WAMC Lab Template

Math Concept(s): Design Linear Equations (Line of best fit and creating a line equation from a graph)
Source / Text:
Developed by: K Raines DeTorres **E-Mail**: kraines@masd209.org **Date:** June 22, 2021

Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

This lab will be completed after working on linear equations from a graph. The students will be given a standard piece of printer paper, will brainstorm a design for a paper airplane, and then do at least three trials with the paper airplane. They will also redesign and redo the trials. They will do this a total of five times. They will the develop a line of best fit along with determining the equation of this line.

Lab Title: Paper Airplanes Can Fly

Prerequisite skills:

How to create a graph correctly
How to determine a line of best fit and what it means
How to determine an equation of a line

Lab objective:

Students will determine the line of best fit and an equation of a line from data that they create from design a paper airplane.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- CCSS.MATH.CONTENT.HSA.SSE.A.1.A – Interpret expressions that represent a quantity in terms of its context.

Standards for Mathematical Practice:

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Model with numbers

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- CCSS.ELA-LITERACY.W.9-10.2: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information to make important connections and distrinctions; including formatting, graphics, and multimedia, if it is helpful.

K-12 Science Standards

- HS-ETS1- Engineering Design

Technology

- 4 – Innovative Designer

Engineering

- HS-ETS1- Engineering Design

Leadership/21st Century Skills:1.A. Think Creatively; 1.B Work Creatively with others; 2.C Make judgements and decisions

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy ☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation

☐x Think Creatively

☐x Work Creatively with Others

☐ Implement Innovations

Critical Thinking and Problem Solving

☐x Reason Effectively

☐ Use Systems Thinking

☐ Make Judgments and Decisions

☐x Solve Problems

Communication and Collaboration

☐x Communicate Clearly

☐x Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy

☐ Access and Evaluate Information

☐ Use and manage Information

Media Literacy

☐ Analyze Media

☐ Create Media Products

Information, Communications and Technology (ICT Literacy)

☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability

☐x Adapt to Change

☐x Be Flexible

Initiative and Self-Direction

☐ Manage Goals and Time

☐ Work Independently

☐ Be Self-Directed Learners

Social and Cross-Cultural

☐x Interact Effectively with Others

☐ Work Effectively in Diverse Teams

Productivity and Accountability

☐ Manage Projects

☐ Produce Results

Leadership and Responsibility

☐ Guide and Lead Others

☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Graph paper
- Color Pencils
- Printer paper
- Tape measure
- A long hallway or a gym

Set-Up Required:

- Set up an area, that you can monitor, to have students throw airplanes
- Put a starting point for each student to throw the airplane

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- One student will be the lead in the group – to make sure that they are staying on task

Cooperative Learning:

- The student groups will have to figure out how they will divide up who is going to design and do the airplanes and who si going to record the information and measure.

Expectations:

Students will be put in groups of 2, and each group will complete five different airplanes. Each type of plane will be flown three times, record each flight, and then determine the line of best fit as well as the equation from this line.

Timeline:

- 2 – 50 minutes class times to do lab
- 1 – 50 minutes class to have discussions and follow up

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Engineering design
- Windmills – the wings
- Wings and design of planes in general

Career Applications

- Engineering – have an idea, prototype, test, redesign, prototype, test…
- Aerospace engineering

Optional or Extension Activities

- Can have students use different types of paper to see if it makes a difference in flight
- Can have students use different sizes of paper, to see if it makes a difference in flight

Student Handout

Name_____ Date_____ Period_____

Paper Airplanes Can Fly

This lab will be to determine which paper airplane flies the best. You will be give the opportunity to create five different airplanes, then test each one. You will graph the results and make a line of best fit to see the trends of your planes.

1) You are to brainstorm, with your group, what the first airplane will look like.
2) Create the paper airplane
3) Fly the airplane – record the distance - repeat two more times.
4) Graph the results
5) Go back and redesign your plane
6) Repeat steps 2 – 5 for a total of 5 times.
7) Make sure you are graphing your results.

When you are finished – make a line of best fit for all of your results. Create an equation for your line of best fit.

Notes: Make sure you that know what the independent variable and the dependent variable are– and that you graph accordingly.

Student Assessment

You will be graded using the following check list – please make sure you pay attention and have all parts completed before you turn it in.

1) Name on paper? _____
2) Have you done five different airplanes? _____
3) Have you graphed all five airplanes? _____
4) Do you have a line of best fit? _____
5) Does the line of best fit make sense? _____
6) Do you have an equation? _____
7) Does your equation make sense? _____