



# MEI GeoGebra Tasks for GCSE Mathematics

## Algebra 1

$$y = mx + c$$



1. Open a new GeoGebra file.

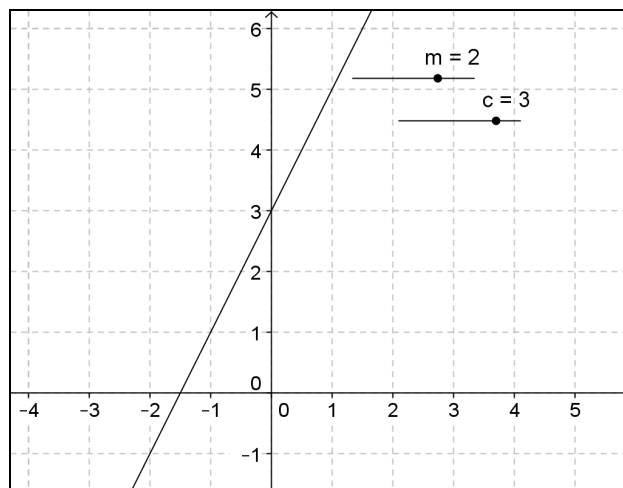
2. Add a slider  and set its name to **m**.

3. Add a slider  and set its name to **c**.

The multiplication sign is essential but you can use a space in place of \*.

4. In the Input bar type **y=m\*x+c** and press enter.

5. Select the cursor  or  and vary the sliders for **m** and **c**.



### Questions


- How does changing **c** affect the line?
- How does changing **m** affect the line?
- Can the line ever be horizontal?
- Can the line ever be vertical?
- Find a way of working out where the lines cross the x-axis?
- If you know the y-value at a point how could you find the x-value?
- If you had two points on the line how could you find m?


# MEI GeoGebra Tasks for GCSE Mathematics

## Algebra 2


### Intersection of two lines


1. Open a new GeoGebra file.

2. Add a slider  and set its name to **m**.


3. Add a slider  and set its name to **c**.



4. In the Input bar type  $y=m*x+c$  and press enter.

5. Add a slider  and set its name to **n**.

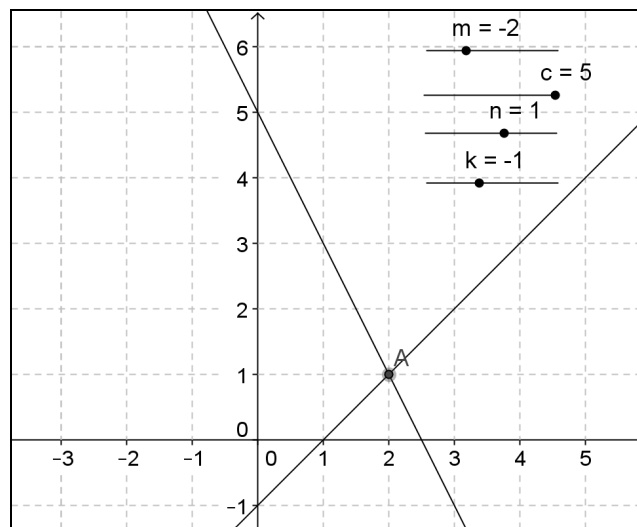
6. Add a slider  and set its name to **k**.

7. In the Input bar type  $y=n*x+k$  and press enter.

8. Use the Intersect Two Objects tool (2<sup>nd</sup> menu)  to find the point of intersection of the two lines.

9. Select the cursor  or  and vary the sliders for **m**, **c**, **n**, and **k**.

The Intersect Two Objects tool can be found on the 2<sup>nd</sup> Menu. Select this tool then click on each line.



#### Questions


- How could you find the exact values of the coordinates of the points of intersection from the equations of the lines?
- When are the two lines the same?
- When will the line and the curve have 0 points of intersection?


# MEI GeoGebra Tasks for GCSE Mathematics

## Algebra 3

### Parallel and Perpendicular lines

1. Open a new GeoGebra file.


2. Add a slider  and set its name to **m**.


3. Add a slider  and set its name to **c**.

4. In the Input bar type  **$y=m*x+c$**  and press enter.

5. Add a new point .

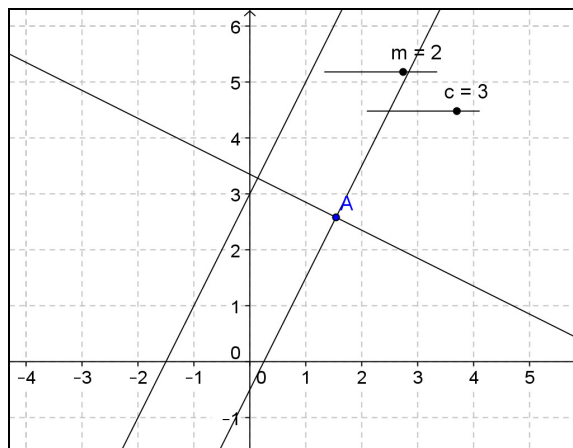
NB this point should not be on the line.

