

Math3105
Homework 3
Due next week in class

Homework Assigned:

1. Verify the following statement using *analytic geometry*.
An alternative (and simpler) solution to the pirate problem places Owl Rock and Falcon Rock at points $(0, 0)$ and $(2d, 0)$ respectively. The palm tree is then located at an arbitrary point (x, y) . By following the instructions, the *midpoint of the segment joining the two stakes can be shown to be the fixed point (d, d)* . This approach requires that you apply a few basic facts about right triangles and complementary angles, as well as the midpoint formula in the Cartesian plane.
2. Write up your work/answers to the cases (1-3) included with this homework.
3. Complete #1 & #2 challenges on the Heart Breaking Puzzle handout.

MESA teaching topic ideas:

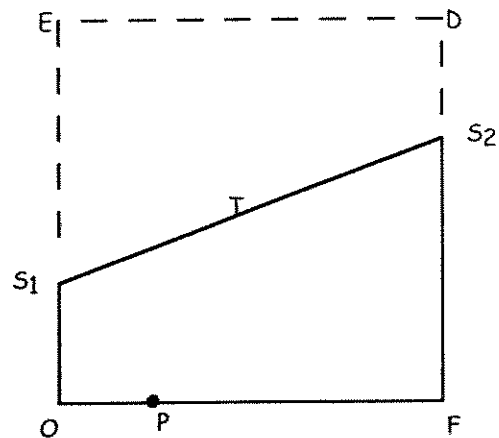
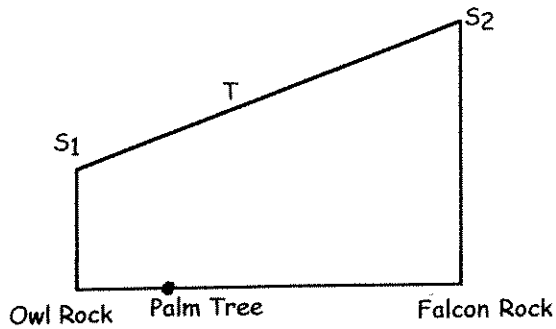
- Tangrams
- Pythagorean Theorem
- Tessellations
- Platonic Solids
- Similarity/Fractals
- Symmetry
- Perimeter/Area of 2d shapes
- Volume/Surface Area of 3d solids
- Geoboard activities
- Map coloring
- Geometry crossword puzzles (or other types of puzzles)
- Geometric games (like Blokus, Battleship, Set, etc.)
- Mobius Strips

Online resources:

- <http://math.rice.edu/~lanius/Lessons/>
- <http://www.aimsedu.org/Puzzle/index.html>

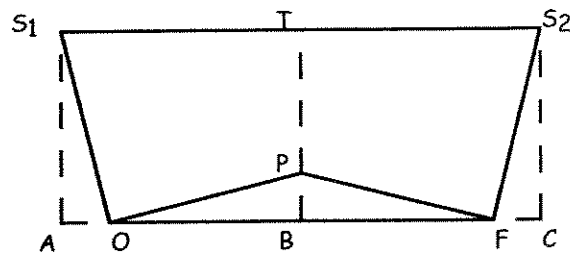
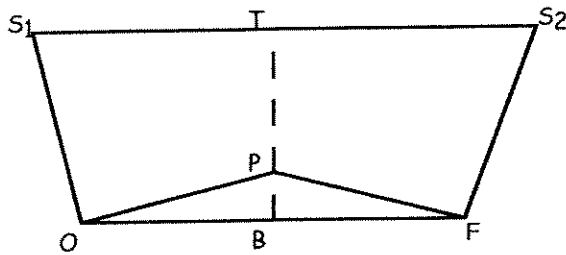
Euclidean Solution to the Pirate Problem:

CASE 1: P on the axis from F to O:



