

Starring, in Ordered Pairs:

- *Ima Slope and Al Jabar*
- *Perp N. Dicular and Par A. Lell*

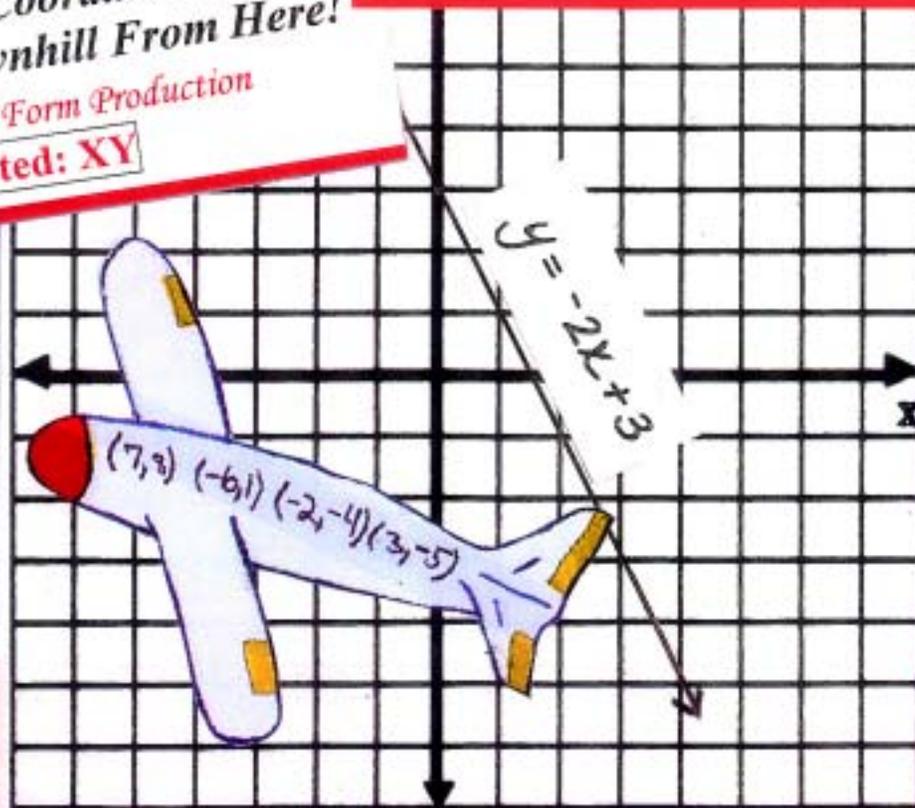
Plot: Your Point

- If coordinates don't fly, why are they on a plane?
- To "b" or not to "b" that's the y-intercept...
- One person's positive slope may be another person's negative slope...
- Learning to cope with slope...when you're a zero or simply undefined!
- What goes up may keep going up...
- The Rise and Fall of the Rise and Run!
- Y intercept?

First Flight of the Coordinate Plane..
...or It's All Downhill From Here!

A Standard Form Production

Rated: XY



An Integrated,
Interdisciplinary
8th Grade Unit on Slope

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Unit Title:
First Flight of the Coordinate Plane
or It's all downhill from Here!

OVERVIEW

I. CONTENT:

Students need to understand that slope represents a rate of change as applied to areas of science, economics and in other daily life.

II. PROCESS:

Through hands-on activities students will practice various modes of graphing (e.g. paper/pencil, classroom wall graphs, and outdoor rope graphs); students will develop thinking skills through note-taking, literature, songs, poems, observations, and class discussions.

III. PRODUCT:

Students will gain an understanding of slopes as a rate of change and its relationship to events in the world around them, as well as its relationships to the linear equation that defines it.

**Unit Overview: Alignment with
National/State/District Pupil Performance Standards**

Benchmark 1: California State Standard 6.0

Students graph a linear equation and compute the x- and y-intercepts. (e.g., graph $2x+6y = 4$)

Benchmark 2: California State Standard 7.0

Students verify that a point lies on a line, given an equation of a line. Students are able to derive linear equations by using the point-slope formula.

Benchmark 3: California State Standard 8.0

Students understand the concepts of parallel lines and perpendicular lines and how their slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point.

Benchmark 4: California State Standard 9.0

Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically.

**I-SEARCH INDEPENDENT RESEARCH PROJECTS
FOR GIFTED AND TALENTED STUDENTS**

1. PARADOXES:

A slope is considered to be positive or negative based on your point of reference when reading a graph from left to right. In a world where measurement cannot be negative, use a model to explain to someone the difference between positive and negative slope, and why slope can be considered negative.

2. ATTRIBUTES:

Create a rap or song describing the attributes (symbols and their meanings) of slope using the slope-intercept formula.

3. ANALOGIES:

Make a crossword puzzle using other words that have the same meaning as slope.

4. **DISCREPANCIES:**

Create a flip book or storyboard explaining why a vertical slope is undefined and why a horizontal slope equals zero.

5. **PROVOCATIVE QUESTIONS:**

Slope is identified in the slope-intercept form as the letter, m , which can be easily remembered by relationship of slope= m =mountain. Devise a mnemonic device to remember what the y -intercept, b , represents.

6. **EXAMPLES OF CHANGE:**

Make a flipbook graphing the change of slope for a series of equations. (e.g., from small to large slope, or from large to small slope.)

7. **EXAMPLES OF HABIT:**

Create a bumper sticker with an acronym that can be used to remember the often forgotten key elements of graphing (i.e. label the line, arrows, etc.)

8. **ORGANIZED RANDOM SEARCH:**

Create a tall tale with a graph to illustrate the movement of two people on a see-saw, identifying its various slopes both positive and negative. Include the use of zero and undefined slopes.

9. **SKILLS OF SEARCH:**

Create a political cartoon showing who defined slope, and how. Be sure to include dates, and other historical information.

10. **TOLERANCE FOR AMBIGUITY:**

Create a travel brochure describing how the concept of slope would be applied in a weight-less environment.

11. **INTUITIVE EXPRESSION:**

Make a display of items that demonstrate how slope can be tasted, seen, heard, smelled, and touched.

12. **ADJUSTMENT TO DEVELOPMENT:**

Create a children's story explaining slope to a younger child, using life examples from which a child would comprehend slope.

13. **STUDY CREATIVE PEOPLE AND PROCESS:**

Role-play or create a skit showing Newton's Laws that involve slope.

14. **EVALUATE SITUATIONS:**

Create three models of the most appropriate and two inappropriate examples of a handicapped ramp.

15. **CREATIVE READING SKILL:**

Analyze children's books for use of slope. Compile and present to class.

16. **CREATIVE LISTENING SKILL:**

Make a tape recording of the sounds of slope with verbal descriptions for each.

17. **CREATIVE WRITING SKILL:**

Write a song for students to memorize to explain the slope-intercept formula.

18. **VISUALIZATION SKILL:**

Make a comic book showing the good and evil of slope.

CRITICAL THINKING SKILLS – ACADEMIC ANALYZING HUMAN ACTIVITIES! (AHA!)

STATE STANDARD # 6 STUDENTS WILL BE ABLE TO GRAPH A LINEAR EQUATION AND COMPUTE THE X- AND Y-INTERCEPTS.

ESSENTIAL QUESTION: How does the Universal Theme of **Producing, Exchanging and Distributing** create mastery learning of essential concepts in this unit?

