

## Answer on Question #45279 – Math - Other

### Problem.

Town Council decides to run a special summer children's show to help promote tourism at the beach. They will set up a temporary stage and seating on the beach for the show. Tickets will be made available for both adults and children with the unusual situation of a child's ticket being more expensive than that of an adult's. You have been asked to analyse the information made available and report back with total profit and ticket sales data.

Child Adult

Ticket Price \$12 \$3

Expected Average Food and Beverage Purchase \$4 \$8

Expected Profit \$10 \$5

income from ticket sales is at least \$900 and the income from food and beverages sales is at least \$1 000.

Task Identifies the maximum profit available to Waihi Town Council

Identifies the number of adults' and children's tickets needed to be sold to maximise the profit.

### Remark.

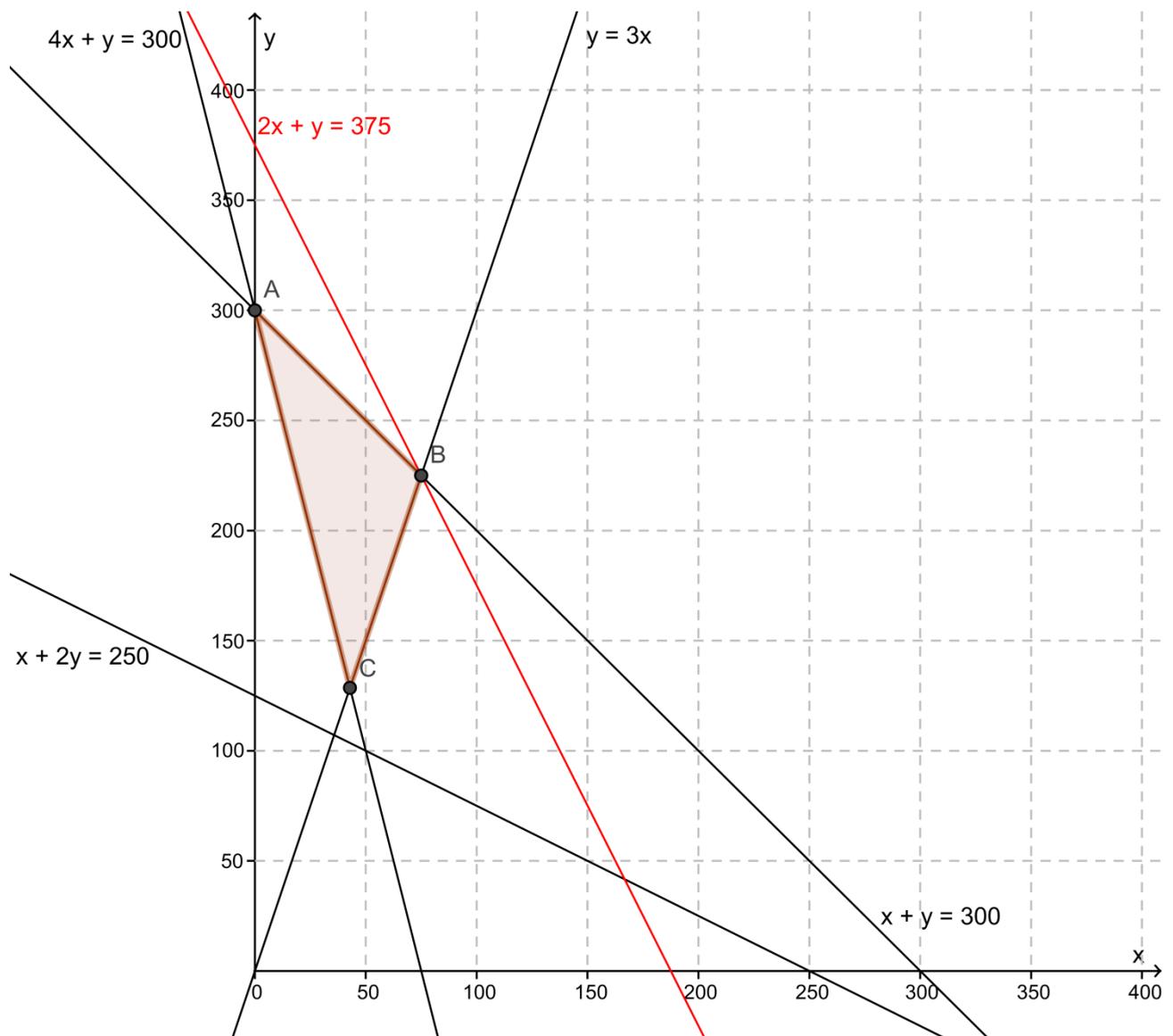
The part of question is missed. It should be "There are a maximum number of 300 temporary seats available for the show. It has been decided that the show will only go ahead if the income from ticket sales is at least \$900 and the income from food and beverages sales is at least \$1 000. Town Council has a health and safety policy for family shows where, across total ticket sales, there cannot be more than 3 children's tickets sold for every adult ticket sold. " instead of "income from ticket sales is at least \$900 and the income from food and beverages sales is at least \$1 000."

### Solution.

Suppose that there was  $x$  childs and  $y$  adults. Then we get system of constraints

$$\begin{cases} x \geq 0; \\ y \geq 0; \\ x + y \leq 300; \\ 12x + 3y \geq 900; \\ 4x + 8y \geq 1000; \\ y \geq 3x. \end{cases}$$

We should maximaze function  $f(x, y) = 10x + 5y$ . The graphical method gives as following result



The function  $f(x, y)$  will obtain the maximum value at intersection point of lines  $y = 3x$  and  $x + y = 300$  or at point  $B(75, 225)$ . Hence, the maximum profit equals  $10 \cdot 75 + 5 \cdot 225 = 1875$  dollars, when show will visit 75 childrens and 225 adults.

**Answer:** \$1875, 75 childrens and 225 adults.