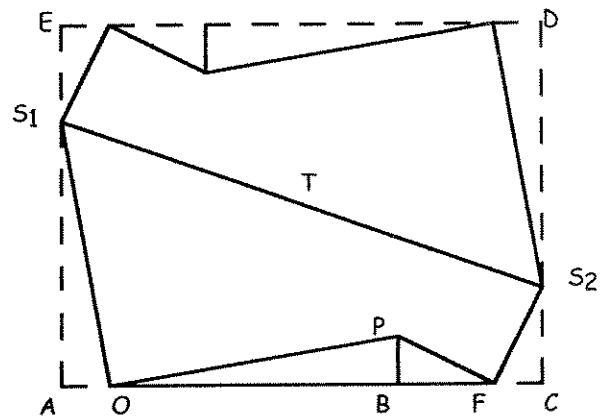
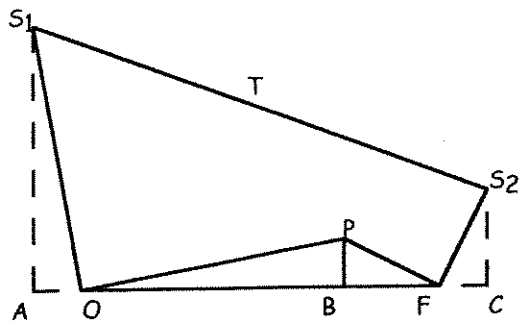
Show that T is at the center of this rigid square.

CASE 2: P on the perpendicular bisector to FO:



Show AS_1 and CS_2 have fixed lengths. Why is this important?

CASE 3: P in an arbitrary interior position:



What other cases are omitted here?



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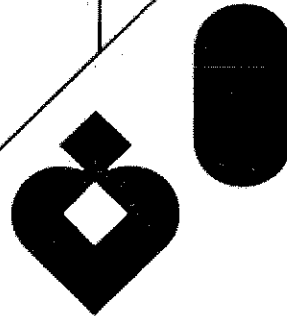
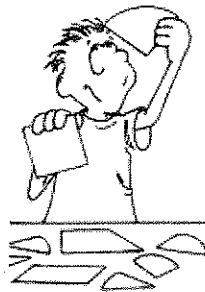
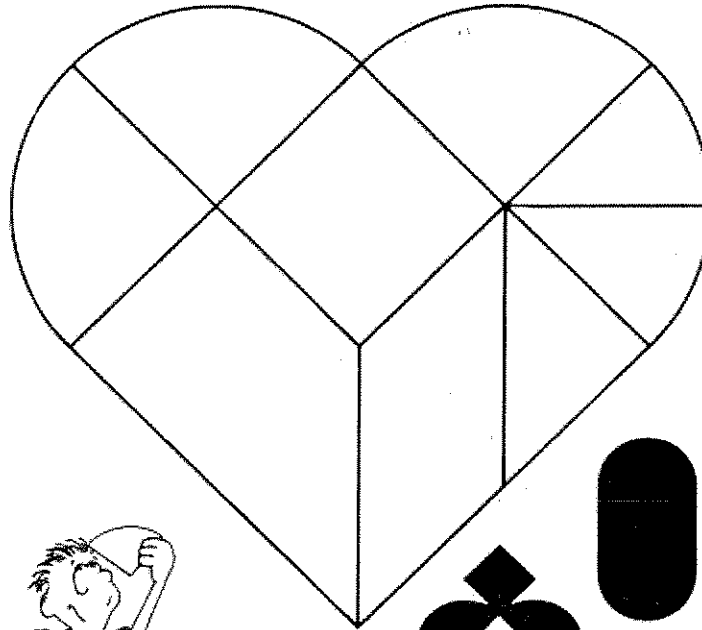
Help/Info

The Heart Breaking Puzzle

Carefully cut out the pieces of the heart puzzle. Use all nine pieces to make as many interesting shapes as you can. (The pieces must be placed edge to edge and can't overlap.) Make a record of your shapes by drawing their outlines on a separate sheet of paper.

Challenges:

1. Reassemble the heart.
2. Make the two shapes shown at bottom right.



Challenges:

1. Reassemble the heart.
2. Make the two shapes shown here.

