Additional Mathematics Coordinate geometry applications

Section 1: Using inequalities for problem solving

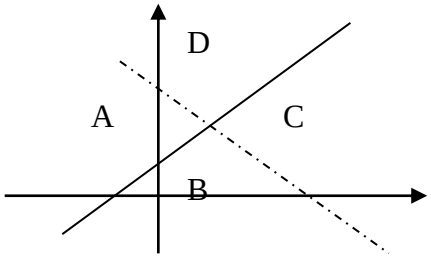
Notes and Examples

Illustrating inequalities involves some conventions;

a) If the inequality includes equality then the line should be solid. If it does not then the line should be dotted. *This shows us whether the points on the line are to be included or not.*

b) The region that is NOT required is usually the one that is shaded, *to leave the required area clear so that points within it can be investigated.*

In the diagram below the lines $y = x + 1$ and $x + y = 5$ divide the graph into four regions; A, B, C and D. Each region can be defined by two inequalities.



A is defined by $y \geq x + 1$ and $x + y < 5$
B is defined by $y \leq x + 1$ and $x + y < 5$
C is defined by $y \leq x + 1$ and $x + y > 5$
D is defined by $y \geq x + 1$ and $x + y > 5$

Example 1

Fred is on a diet. He is allowed to eat only Energibisks and Slimfaster bars. Energibisks contain 4g of fat and 300 calories; Slimfaster bars contain 6g of fat and 500 calories. His trainer says that he must keep his daily fat intake to less than 25g and his calorie intake to more than 1500 calories. However, the food tastes disgusting and Fred can only eat, at most 4 Energibisks and 3 Slimfaster bars in a day. If he eats x Energibisks and y Slimfaster bars in a day, write down 4 inequalities that will describe this situation.

Solution

$4x + 6y < 25$ Fat

$300x + 500y > 1500$ Calories

$x \leq 4$ Energi

$y \leq 3$ Slimfast