1. PRODUCING, EXCHANGING, AND DISTRIBUTING [ECONOMICS]

KNOWLEDGE:

Anticipatory Set: After seeing clip from Grease (scene: Travolta & Greasers are fixing up older car) You are given this true life example to graph: “You have found an ’86 Mustang GT in great shape for \$4000. Negotiating with your parents, your parents will not give you the money, but they have \$5000 in the bank that you can have the interest on annually; the rate is 5%. Graph the rate at which the money will accrue on the x- and y-axis.”

COMPREHENSION:

Because you’re smart and don’t have to do a lot of homework, you feel you can handle an after school job and keep your grades at a B or better. This job at Burger King pays \$5 per hour for 25 hours a week. Recalculate your earnings combined with the interest from your parent’s bank account. How long would it take for you to earn the \$4000?

APPLICATION:

Anticipatory Set: Sing the Beatles’ “Tax Man” and discuss the song.

Students will be given this dilemma: you have just received your first monthly check from Burger King. Social Security and other taxes have been taken out at the combined rate of 20%.

Product: Plot the new rate of money earned on taxed income. Use a transparency to overlay the two rates (before and after taxes) for the class to see on the overhead projector.

Multicultural and/or ESL and/or Bilingual Link: Taxes in Sweden are approximately 70% of gross income. Plot your savings at 70% of gross wages. Discuss the differences between a socialist and capitalist government.

Mathematics/Science Link and/or Humanities Link: Discuss Steven Forbes idea of a flat tax for America, where everything sold would be taxed at a rate of 6% regardless of the income of a person’s earnings. Verbally compare how the taxes would affect people who are rich and people who are impoverished.

School-to-Career/Tech Prep Link: Interview a car appraiser from a local dealership on how they determine a used car’s trade-in value.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory Set: Sing “Born to Be Wild” (Bob Seager)

Students will: Discuss the reason why teenagers want a car. Is it to be free and to get out from under teacher or parental supervision? We then discover the cost of insurance, gas, repairs, do we lose our freedom because we are now serving a car?

Class/team/individual product: Plot the real monthly cost of owning a car if the monthly payment is \$250, insurance \$120, gasoline \$60, repairs \$50, at an income derived from your interest and your job. How much of your time will be spent maintaining your car?

INDIVIDUAL JOURNAL ASSIGNMENT:

After explaining the mathematics, write a journal assignment, “Does owning your own car set you free?”

HOMELINK:

Ask your homelink: Did you have a car as a kid? How much was it? Did you have to pay for it? How much was insurance? Who paid for it? Do they feel their car gave them freedom or cost them their freedom?

STATE STANDARD # 6.0: STUDENTS WILL GRAPH A LINEAR EQUATION AND COMPUTE THE X- AND Y-INTERCEPTS

STUDENTS WILL BE ABLE TO PLOT POINTS AND DRAW A SLOPE ON A COORDINATE PLANE; IDENTIFY POSITIVE AND NEGATIVE SLOPES; AS WELL AS BEGIN TO IDENTIFY WHETHER A SLOPE IS LESS OR GREATER THAN ONE.

ESSENTIAL QUESTION: How does the Universal Theme of **Transportation** create mastery learning of essential concepts in this unit?

2. TRANSPORTATION

KNOWLEDGE:

Anticipatory Set: From the movie “Airplane” (scene: landing) or Top Gun (scene: Tom Cruise’s buddy loses nerve to land plane and Cruise instructs him to land.)

Students will: be given a situation where a plane has come down to 5000 feet, and has hit a landing speed of 180 miles per hour. The plane is 2.8 miles from the runway. At this constant speed, what slope must they have to hit the runway? Graph this problem on a x- and y- coordinate plane.

COMPREHENSION:

The plane is now coming down 2.1 miles from the runway from an altitude of 1 mile (5280 feet). At a slope of negative .9, will the airplane make the runway? Defend your answer with a graph.

APPLICATION:

Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.

Anticipatory Set:

Song: Free Fallin’ (Tom Petty)

Back in the USSR (Beatles)

Students will: A jet is at a cruising altitude of 2 miles, and wants to descend at a gentle slope at a negative .1, at what distance from the airport should the jet begin its descent?

Class/team product: Make a model using a paper airplane and string and a wire hanger as the x- and y-axis, with a scale of one inch: one mile, demonstrate the above situation.

Multicultural and/or ESL and/or Bilingual Link: Interpret the above situation using kilometers, knowing that there are .6 miles per kilometer.

Mathematics/Science Link and/or Humanities Link: Does the slope of the plane’s descent affect its fuel consumption? What type of slope would be more beneficial for our environment by creating less air pollution? Why?

School-to-Career/Tech Prep Link: Have a pilot audiotape five minutes of his cockpit conversation with the air traffic controller directing the plane towards its descent. Have the pilot explain on the tape why they had the plane descend at the rate it did.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Indiana Jones and the Temple of Doom (scene where pilots dessert the plane leaving Indy, Lady and the Kid in the plane. Indy tries to fly the plane and it’s out of fuel. Continue with the raft scene going down the snow slope and the river, etc.)

Students will: Examine the movie for various slopes.

Class/team/individual product:

Identify and illustrate as many types of slopes (positive or negative) as you see them in the scene.

INDIVIDUAL JOURNAL ASSIGNMENT:

Consider your route to and from school and the examples of slope you see daily. Describe three situations where a slope you see makes life easier or more difficult.

HOMELINK:

Make a paper airplane, fly it, and record its slope in feet. Explain to your parents how you calculated slope and why is slope important for the landing of aircraft?

STATE STANDARD #9.0: STUDENTS WILL BE ABLE TO SOLVE A SYSTEM OF LINEAR EQUATIONS.

ESSENTIAL QUESTION: How does the Universal Theme of Communications create mastery learning of essential concepts in this unit?

3. **COMMUNICATIONS**

KNOWLEDGE:

Anticipatory Set: Show “The Perfect Storm” (scene: meteorologist is tracking storms on the computer to determine where and when they will intersect.)

Students will: be given two linear equations to graphically determine their point of intersection.

COMPREHENSION:

Given pairs of equations and graphs, students will distinguish which pairs of equations match, which graphs.

APPLICATION:

Anticipatory Set: U-571 (scene: plotting two coordinates at a plotting table) or Behind Enemy Lines (scene: Gene Hackman is using triangulation to locate the downed pilot.)

Students will: Given a coordinate plane that has been copied on a local map, students will find two linear equations that intersect a point of their choice on the map.

Class/team product: map

Multicultural and/or ESL and/or Bilingual Link: Students are given a non-Arabic number system to replace the Arabic numbers on a coordinate plane, and translate a system of equations into the new number system to create a secret code for their linear equations.

Mathematics/Science Link and/or Humanities Link: After seeing the clip from Contact (scene: Jodie Foster goes through the wormhole and meets her father. Students will discuss why Heaven has always been on a plane that is “up” and hell has always been on a plane that is “down”. All cultures have had a plane that was considered Heaven and a plane that was considered hell. Why?

