

Business Partner: Cox Surveying
Curriculum Relationship: Math
Grade Level: 9-12

Jack Adams
 Eisenhower Middle High School

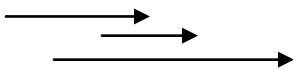
Objective: The student will be able to graph Polar Coordinates and be able to convert Polar Coordinates to Rectangular Coordinates and vice versa.

Standards Assessed: 2.1, 2.2, 2.5, 2.8, and 2.9

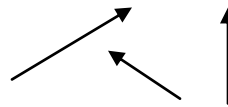
Procedure: A few of the more know places that polar coordinates are used are in the navigation industry, both maritime and aeronautical, and in land surveying. The reason they use polar coordinates is because they are more efficient in their situations. In polar coordinates you only measure one angle and one distance. Using rectangular coordinates in the above applications would require you to measure three angles and two distances. Let's see how polar coordinates work.

To form a polar coordinate system in a plane you start with a fixed point, called the origin or pole. From this point you draw a ray, usually horizontally to the right. This ray is called the polar axis. In surveying this axis would be pointed North no matter what direction that would be.

Examples of Mathematical Polar Axis

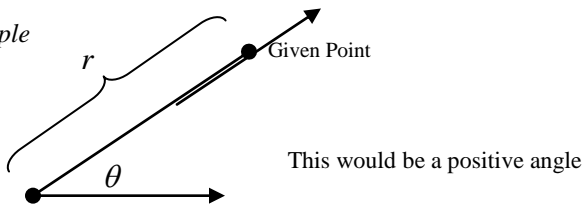


Examples of Surveying Polar Axis



Polar coordinates have the form (r, θ) where r is the distance from the origin or pole to the given point. The angle from the polar axis to the ray originating from the pole and going through the given point is called θ . The angle is positive if you go counterclockwise from the polar axis and negative if you go clockwise from the polar axis.

Example



Origin
or Pole

The angle θ can be given in positive or negative, degrees or radians, and r can be given in any linear measurement.

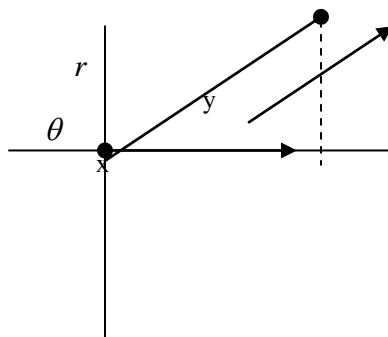
Examples: θ could equal 40° , -118° , $\frac{\pi}{6}$, $-\frac{5\pi}{6}$

Help the students

Plot the following points: A $(3, 30^\circ)$ B $(-4, 50^\circ)$ C $(6, -135^\circ)$ D $(-2, -\pi/2)$

Let them plot these on their own E $(-3, 2\pi/3)$ F $(2, 60^\circ)$ G $(-1, -175^\circ)$ H $(0, -9\pi/2)$

Now let's see how to convert polar coordinates to rectangular coordinates. Looking at this drawing you should remember from trig that the $\cos \theta = x/r$, therefore $r (\cos \theta) = x$ and that the $\sin \theta = y/r$, therefore $r (\sin \theta) = y$.



To change $(2, 30^\circ)$ to rectangular form you take $2 (\cos 30^\circ)$ to get ≈ 1.73 for x and for y you take $2 (\sin 30^\circ)$ to get 1.

You try to change $(5, 138^\circ)$ and $(-4, 1.077)$ to rectangular form. Be careful the second point is in radians.

Changing rectangular coordinates to polar coordinates is a little trickier as you need to know what quadrant you are starting in to get the right answers. If you look at the above picture again you know from Geometry that $x^2 + y^2 = r^2$ therefore r equals the square root of $x^2 + y^2$. Trig taught us that $\tan \theta = y/x$, therefore $\theta = \tan^{-1} y/x$. This is where you have to be careful as to what quadrant you are in.

Example problem: change (-3.207,-5.719) to polar coordinates.

Solution: r = the square root of $(-3.207)^2 + (-5.719)^2$ which is 6.557. To find the angle you take the $\tan^{-1}(-5.719/-3.207)$ which is 1.05973 radians or 60.7179°. You must then add the radians to Π or the degrees to 180° to get (6.557, 4.20132) or (6.557, 240.7179°). We did this to make sure our answer was in the third quadrant.

