# Generic Lesson Plan Template

You should submit this form in addition to any computer generated files/documents/models to your group folder on Angel. Please create a .zip file and upload the group of files as a single archive.

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| Name: **Evan Brauer** |
| Grade level(s)/Subject taught: **Grade 10 - Geometry** |
| Objectives: **To have students transform shapes, use properties of parallelism and compute areas of both regular and non-regular polygons through the use of Geometer's Sketchpad.** |

1. *Write* the Mathematical Concept or "key idea" that modeling will be used to teach:

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| **1. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships** |
| **2. Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.** |

Materials:

**Computer with Geometer's Sketchpad**

- **The lesson will begin with a class discussion of polygons and their characteristics. Specifically, we will review how to find the area of a triangle, properties of parallel lines and transformations.**

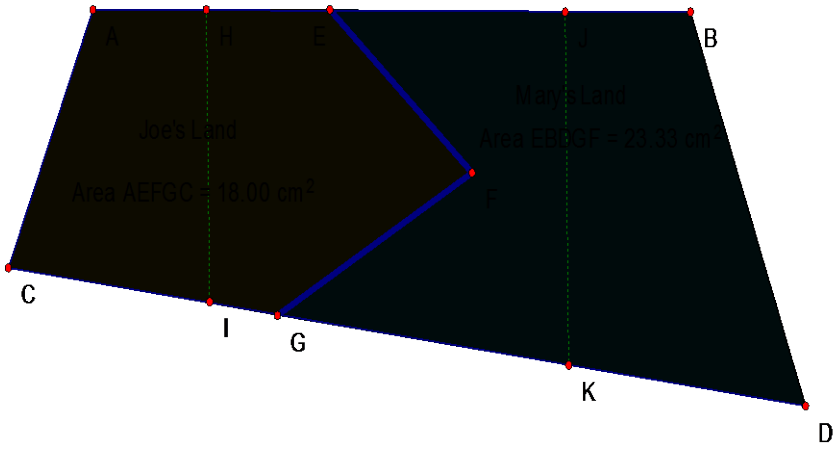
**Next the students will be given a real-world problem to solve, discussing it first as a class (GSP figure 1). The teacher will then ask the students if possible solutions could be either the line connecting points H and I or the line connecting points J and K. After the class agrees that neither of these lines could be a solution, the students would work alone or in pairs to try and come up with some strategies to solve the problem. After about 15 minutes, during which time the teacher is circulating throughout the room, listening and watching the students discuss the problem, the class comes back together as a whole. Students will verbalize their strategies and other students will ask questions and try some of these techniques on GSP. After about ten minutes the students will go back to work on their own. If some groups are still unable to determine a method to solve the problem, the teacher would give some clues (draw the needed parallel lines – GSP figure 2); discuss what shapes are now formed (triangle); review triangle transformations. The class will end with the task of completing this problem as homework. If any group completes it early, an extended assignment would be to determine where to draw a straight property line so that the two properties have equal areas.**

**The teacher will assess the student's learning of the lesson by looking at their homework and using the attached rubric.**

***FIGURE 1***

Joe and Mary each have land that borders on the other's. The border makes it very difficult to work that part of the land, so they have asked you for help:

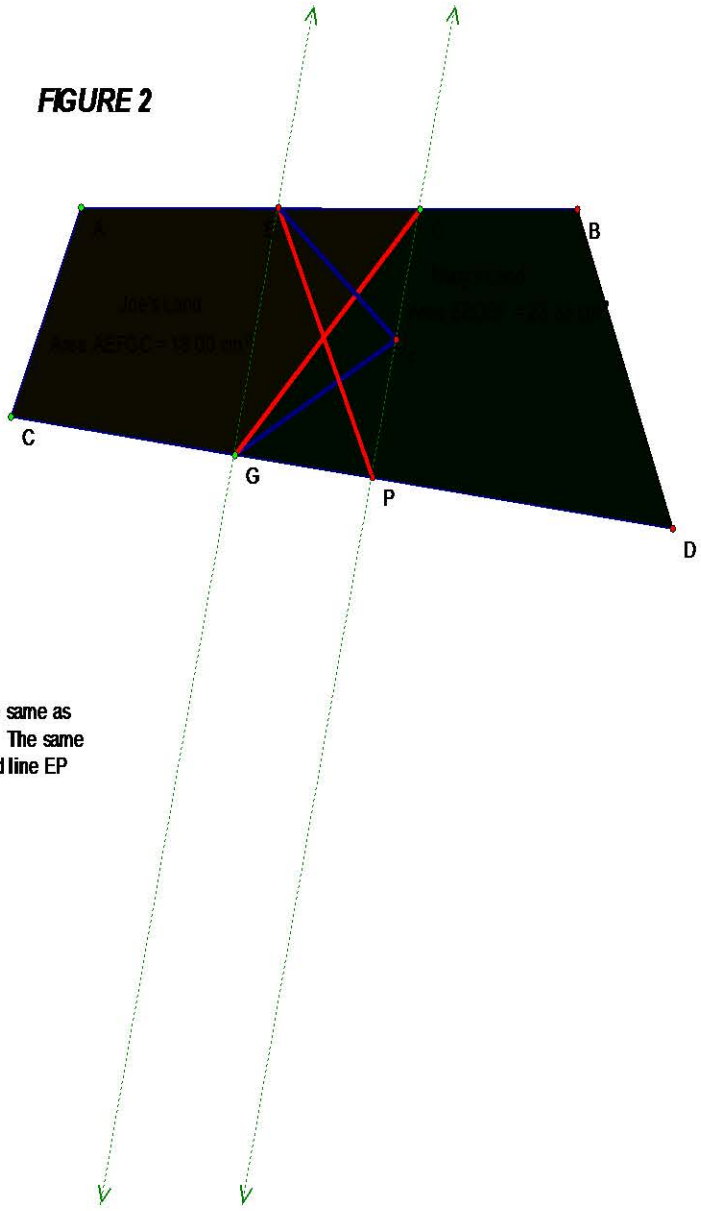
Can you create a new border consisting of a straight line that runs from segment AB to segment CD that maintains both Joe's and Mary's current land mass (maintain the area of both properties)



