2003

11 (a) The line K cuts the x-axis at $(10, 0)$ and the y-axis at $(0, 5)$.

(i) Find the equation of K.

(ii) Write down the three inequalities that together define the region enclosed by K, the x-axis and the y-axis.
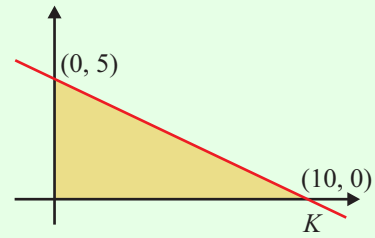
(b) A developer is planning a scheme of holiday homes, consisting of large and small bungalows. Each large bungalow will accommodate 8 people and each small bungalow will accommodate 6 people. The development is not permitted to accommodate more than 216 people. The floor area of each large bungalow is 200 m² and the floor area of each small bungalow is 100 m². The total floor area of all the bungalows must not exceed 4000 m².

(i) Taking x as the number of large bungalows and y as the number of small bungalows, write down two inequalities in x and y and illustrate these on graph paper.

(ii) The expected net annual income from each large bungalow is €14 000 and from each small bungalow is €8000. How many of each type should be built in order to maximise the total expected net annual income?

(iii) The developer decides to build as indicated in part **(ii)**. The cost of building each large bungalow is €110 000 and the cost of building each small bungalow is €85 000. The total cost of the development is equal to the building costs plus €1.58 million. How many years will it take to recoup the total cost of the development?

ANSWERS

11 (a) (i) $x + 2y - 10 = 0$

(ii) $x + 2y - 10 \leq 0$, $y \geq 0$, $x \geq 0$

(b) (i) $4x + 3y \leq 108$, $2x + y \leq 40$

(ii) $x = 6$, $y = 28$

(iii) 15