School-to-Career/Tech Prep Link: Bring a fire fighter to discuss how they determine the shortest/best route to an emergency.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Star Wars-- After discussing the invention of Algebra by an Arab Al Jabar, students will defend the statement that necessity is the mother of invention (i.e. Algebra was not needed until people needed to find unknown variables on a coordinate plane.) Historically, these ideas were used in navigation using stars, the sun, and the moon. As we go into the future and move out of Isaac Newton’s laws that govern our universe, what will be the navigation markers for our expanded physical universe?

Students will: As a team, role play finding your way through outer space using astronomical terms (pulsars, black holes, quasars, etc.) See which team does the best skit.

Class/team/individual product: skit

INDIVIDUAL JOURNAL ASSIGNMENT:

Write a description of how you would communicate to someone how to meet at the same place at the same time.

HOMELINK:

If you were to leave your home and your parent was to leave their place of work, draw out the directions for meeting at a local site or landmark that neither of you have ever been before. Draw a freehand map showing your route with handwritten directions.

STATE STANDARD #7.0: STUDENTS WILL BE ABLE TO FIND THE LINE OF BEST FIT IN A SCATTER PLOT AND DETERMINE A SLOPE.

ESSENTIAL QUESTION: How does the Universal Theme of **Protecting and Conserving** create mastery learning of essential concepts in this unit?

4. PROTECTING AND CONSERVING

KNOWLEDGE:

Anticipatory Set: Book: How to Lie With Statistics by Huff

Students will: Given a graph of crime statistics, find the line of best fit to determine the slope of the graph in a ten-year time frame and describe the trend of instances of crime. If there is a negative slope, theoretically when will crime disappear? If there is a positive slope, when will crimes, theoretically, become pandemic?

COMPREHENSION:

Given a graph of air or water quality of the past ten years in the county, determine the line of best fit and calculate the slope of that line. Predict the quality of air or water in ten years.

APPLICATION:

Anticipatory Set: Batman Movie (Original movie with Michael Keaton, scene: police are observing chart and are stymied by rise of crime....continue to when Batman swoops down to stop a crime.)

Students will: Given a scatter plot of crime over a number of years, students will determine if crime is on the rise or on the decline and support their answers.

Situation: The City Mayor insists that crime is increasing; Joker, however, insists that crime is decreasing. If you were the Batman's PR Person, how could you skew the graph to support his belief? Likewise, if you were The Joker's PR Person, how could you skew the graph to support his belief. Half of the students in the class will represent each bias, and draw a graph that supports Batman's or Joker's positions.

Class/team product: debate

Multicultural and/or ESL and/or Bilingual Link: Compare the lines of best fit of the graphs of Mexico City, Rio De Janero, Paris, Hong Kong, Oslo, Moscow for air quality for the past twenty years.

Mathematics/Science Link and/or Humanities Link: Compare the rate of asthma with the air quality of the above cities.

School-to-Career/Tech Prep Link: Have a campus police officer discuss crime rates in the community and whether he or she believes crime in the community is on the rise or decline.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Money (Pink Floyd)

Students will: Correlate the bankruptcies of K-Mart, Enron, WorldCom with the changes in the stock market, making a connection with the type of slope representing the stock market's rise and decline.

Class/team/individual product: Picture Story

INDIVIDUAL JOURNAL ASSIGNMENT:

After evaluating the graphs regarding crime and greed as done above, do you think crime pays or greed is gainful?

HOMELINK:

Determine the slope of five objects in your house or in your neighborhood (e.g. slide, lamp, ramp, oven range hood, back of a chair, etc.) Measure the rise and run in inches or centimeters and record your findings. (No undefined or 0 slopes).

STATE STANDARD #6.0 and 7.0: STUDENTS WILL BE ABLE TO FIND THE LINE OF BEST FIT FOR GIVEN DATA AND INTERPRET THE TRENDS OF THAT DATA.

ESSENTIAL QUESTION: How does the Universal Theme of **Providing Education** create mastery learning of essential concepts in this unit?

5. **PROVIDING EDUCATION**

KNOWLEDGE:

Anticipatory Set: “School Days” (Chuck Berry: The Best of Chuck Berry)

Students will: be given SAT-9 scores from three anonymous students from the three previous three years and will be asked to think/pair/share what they think the trend is of the scores of the anonymous students. Teacher will ask the students to think how the information could be organized to get a better picture of the scores for comparison (i.e. graph).

COMPREHENSION:

Give students the SAT-9 scores for Windsor Middle School for the last five years, in language arts, math and total, and ask them to look for trends in these areas. Students will graph the scores and predict and defend what they think the school’s SAT-9 scores will be this year.

APPLICATION:

Anticipatory Set:

Teach Your Children Well (Crosby, Stills and Nash)
Calvin and Hobbes Comic

Students will: Organize data of SAT-9 scores of middle schools in the county and graph and compare the slope of best fit for each graph and predict the trends for future SAT-9 scores.

Class/team product: Students will do this work on wall graphs.

Multicultural and/or ESL and/or Bilingual Link: Compare test scores with those of your Sister City.

Mathematics/Science Link and/or Humanities Link: Compare high school drop-out rates for Sonoma County from 50 years ago to present.

School-to-Career/Tech Prep Link: High School Guidance Counselor will come in to discuss the importance of SAT-9 scores.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Kodachrome (Paul Simon)

Students will: Students will select a state of their choice to graphically compare the standardized test scores from the previous five to ten years.

Class/team/individual product: Students will present their findings through the medium of their choice (i.e. poster board display, Power Point, transparency, comic strip, etc.)

INDIVIDUAL JOURNAL ASSIGNMENT:

Do you think SAT-9 scores are a valid indicator of future success in life? Can you think of anybody for whom they weren’t?

HOMELINK:

Students will ask their homelink if they remember taking standardized tests in school and how much importance was placed on the testing. Compare and contrast the difference between then and now. Does homelink think standardized tests are important indicators of future success?

STATE STANDARD #8.0: STUDENTS WILL BE ABLE TO UNDERSTAND THE CONCEPTS OF PARALLEL AND PERPENDICULAR LINES AND HOW THEIR SLOPES ARE RELATED.

ESSENTIAL QUESTION: How does the Universal Theme of Making and Using Tools and/or Technology create mastery learning of essential concepts in this unit?

6. MAKING AND USING TOOLS AND/OR TECHNOLOGY

KNOWLEDGE:

Anticipatory Set: Show paintings from Modriani and Picasso

Students will: Students will identify in a Picasso painting the perpendicular and parallel lines.

COMPREHENSION:

Identify perpendicular and parallel lines within the classroom. Record their observations.

APPLICATION:

Anticipatory Set: Show pictures of the architecture of Frank Lloyd Wright

Students will: make a simple architectural drawing of a structure, color-coding parallel and perpendicular lines.

Class/team product: drawing

Multicultural and/or ESL and/or Bilingual Link: Analyze the geometric patterns found in the daily items such as blankets, artwork, baskets, costumes, etc. of Native cultures.

Mathematics/Science Link and/or Humanities Link: Using magazines of Colonial architecture, identify and color-code examples of parallel and perpendicular lines.

School-to-Career/Tech Prep Link: Have an architect speak to the class about his or her occupation.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Bring in a sample of Native American Art or Escher's Art

Students will: Construct a geometric art project that incorporates parallel and perpendicular lines

Class/team/individual product: artwork

INDIVIDUAL JOURNAL ASSIGNMENT:

Do you see parallel and perpendicular lines in nature? Where?

