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Astronomy and Space Science
Unit Plan
15 April 2021

40 Points Unit Plan. (working with Mr. Sheffield for this unit, same students at the same school collaborative project between Math and Science)

Weekly Lesson Plan Format: This is what our school uses but I was afraid it was not detailed enough for this course so I included this description as well.

Main idea: Distance,midpoint and forces in space including gravity and motion, and what needs to be taken into account when landing a vessel on another planet such as mars.

Standards:

- **KY.HS.G.12.** Use the Pythagorean Theorem to solve right triangles in applied problems.
- **KY.HS.G.23** Find measurements among points within the coordinate plane. **a**. Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment. **b**. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

The unit goal: Students will gain a comprehensive knowledge of distance and midpoint formulas.

Lesson 1: Landing on Mars:

- How to determine the optimal distance from Earth to Mars?
- Calculating the distance between earth and mars at launch students will use the pythagorean theorem to derive the distance formula and use it to solve.
- Calculate midpoint using the midpoint between earth and mars for a place to retrieve supplies.

Lesson 2: Mr. Sheffields Lesson on Cadapoltes projectile motion in terms of Earth with catapults. (NOT MY LESSON)

- Distance, velocity, and gravity with respect to flying projectiles on Earth.
- Building of miniature model Catapults to show how the forces above worked together to create a medieval era weapon. Other references to eras: Cannons, muskets, Rifles, and rockets.

Lesson 3: Analyzing Data (My part of lesson 2)

- Discussion about what occurred in Mr. Sheffield Class and how they collected data.
- Sheffield's How far will it fly worksheet Students will use the data that has been identified from the above worksheet and activity. Together with the teacher they will go back

through their work and complete answer additional questions throughout the lesson (included in the comments section on Sheffield's How far will it fly worksheet.
- Using the Data determine the estimated midpoints and distance of there next catapolute with variations or changes made to the Cadapoltes.
- Determine what changes would have to occur to land on mars based on their finding from Monday and from the cadapoltes.
- In their journals they will determine the new variations and changes that will be made to the cadapoltes to make a missile land on mars.

Lesson 4: Distance Formula.Saving the Day
- Using the skills that they learned in Mr. Sheffields class about catapults and this article about EPOXI mission and video. https://solarsystem.nasa.gov/missions/deep-impact-epoxi/in-depth/ https://www.jpl.nasa.gov/videos/epoxi-mission-captures-jets-in-action
- Students will then plan their own mission to similar to epoxi in which they are trying to hit the comets or meteorites to study/ eliminate them before hiting the planets.
- Students will use their knowledge of distance, velocity and midpoint to plan this mission.
- For their mission they will need to refuel at a half way point to achieve maximum velocity. For this students will need to go back through their plan and place refueling stations throughout the galaxy to complete their missions successfully.

Lesson 5: Summative Assesment
- Class discussion over the distance and midpoint formulas. Answer any questions before students begin the activity.
- Space Distance Task