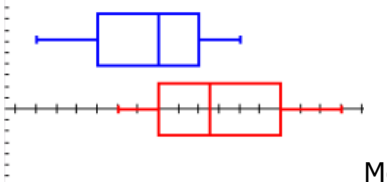
- Mean, Median, Mode, Range
- Choosing the best method to describe a set of data
- The effect of outliers

Online Sites:
http://moodle.oakland.k12.mi.us/os/mod/book/tool/print/index.php?id=25497 (measures of center)
https://www.youtube.com/watch?v=TdzrQqqFXW4 (measures of variation)

Practice Problem

In a golf tournament, the top 6 men's & women's scores are given. Compare the spread of the data.
Men's: 65, 68, 70, 72, 73, 75
Women's: 69, 71, 73, 74, 77, 80

Answer



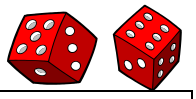
Men's=blue Women's=red

The range of the women's scores is greater than the range of men's scores by 1. Neither graphs appear symmetrical. The men's skews left while the women's skews right and the men's median is lower than the women's. 50% of the men's lowest scores fall in the range of the lowest 25% of women's scores. The interquartile range for the men's is 5 with a median of 71, while the women's interquartile range is 6 with a median of 73.5. Overall, the men had better scores than the women.

Volume 1 Issue 6

Math 7
Unit 6 Probability

Dear Parents,
Below is information regarding Unit 6, Probability.



Probability

By the end of this unit, students will be able to:

- Investigate chance processes and develop, use, and evaluate probability models
- Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation
- Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy
- Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability

Vocabulary

- **Chance Process:** The repeated observations of random outcomes of a given event.
- **Compound Event:** Any event which consists of more than one outcome.
- **Empirical:** A probability model based upon observed data generated by the process. Also, referred to as the experimental probability.
- **Event:** Any possible outcome of an experiment in probability. Any collection of outcomes of an experiment. Formally, an event is any subset of the sample space.
- **Experimental Probability:** The ratio of the number of times an outcome occurs to the total amount of trials performed.

$$Experimental\ Probability = \frac{\text{The number of times an event occurs}}{\text{The total number of trials}}$$

- **Independent events:** Two events are independent if the occurrence of one of the events gives us no information about whether or not the other event will occur; that is, the events have no influence on each other.
- **Probability:** A measure of the likelihood of an event. It is the ratio of the number of ways a certain event can occur to the number of possible outcomes.
- **Probability Model:** It provides a probability for each possible non-overlapping outcome for a change process so that the total probability over all such outcomes is unity. This can be either theoretical or experimental.
- **Relative Frequency of Outcomes:** Also, Experimental Probability
- **Sample space:** All possible outcomes of a given experiment.
- **Simple Event:** Any event which consists of a single outcome in the sample space. A simple event can be represented by a single branch of a tree diagram.
- **Simulation:** A technique used for answering real-world questions or making decisions in complex situations where an element of chance is involved.
- **Theoretical Probability**: The mathematical calculation that an event will happen in theory. It is based on the structure of the processes and its outcomes.
- **Tree diagram:** A tree-shaped diagram that illustrates sequentially the possible outcomes of a given event.
  - http://intermath.coe.uga.edu/dictnary/homepg.asp

Textbook Connection

McGraw Hill Georgia Math Grade 7: Chapter 10
McGraw Hill Textbook Online: connected.mcgraw-hill.com

Web Resources

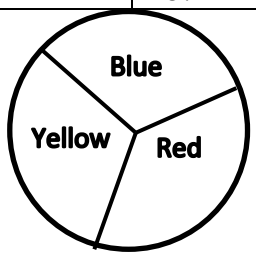
- Random Dice Simulator This simulator allows students to roll up to six dice at a time.
- Random Coin Flipper This site allows you to flip virtual coins
- Adjustable Spinner
- http://mathforum.org/dr.math/faq/faq.prob.intro.html
- http://mathforum.org/dr.math/faq/faq.prob.world.html
- https://www.mathgoodies.com/lessons/vol6/intro_probability

Practice Problems

1) The probability of snow is P(snow) =30% = 0.3. What is the probability that it will not snow?

2)You can estimate the probability of an event by using experimental methods. After 1000 spins of the spinner, the following information was recorded. Estimate the probability of the spinner landing on red.

Outcome	Blue	Red	Yellow
Spins	448	267	285



3)You roll a pair of fair 6-sided dice. Create a table.

a. What is the probability that the sum of the numbers rolled will be 9?
b. What is the probability that the sum of the numbers will be less than 15?
c. What is the probability that the sum of the numbers will be odd?

Answers

1) The probabilities must add to 1, so the probability of no snow is P(no snow) = 1 – 0.3 = 0.7, or 70%.

2) Probability ≈ $\frac{\text{number of spins that land on red}}{\text{total number of spins}} = \frac{267}{1000} = 0.267$

3)a) There are 36 possible outcomes (sums) and 4 of them are equal to 9. So, the probability of rolling a sum of 9: P(sum of 9)= $\frac{4}{36} = \frac{1}{9}$.

b) Out of 36 possible outcomes (sums), all the sums are less than 15. So, the probability of rolling a sum less than 15: P(sum less than 15)= $\frac{36}{36}$ =1 or 100%.

c) Out of 36 possible outcomes (sums), 18 sums are odd numbers. So, the probability of rolling an odd sum: P(odd number sum)= $\frac{18}{36} = \frac{1}{2}$ or 50%.

Volume 1 Issue 1

Math 78
Unit 1 Geometry

Dear Parents,
Below is information regarding Unit 1, Geometry. Look for additional newsletters for future units.