HOMELINK:

Have your parents identify objects and tell them whether they are parallel or perpendicular by spelling the words.

STATE STANDARD #6.0: STUDENTS WILL BE ABLE TO GRAPH THE RESULTS OF THEIR PERSONAL GAINS IN A PHYSICAL SPORT.

ESSENTIAL QUESTION: How does the Universal Theme of Providing Recreation create mastery learning of essential concepts in this unit?

7. PROVIDING RECREATION

KNOWLEDGE:

Anticipatory Set: Theme from ABC's Wide World of Sports (Original sound track Televisions greatest Hits 2-c)

Students will: Given data of Kelley's swimming log, graph her times and chart the line of best fit. Assess in which strokes she has a probability of reaching an "A" time.

COMPREHENSION:

Using running times from a distinguished sports figure, chart and graph the times, determining the line of best fit and determine the slope.

APPLICATION:

Anticipatory Set: Rocky (running scene)

Students will: record their personal times in an activity and chart and graph their results.

Class/team product: chart and graph of results.

Mathematics/Science Link and/or Humanities Link: Record heart rates to determine if they change as they become conditioned

School-to-Career/Tech Prep Link: Clip of Michael Jordan's personal background and how he progressed through his perseverance.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Teacher trying to juggle

Students will: Learn to juggle handkerchiefs and record the time they are able to keep the handkerchiefs juggling and measure their progress of times.

Class/team/individual product: A class chart of results showing time in air.

INDIVIDUAL JOURNAL ASSIGNMENT:

Analyze your preference for competing. Does your performance improve more working by yourself or with others?

HOMELINK:

Were your parents interested in the same sports as you? Did they prefer to compete individually or in a group?

STATE STANDARD # 9.0: STUDENTS WILL BE ABLE TO STUDENTS SOLVE A SYSTEM OF TWO LINEAR EQUATIONS IN TWO VARIABLE ALEBRAICALLY ANDA ARE ABLE TO INTERPRET THE ANSWER GRAPHICALLY.

ESSENTIAL QUESTION: How does the Universal Theme of Organizing and Governing create mastery learning of essential concepts in this unit?

8. **ORGANIZING AND GOVERNING**

KNOWLEDGE:

Anticipatory Set: Grease (Dance Contest)

Students will: A student club has a carry over from last year of \$300 and can raise \$30 and week selling snacks at break. The band club has no carry over funds from last year, but can raise \$55 per week selling snow cones and ice cream. Which group will raise the money needed for the Royalty Dance first and how long will it take? Students will write the equations representing each situation including the constants and variables.

COMPREHENSION:

Given the information from the products of two fundraising magazine, write the equations and determine how many items sold at the given cost would be needed to reach \$1000 first.

APPLICATION:

Anticipatory Set: Andy Griffith Show (Scene where Opey is selling lemonade)

Students will: Students come up with their own fund raisers and determine which will raise the most money first and how much they will each raise.

Class/team product: Make a marketing pamphlet comparing and contrasting two fundraisers, showing the graph of the systems of equations.

Multicultural and/or ESL and/or Bilingual Link: Convert the cost of your product from dollars to peso, francs, Euro, yen, etc.

Mathematics/Science Link and/or Humanities Link: Discuss the necessity of fundraising in school and why there is a need.

School-to-Career/Tech Prep Link: Have a business leader come in to discuss economics including supply and demand.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Show the bumper sticker that reads, “Wouldn’t it be a wonderful day when schools have all the money they need and the air force has to have a bake sale to buy a new jet?”

Students will: Design a fundraising product including a prototype to raise money for the end of year party. Determine how much money will be needed (overhead) and how many items must be sold, and at what cost to raise the money needed.

Class/team/individual product: A product prototype or brochure.

INDIVIDUAL JOURNAL ASSIGNMENT:

Do you think that schools should have to fundraise to pay for sports, extracurricular activities, and field trips? If not, where should the money come from?

HOMELINK:

What kinds of things did your parents do to raise money as kids? What was the cost of items sold?

STATE STANDARD #6.0: STUDENTS WILL BE ABLE TO GRAPH A LINEAR EQUATION AND COMPUTE THE X- AND Y-INTERCEPTS.

ESSENTIAL QUESTION: How do the Universal Theme of Moral, Ethical and Spiritual Behavior create mastery learning of essential concepts in this unit?

9. MORAL, ETHICAL AND SPIRITUAL BEHAVIOR

KNOWLEDGE:

Anticipatory Set: “The Golden Rule” as shared by different religions, from the book, Oneness.

Students will: Creating a pictograph using the signs of various religions (i.e. Star of David: Jewish; Cross: Christian; Crescent: Muslim) to graph the religious populations in the United States over the past 50 years. Students will analyze the rise or decline of the populations of the religions during this time frame.

COMPREHENSION:

Compare the world population in the above religions and make a pictograph.

APPLICATION:

Anticipatory Set: Another selected page from the book, Oneness that emphasizes the common traits among religions.

Students will: Choose two of the religions above and make an equation that represents their populations’ decline and growth and graphically and/or algebraically determine when the populations of those religions will be equal.

Class/team product: graph

Multicultural and/or ESL and/or Bilingual Link: already highly multi-cultural
Mathematics/Science Link and/or Humanities Link: already highly humanitarian
School-to-Career/Tech Prep Link: Invite a Private School Counselor to come in and compare and contrast the education in the public and private realms.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Gospel

Students will: Discuss how gospel influenced the growth of blues, which influenced the growths of jazz and rock and roll.

Class/team/individual product: Graph sales of gospel, blues, jazz, and rock and roll records from the 50's.

INDIVIDUAL JOURNAL ASSIGNMENT:

What would our community be like without organized religion? How does spirituality play a part in your life, if at all?

HOMELINK:

Discuss with your parents why religion is or is not a part of your home life.

STATE STANDARD #8.0: STUDENTS WILL BE ABLE TO FIND THE EQUATION OF A LINE PERPENDICULAR TO A GIVEN LINE THAT PASSES THROUGH A GIVEN POINT.

ESSENTIAL QUESTION: How does the Universal Theme of Aesthetic Needs create mastery learning of essential concepts in this unit?

10. **AESTHETIC NEEDS**

KNOWLEDGE:

Anticipatory Set: A beautiful image of stained glass

Students will: Observe and identify intersecting lines and determine which lines are perpendicular to each other. On the overhead, teacher will overlay a coordinate plane on the stained glass image so students can calculate the slope of several perpendicular lines to determine that the slopes of perpendicular lines are the negative inverse of each other.

COMPREHENSION:

Given a set of linear equations, find equations that are perpendicular to each given equation.

APPLICATION:

Anticipatory Set: Song: Mona Lisa (Nat King Cole, Best of Nat King Cole, Vol. I)

Students will: create their own stained glass image in which there must be at least five perpendicular intersections. Overlaying the stained glass image over a coordinate plane, students will calculate the equations of the five pairs of perpendicular lines.

Class/team product: stained glass image

Multicultural and/or ESL and/or Bilingual Link: Analyze the works of various non-American artists, citing perpendicular lines and calculating their linear equations, noting the pattern of negative reciprocal slopes for perpendicular lines.

Mathematics/Science Link and/or Humanities Link: Examine the professional lives of pointilists and cubists and their works.

