Spotlight Project: *Projectile Motion*

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Name of Project: Projectile motion	**Duration:**	2 weeks
Subject/Course: math (Algebra II/Trigonometry)	**Grade Level:**	11
Other Subject Areas to Be Included: Physics		

Project Idea Summary of the challenge, investigation, scenario, problem, or issue:	Students work in teams to design and construct a ballistic device that launches an object in a flight path that follows a parabola. They use low cost materials (PVC pipe, plywood, rubber bands, etc.) to build the device, which must be capable of repeated firings. Students use knowledge of quadratic functions in order to hit a target. Each team conducts multiple tests and use the data they record to redesign their device if needed. Students make an oral presentation using PowerPoint slides to summarize their findings.
Driving Question	How can we build a device to launch a projectile, and calculate its motion in order to hit a target?
Content and Skills Standards to be addressed:	**Students will be able to:** • Use two-dimensional equations of motion for projectile motion to calculate initial velocity, time in the air, horizontal distance and maximum height. • Use trigonometry to resolve two-dimensional vectors into its vertical and horizontal components • Graph quadratic equation and find x-intercepts, y-intercepts and vertex • Apply factoring, quadratic formula and graphing calculator to find x-intercepts of a quadratic graph <u>CA Content Standards</u> – Algebra II: 8.0, 10.0; Trigonometry: 12.0, 19.0; Physics: 1i, 1j

21st Century Skills explicitly *taught and assessed* (T+A) or *encouraged* by project work, but not taught or assessed (E):		T+A	E		T+A	E
	Collaboration	☒	☐	Other: Critical and Creative Thinking; Problem Solving	☐	☒
	Presentation	☒	☐		☐	☐
	Critical Thinking:	☐	☐		☐	☐

Culminating Products & Performances	**Group:**	Design Proposal Complete Ballistic Device main Test Report	Angles of Elevation Report Oral Presentation	**Presentation Audience:** ☐ Class ☐ School ☐ Community ☐ Experts ☐ Web ☐ Other:_____
	Individual:			

Entry Event to launch inquiry and engage students:	Activity: Paper wad tossing contest (try to hit wastebasket, tossing over students of varying heights) and discussion of parabolas Video: Scenes from last year's project (final tests of projectile launch devices)				

Assessments	**Formative Assessments** (During Project)	Quizzes/Tests	☒	Practice Presentations	☒
		Journal/Learning Log	☐	Notes	☐
		Preliminary Plans/Outlines/Prototypes	☒	Checklists	☐
		Rough Drafts	☐	Concept Maps	☐
		Online Tests/Exams	☐	Other:	☐
	Summative Assessments (End of Project)	Written Product(s), with rubric: _____	☐	Other Product(s) or Performance(s), with rubric:_____	☐
		Oral Presentation, with rubric	☒	Peer Evaluation	☒
		Multiple Choice/Short Answer Test	☒	Self-Evaluation	☒
		Essay Test	☐	Other:	☐

Resources Needed	**On-site people, facilities:**	large open area for constructing and firing ballistic devices; other teachers and aides as available to help with construction
	Equipment:	measuring tape, LCD projector
	Materials:	low cost materials (PVC pipe, plywood, rubber bands, etc.) which may be provided or that students may collect
	Community resources:	none

Reflection Methods	*(check all that will be used)*	Journal/Learning Log	☐	Focus Group	☐
		Whole-Class Discussion	☐	Fishbowl Discussion	☐
		Survey	☒	Other:	☐

Spotlight Project: *Projectile Motion*

Spotlight Project Sample: *American Archetypes*

PROJECT TEACHING AND LEARNING GUIDE

Project: American Archetypes

Course/Semester:

Knowledge and Skills Needed by Students to successfully complete culminating products and performances, and do well on summative assessments	Scaffolding / Materials / Lessons to be Provided by the project teacher, other teachers, experts, mentors, community members
Business communication	➜ Students write resumes and cover letters — instruction, including samples and templates, provided by counselor (peer editing of drafts, final edits by counselor
Online research skills	➜ Evaluating website accuracy activity (online and worksheet). Effective search (engine) techniques activity led by teacher
PowerPoint and Excel	➜ Instruction in software use provided by computer applications teacher
marketing tools and techniques	➜ Weekly visits by local business partners with expertise in marketing and product development. Students begin email exchanges with experts.
Presentation skills	➜ Video review of students presentations Jigsaw activity to learn presentation rubric mock presentation by instructor Peer assessment (using rubric) of practice presentations
Report writing	➜ Direct small-group instruction on the features of report writing by instructor. Peer editing of drafts, final drafts by teacher. Direct small-group instruction on MLA Citations (including online bibliography generators). Jigsaw activity to learn report writing rubric
U.S. history content Knowledge	➜ Textbook review, lectures, research-based worksheets, objective weekly quizzes, online research

Spotlight Project Sample: *Design and Attract*

PROJECT CALENDAR

Project: Design and Attract | **Start Date:** Feb. 2

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
PROJECT WEEK ONE				
Grabber: memo from Middleburg University

Know/Need to Know list

Project Teams Announced

Discussion of expectations for team work

First team meeting: roles, contract, initial task list | Explanation of Project Details, Procedures

Explanation of rubrics for major products

Review samples of professional products in relation to rubric

Team meeting: task list

Daily team assessment | Design Software review (taught prior to project)

Lesson: Assessing client needs

Team work time: begin assessment of client needs

Homework: Reading on assessing client needs

Daily team assessment | Lesson: Design theory

Team work time: continue assessment of client needs; begin brainstorming ideas for materials

Homework: complete client needs assessment (due mon.)

Daily team assessment | Checkpoint: Quiz on Design Theory

Team work time: begin design of materials

Review/Revise Know/Need to Know list

Daily team assessment; meeting with team leaders |
| **PROJECT WEEK TWO** | | | | |
| Checkpoint: collect "Client Needs Assessment"

Team work time: Continue designing materials

Homework: notes on initial ideas due tomorrow

Daily team assessment | Checkpoint: Collect notes on initial ideas for materials

Checkpoint: Teams meet with others to critique work in progress

Team work time: discuss feedback from critique

Daily team assessment | Lesson: Typography review

Team work time: Continue creating materials

Review/revise Know/Need to Know list

Daily team assessment | Checkpoint: Quiz on typography

Explanation of rubric for presentation of products

Team work time: Continue creating materials

Daily team assessment; meeting with team leaders | Checkpoint: Teams meet with others to critique work in progress

Team work time: Continue creating materials, planning presentation

Daily team assessment

Homework: Continue creating materials |
| **PROJECT WEEK THREE** | | | | |
| Team work time: Finish creating materials, planning presentation

Checkpoint: Submit materials for teacher review

Final review/revision of Know/Need to Know list

Daily team assessment | Team work time: Prepare and practice presentation of materials

Daily team assessment | Team work time: Prepare and practice presentation of materials

Daily team assessment | Presentation Day | Self and Peer Assessment

Project Debrief and celebration |