Geometry

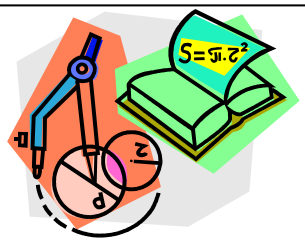
By the end of this unit, students will be able to:

- Draw geometric shapes with given conditions (focus on triangles).
- Describe 2-D figures that result from slicing 3-D figures (prisms, pyramids, cones, cylinders & spheres).
- Use the formulas for the area and circumference of a circle to solve problems.
- Use facts about supplementary, complementary, vertical and adjacent angles in a multi-step problem to find an unknown angle measure.
- Solve real-world problems involving area, volume and surface area of 2-D & 3-D objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

Vocabulary

- **Adjacent Angle:** Angles in the same plane that have a common vertex and a common side, but no common interior points.
- **Circumference:** The distance around a circle.
- **Complementary Angle:** Two angles whose sum is 90 degrees.
- **Congruent:** Having the same size, shape and measure. $\angle A \cong \angle B$ denotes that $\angle A$ is congruent to $\angle B$.
- **Cross- section:** A plane figure obtained by slicing a solid with a plane.
- **Irregular Polygon:** A polygon with sides not equal and/or angles not equal.
- **Parallel Lines:** Two lines are parallel if they lie in the same plane and they do not intersect. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ denotes that $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$.
- **Pi:** The relationship of the circle's circumference to its diameter, when used in calculations, pi is typically approximated as 3.14; the relationship between the circumference (C) and diameter (d), $\frac{C}{d} \approx 3\frac{1}{7}$ or 3.14
- **Regular Polygon:** A polygon with all sides equal (equilateral) and all angles equal (equiangular).
- **Supplementary Angle:** Two angles whose sum is 180 degrees.
- **Vertical Angles:** Two nonadjacent angles formed by intersecting lines or segments. Also called opposite angles.

http://intermath.coe.uga.edu/dictnary/homepg.asp
http://www.teachers.ash.org.au/jeather/maths/dictionary.html



Textbook Connection

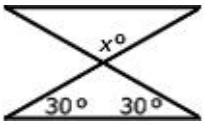
McGraw Hill Georgia Math Grade 7 Plus:
Chapter 2 Lessons 1-8, 10-12
Textbook Online: connected.mcgraw-hill.com

Web Resources

- http://www.mathsisfun.com/geometry/construct-ruler-compass-1.html
- http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7i5/bk7_5i5.htm
- www.learner.org/channel/courses/learningmath/geometry/session9/part_c/index.html
- http://illuminations.nctm.org/LessonDetail.aspx?id=U166
- http://illuminations.nctm.org/ActivityDetail.aspx?ID=116 circumference
- http://www.uen.org/Lessonplan/preview.cgi?LPid=23360 entire lesson plan area/circum.
- http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/
- http://www.learner.org/interactives/geometry/area.html surface area/volume
- http://www.analyzemath.com/Geometry/angles.html
- http://www.mathsisfun.com/geometry/vertical-angles.html
- http://www.mathsisfun.com/geometry/adjacent-angles.html

Practice Problems

1) Find the measure of angle *x*.



2) Draw an isosceles triangle with only one eighty degree angle. Is this the only possibility or can another triangle be drawn that will meet these conditions?

3) A triangle has an area of 6 square feet. The height is four feet. What is the length of the base?

4) What is the face shape created from cuts made parallel to the base of a rectangular pyramid?

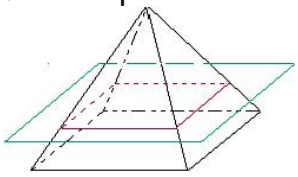
Answers

1) First, find the missing angle measure of the bottom triangle (180 – 30 – 30 = 120). Since the 120 is a vertical angle to *x*, the measure of *x* is also 120°.

2) Through exploration, students recognize that the sum of the angles of any triangle will be 180 degrees.

3) One possible solution is to use the formula for the area of a triangle and substitute in the known values, then solve for the missing dimension. The length of the base is 3 ft.

4) If the pyramid shown is cut parallel to the base, the resulting face shape is a rectangle.



Volume 1 Issue 2

Math 78
Unit 2: Inferences

Dear Parents,
In this unit your child will learn how to quantify data, and how to organize and display it in different ways. Your child will also learn about **populations** and **samples**. When information is being gathered about a group, such as all registered voters, that entire group is called a population. Because it can be difficult or impossible to research all members of a population, we often choose a part of a population, called a sample, to study. The way a sample is chosen affects how well it represents the entire population. A **random sample**, in which each member of the population has an equal chance of being chosen, is more representative than a **biased sample**. Students will also make use of the box and whiskers plot which displays the upper and lower extreme, the upper and lower quartile, and the median to enable them to make inferences.

Inferences

By the end of this unit, students will:

- Understand how statistics is used to gain information about populations.
- Use data from a random sample to draw inferences about populations.
- Assess the degree of visual overlap of 2 numerical data distributions with similar variability.
- Use measures of center & measures of variability to draw informal comparative inferences about 2 populations.