Homework: Page 553, #1-9 odd, #17-28 all.

Business Partner: Warren General Hospital—Diabetic Nurse Educator
Curriculum Relationship: Health / Physical Education
Grade Level: 6-8

Carrie Corbran

Youngsville Elementary Middle School/Youngsville High School

This lesson plan is used to help students with diabetes to correctly check their blood sugar levels. By effectively managing their blood sugar levels, students can prevent or delay diabetes-related complications.

Goal: The student will use a glucometer to find their blood sugar level.

Objectives: The student will:

1. State when blood sugar measuring is indicated.
2. Demonstrate ability to calibrate the glucometer.
3. Demonstrate the procedure for measuring blood sugar level.
4. Gain understanding of the proper maintenance, care, and storage of the glucometer.

Materials:

1. One Touch Ultra 2 Meter
2. One Touch Ultra Test Strips
3. Lancing device
4. Sterile lancets
5. Soap and Water

Procedure/Activity:

1. Introduce the topic. State that using a glucometer to test blood sugar levels is safe, easy and the results are accurate when the manufacturer's instructions are followed.
2. Discuss guidelines set by their physician for when to measure their blood sugar level, such as before meals and when there is a possibility of hypoglycemia.
3. Demonstrate procedures for calibrating the glucometer and measuring the blood sugar level.
 - a. Wash hands with soap and water. Rinse and dry.
 - b. Turn the meter on by inserting a test strip. Hold the strip so that the three contact bars are facing up. Insert the strip with the bars into the meter as far as it will go without bending it.
 - c. Make sure the meter is calibrated by matching the code displayed on the meter with the code on the test strip bottle. Use the up or down arrow to adjust the code on the meter to match that on the bottle of test strips. Press OK when the numbers match. The APPLY BLOOD screen will appear when the meter is ready for testing.
 - d. Prick the fingertip with a sterile lancet device.
 - e. Hold the hand down, gently squeeze and/or massage the fingertip until a drop of blood appears.
 - f. Apply a sample of blood on to the test strip. Touch and hold it against the narrow channel on the top edge of the strip. Fill the confirmation window.
 - g. Wait while the meter counts down from 5 to 1 and then displays the blood sugar level.
 - h. Read and record the blood sugar level.
 - i. Turn the meter off by removing the test strip.
 - j. Discard the used lancet and test strip.
4. Discuss proper care of supplies.
 - a. Store supplies in the carrying case that the meter comes in.
 - b. Keep the supplies in a cool, dry place below 86* F. Do not refrigerate.
 - c. Avoid exposing the supplies to direct sunlight.
 - d. Store test strips in their original container with the cap tightly closed.
 - e. Clean the meter as needed with a cloth dampened with water.

Business Partner: Bollinger Enterprises Inc**Curriculum Relationship: Math****Grade Levels: 4**

Diane Hayes

Allegheny Valley Elementary School

Objective: Students will solve a mathematical word problem, utilizing the five step problem solving format that is based on an actual work situation.

Materials: Teacher developed worksheet, pencil, manipulatives (actual work sample items such as straw, cap, and mug), and calculator.

Procedure: Applying the five step problem solving method, students will solve a word problem and explain in detail, using appropriate mathematical language, how they arrived at the solution.

Activities: Sample Format

Problem:

Part I: In an assembly job, John must place (1) straw and (1) cap in each Pepsi mug. If (40) mugs are to be assembled, how many total straws and caps will be needed?

Part II: Once the mugs are capped and placed in a box, how many mugs are needed to fill 50 boxes that each contain 24 mugs? Give (1) example of how the mugs could be boxed (you may use a drawing).

Step 1: Write the questions.

Step 2: List the information you have.

Step 3: Solve the problems.

Step 4: Label and circle your answers.

Step 5: Explain HOW you solved the problem, and WHY you solved it that way. Use mathematical terms in your explanation.

Business Partner: Warren County Historical Society**Curriculum Relationship: Social Studies****Grade Level: 10-12**

Jason Kisselbach

Warren High School

Objective: Students are to design an historical pamphlet or brochure about a particular person, place or event from the current unit. This pamphlet is to be educational and informative for your museum or exhibit.

