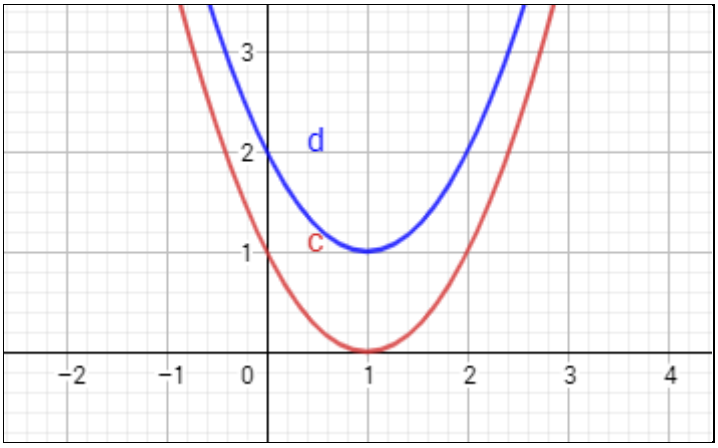
MEI GeoGebra Tasks for AS Pure

Task 3: Algebra – Graphs of quadratic functions

1. Plot the curve: **y = (x + a) (x + b)**
   If prompted click *Create Sliders*.

2. Plot the curve: **y = (x + p)^2 + q**
   If prompted click *Create Sliders*.



Questions for discussion

- Can you find values for *a*, *b*, *p* and *q* so that the two graphs are the same?
- What is the relationship between the values of *a*, *b*, *p* and *q* when the graphs are the same?

Problem *(Try the problems with pen and paper first then check it on your software)*

Solve the equation $x^2 - 2x - 8 = 0$ by both factorising and completing the square.

Further Tasks

Change the equation in step 2 to **y = k (x + p)^2 + q** (with a slider for *k*).

- Where does this curve cross the *x*-axis?
- Can you change the equation in step 1 so the curves are the same?

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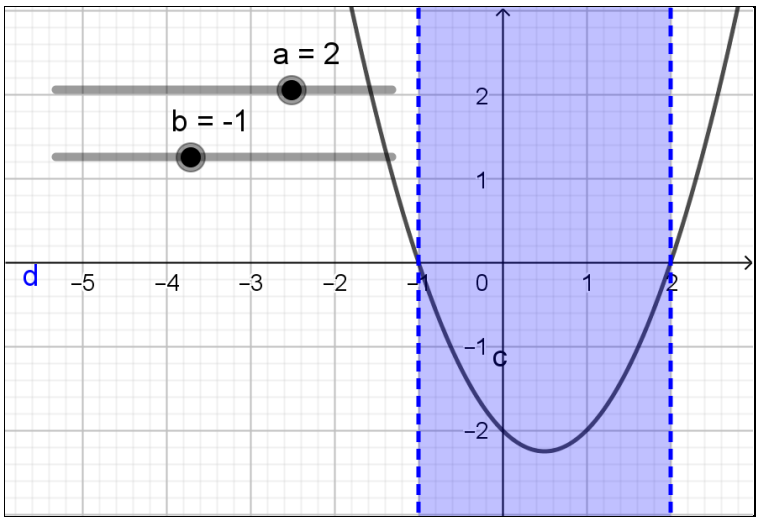
Task 13: Quadratic Inequalities

1. Plot the curve: **y=(x-a)(x-b)**
   If prompted click *Create Sliders*.

2. Plot the inequality: **(x-a)(x-b)<0**



Questions for discussion

- If the product of two numbers is negative what does this tell you about the numbers?
- Will you always be able to find *x*-values for which a quadratic is negative?
- What would the solution to $(x-a)(x-b)>0$ look like?

Problem *(Try the problem with pen and paper first then check it on your software)*

Sketch the graph of $y = 2x^2 - x - 6$ and hence solve the inequality $2x^2 - x - 6 \geq 0$.

Further Tasks

- Find the range of values for k such that $x^2 - 4x + 3 = kx$ has two distinct roots.
- Investigate $y > mx + c$ and $y > ax^2 + bx + c$ graphically.