Vocabulary

- **Box and Whisker Plot**: A diagram that summarizes data using the median, the upper and lowers quartiles, and the extreme values (minimum and maximum). Box and whisker plots are also known as box plots. It is constructed from the five-number summary of the data: Minimum, Q1 (lower quartile), Q2 (median), Q3 (upper quartile), Maximum.
- **Frequency**: the number of times an item, number, or event occurs in a set of data
- **Grouped Frequency Table**: The organization of raw data in table form with classes and frequencies.
- **Histogram**: a way of displaying numeric data using horizontal or vertical bars so that the height or length of the bars indicates frequency
- **Inter-Quartile Range (IQR)**: The difference between the first and third quartiles. (Note that the first quartile and third quartiles are sometimes called upper and lower quartiles.)
- **Maximum value**: The largest value in a set of data.
- **Mean Absolute Deviation:** the average distance of each data value from the mean. The MAD is a gauge of "on average" how different the data values are form the mean value.

$$MAD = \frac{total\ distance\ from\ the\ mean\ for\ all\ values}{number\ of\ data\ values}$$

- **Mean**: The "average" or "fair share" value for the data. The mean is also the balance point of the corresponding data distribution.

$$arithmetic\ mean = \bar{x} = \frac{x_1 + x_2 + x_3 + \cdots x_n}{n}$$

- **Measures of Center**: The mean and the median are both ways to measure the center for a set of data.
- **Measures of Spread**: The range and the mean absolute deviation are both common ways to measure the spread for a set of data.
- **Median**: The value for which half the numbers are larger and half are smaller. If there are two middle numbers, the median is the arithmetic mean of the two middle numbers. Note: The median is a good choice to represent the center of a distribution when the distribution is skewed or outliers are present.
- **Minimum value**: The smallest value in a set of data.

- **Mutually Exclusive**: two events are mutually exclusive if they cannot occur at the same time (i.e., they have not outcomes in common).
- **Outlier**: A value that is very far away from most of the values in a data set.
- **Range**: A measure of spread for a set of data. To find the range, subtract the smallest value from the largest value in a set of data.
- **Sample:** A part of the population that we actually examine in order to gather information.
- **Simple Random Sampling**: Consists of individuals from the population chosen in such a way that every set of individuals has an equal chance to be a part of the sample actually selected. Poor sampling methods, that are not random and do not represent the population well, can lead to misleading conclusions.

Textbook Connection

McGraw Hill Georgia Math Grade 7: Chapter 7
McGraw Hill Textbook Online: connected.mcgraw-hill.com

Web Resources

Vocabulary Online: List One List Two Online Quiz Measures of Center
Instructional Videos:

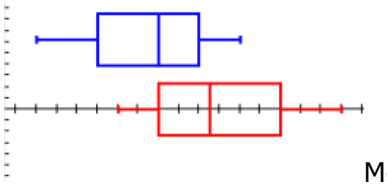
- Mean, Median, Mode, Range
- Choosing the best method to describe a set of data
- The effect of outliers

Online Sites:
http://moodle.oakland.k12.mi.us/os/mod/book/tool/print/index.php?id=25497 (measures of center)
https://www.youtube.com/watch?v=TdzrQqqFXW4 (measures of variation)

Practice Problem

In a golf tournament, the top 6 men's & women's scores are given. Compare the spread of the data.
Men's: 65, 68, 70, 72, 73, 75
Women's: 69, 71, 73, 74, 77, 80

Answer



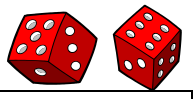
Men's=blue Women's=red

The range of the women's scores is greater than the range of men's scores by 1. Neither graphs appear symmetrical. The men's skews left while the women's skews right and the men's median is lower than the women's. 50% of the men's lowest scores fall in the range of the lowest 25% of women's scores. The interquartile range for the men's is 5 with a median of 71, while the women's interquartile range is 6 with a median of 73.5. Overall, the men had better scores than the women.

Volume 1 Issue 3

Math 78
Unit 3 Probability

Dear Parents,
Below is information regarding Unit 6, Probability.



Probability

By the end of this unit, students will be able to:

- Investigate chance processes and develop, use, and evaluate probability models
- Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation
- Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy
- Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability

Vocabulary

- **Chance Process:** The repeated observations of random outcomes of a given event.
- **Compound Event:** Any event which consists of more than one outcome.
- **Empirical:** A probability model based upon observed data generated by the process. Also, referred to as the experimental probability.
- **Event:** Any possible outcome of an experiment in probability. Any collection of outcomes of an experiment. Formally, an event is any subset of the sample space.
- **Experimental Probability:** The ratio of the number of times an outcome occurs to the total amount of trials performed.

$$Experimental\ Probability = \frac{\text{The number of times an event occurs}}{\text{The total number of trials}}$$

- **Independent events:** Two events are independent if the occurrence of one of the events gives us no information about whether or not the other event will occur; that is, the events have no influence on each other.
- **Probability:** A measure of the likelihood of an event. It is the ratio of the number of ways a certain event can occur to the number of possible outcomes.
- **Probability Model:** It provides a probability for each possible non-overlapping outcome for a change process so that the total probability over all such outcomes is unity. This can be either theoretical or experimental.
- **Relative Frequency of Outcomes:** Also, Experimental Probability
- **Sample space:** All possible outcomes of a given experiment.
- **Simple Event:** Any event which consists of a single outcome in the sample space. A simple event can be represented by a single branch of a tree diagram.
- **Simulation:** A technique used for answering real-world questions or making decisions in complex situations where an element of chance is involved.
- **Theoretical Probability**: The mathematical calculation that an event will happen in theory. It is based on the structure of the processes and its outcomes.
- **Tree diagram:** A tree-shaped diagram that illustrates sequentially the possible outcomes of a given event.
  - http://intermath.coe.uga.edu/dictnary/homepg.asp

Textbook Connection

McGraw Hill Georgia Math Grade 7: Chapter 10
McGraw Hill Textbook Online: connected.mcgraw-hill.com

Web Resources

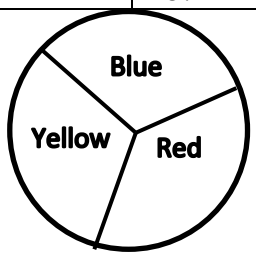
- Random Dice Simulator This simulator allows students to roll up to six dice at a time.
- Random Coin Flipper This site allows you to flip virtual coins
- Adjustable Spinner
- http://mathforum.org/dr.math/faq/faq.prob.intro.html
- http://mathforum.org/dr.math/faq/faq.prob.world.html
- https://www.mathgoodies.com/lessons/vol6/intro_probability

Practice Problems

1) The probability of snow is P(snow) =30% = 0.3. What is the probability that it will not snow?

