5. The head of a Mathematics department needs to order three types of paper. The three types of paper are plain, lined and graph.

All three types of paper are sold in reams. (A ream is 500 sheets of paper.)

Based on the last academic year the head of department formed the following constraints.

- At least half the paper must be lined
- No more than 15% of the paper must be graph paper
- The ratio of plain paper to graph paper must be 5 : 2

The cost of each ream of plain, lined and graph paper is £5, £12 and £15 respectively. The head of department has at most £834 to spend on paper.

The head of department wants to maximise the total number of reams of paper ordered.

Let x, y and z represent the number of reams of plain paper, lined paper and graph paper ordered respectively.

(a) Formulate this information as a linear programming problem in x and y only, stating the objective and listing the constraints as simplified inequalities with integer coefficients.

(7)

The head of department decides to order exactly 42 reams of lined paper and still wishes to maximise the total number of reams of paper ordered.

(b) Determine

(i) the total number of reams of paper to be ordered,

(ii) the number of reams of graph paper to be ordered.

(3)

(Total for Question 5 is 10 marks)