

## Chapter 3 / Example 4

# Voronoi diagrams

In questions about Voronoi diagrams, a GDC may be used to solve simultaneous equations.

A town has four coffee shops, A, B, C and D. An entrepreneur wishes to open a new shop in the town but would like it to be as far as possible from all the other four coffee shops. Consider the Voronoi diagram showing the positions of the 4 coffee shops on a set of coordinate axes. A(1, 6), B(2, 2), C(8, 2) D(8, 5) where one unit represents 1 km.

- Find the coordinates of the vertices P and Q in the Voronoi diagram.
- Determine the best position for the new shop so as to be as far as possible from any other shop.

The perpendicular bisector of [AD] is  $7x - y = 26$

The perpendicular bisector of [BD] is  $2x + y = 13.5$

To find the point of intersection solve the simultaneous equations press **MENU** **A** **EQN** to enter equation mode.

Press **F1** Simultaneous

There are 2 unknowns so press **F1** 2.

Simultaneous  
No Data In Memory

Number Of Unknowns?  
2 3 4 5 6

Enter to coefficients into the matrix.

Press **F1** SOLVE.

$a_n X + b_n Y = C_n$

	a	b	c
1	7	-1	26
2	2	1	13.5

13.5

SOLVE DELETE CLEAR EDIT

The calculator displays the solution  $x = 4.39, y = 4.72$

The coordinates of Q are 4.39, 4.72 .

$a_n X + b_n Y = C_n$

X 4.3888  
Y 4.7222

4.388888889

REPEAT