2)You can estimate the probability of an event by using experimental methods. After 1000 spins of the spinner, the following information was recorded. Estimate the probability of the spinner landing on red.

Outcome	Blue	Red	Yellow
Spins	448	267	285



3)You roll a pair of fair 6-sided dice. Create a table.

a. What is the probability that the sum of the numbers rolled will be 9?
b. What is the probability that the sum of the numbers will be less than 15?
c. What is the probability that the sum of the numbers will be odd?

Answers

1) The probabilities must add to 1, so the probability of no snow is P(no snow) = 1 – 0.3 = 0.7, or 70%.

2) Probability ≈ $\frac{\text{number of spins that land on red}}{\text{total number of spins}} = \frac{267}{1000} = 0.267$

3)a) There are 36 possible outcomes (sums) and 4 of them are equal to 9. So, the probability of rolling a sum of 9: P(sum of 9)= $\frac{4}{36} = \frac{1}{9}$.

b) Out of 36 possible outcomes (sums), all the sums are less than 15. So, the probability of rolling a sum less than 15: P(sum less than 15)= $\frac{36}{36}$ =1 or 100%.

c) Out of 36 possible outcomes (sums), 18 sums are odd numbers. So, the probability of rolling an odd sum: P(odd number sum)= $\frac{18}{36} = \frac{1}{2}$ or 50%.

Math 78
Unit 4 Transformations, Congruence & Similarity

Volume 1 Issue 4

References

Glencoe Grade 7 Plus Text Connection: Volume 1, Chapter 4 Lessons 1-6; Chapter 5 Lessons 1-3, 5

Glencoe/McGraw-Hill Text Online: connectED.mcgraw-hill.com

Apps available using mheonline.com/apps

Links:

http://www.shodor.org/interactivate/activities/TransmographerTwo/

http://mathbitsnotebook.com/Geometry/Transformations/TRRigidTransformations.html

http://www.xpmath.com/forums/arcade.php?do=play&gameid=115

http://www.sciencekids.co.nz/gamesactivities/math/transformation.html

https://www.mathgames.com/skill/8.17-identify-reflections-rotations-and-translations

https://www.mathgames.com/skill/8.46-

Dear Parents

Welcome to the new school year! We are eager to work with you and your students as we learn new mathematical concepts. In the classroom, students will frequently work on tasks and activities to discover and apply mathematical thinking. Students will be expected to explain or justify their answers and to write clearly and properly. Mathematical content will be organized into units following the Georgia grade 8 curriculum map.

Concepts Students will Use and Understand:

- Develop the concept of transformations and the effects that each type of transformation has on an object;
- Explore the relationship between the original figure and its image in regards to their corresponding parts being moved an equal distance which leads to concept of congruence of figures;
- Learn to describe transformations with both words and numbers;
- Relate rigid motions to the concept of symmetry and to use them to prove congruence or similarity of two figures;
- Physically manipulate figures to discover properties of similar and congruent figures; and
- Focus on the sum of the angles of a triangle and use it to find the measures of angles formed by transversals (especially with parallel lines), find the measures of exterior angles of triangles, and to informally prove congruence.

Vocabulary

Alternate Exterior Angles: Alternate exterior angles are pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on opposite sides of the transversal and are outside the other two lines. When the two other lines are parallel, the alternate exterior angles are equal.
Alternate Interior Angles: Alternate interior angles are pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on opposite sides of the transversal and are in between the other two lines. When the two other lines are parallel, the alternate interior angles are equal.
Angle of Rotation: The amount of rotation about a fixed point.
Congruent Figures: Figures that have the same size and shape
Corresponding Sides: Sides that have the same relative positions in geometric figures
Corresponding Angles: Angles that have the same relative positions in geometric figures
Dilation: Transformation that changes the size of a figure, but not the shape
Linear Pair: Adjacent, supplementary angles. Excluding their common side, a linear pair forms a straight line.
Reflection: A transformation that "flips" a figure over a line of reflection
Reflection Line: A line that is the perpendicular bisector of the segment with endpoints at a pre-image point and the image of that point after a reflection.
Rotation: A transformation that turns a figure about a fixed point through a given angle and a given direction

Same-Side Interior Angles: Pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on the same side of the transversal and are between the other two lines. When the two other lines are parallel, same-side interior angles are supplementary.

transversal-of-parallel-lines

https://matchthememory.com/Anglenameschapter3

http://www.mymathsroom.com/anglePairs.html

http://www.mathsisfun.com/geometry/parallel-lines.html

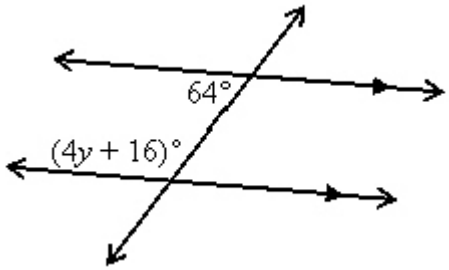
Same-Side Exterior Angles: Pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on the same side of the transversal and are outside the other two lines. When the two other lines are parallel, same-side exterior angles are supplementary.
Scale Factor: The ratio of any two corresponding lengths of the sides of two similar figures
Similar Figures: Figures that have the same shape but not necessarily the same size
Transformation: The mapping, or movement, of all the points of a figure in a plane according to a common operation
Translation: A transformation that "slides" each point of a figure the same distance in the same direction
Transversal: A line that crosses two or more lines

Additional Vocabulary Help:

http://intermath.coe.uga.edu/

Examples:

1. Define and describe two types of dilations.
2. What would be the new coordinates of (2,4), (3,5), (4,3) and (3,2) if you graphed them on a coordinate plane and rotated them 90° about the origin? What quadrant is the new figure in?
3. What is the value of *y* in the figure below? What is measure of the angle 4y + 16?