School-to-Career/Tech Prep Link: Have a graphic artist come in and discuss the use of lines in art, and how what used to be done by hand is now generated by computers.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Movie: Tron (scene: Jeff Bridges racing on motorcycle on a computer plane trying not to be destroyed.)

Students will: Design a complex piece of artwork using any medium other than paper and pen/pencil in which all connecting lines are perpendicular to each other.

Class/team/individual product: artwork

INDIVIDUAL JOURNAL ASSIGNMENT:

Why did cavemen 50,000 years ago generate art? Why was art important to their lives when survival was difficult? Why is art important to you?

HOMELINK:

What type of artwork is displayed in your home and/or ask your parents what type of art is their favorite, and why?

STATE STANDARD #6.0: STUDENTS WILL BE ABLE TO GRAPH A LINEAR EQUATION AND COMPUTE THE X- AND Y- INTERCEPTS.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of graphing rise and run and finding slope and visa versa?

11. **SLOPE** (McDougal Littell)

KNOWLEDGE:

Anticipatory Set: Video of Olympic ski team with music theme

Students will: Discuss slope and where they see/use it. Use model of ramp to discuss difference of slopes. How do you measure it? Rise and run. Discuss climbing stairs and how you must rise your leg first before doing the run. Have students model this and how you must rise foot before running foot to climb stairs. Measure the rise and run of ramp in several angles of ascent of the ramp. Transfer to graph paper, stressing use of y-intercept as a starting point of graph. Given a slope on graph paper, calculate the slope by drawing a slope triangle and finding the rise and run. Use positive slopes, first.

COMPREHENSION:

Give students y-intercepts and slopes to graph on graph paper, as well as give lines to calculate slope.

APPLICATION:

Anticipatory Set:

“Can You Take Me Higher?” By Creed

“Ain’t No Mountain High Enough” by Diana Ross

Students will: Measure the slope of different colored yarns arranged on the walls

Class/team product: Record the results of their slopes on the walls and check results

Multicultural and/or ESL and/or Bilingual Link: Handout with Native American patterns and find and measure slopes of lines.

Mathematics/Science Link and/or Humanities Link: Investigate the maximum slope down which a skier or skater could slide.

School-to-Career/Tech Prep Link: Have a highway engineer discuss the application of slope in super-elevation of highways.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Short Circuit II (Alley Sheedy)

Students will: Make a drawing of a jump ramp for skates or bikes, or...and determine the slope of at least five sections of the ramp.

Class/team/individual product: Drawing

INDIVIDUAL JOURNAL ASSIGNMENT:

Discuss how you could measure the slope of a mountain that you climbed.

HOMELINK:

Interview parents. Name three inclines that are vital to the comforts of your home.

STATE STANDARD # 6.0: STUDENTS WILL BE ABLE TO WRITE A SLOPE-INTERCEPT EQUATION GIVEN A LINE ON A GRAPH.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of slope-intercept equations relate to mastery learning of slope?

12. **SLOPE INTERCEPT FORMULA** (McDougall-Littell)

KNOWLEDGE:

Anticipatory Set: Calvin and Hobbes comic

Students will: Given a line, draw the slope triangle, find the rise and run and y-intercept, and write the slope-intercept form for the equation.

COMPREHENSION:

Given a line on graph, students will draw a slope triangle, calculate the slope, find the y-intercept and write the slope-intercept form of the equation.

APPLICATION:

Anticipatory Set: Forensics scene from Crime Scene Investigators (CSI) where they are reconstructing a crime.

Students will: Compare crime scene investigation with the clues from a line on a graph to find a slope-intercept equation. Students will use slope triangle to calculate the slope, y-intercept and write the slope-intercept equation.

Class/team product: Slope-intercept equations.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: "Ain't No Mountain High Enough" (Diana Ross)

Students will: Draw five lines on a graph and write their slope-intercept formulas on a separate piece of paper. Trade with partners to check accuracy of formulas.

Class/team/individual product: Slope-intercept formulas

INDIVIDUAL JOURNAL ASSIGNMENT:

Explain in words how to write a slope-intercept equation for a line.

HOMELINK:

Explain to your homelink the process of writing the slope-intercept formula for a given line.

STATE STANDARD #6.0: STUDENTS WILL BE ABLE TO GRAPH A LINE GIVEN THE SLOPE INTERCEPT FORM.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of the slope intercept formula relate to mastery learning of slope?

13. **SLOPE** (McDougal-Littell, The Algebra Game: Linear Graphs)

KNOWLEDGE:

Anticipatory Set: Somewhere Over the Rainbow (Wizard of Oz) (Stress the Why (Y) –Get it?)
Students will: be able to put an equation in intercept form. Recognize that the coefficient of x, called m, is the slope of a line; and, the constant, called b, is the y-intercept. From this equation students will be able to graph the line.

COMPREHENSION:

Given an equation in slope-intercept form, students will be able to graph a line.

APPLICATION:

Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.

Anticipatory Set: Show right triangles in a blueprint.

Students will: Use slope-intercept equations to draw lines on a graph.

Class/team product: graphs

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Slip Slidin' Away (Paul Simon)

Students will: write five slope-intercept equations and draw the lines for them on a separate paper as a key and trade with neighbors to check for accuracy.

Class/team/individual product: Slope-intercept equations and their graph keys.

INDIVIDUAL JOURNAL ASSIGNMENT:

Explain in words how a line can be drawn from a slope-intercept equation.

HOMELINK:

Explain the process of finding a line from a slope-intercept equation.

STATE STANDARD #7.0: STUDENTS WILL BE ABLE TO CALCULATE THE SLOPE OF A LINE GIVEN TWO POINTS ON A LINE.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of calculating slope using two points relate to mastery learning of slope?

14. **SLOPE** (McDougal-Littell)

KNOWLEDGE:

Anticipatory Set: Pictures of pyramids for analyzing slopes of sides

Students will: use slope triangles to calculate the slope of a given line given any two points on that line.

COMPREHENSION:

Calculate slopes of the line, given two points on the line. Calculate the slope of the line by finding using two other points on the line.

APPLICATION:

Anticipatory Set: Artwork by George Seurat showing pointilism

Students will: Use two points on one of Seurat's painting to calculate slope.

Class/team product: graph

Multicultural and/or ESL and/or Bilingual Link: Self-evident multi-cultural link

Mathematics/Science Link and/or Humanities Link: Use different structures (i.e. Pyramids, Stonehedge, Eiffel Tower, etc.) from different countries to identify and calculate slope.

School-to-Career/Tech Prep Link: Have a roofer come in to discuss the importance of slope and pitch

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Calculate the slope of Mt. Everest from a city at the base of the mountain.

Students will: have to find the difference in elevation and the horizontal distance from the starting point to the top of the mountain.

Class/team/individual product: Create a model illustrating the slope, and label the points used.

INDIVIDUAL JOURNAL ASSIGNMENT:

How would knowing how to calculate slope be important for explorers on the surface of Mars?

HOMELINK:

Working with your homelink, and using a clock with a face, calculates the slope of three different times. Will the slope be the same for those times on any sized clock?

STATE STANDARD #7.0: STUDENTS WILL BE ABLE TO VERIFY THAT A POINT LIES ON A LINE GIVEN AN EQUATION OF THE LINE.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of testing points on a line relate to mastery learning of slope?

