

Year 10 Elective: The Yachting Regatta - Analysis Task

You are advised to use Geogebra to plot the paths, find the coordinates of the buoys and the lengths of each leg of the race. You should attach the printout of the Geogebra to your written assignment.

The annual yachting regatta of the Mathematical Club is to take place on Lake Tetrahedra. Starting at the marina (which can be considered to be coordinate point $(0,0)$), the yachts are to travel around six buoys located at various positions on the lake.

The location of each of the six buoys is described below:

- **first buoy:** on the path given by the relationship $y = 2x$.
- **second buoy:** on the path given by $11y + 2x - 72 = 0$.
- **third buoy:** 10 units directly below the second buoy on the path given by $x + 8 = 0$
- **fourth buoy:** at the coordinate point $(-3, 11)$.
- **fifth buoy:** to the right of the fourth buoy on a path parallel to the x-axis. The path on which the fifth and sixth buoys are located is given by $5y + 7x - 69 = 0$.
- **sixth buoy:** located 2 units down from the first buoy and 4 units to the right of it.
 - a. Draw a set of axes with the following dimensions, x axis -10 to 10 , y axis -5 to 12 . Label each of the important components on the set of axes.
 - b. Sketch the paths the yachts will take travelling from the marina, to each buoy and back to the marina.
 - c. Use your graphs to determine the coordinate position of each of the six buoys.
 - d. Determine the relationship describing the path between the third and fourth buoy.
 - e. Determine the relationship describing the path between the fourth and fifth buoys.
 - f. Describe the path (ie find the equation) from the sixth buoy back to the marina.
 - g. The Commodore's motor launch breaks down at coordinate point $(4, 8)$. Will this interfere with the paths taken by the yachts? Explain, using mathematical reasoning.
 - h. Calculate the total distance of the race, showing all working. Assume the scale of one unit on the x-axis/y-axis equals 1 km.



The patrol motor boat needs to travel along the circular path just outside the paths of the racing yachts.

- i. Find the equation of the circular path for the motor boat and draw it on your diagram.