Key:

1. A dilation changes the size of a figure, but not the shape. A dilation could be an enlargement or reduction of a figure.
2. The new coordinates would be: (-3,4), (-5,3), (-4,2), (-2,3) in quadrant II.
3. 4y + 16 + 64 = 180; 4y + 80 = 180; 4y = 100; y = 25; measure of the angle is 116.

Math 78
Unit 5 Exponents

Volume 1 Issue 5

References

Glencoe/McGraw-Hill Grade 7 Plus: Chapter 3 Lessons 1-10; Chapter 4 Lessons 1-5

Textbook Online: connectED.mcgraw-hill.com

Helpful Links:

https://mathbitsnotebook.com/Algebra1/RatIrratNumbers/RNRatIrrat.html

http://www.math-play.com/rational-and-irrational-numbers-game/rational-and-irrational-numbers-game.html

https://www.mangahigh.com/en-us/math_games/number/exponents/square_and_cube_roots

http://www.math-play.com/square-root-game.html

https://www.mathgames.com/skill/8.22-convert-between-standard-and-scientific-notation

http://www.math-play.com/Scientific-Notation-Concentration/Scientific-Notation-Concentration.html

Dear Parents

Below you will find a list of concepts that your child will use and understand while completing Unit 5 Exponents. Also included are references, vocabulary and examples that will help you assist your child at home.

Concepts Students will Use and Understand

- An irrational number is a real number that can not be written as a ratio of two integers.
- All real numbers can be plotted on a number line.
- Exponents are useful for representing very large or very small numbers.
- Square roots can be rational or irrational.
- Some properties of real numbers hold for all irrational numbers.
- Solving multi-step equations
- Evaluate square and cubed roots

Vocabulary

Additive Inverse: The sum of a number and its additive inverse is zero. Also called the opposite of a number. Example: 5 and -5 are additive inverses of each other.
Irrational number: A real number whose decimal form is non-terminating and non-repeating that cannot be written as the ratio of two integers.
Radical: A symbol ($\sqrt{\ }$)that is used to indicate square roots.
Rational number: A number that can be written as the ratio of two integers with a nonzero denominator.
Scientific Notation (Exponential Notation): A representation of real numbers as the product of a number between 1 and 10 and a power of 10, used primarily for very large or very small numbers.
Square root: One of two equal factors of a nonnegative number. For example, 5 is a square root of 25 because 5•5 = 25. Another square root of 25 is -5 because (-5)•(-5) = 25. The +5 is called the principle square root
Addition property of equality: Adding the same number to each side of an equation produces an equivalent expression.
Additive inverse: The sum of a number and its additive inverse is zero
Inverse operation: Pairs of operations that undo each other.
Multiplication property of equality: States that when both sides of an equation are multiplied by the same number, the remaining expressions are still equal.
Multiplicative inverse: Numbers are multiplicative inverses of each other if they multiply to equal the identity, 1.

Try http://intermath.coe.uga.edu/ for additional help.

Math 8 Unit 2 Exponents Practice Problems

Example 1

1. Simplify the following without negative exponents:
   a. 4^{-2}
   b. $\dfrac{3^2 x}{2^{-3} x^{-2}}$
   c. $7a^{-4}b^3y^{-2}$
2. Change to standard form: 8.51×10^{-2}
3. Change to scientific notation: 107,000,000,000

Example 2

4. Find the following square roots, graph the results on a number line and explain why each result is rational or irrational:
   a. $\sqrt{144}$
   b. $\sqrt{56}$
5. Estimate the square root of 18.
6. What are the two square roots of 36?
7. Find the following cube roots: a) $\sqrt[3]{8}$ b) $\sqrt[3]{27}$

Example 3

8. Solve the following equation: $2x + 3(4x - 3) = 8 - 3x$

Answer Key

Example 1

1 a. $\dfrac{1}{16}$
b. $72x^3$
c. $\dfrac{7b^3}{a^4y^2}$

2. 0.0851
3. 1.07×10^{11}

Example 2

4. a. 12, rational because it can be written as a ratio.
   b. about 7.48, irrational because the exact value is a non-terminating, non-repeating decimal.
5. Between 4 and 5; closer to 4; about 4.2
6. ± 6
7. a) 2 b) 3

Example 3

8. x = 1

Volume 1 Issue 6

MATH 78 Unit 6
Geometric Applications of Exponents

Dear Parents,
Below are examples of what your child is learning in Unit 6. Look for future newsletters.

Students will be able to:

- Explain the proof of the Pythagorean Theorem and its converse.
- Apply the Pythagorean Theorem to determine lengths of sides of right triangles with 2 or 3 dimensions or the distance between 2 coordinates.
- Apply the formulas for volumes of cones, cylinders and spheres
- Use volume formulas to solve real-world problems.
- Use square roots and cube roots to represent solutions to equations.