15. **SLOPE** (McDougal-Littell)

KNOWLEDGE:

Anticipatory Set: Major Tom (David Bowie) (testing)

Students will: be able to recognize that using an input/output machine can be used to test points, but inputting coordinates directly into an equation to see if both sides of the equation are equal is faster.

COMPREHENSION:

Given sets of equations, students will test points that are or are not on the line.

APPLICATION:

Anticipatory Set: Butch Cassidy and the Sundance Kid (scene: the posse is tracking Butch and Sundance)

Students will: Come up with their own linear equation, and identify four points that satisfy the equation. Students will identify a fifth point not on the line, and explain with the equation why the points are not on the line.

Class/team product: graphs and equations

Multicultural and/or ESL and/or Bilingual Link: Translate mathematical words regarding slope in this unit from English into Spanish or any other language.

Mathematics/Science Link and/or Humanities Link: Research how GPS tells you where you are no matter where you are on earth.

School-to-Career/Tech Prep Link: Have a ship captain come in to discuss navigation where there are no landmarks.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: A passage from Treasure Island (passage: finding his way back to shore from the treasure site)

Students will: Make a map of points surrounding a buried treasure with a key of equations that lead to the treasure. Have a partner find the lines of the equations to discover the treasure.

Class/team/individual product: map, key, game

INDIVIDUAL JOURNAL ASSIGNMENT:

Discuss the importance of maps to Christopher Columbus' voyages.

HOMELINK:

Discuss with your parents when they have used maps and what sources are available for getting a map.

STATE STANDARD #7.0: STUDENTS WILL BE ABLE TO DERIVE LINEAR EQUATIONS BY USING THE POINT-SLOPE FORMULA.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of using the point-slope formula relate to mastery learning of slope?

16. **SLOPE** (McDougall-Littell)

KNOWLEDGE:

Anticipatory Set: Picture of Rosetta Stone. Discuss how archaeologists translated the hieroglyphics from the stone.

Students will: When given a point and a slope of a line derive a linear equation in y-form (slope-intercept form) and graph the line.

COMPREHENSION:

Given points and slopes, students will put into y-form (slope-intercept form) and graph the equations.

APPLICATION:

Anticipatory Set: Discuss clues to find the missing part of the puzzle.

Students will: Graph initials of their first names using straight lines. Students will graph three non-zero, non-undefined lines. Calculate slope, plot a coordinate on each line, pass to another student to find the slope-intercept formula for each line.

Class/team product: graphs with slope-intercept formula.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: Scene from the movie “The Patriot”

Students will: research how early American farmers and merchants used symbols to represent their livestock and goods. Make a key. (Translating)

Class/team/individual product: key

INDIVIDUAL JOURNAL ASSIGNMENT:

Write in words how to use a slope and a coordinate to write a linear equation in slope-intercept form.

HOMELINK:

Explain to your homelike what the point-slope formula is and how to translate it into slope-intercept form.

STATE STANDARD #9.0: STUDENTS WILL BE ABLE TO SOLVE A SYSTEM OF TWO LINEAR EQUATIONS IN TWO VARIABLES ALGEBRAICALLY AND ARE ABLE TO INTERPRET THE ANSWER GRAPHICALLY.

ESSENTIAL QUESTION: How does the discipline/sub-discipline of solving systems of linear equations algebraically relate to mastery learning of slope?

17. **SLOPE** (McDougall-Littell)

KNOWLEDGE:

Anticipatory Set: War of the Worlds (H. G. Wells) Say: The Martians have taken away all graphing devices including rulers and calculators. You have only a pencil to find the intersection of linear equations.

Students will: In a system of two linear equations, students will solve one equation for y, and use substitution to solve for the other variable, x, in the other equation. Then, students will substitute the value for x into one of the original equations to solve for y.
Students will understand that the x and y values represent the coordinate of intersection of the two lines.

COMPREHENSION:

Given systems of equations, students will solve them algebraically.

APPLICATION:

Anticipatory Set: video footage of Gulf War scene where Patriot missiles are being used to intercept SCUD missiles.

Students will: Use systems of equations to identify intersections which, when graphed, will form a geometric shape.

Class/team product: graphed shapes

Multicultural and/or ESL and/or Bilingual Link: Students will put a coordinate plane on top of artwork and find the equations of each of two intersecting lines. Verify algebraically that they are a systems of equations, by algebraically finding their point of intersection.

HIGHER ORDER THINKING SKILLS (H.O.T.S.):

Anticipatory set: video footage of Olympic Skeet Range Shooting showing the difficulty of hitting a moving target.

Students will: Research the complexities of shooting one missile down with another.

Class/team/individual product: Explain to the class the difficulties with so many variables to be solved mathematically.

INDIVIDUAL JOURNAL ASSIGNMENT:

Explain to someone how do you throw a ball to a moving target such as in football, basketball, hockey, water polo, baseball, etc. How do you know where to throw the ball and how hard? Can it be explained in words, or is it something you must do to know?

HOMELINK:

Ask your homelink, when driving, how they know when it's a safe distance for passing or for pulling into traffic. Were they able to explain it to you in words? Or did they have to model or draw it to explain?

**MORAL/ETHICAL/SPIRITUAL
REASONING AND DILEMMAS**

TEN ETHICAL DILEMMAS

ESSENTIAL QUESTION: How does the content of this unit reflect **character education** through Moral and Ethical dilemmas?

1. **Producing, Exchanging, and Distributing** [Economics]

ESSENTIAL QUESTION: How does the **Human Activity** of **Producing, Exchanging and Distributing** create moral/ethical dilemmas?

DILEMMA: The \$5000 in your parents' bank account has been set aside for your college education. You have been given the choice of spending the \$5000 immediately to get the car of your dreams, or use only the interest from the \$5000, knowing that you must still work 25 hours a week in order to purchase the car. What do you choose and why?

2. **Transportation**

ESSENTIAL QUESTION: How does the **Human Activity** of **Transportation** create moral/ethical dilemmas?

DILEMMA: You are the pilot of a passenger jet flying refugees from a war-torn district in Afghanistan. Your engine has been shot so that your plane will imminently crash. You and your crew have parachutes with which to escape the plane. You and your crew can either choose to jump from the plane with your parachutes resulting in saving your own lives, but at certainty that all the refugees on board will be killed. Your other choice is to give your attempt to land the plane with the possibility of losing your life, but possibly saving the lives of some or all of the passengers on board. What do you choose and why?

3. Communications

ESSENTIAL QUESTION: How does the **Human Activity** of Communications create moral/ethical dilemmas?

DILEMMA: A Submarine Commander fires on another submarine who has historically been an enemy. The shot was unprovoked and should not have been fired. There are survivors on the enemy sub. If the crew of the submarine who fired the shot saves the survivors, they risk the situation being publicized and a war ensuing. If the crew does not pick up the survivors, the crew of the downed sub will perish and the incident will not be reported. You are the Commander, what do you do?

4. Protecting and Conserving

ESSENTIAL QUESTION: How does the **Human Activity** of Protecting and Conserving create moral/ethical dilemmas?

DILEMMA: You are the executive of a major corporation. Your profit projects are due to the Board of Directors. You notice that you can easily skew the figures to show an overly optimistic profit for the following year, which would boost your stock market value, leaving you with a personal gain of \$1.5 million. In doing so, those who invest in your company risk losing their life savings, a risk you deem insignificant. It's due in one hour, what do you do?