## *FIGURE 2*

Joe and Mary each have land that borders on the other's. The border makes it very difficult to work that part of the land, so they have asked you for help.

Can you create a new border consisting of a straight line that runs from segment AB to segment CD that maintains both Joe's and Mary's current land mass (maintain the area of both properties)

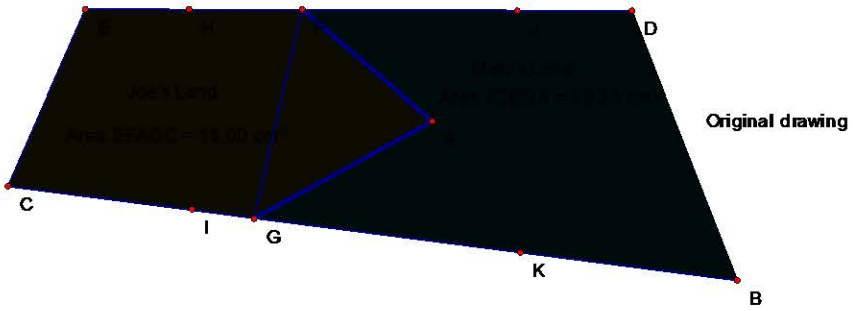



To solve this problem, first draw a line through points E and G. Then draw a line parallel to the line you just drew through point F. The solution to the question is the line segment EP or OG

Area AOGC = 1800cm²

Area CBDG = 2333cm²

These two areas are the same as the original land areas. The same would be true if we used line EP instead of OG.

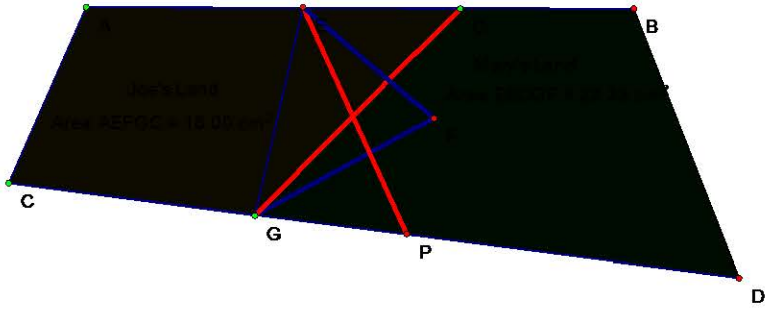



Original drawing

***WHY DOES THIS WORK?***

***In both drawings, the base of triangle FAG (which is EFG in the solution drawing) is the same (segment FG or EG). Point O in the solution drawing was created from a parallel line to EG, thus, the altitude from O to EG is equal to the altitude from A to FG in the original drawing, as altitudes bewteen parallel lines are equal. So both triangle FAG (original) and OEG (solution) have the same area, so land masses remain constant.***

Solution drawing



# Math - Problem Solving : Geometric Transformations with Area Fitting

Teacher Name: **Mr. Brauer**

Student Name: _____

| CATEGORY | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| Diagrams and Sketches | Diagrams and/or sketches are clear and greatly add to the reader's understanding of the procedure(s). | Diagrams and/or sketches are clear and easy to understand. | Diagrams and/or sketches are somewhat difficult to understand. | Diagrams and/or sketches are difficult to understand or are not used. |
| Mathematical Terminology and Notation | Correct terminology and notation are always used, making it easy to understand what was done. | Correct terminology and notation are usually used, making it fairly easy to understand what was done. | Correct terminology and notation are used, but it is sometimes not easy to understand what was done. | There is little use, or a lot of inappropriate use, of terminology and notation. |
| Explanation | Explanation is detailed and clear. | Explanation is clear. | Explanation is a little difficult to understand, but includes critical components. | Explanation is difficult to understand and is missing several components OR was not included. |
| Mathematical Reasoning | Uses complex and refined mathematical reasoning. | Uses effective mathematical reasoning | Some evidence of mathematical reasoning. | Little evidence of mathematical reasoning. |
| Mathematical Concepts | Explanation shows complete understanding of the mathematical concepts used to solve the problem(s). | Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s). | Explanation shows some understanding of the mathematical concepts needed to solve the problem(s). | Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written. |
| Neatness and Organization | The work is presented in a neat, clear, organized fashion that is easy to read. | The work is presented in a neat and organized fashion that is usually easy to read. | The work is presented in an organized fashion but may be hard to read at times. | The work appears sloppy and unorganized. It is hard to know what information goes together. |