Vocabulary

Altitude of a triangle: The perpendicular distance between a vertex of a triangle and the side opposite that vertex. Sometimes called the height
Base (of a polygon): the bottom side, on which the polygon 'sits,
Cone: A three dimensional figure with a circular or elliptical base and one vertex.
Cylinder: A three dimensional object with two parallel, congruent, circular bases.
Diameter: The distance across a circle through its center. The line segment that includes the center and whose endpoints lie on the circle.
Distance: The amount of space between two points or things. Distance is always a non-negative number.
Solid: A figure that has length, width, and thickness (i.e., a figure that is 3-dimensional).
Hypotenuse: In a right triangle, the side opposite to the right angle.
Leg: Either of the two shorter sides of a right triangle. These two sides together form the right angle in the right triangle.
Pythagorean Theorem: A theorem that states that in a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.
Pythagorean Triples: A set of three non-zero whole numbers, a, b, and c, such that $a^2 + b^2 = c^2$.
Sphere: The set of all points in space that are equidistant from a fixed point, called the center.
Radius: The distance from the center of a circle to any point on the circle.
Volume: The amount of space occupied by an object.

Try: http://intermath.coe.uga.edu/

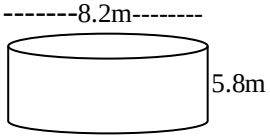
Resources:
Glencoe/McGraw Hill Georgia Math Grade 7 Plus
Volume 2 Unit 3: Chapter 8 Lessons 1-4 and Chapter 9 Lessons 1-3
Textbook Online: connectED.mcgraw-hill.com

Web resources:

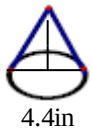
- www.aaaknow.com/geo.htm
- www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/?version=1.5.0_06&browser=MSIE&vendor=Sun_Microsystems_Inc.
- http://www.factmonster.com/ipka/A0876212.html
- https://mathbitsnotebook.com/Geometry/3DShapes/3DCylinders.html (exclude surface area)
- https://mathbitsnotebook.com/Geometry/3DShapes/3DCones.html (exclude surface area)
- https://mathbitsnotebook.com/Geometry/3DShapes/3DSpheres.html (exclude surface area)

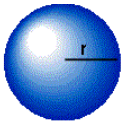
Practice Problems

1.) For the figure below, state its mathematical name, estimate its volume, then use formulas to compute the volume.



2.) For each figure below, state their mathematical names, estimate the volume, then compute the volume.





The radius is 4 ft.

3) A football field is 360 feet by 45 feet. How long is the walk from one corner diagonally to the opposite corner?

Answers to Practice Problems

1.) This is a cylinder. Its estimated volume is 3(4)(4)(6)=288m ². The volume is $V=\pi r^2 h$ =3.14(4.1²(5.8) ≈ 306.144m³.

2.) This is a cone. Its estimated volume is 28in³. By formula,

$V=\frac{1}{3}\pi r^2 h \approx \frac{1}{3}(3.14)(2.2^2)(7)=35.46in^3$

This is a sphere. Its estimated volume is 265cm³. By formula,

$V=\frac{4}{3}\pi r^3 = \frac{4}{3}\pi 4^3 = 268.08\, ft^3$ (2)(2)(3)=4cm³

3) Use the Pythagorean Theorem: 360² + 45² = c²; 129,600 + 2025 = c²; 131,625 = c²; c ≈ 362.8 feet

Math 78
Unit 7 Functions

Volume 1 Issue 4

References

Glencoe/McGraw-Hill Georgia Math 7 Plus Volume 2, Chapter 10 Lessons 1-2

Glencoe/Mcgraw-Hill, Georgia Math 8, Text Online: connected.mcgraw-hill.com

Challenges:

www.figurethis.org

Links:

- http://www.purplemath.com/modules/fcns.htm
- http://www.purplemath.com/modules/fcns2.htm
- http://www.shodor.org/interactivate1.0/lessons/fm2.html
- http://www.mathgoodies.com/lessons/vol6/independent_events.html
- https://mathbitsnotebook.com/Algebra1/Functions/FNFuncBasics.html
- https://mathbitsnotebook.com/Algebra1/Functions/FNDomainRange.html

Dear Parents

Below you will find a list of concepts that your child will use and understand while completing Unit 7: Functions. Also included are references, vocabulary and examples that will help you assist your child at home.

Concepts Students will Use and Understand

- Recognize a relation as a correspondence between varying quantities.
- Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.
- Distinguish between relations that are functions and those that are not functions.
- Recognize functions in a variety of representations and a variety of contexts.
- Identify relations and functions as linear or nonlinear.
- Translate among verbal, tabular, graphic, and algebraic representations of functions.

Vocabulary

Domain: The set of x-coordinates of the set of points on a graph; the set of x-coordinates of a given set of ordered pairs. The value that is the input in a function or relation.

Function: A rule of matching elements of two sets of numbers in which an input value from the first set has only one output value in the second set.

Graph of a Function: The set of all the points on a coordinate plane whose coordinates makes the rule of function true.

Input: The set of possible values for the first coordinate of a function (domain.)

Output: The set of possible values for the second coordinate of a function (range.)

Range: The y-coordinates of the set of points on a graph. Also, the y-coordinates of a given set of ordered pairs. The range is the output in a function or a relation.

Range of function: The set of all output values or the *y*-values of a function or a relation is called the range of the function or the relation.