5. Providing Education

ESSENTIAL QUESTION: How does the **Human Activity** of Providing Education create moral/ethical dilemmas?

DILEMMA: You need to a score of 1150 on the SAT to get into Harvard Medical School, the school at which your mother, father, and your older cousins attend. You've always loved medicine and your good with people—you will make an excellent doctor! On the other hand, you don't test well and may not achieve the score you need. You have been offered the answers to the SAT ensuring your entrance into Harvard. What do you do?

6. Making and Using Tools and/or Technology

ESSENTIAL QUESTION: How does the **Human Activity** of Making and Using Tools and/or Technology create moral/ethical dilemmas?

DILEMMA: You're an A student whose artistic abilities are not strong. You have spent all of your time on your academic classes and are sure to pass them with top scores. Unfortunately, you have neglected your final project in your art class and have nothing to turn in tomorrow when they are due. You have downloaded from the Internet the artwork of an obscure artist whom you know your teacher will not recognize. If you use this plagiarized artwork you will achieve the top score, guaranteeing you an A in the class. What do you do

7. Providing Recreation

ESSENTIAL QUESTION: How does the **Human Activity** of Providing Recreation create moral/ethical dilemmas?

DILEMMA: You are one of the star athletes on your swim team. Your competition is comprised of teammates who are faster than you in breaststroke, butterfly and freestyle—but only by tenths of a second. If you can beat them at these strokes, you can sweep the Championships and will be offered a full-ride to the college you've had your eye on. You have been offered Steroids and other performance enhancers that will increase your chances of winning. The side effects for these drugs include liver, kidney and heart damage. What do you do?

8. Organizing and Governing

ESSENTIAL QUESTION: How does the **Human Activity** of **Organizing and Governing** create moral/ethical dilemmas?

DILEMMA: You're in charge of counting the money and keeping the inventory for your class fundraiser. Daily, you handle nearly \$300. You can skim off the top \$20 a day (\$400 a month) without anyone noticing. If your class still reaches their fundraising goal, is there anything wrong with skimming off the top?

9. Moral, Ethical and Spiritual Behavior

ESSENTIAL QUESTION: How does the **Human Activity** of **Moral, Ethical and Spiritual Behavior** create moral/ethical dilemmas?

DILEMMA: Since the first day of school, you have made friends with the nicest person you know. You share everything together—you secrets, your fears, hopes and dreams. You cannot imagine your life without this new friend, until you discover she is of a different religion than you. Your parents have strict religious beliefs that do not tolerate social interaction with other religious beliefs. Your parents have told you must sever the relationship with this friend. What do you do?

10. Aesthetic Needs

ESSENTIAL QUESTION: How does the **Human Activity** of **Aesthetic Needs** create moral/ethical dilemmas?

DILEMMA: You are in the “in” crowd in your senior class and are certain to be the Prom Queen as a part of this group. You have developed a friendship with a boy considered to be a nerd in your AP math and physics class. This kid has all the attributes of a truly kind, caring, and intelligent human being. If you let this friendship become public knowledge, you risk being made fun of by the “in” crowd and risk losing the Prom Queen election. What do you do?

PRODUCTIVE THINKING SKILLS DIVERGENT / CREATIVE THINKING

1. BRAINSTORM MODEL

- A. BRAINSTORM ALL OF THE _____:
- AHA #1. Graphs you see around you
 - AHA #2. Airplanes make our economy function and thrive
 - AHA #3. Ways weather affects your life
 - AHA #4. Ways crime makes your life more expensive
 - AHA #5. Reasons why we should never have to take a test again
 - AHA #6. Different forms of art
 - AHA #7. Individual and team sports
- B. BRAINSTORM AS MANY _____ AS YOU CAN THINK OF.
- AHA #8. Fundraising Activities
 - AHA #9. Religions
 - AHA #10. Ways of making art using lines
 - AHA #11. Number of ways of converting miles to other units
 - AHA #12. Slopes
 - AHA #13. Songs that use or imply slope
- C. HOW MANY WAYS CAN YOU COME UP WITH TO _____?
- AHA #14. Climb up stairs
 - AHA #15. Describe directions.

2. VIEWPOINT MODEL (Human or Animate) (Use Cultural Literacy Terms)

- A. HOW WOULD _____ LOOK TO A(N) _____?
- AHA #1. How would money look to an egocentric?

- AHA #2. How would an airplane look to a cloud?
- AHA #3. How would a modern map look to Columbus?
- AHA #4. How would crime look to the Pillsbury Dough Boy?
- AHA #5. How would your test scores look to an impoverished boy from Bosnia?
- AHA #6. How would Picasso's art look to an Aztec?
- AHA #7. How would an athlete look to a red blood cell?
- AHA #8. How would a fundraiser look to a rich student from Beverly Hills?

B. WHAT WOULD A _____ MEAN FROM THE VIEWPOINT OF A(N) _____?

- AHA #9. How would the Golden Rule look to a robber?
- AHA #10. How would diamonds look to a three year old?
- AHA #11. How would three dimensional space look to someone who lived in two dimensions?
- AHA #12. How would a curb look to an ant?
- AHA #13. How would slope feel to a blind person?
- AHA #14. What would slope look like from the viewpoint of a piece of graph paper?

C. HOW WOULD _____ VIEW THIS?

(Use one person from history here)

1. Apache Indians
2. High School Senior
3. Abraham Lincoln
4. Blue Beard
5. Walt Disney
6. Madam Curie
7. Al Jabar

3. **INVOLVEMENT MODEL (Personification/Inanimate object brought to life)**

A. HOW WOULD YOU FEEL IF YOU WERE _____?

- AHA #1. How would you feel if you were a percent sign?
- AHA #2. How would you feel if you were the hood of a car?
- AHA #3. How would you feel if you were a pair of equations?
- AHA #4. How would you feel if you were air or air pollution?
- AHA #5. How would you feel if you were a SAT-9 test?
- AHA #6. How would you feel if you were a perpendicular line?
- AHA #7. How would you feel if you were a stop watch?

B. IF YOU WERE A _____, WHAT WOULD YOU (SEE, TASTE, SMELL, FEEL, etc.)

- AHA #8. If you were a thousand dollars what would you smell?
- AHA #9. If you were the bible, what would you hear at mass?
- AHA #10. If you were an intersection in a road, what would you see?
- AHA #11. If you were the walls of an eighth grade Algebra math class, what would you see?
- AHA #12. If you were the walls of a kindergarten math class, what would you see?
- AHA #13. If you were a ruler (straight edge), what would you feel?
- AHA #14. If you were a formula, what would you feel?

C. YOU ARE A _____. DESCRIBE HOW IT FEELS.

- AHA #15. If you were a number, how would you feel?
- AHA #16. If you were the lead of a pencil, how would you feel?
- AHA #17. If you were the eraser of a pencil, how would you feel?

4. **CONSCIOUS SELF-DECEIT MODEL**

- A. SUPPOSE _____ WHAT _____
- AHA #1. Suppose cars did not use gas, what would they use?
 AHA #2. Suppose you were an airplane outside the atmosphere, how do you feel?
 AHA #3. Suppose all the lines on a map were straight, how would you get where you need to go
 AHA #4. Suppose the crime rate went down to zero, what would police do?
 AHA #5. What if students aced all tests, what would happen to schools and teachers?
 AHA #6. Suppose you were a number, how would you feel in a calculator?
 AHA #7. Suppose you are an integer, how do you exercise?
 AHA #8. Suppose education had unlimited funding, what would you buy?
 AHA #9. Suppose you were a religious population, what number are you afraid of?