Directions: Students will pick by lottery their topic and design a pamphlet or brochure for the class. You must meet the following criteria:

1. The pamphlet or brochure must be typed single spaced on a 8 x 11 inch sheet of paper. Using both front and back sides of the pamphlet or brochure. 10 points
2. Set your paper up into three columns so it can be folded either length or width wise. 10 points
3. The information presented must be correct and content specific to the topic given. You may need to give a brief overview of events leading up to your topic, or a short Biography of person or people involved, such date or birth and relation to the topic. For the building or place and over of its history leading up to and after the event. The Primary focus is the event at hand. 20 points.
4. Make a time-line of events in one column of your pamphlet or brochure must be at least 10 items in correct order. 10 points.
5. You must include three to five images in your pamphlet or brochure. Please place a number or letter under each image used. You may copy and paste them in by hand if you do not do it on the computer. 15 points (5 points for each image)
6. Please include a work-cited page separate from your pamphlet or brochure make sure to also include where you got your images from within your work-cited page. You must use at least a minimum of 4 sources, internet may count for only two sources and one source must be a book. Work-cited must be correctly done. 15 Points.
7. In the last column at the bottom please put: *Designed by:* under your name then under the name of your museum or institution. 5 points.
8. Present you pamphlet or brochure to the class. 10 points

Total: 95 points

Due Date: _____

Counts as a test

Business Partner: US Forest Service Wildlife Biologist**Curriculum Relationship: Reading Comprehension****Grade Level: 9-12**

Mattie Maletto

Warren High School

Objective: Following examples and group practice the students will independently follow written directions, read a graph, and locate specified information and answer 11 of 13 questions correctly.

Materials:

1. Corrective Reading Comprehension Student Books and Workbooks
2. Overhead projector
3. Graphs on transparencies
4. Student copies of the transparencies

Procedure:

1. Describe objective for the lesson to the students
2. Elicit student responses for previous experience with graphs
3. Present this lesson's graphs on the overhead
4. Read the information in section A describing the use of numbers on the graph presented in the lesson
5. Read the directions and follow these directions to mark the overhead
6. Call on students to read the next set of directions and mark the next overhead as described above while students at their seats mark their graphs
7. Call on students to read the next set of directions as described above while students mark their graphs
8. Ask students to complete corresponding graphs in their workbooks
9. Assist students as needed
10. As students finish have them select a graph to demonstrate procedure to the class

Business Partner: Boy Scouts**Curriculum Relationship: Outdoor Education****Grade Level: 9-12**

Jeff Manelick

Youngsville High School

Lesson 7: Rappelling – Rappel 2

Purpose: The student will experience a complete descent.

Standards: 10.3.12 A&D, and 10.4.12 D

Objectives: The student will demonstrate the skills necessary to complete a descent.

Materials: Webbing, rope, carabineer, friction device, harness, helmet and gloves

Procedure: Divide class into two groups if necessary. One group will be those with interest and permission to rappel. Group two will be those opting out of the rappel (this is an optional activity). Group two will remain at school and work on article reviews during regularly scheduled class time. Group one will depart school at approximately 8:15 a.m. and arrive at the Boy Scout camp (Olmstead) at approximately 9:00 a.m. The group will rappel from approximately 9:30 to 11:30 a.m. Lunch will be from 11:30 a.m. to 12:00 p.m. The group will continue to rappel from 12:00 until 2:00 p.m. The class will depart the Boy Scout camp at 2:15 p.m. and return to school at approximately 3:00 p.m.

Activity: This activity is from a height of approximately 25 feet. Three or four students will apply harnesses, helmets, and gloves. One will prepare to rappel. One student will assume the Brake responsibilities. The same procedures used in Lesson 5 and 6 will be used. Once on the ground, the person rappelling will go to the end of the Brake line. The Brake will take the harness, helmet, and gloves and get in the rappel line. Points of emphasis safety, safety, safety – previous points from #6

Summary: Debrief at conclusion of each session. Topics will include a comparison of Lesson 6 and Lesson 7

Assessment: This is a bonus point activity. The same assessment and rubric for Lessons 5 and 6 will be used to determine bonus points.

Business Partner: Rouse Estates
Curriculum Relationship: Music
Grade Level: 9-12

Christina Montgomery
 Youngsville High School

Objective: The students will be informed of some of the eighty two job titles available at the Rouse Estates, as well as volunteer opportunities to help complete their graduation projects.