Relation: A rule that gives an output number for every valid input number

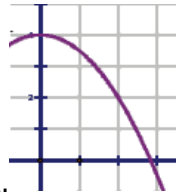
Additional Vocabulary Help:

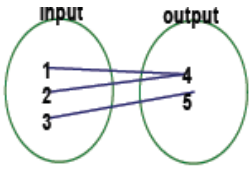
http://intermath.coe.uga.edu/

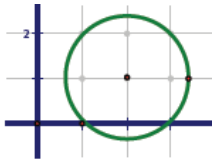
Math 8 Unit 4 Functions

Examples:

2. Graph the sequence on a coordinate plane: 2, 5, 8, 11, … (hint: the domain is the position of the term) Is the graph a function and is it linear or nonlinear?
3. What makes a relation a function?
4. Identify which of the following are functions:

A. 

B. 

C. 

D. y=3x+5

E. {senators, states}

F. {states, senators}

G. {(1,2), (2,3), (1,4), (4,1)}

Key

1. (1, 2), (2, 5), (3, 8), (4, 11); yes, a linear function.
2. A relation is a function when every input has one unique output.
3. A, B, D, E

Math 78
Unit 8 Linear Functions

Volume 1 Issue 8

References

Glencoe/McGraw-Hill Georgia Math Grade 8 Volume 2, Chapter 7 Lessons 4-10

Glencoe/McGraw-Hill Georgia Math Grade 8 Text Online: connectED.mcgraw-hill.com

Learning Links:

https://my.hrw.com/math11/math06_07/nsmedia/lesson_videos/alg1/player.html?contentSrc=6344/6344.xml

https://my.hrw.com/math11/math06_07/nsmedia/lesson_videos/alg1/player.html?contentSrc=7506/7506.xml

http://mathbitsnotebook.com/Algebra1/LinearEquations/LELineEquations.html

http://mathbitsnotebook.com/Algebra1/LinearEquations/LEGraphiLines.html

https://my.hrw.com/math11/math06_07/nsmedia/lesson_videos/alg1/player.html?contentSrc=6347/6347.xml

Dear Parents

Below you will find a list of concepts that your child will use and understand while completing Unit 5 Linear Functions. Also included are references, vocabulary and examples that will help you assist your child at home.

Concepts Students will Use and Understand

- Graph proportional relationships
- Interpret unit rate as the slope
- Use similar triangles to explain the concept of slope
- Derive the equation y=mx and y=mx+b
- Interpret equations in y=mx+b form as linear functions

Vocabulary

- **Intersecting Lines:** Two lines that cross each other. Lines intersect at one point unless the lines fall directly on top of each other (in which case they are essentially the same line and are sometimes called coincidental).
- **Origin:** The point of intersection of the vertical and horizontal axes of a Cartesian plane. The coordinates of the origin are (0, 0).
- **Linear Functions:** functions that form a straight line
- **Proportional Relationships:** A relationship between two equal ratios.
- **Slope:** The "steepness" of a line. The slope of a line can be found directly when a linear equation is in slope-intercept form ($y = mx + b$). In this form, the slope is the coefficient of x and is represented by the letter m. The slope of a line can also be found by determining the ratio of the "rise" to the "run" between two points on the graph. In other words, slope measures how much the line rises vertically given a particular run or horizontal distance.
- **Slope-Intercept Form:** y=mx+b where m represents the slope and b represents the y-intercept
- **Unit Rate**: A comparison of two measurements in which the second term has a value of 1. Unit rates are used to compare the costs of items in a grocery store.
- **Y-intercept:** where a line crosses the y-axis on the coordinate plane

Try: *http://intermath.coe.uga.edu/*

Math 8 Unit 5 Practice Problems

Formulas

Slope (m)

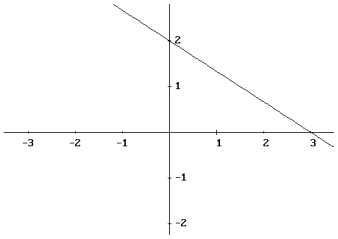
$m = \frac{y_2 - y_1}{x_2 - x_1}$

Slope-Intercept Form

y = mx+b

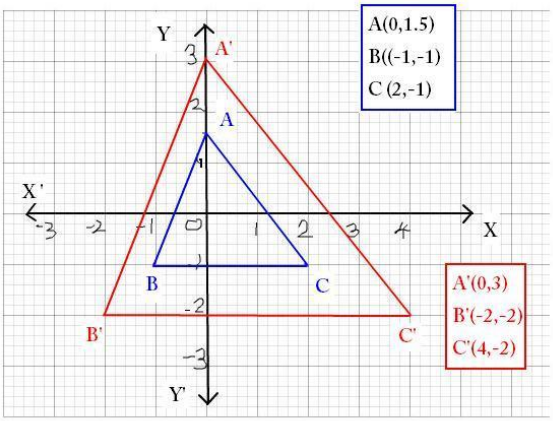
Y-intercept (b); (0,b)

Example 1



What is the slope of the function? What is the y-intercept? Write the equation of the line in slope-intercept form. Is this a linear function? Why?

Example 2



What is the slope of $\overline{AB}$ and $\overline{A'B'}$?

Key

Example 1

Slope (m) = -2/3 Y-intercept (b)= 2

Equation of the line: y = -2/3x +2

Yes, it is a linear function because every input has exactly one output and the line is linear.

Example 2

The slopes are the same: 5/2 or 2.5; Similar triangles will have like sides proportional with the same slope.

Math 78
Unit 9 Linear Models and Tables

Volume 1 Issue 9

References

Georgia Math Grade 8 Volume 2:
Chapter 8 Lessons 1-6

Georgia Math Online:

www.connectED.mcgraw-hill.com

Links:

https://mathbitsnotebook.com/Algebra1/StatisticsReg/ST2ScatterPlot.html

https://mathbitsnotebook.com/Algebra1/StatisticsReg/ST2TwoWayTable.html

https://www.youtube.com/watch?v=6IdJ1aPFDCs

Dear Parents

Below you will find a list of concepts that your child will use and understand while completing Unit 6 Linear Functions. Also included are references, vocabulary and examples that will help you assist your child at home.

