8. The objective for a linear programming problem is

$$\text{Maximise} \quad P = 5x + y + 10z$$

It is known that $x + y + z = 100$

(a) Show that the objective can be written as

$$\text{Minimise} \quad C = 5x + 9y$$

(3)

The constraints for the problem are

$$2x + 7y \geqslant 70$$

$$6x + 7y \leqslant 210$$

$$7x + 3y \geqslant 105$$

$$x \leqslant 3y$$

$$x, y \geqslant 0$$

(b) Draw the constraints on the grid in the answer book, shading to leave the feasible region, which should be labelled R.

(3)

(c) Use point testing to determine the exact coordinates of the optimal vertex.

(4)

Given that the original problem requires integer solutions,

(d) determine the optimal values of x, y and z and state the value of P.

(4)

(Total for Question 8 is 14 marks)

TOTAL FOR PAPER IS 75 MARKS