

Non-linear inequalities and regions of graphs

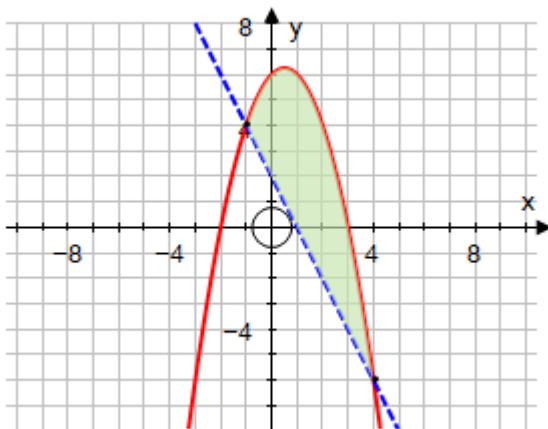
A LEVEL LINKS

Scheme of work: 1d. Inequalities – linear and quadratic (including graphical solutions)

Key points

- First replace the inequality sign by = and sketch or plot the linear or the first quadratic equation if both inequalities are quadratic.
- Replace the inequality sign by = and sketch or plot the second equation.
- Use the graph to find the region which satisfies both inequalities.

Example: Sketch the region which satisfies the inequalities $y + 2x > 2$ and $y \leq 6 + x - x^2$



- 1 Replace the inequality with an equals sign and plot the graph of $y = 2 - 2x$

Remember that the inequality is greater than so remember to sketch with a *dotted* line.

- 2 For the quadratic, replace the inequality with an equals sign and plot the graph of $y = 6 + x - x^2$

- 3 Solve this equation and sketch on the same axes as the linear equation.

Remember that the inequality is less than or equals to so remember to sketch with a *solid* line.

- 4 Shade the required region.

- 5 Note that you can sketch the graphs, you can plot them on graph paper or, better still you can use graph plotting software to plot the graphs if your calculator is capable of doing this.

Practice questions

- 1 On the grid provided, on graph paper or otherwise, plot or sketch the region which satisfies the inequalities:

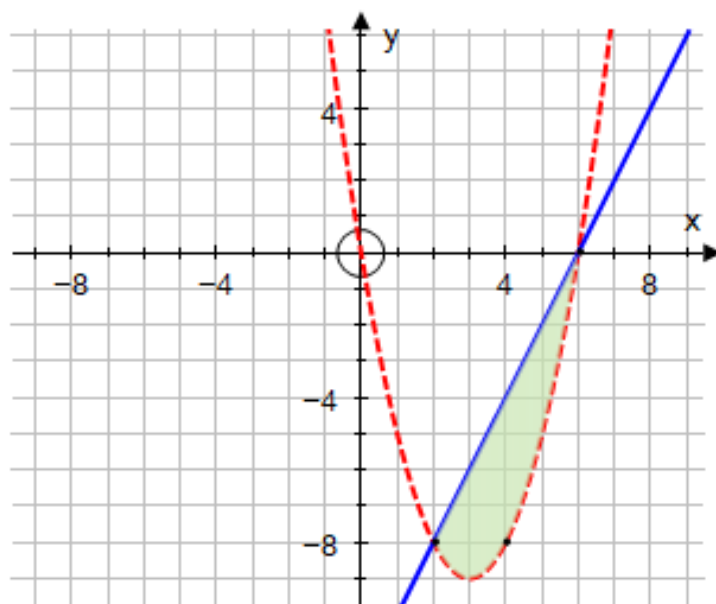
$$y + 12 \leq 2x \text{ and } y > x^2 - 6x$$

- 2 On the grid provided, on graph paper or otherwise, plot or sketch the region which satisfies the inequalities:

$$y \geq x^2 - 9 \text{ and } y \leq 3 - 2x - x^2$$

Answers

1



2