Concepts Students will Use and Understand

- identify the rate of change and the initial value from tables, graphs, equations, or verbal descriptions
- write a model for a linear function
- sketch a graph when given a verbal description of a situation
- analyze scatter plots
- informally develop a line of best fit
- use bivariate data to create graphs and linear models
- recognize patterns and interpret bivariate data

Vocabulary

- **Model:** A mathematical representation of a process, device, or concept by means of a number of variables.
- **Interpret**: To establish or explain the meaning or significance of something.
- **Initial Value:** *y*-intercept.
- **Qualitative Variables:** A variable whose values are not numerical. Examples include gender (male, female), paint color (red, black, blue), type of bird (cardinal, blue bird, owl), and etc.
- **Linear:** A relationship or function that can be represented by a straight line.
- **Non-linear:** A relationship which does not create a straight line.
- **Slope:** The measure of steepness of a line.
- **Rate of Change:** The ratio of the change in the output value and change in the input value of a function.
- **Bivariate Data:** Two different response variables that are from the same population. This website has a good powerpoint (the 2nd one) that may help with the explanation. http://www.sophia.org/packets/bivariate-data-two-variables--2
- **Quantitative Variables:** A variable whose values are numerical. Examples include height, temperature, weight, grades, and etc.
- **Scatter Plot:** The graph of a collection of ordered pairs that allows an exploration of the relationship between the points.
- **Line of Best Fit:** A straight line drawn through the center of a group of data points plotted on a scatter plot.
- **Clustering:** The partitioning of a data set into subsets (clusters), so that the data in each subset (ideally) share some common trait - often similarity or proximity for some defined distance measure.
- **Outlier:** An element of a data set that distinctly stands out from the rest of the data.

Math 8 Unit 6 Practice Problems

Formulas

Slope (m)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

Slope-Intercept Form

y = mx+b

Y-intercept (b); (0,b)

Example 1

The table shows the balance of a bank account on different days of the month. Find the rate of change during each time interval.

Day	1	6	16	22	30
Balance ($)	550	285	210	210	175

Example 2

Megan rolls a number cube and tosses a coin 200 times as part of an experiment. From her experiment, she records that a five was rolled 37 times and the coin landed on tails 107 times. On 88 occasions, neither a five was rolled nor did the coin land on heads. Complete the table.

	Five	Not a Five	**Total**
Head			
Tail			
Total			

Answer Key

Example 1

Rate of changes: (results in a non-linear graph)
Day 1-6 = -53
Day 6-16 = -7.5
Day 16-22 = 0
Day 22-30 = -4.375

Example 2

	Five	Not a Five	Total
Head	18	75	93
Tail	19	88	107
Total	37	163	200

Math 78 Unit 10
Solving Systems of Equations

Volume 1 Issue 10

References

McGraw Hill Georgia Math 8 Volume 2:

Chapter 9 –
Lessons 3 & 4

Georgia Math Online:

www.connectED.mcgraw-hill.com

Links:

http://www.purplemath.com/modules/systlin1.htm

https://my.hrw.com/math11/math06_07/nsmedia/lesson_videos/alg1/player.html?contentSrc=7529/7529.xml

http://mathbitsnotebook.com/Algebra1/Systems/SYlinear.html

http://mathbitsnotebook.com/Algebra1/Systems/SYlinearGraphic.html

http://mathbitsnotebook.com/Algebra1/Systems/SYlinearAlgebra.html

Dear Parents:

Below you will find a list of concepts that your child will use and understand while completing Unit 7 Solving Systems of Equations. Also included are references, vocabulary and examples that will help you assist your child at home.

Concepts Students will Use and Understand

- Analyze and solve systems of linear equations.
- Understand and solve systems of equations graphically and algebraically, using technology as appropriate.
- Solve real-world problems leading to two linear equations with two variables.

Vocabulary

Coefficients: a numerical factor in a term of an algebraic expression.

Intersecting Lines: lines that have one point in common or all points in common.

Linear Combination Method: a technique for solving a system of equations that involves combining two equations in order to eliminate one of the variables and solving for the remaining variable. Adding, subtracting, or multiplying a system of equations to help solve the system.

Simultaneous equations: Another name for a system of Linear Equations

Substitution Method: a technique for solving a system of equations that involves replacing one variable with an equivalent expression and solving for the remaining variable.

System of Linear Equations: two or more equations that together define a relationship between variables usually in a problem situation. A system of equations can have no solution, one solution, or many solutions.

Try http://intermath.coe.uga.edu/ for additional help.
www.ceismc.gatech.edu/csi

Math 8 Unit 7
Solving Systems of Equations

Example 1

Solve the system of equations using any method you choose.

$2x + y = 7$
$x - 3y = 0$

Example 2

Determine whether either of the points (–1, –5) and (0, –2) is a solution to the given system of equations.

$y = 3x - 2$
$y = -x - 6$

Example 3

Gustav has 35 dimes and quarters that total $5.00. Solve a system of equations to find out how many dimes and how many quarters he has.

Key

Example 1

(3,1)

Example 2

To check the given possible solutions, I just plug the *x*- and *y*-coordinates into the equations, and check to see if they work.

(-1, -5) is the only point that satisfies both equations so it is a solution.

Example 3

Let d = # of dimes and q = # of quarters
d + q = 35 and 0.1d + 0.25q = 5

He has 25 dimes and 10 quarters