- B. YOU CAN _____ WHAT _____?
- AHA #10. You can paint only with numbers, what would you paint?
 AHA #11. You can have any career, what would you be?
 AHA #12. You could know the last number of pi, what would you do with it?
 AHA #13. You can only see with your toes, how do you sit?
 AHA #14. You can eat metal, what is your diet?
 AHA #15. You can go without sleep, redesign your school weekly schedule.
 AHA #16. You can be any page in a book, what page would you be?
 AHA #17. You can see only numbers, what does your world look like?

5. **FORCED ASSOCIATION MODEL (Use cultural literacy terms here)**

- A. HOW IS _____ LIKE _____
- AHA #1. How are taxes like pimples?
 AHA #2. How is an odometer like an eardrum?
 AHA #3. How is a compass like dyslexia?
 AHA #4. How is slope like a criminal?
 AHA #5. How are test scores like climate?
 AHA #6. How are parallel lines like anorexia?
 AHA #7. How are lines of best fit like a balanced diet?

- B. GET IDEAS FROM _____ TO IMPROVE _____.
- AHA #8. Get ideas from AT&T to improve fundraising.
 AHA #9. Get ideas from Mother Theresa to improve public schools.
 AHA #10. Get ideas from Renoir to improve computer graphics.
 AHA #11. Get Ideas from a squirrel to build a house.
 AHA #12. Get ideas from a tree to improve the environment.
 AHA #13. Get ideas from a high school senior to improve school.
 AHA #14. Get ideas from a senior citizen to improve life.

- C. I ONLY KNOW ABOUT _____. EXPLAIN _____ TO ME.
- AHA #15. Up...down
 AHA #16. White...colors
 AHA #17. Flat...tall

6. **REORGANIZATION/SYNECTICS MODEL**

- A. WHAT WOULD HAPPEN IF _____?
- AHA #1. What would happen if the government paid us taxes?
 AHA #2. What would happen if there were no wheels?
 AHA #3. What would happen if there were no zero?
 AHA #4. What would happen if there were no homes?
 AHA #5. What would happen if education were not free?
 AHA #6. What would happen if lines could never cross?

AHA #7. What would happen if tools were made of numbers?

B. SUPPOSE _____ (HAPPENED)
WHAT WOULD BE THE CONSEQUENCES?

AHA #8. Suppose no one wanted to be a Mathematician?

AHA #9. Suppose there was no religion?

AHA #10. Suppose music could only be played with two notes?

AHA #11. Suppose we only had eight fingers, how would we count?

AHA #12. Suppose your brain could take a break, what would it do with its time off?

AHA #13. Suppose appliances could talk, what would they say?

AHA #14. Suppose you could drive, where would you go?

C. WHAT WOULD HAPPEN IF THERE WERE NO _____ ?

AHA #15. Teachers

AHA #16. Sounds

AHA #17. Education

CULTURAL LITERACY

Names:

Al Jabar

Ideas and vocabulary:

Slope is a rate of change

Connection between a linear equation and its graph

Parallel lines

Perpendicular lines

Systems of equations

Slope-intercept formula

Point-slope formula

Coordinate plane

Plotting points

Connection between points and a line

Symbols for formulas (m , b , etc...)

Components of a complete graph

RESOURCES

I. Bibliography – Teacher/Professional Books and Resources:

- The Green Book of Songs by Subject: The Thematic Guide to Popular Music
- Equate: The Equation Thinking Game by Conceptual Math Media
- TI-82/83: Graphing Calculator Activities for Middle School Math by Charles Lund
- The Algebra Game: Linear Graphs, by Catheryne Draper
- Connected Mathematics Project: Looking for Pythagoras by Prentice Hall
- Connected Mathematics Project: Thinking with Mathematical Models by Prentice Hall
- Interact Simulations: Challenge Math Projects by Interact
- The Timestables of History by Bernard Grun
- Where'd They Get That Idea? By Touchstones
- Algebra 1 by McDougal Littell
- Algebra 1 by Glencoe
- Cultural Literacy by E.D. Hirsch, Jr.

II. Educational Films/Videos

- Michael Jordan's Background
- Flights of Imagination; Smithsonian National Air and Space Museum

- News Clipping of Gulf War
- Olympic clip of Skeet of Shooting

III. Books

- Oneness, Jeffrey Moses
- How to Lie With Maps, Mark Monmonier
- How to Lie With Statistics, Darrell Huff
- Calvin & Hobbes (Science/Math Topics)

IV. Commercial Films/Videos

- Grease
- Airplane
- Top Gun
- Indiana Jones and the Temple of Doom
- The Perfect Storm
- U-571
- Star Wars
- Behind Enemy Lines
- Contact
- Batman (Michael Keaton)
- The Andy Griffith Show clip
- Tron
- Short Circuit II
- The Patriot
- War of the Worlds

V. Poetry:

- Falling Up, Book: Falling Up, by Shel Silverstein
- Buckin' Bronco, Book: A Light in the Attic, by Shel Silverstein
- Obedient, Book: Falling Up, by Shel Silverstein (about following rules)
- Something Missing, Book: A Light in the Attic, by Shel Silverstein
- Music Lesson, Book: Falling Up, by Shel Silverstein
- How to Make a Swing With No Rope or Board or Nails, Book: A Light in the Attic, by Shel Silverstein
- The Climbers, Book: A Light in the Attic, by Shel Silverstein
- Keepin' Count, Book: Falling Up, by Shel Silverstein
- Where the Sidewalk Ends, Book: Where the Sidewalk Ends, by Shel Silverstein
- 18 Flavors, Book: Where the Sidewalk Ends, by Shel Silverstein (connection: 18 I-searches)

VI. Art Works

- Paintings by Modriani
- Paintings by Picasso
- Architecture by Frank Lloyd Wright
- Native American Geometric Art (Blankets, baskets, etc.)
- Escher
- George Seurat (pointilism)

VII. Music

- Tax Man, Beatles
- Born to Be Wild, Bob Seager
- Free Fallin', Tom Petty

- Back in the USSR, Beatles
- Money, Pink Floyd
- School Days, Chuck Berry
- Teach Your Children Well, Crosby Stills and Nash
- Kodachrome, Paul Simon
- Theme from ABC's Wild World of Sports
- Gospel Music
- Mona Lisa, Nat King Cole
- Ain't No Mountain High Enough, Diana Ross
- Slip, Slidin' Away, Paul Simon

VIII. Resource People/Mentors

- High School Guidance Counselor
- Airplane Pilot
- Car Appraiser
- Fire Fighter
- Police Officer
- Architect
- Business Leader
- Private School Counselor
- Graphic Artist
- Highway Engineer
- Roofer
- Ship Captain

IX. Other Material (CD-ROM, Laser Disc, Internet sites, etc.)

- www.purplemath.com
- www.mcdougallittell.com
- www.cyberedinc.com
- www.coolmath.com
- www.mathtutor.com
- www.discoveryschool.com
- www.drmath.com
- www.glenridge.org
- www.movieactors.com