

Mathematics

Civil Engineering – Parcel of Land and Subdivisions

Subject Area: 7th-8th Grade Math, Algebra I, Geometry
Grade Levels: 7th-12th

Date

Lesson Overview

Materials Included in this Lesson

- Written detailed description of the plot of land
- Map with each lot, cost per lot
- Details about cost, etc.
- Ruler
- Protractor

Other Materials for this Lesson

- worksheets
- etcetera
- etcetera

Skills the Student will Learn

- Following written description using land marks, angles, gps coordinates, and key vocabulary
- Write detailed description using different form of measurements and vocabulary
- Finding area of polygons
- Compare change in cost and mark up property value by increase in surface area to equal out the cost

Student Deliverables

- Write up with measurements, calculations, and explanation

Length of Lesson: 4 Days

Activity Day One

I will give students a copy of a written description of a parcel of land, show students how to find and trace out the parcel of land.

I will have parcels divided by rope in a field or room, with some land marks. Students will be in groups (4-6). Each group will be given a GPS-r or show how to get coordinates from their

phone, meter stick, protractor, other measuring devices. Each group is also assigned a parcel of land. The students are responsible for writing a detailed description using angle and length measurements, angle measurements, GPS coordinates, landmarks, etc. Due next day.

Note: Take picture of the parcel of lands with the borders I put up, get different angles.

Activity Day Two

Teach students how to find areas of quadrilaterals

Teach students how to convert into exact measurements on a scale drawing by multiplying with scale factor

Give students time to look at a **map** of planned lots in a parcel. They are to investigate the cost of construction, cost of each lot, etc.

Note: I would have collected students written description of their parcels and will grade it by the night.

Activity Day Three

Give each group another group's written description of their parcel. Their goal/job is to outline the other group's parcel of land based on that groups written description. After they are done, take pictures from the same angle. Show the class the original picture I traced out and the one they traced out based on the description. Have the group score each others written description and how well they followed the description.

Note: I will grade students score with the score I had ahead of time.

Activity Day Four

Tell students there has been a change of plans

-economy took a hit, construction plans put on hold, 5 years later, economy picked up, want to restart on the construction, but now residents are upset with proposed 4 lane street, wants to have a 2 lane street. Already put in concrete for 4 lanes, will have to remove some concrete. Cost for labor, etc. Your company will have to redesign the **map** which cost time and money and will have to also remove concrete which cost money. Save money on putting down lines for 4 lanes and also open up more land. Needs to remove 20 feet from the northern side.

How much more would it cost the developers?

How much more land would be gained on each lot?

How much should you charge more per/sq. ft to negate the extra cost?

How much more would each lot cost?

Enrichment Suggestions

Students can make the **map** themselves given an empty parcel with some regulations from the city

Student Resources

Students can look up city codes for where they live on lot sizes, street sizes, etc..

Common Core Standards

- G-SRT1b
- G-MG3
- 7-RP1
- 7-RP2b
- 7-RP3
- 7-G1
- 7-G2
- 7-G6

CTE Pathway Standards: Engineering and Architecture

- Knowledge and Performance Anchor Standards:
 - 2.3
 - 2.4
 - 2.5
 - 3.2
 - 5.1
 - 5.2
 - 5.3
 - 5.4
 - 7.1
 - 8.2
 - 8.3
- Engineering Technology Pathway:
 - B1.3
 - B1.4
 - B1.5
 - B2.1
- Engineering Design Pathway:
 - C3.2

Lesson Plan Relevance To Externship

-Civil engineers work with Land Surveyors often. Land Surveyors have to use many measuring devices and written description to identify a parcel of land. Some descriptions are old and uses land marks, angels, and length measurements. Land Surveyors must be able to accurately identify a parcel with these descriptions and also to write one as well. Students will need to be able to follow written description and writing detailed descriptions themselves using many forms of measurements accurately.

-Civil engineers design **maps and lots** on a parcel based on city codes and what developers want. Their designs frequently change depending on many things such as city rejecting the plan or asking for changes, developers asking for changes, and construction being put on hold and being restarted again with new changes and ideas. There are many agencies involved in putting up a house. Students will have to compare and make adjustments to make their calculations work when changes occur.

Rubric for the (type in the title) Project

Student Deliverables	1 Exceeds Expectations	2 Meets Expectations	3 Approaches Expectations	4 Fails to meet Expectations