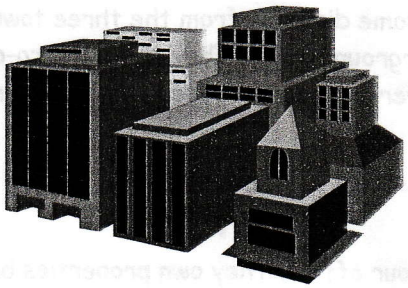
REGIONAL PLANNER



The following problems are to be completed as part of your Application Section for ~~Security Level Checks~~ Your Unit Problem.

Part A

You have been hired as the regional planner for the region of MATHLAND made up of several towns. When you superimpose a co-ordinate system on the map of the region, **OrrTown** is located at (11,-3), the town of **Tanconville** is at (2,12) and **Bakerland** is at (-4,-12). The units on the co-ordinate system are kilometres, in other words, **OrrTown** is located 3 km west and 11 km north of the "*origin*".

1. Construct a map of MATHLAND, identifying the location of the three towns.
2. One of your jobs is to help the local internet company Dookie's Domain. The repair people at Dookie's Domain want to know how far they have to travel to each town to do repairs.
   a.) Dookie's Domain is located at the origin. Add them to your map.
   b.) Find out how far a repair man would have to travel to get to each town.
   c.) If the repair man could travel in a straight line on his bike at an average speed of 8km/h how long would it take to get to each town?

Part B

Another one of your jobs is to decide the best location for a new hospital for the town of **Smajdafield**, which is also in the region of MATHLAND. People located less than 20 km from the hospital are judged to have excellent access to the hospital, those located exactly 20 km away have acceptable access, and anyone living further than 20 km away has poor access.

1. Label a new set of axes as **Smajdafield**.
2. If the hospital is located at co-ordinates (0,0), **sketch** a map showing the location of people who have excellent access, acceptable access and poor access to the hospital.
3. Find the **equation** that describes all locations where people have acceptable access to the hospital.
4. A suburb of **Smajdafield** called **Parabola** is located at co-ordinates **(12, 13)**. What quality of access to the hospital do the residents of **Parabola** have? Explain.

Part C

Another job is to assist a local television cable company. The company has decided they would like to build a central station at a location that is the same distance from the three towns from part A (use the same axes). The signal will be sent via an underground cable. They think the co-ordinates of this location are (-1, 0). Use your analytic geometry skills to verify their proposed location is, in fact, the same distance from the three towns.

Part D

Two inhabitants of **OrrTown** come into your office. They own properties beside each other, and are a having a dispute over the property line. When consulting a map of the town, you find that one house is located at A(-1, 8) and the other is at B(3, -4) on the town map. When you consult the records, you find out that the property line is located exactly halfway between the two houses. It is also perpendicular to the line segment joining the two houses. Find the equation of the property line. (**Label a new set of axes as OrrTown**).

Part E

The cable company from Part C is interested in the distances between the three towns they serve, because they want to estimate travel times for their repair people as they travel from town to town.

a) Classify the triangle formed by the three towns.
b) The representative you are dealing with has expressed the belief that since all three towns are the same distance from the central station, they must be the same distance from each other. Is this true? Explain your reasoning.

Part F

Ms. Mayhew, a resident of OrrTown, needs to put a pond in her triangular back yard. Her Back yard has coordinates (18,54), (-27,36), (27,-18). What is the diameter of the largest circular pond that will fit in her backyard?

Part G

A resident of **Taconville** comes into your office one day. She owns a piece of property that is in the shape of a parallelogram. There have been stakes at each corner of the property, but one of them has been lost. The three remaining stakes are located at P(2,3), Q(0, -2) and R(-6, 1) on the town's map.

a) The owner thinks the missing stake was located at S(-7, -4). Is she correct? Justify your conclusion.
b) How many locations are possible for the missing stake to form a parallelogram? List them.
c) Choose **ONE** of your new co-ordinates and verify that it is parallelogram.