Materials: pencils, handouts: Volunteer Application, volunteer opportunities, job titles/descriptions of the Rouse Estates

Procedure: Intro: The students will write as many job titles they can think of that are available at the Rouse Estates

1. Lead a quick discussion of the student efforts.
2. Pass out the job description handout/discuss
3. Pass out the volunteer information/application forms and discuss
4. Answer any questions

Business Partner: Skylon Mold & Machining
Curriculum Relationship: Math
Grade Level: 6-12 Learning Support

Christina Swanson
 Sheffield Middle High School

Objective: The students will use their background knowledge of solid figures and measurement to design a model to be used to fabricate a puck for a container of their choosing.

Materials: pencil, ruler, graphing paper, container, reference guide sheets

Procedures:

1. The teacher should review prior lessons pertaining to the production of pucks.
2. The teacher should present a step-by-step example of the project.
3. The teacher should provide and explain to the students a rubric to base their projects on.
4. The teacher should give the student(s) the choice to work independently or with a partner.
5. The student(s) will select a container (school appropriate) and have it approved by the teacher before beginning project.
6. The teacher should provide a mini lesson/review lesson on how to find the measurements of solid figures. Also, provide appropriate guide sheets based on the instructional level of each students.
7. The students should begin designing their models.
8. Upon completion of the models the students will present/share their drafts with the class.

Activities: Based upon the abilities of the individuals participating in this project, appropriate adaptations and modifications may need to be made on an individualized basis.

Business Partner: Blair Corporation
Curriculum Relationship: Math
Grade Level: 8

Rebecca Yeager
 Youngsville Elementary Middle School

Objective: Polling, Data Analysis, Design – Students will put to use skills from math class to determine characteristics that a live audience prefers. they will then analyze the data and prepare a report as to the qualifications their line of attire will measure to. Students then are to design their attire and present their product in a professional display.

Materials: Excel, paper, pencils, fabric swatches, other color adding materials such as water color, markers, crayons...display board,

Standards Addressed: M8.A.3.2 (2.2.8.D) Use estimation strategies in problem solving situations

M8.E.4.1.2 Make predictions based on survey results or graphs.

1.4.8.B. Write multi paragraph informational pieces

1.5.8.A Write with a sharp distinct focus

9.1.8.B Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts.

9.1.8.J Incorporate specific uses of traditional and contemporary technologies within the design for producing, performing and exhibiting works in the arts or the works of others.

Procedure:

1. Introduction by teacher:
 - a. Ask students where they buy their clothes. Keep notes on the board.
 - b. Tell students different ways to purchase clothing, stores, inet, catalogues, friends...
 - c. Ask students what they know about the process of making clothes. Keep notes on the board.
 - d. Ask students if they know of a company in our area that produces clothing.
 - e. Tell what they know.
 - f. Give a brief history of Blair Corp. and their process today. Use their Internet site.
2. Students will be introduced to the objectives.
3. Students will receive the first rubric that allows them to score their data gathering, analysis and their presentation.
4. Students prepare be separating into groups no larger than 4. Within these groups students will identify the audience to which they will design for. They will write a description of that audience including what characteristics they know. They will identify the attire that will be focused upon and state a reasoning why.
5. Students will put together and publish a questionnaire looking for information about the tendencies of their populations likes and dislikes in regard to the attire they are focusing on.
6. Students will organize their data on excel and present their findings using grafts and charts with verbal explanations.
7. Students will take the information and design the attire that they think their population would go nuts over and purchase.
8. Students must present a written report as to why and how their design best suits the audience's likes.
9. Students must present a board that incorporates the following
 - a. Sketches of the attire
 - i. If ensemble, all matching pieces
 - ii. If one object, multiple views of the object
 - b. A written specification/ description of the object
 - c. A projected cost with justification.
 - d. Fabric/Material samples (real or drawing)
 - e. Color samples

Is there more than one color available?
How many different colors will be in the object?
 - f. A persuasive writing encouraging the consumer to purchase this item.

A continuation of this project would be to produce a catalogue, via computer design, that is available to the audience and have them mock a purchase, keeping true to their likes-their financial income-tastes...

Students would then analyze the information to see which product might have done well and why.

Wouldn't it be neat if students were able to create the items of clothing or work with production companies to establish YEMS' own line of clothing?

It would be neat if the kids could see the people at Blair at work.