

Using Hands-On STEAM Projects to Differentiate in Math

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About Us

- 4th Grade Teachers at a mid-sized independent school (approximately 525 students, N-12), in upstate NY
- Together, we have anywhere from 30-40 fourth grade students each year
- We both have Master's Degrees in Elementary Education & a passion for math
- While our school is not bound to the Common Core, our topics do correspond with the New York state 4th grade curriculum

Why Use Hands-On STEAM Projects?

STEAM (science, technology, engineering, arts, mathematics) projects can help your students in many ways:

- Children tend to take more ownership of a project that is relevant and contains a hands-on element.
- These projects allow students to use different types of intelligences to solve the problems.
- By using STEAM to integrate subjects within projects, students interests are addressed in many ways. When students are interested in a topic, they are more likely to be invested in the project.
- Art is considered an important part of most of our projects by asking students to consider the look of their final project. We encourage children to design creations that are not only functional, but also aesthetically pleasing to them (you would not likely buy a car that you don't like the look of)

Tips for Successful Integration of Projects

- Make projects relevant, interesting, and fun!
- Don't have to be used solely in math class - integrate subjects!
- Don't be afraid to send projects home for the kids to work on as a long-term homework assignment.
 - Not only does this free up class time for other topics and projects, but it teaches the kids about time management and sets the basis for good homework habits.
- Vary topics and skills addressed throughout the year
- Allow opportunities for interest-driven choices, to motivate students
- Don't stress about hitting every aspect of STEAM in every project

Wampum Belts Project

- Math skills: coordinate graphing, patterns, fractions
- Ways to differentiate:
 - Size of graph paper and use of ordered pairs
 - Number of squares used in the design
 - OT: string vs. pipe cleaners
- Extension: Ask students to make a list of their ordered pairs and trade with a partner who will then attempt to recreate their design

Punkin' Chunkin'

- Math skills: measurement, time, data analysis
- Ways to differentiate:
 - allowing students to choose from several design classes (catapult, trebuchet, or human powered) and by allowing students to choose which type of “pumpkin” they want to chunk (pumpkin [over 2 pounds], gourd [less than 2 pounds], or candy pumpkin)
 - Differentiate by having students measure different things (distance, time, angle of launch)
 - Extension: Ask students to use data gathered to calculate velocity and speed

Thanksgiving Dinner Math

- Math skills: multiplication, addition of large numbers, money, rounding
- Ways to differentiate:
 - Give out different store flyers (some with more products to search through than others)
 - Allow students to pick how many people they will be serving
 - Allow Student choice on whether to work individually or with a partner
 - Allow students who need it, to use a calculator
 - Another option is to practice rounding skills and have kids round prices to the nearest dollar prior to adding

Thanksgiving Dinner Math

- Extension:
- Ask students to predict the total cost prior to starting the activity and to compare their prediction with their actual calculated cost.
- Ask students to complete additional tasks related to the project
- Provide students with a budget. Allow them to “shop” at as many stores as they choose, but they must acquire all necessary items within the parameters of their budget.

The Merry Toy Maker

- Math skills: percentages, money, multiple digit multiplication
- Ways to differentiate:
 - Differentiate by interest by allowing students to decide which type of advertisement to create (magazine ad, billboard, or commercial), and what type of toy or prototype to create.
- Extension:
 - Ask students to calculate profit margins and sale prices

Your Great Adventure

- Math skills: measurement, money, elapsed time, addition, division
- Ways to differentiate:
 - They may use any mode of transportation that they would like, **except** an airplane.
 - Students can complete this project at their own level by choosing a location that is near or far, and city to city vs. POI to POI
 - Interest based differentiation for chosen location
 - Allow students to choose how to present their information
- Technology Aspect: most students will use computers to access maps, train or bus schedules, etc.

Your Great Adventure

- Extensions:
- Find a different route home
- Compare different routes (fastest route vs, shortest route)
- Calculate travel time
- Calculate trip cost

Harley Hotel

- Math skills: multiple digit multiplication, long division, money, area and perimeter, coordinate graphing
- Ways to differentiate:
 - Allow students to work at their level by choosing big their hotel will be (number of rooms, building footprint, etc.)
 - Make some parts of the project optional (based on time constraints)
- Extensions:
 - Reject the students first proposal and require them to complete more complex calculations

Harley Hotel

- Engineering Aspect: design a 3D model hotel (using student choice of materials)
- Art Aspect: creating a 2D layout of the hotel grounds

Story Island

- Math skills: area, perimeter, coordinate graphing
- This project integrates math, engineering, and writing.
- Ways to differentiate:
 - Differentiate by interest – this project appeals to those students who don't see themselves at being “good” at math
 - students may choose to make their island in any shape and size
 - students may choose from different sizes of graph paper (OT needs)
- Engineering aspects - creating a 3D model of the island

Knitting

- Math Skills: multiplication, money, real life problem solving
- Ways to differentiate:
 - Since the students are tasked with writing their own math problems, they are able to work at a level that is comfortable for them.
 - Allow students to use different sized needles and yarn (OT)
- Extensions:
 - Allow students who are interested and able, to knit larger “blankets”. We have, in the past, donated these small blankets to a local animal shelter for their cats.

Smaller In Class Projects

- Here are some other great math projects:
 - Turkey Math
 - Soup Mixes
 - Measurement Olympics
 - M & M Math
 - Cheesemaking
 - Human Coordinate Graphing

Thank You For Coming!

- If you would like a copy of a project and did not get one today, please email us and we will send you a copy of it electronically:
- nsullivan@harleyschool.org
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