6. Use the Parallel Line tool (4<sup>th</sup> menu)  to create a line parallel to the original line through the point.

7. Use the perpendicular line tool (4<sup>th</sup> menu)  to create a perpendicular to the original line through the point.

8. Vary the sliders for **m** and **c** and the position of the point.

The Parallel Line tool can be found on the 4<sup>th</sup> Menu. Select this tool then click on the point and then the line.



You might find it useful to rewrite the equations of the lines in the form  $y=mx+c$ .

#### Questions


- What is the relationship between the gradient of parallel lines?
- What is the relationship between the gradient of perpendicular lines?
- How does this relate to vertical and horizontal lines?


# MEI GeoGebra Tasks for GCSE Mathematics

## Algebra 4



$$y = x^2 + bx + c$$

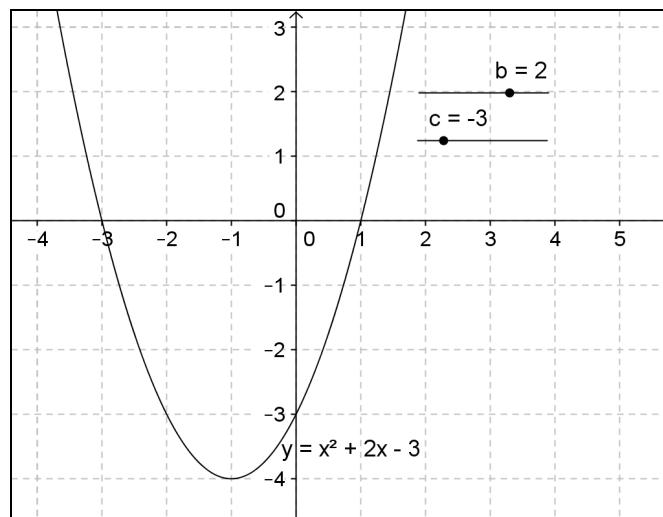
1. Open a new GeoGebra file.

2. Add a slider  and set its name to **b**.

3. Add a slider  and set its name to **c**.

4. In the Input bar type  $y=x^2+b*x+c$  and press enter.


5. Select the cursor  or  and vary the sliders for **b** and **c**.



### Questions

- What is the effect of varying **c**?
- What is the effect of varying **b**?
- Can you find where the curve crosses the x-axis for different values of **b** and **c**?
- Can you find values of **b** and **c** so the curve touches (but doesn't cross) the x-axis?
- Can you find values of **b** and **c** so the curve doesn't cross or touch the x-axis?

### Extension

6. Add a slider  and set its name to **a**.

7. Change the equation of the curve to  $y=a*x^2+b*x+c$ .

### Question

- How does changing **a** affect the curve?

# MEI GeoGebra Tasks for GCSE Mathematics

## Algebra 5


### Factorised form of quadratic equations: $y = (x - p)(x - q)$



1. Open a new GeoGebra file.

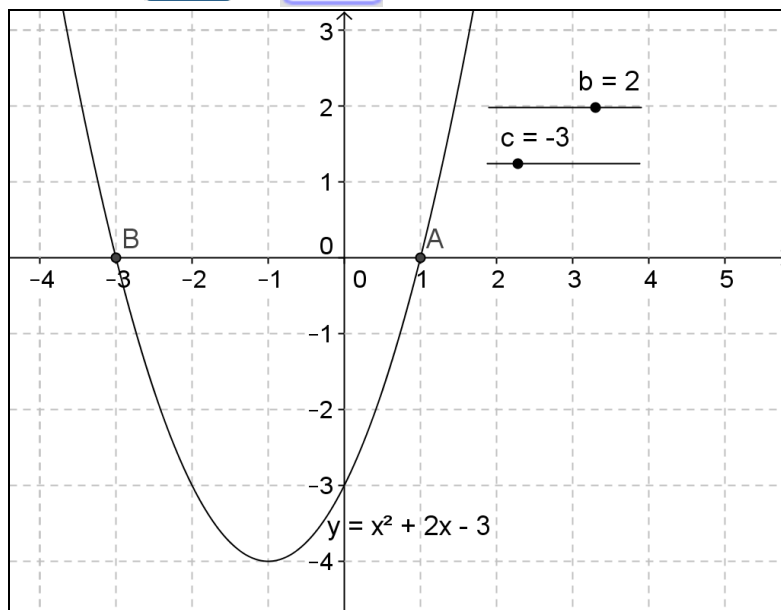
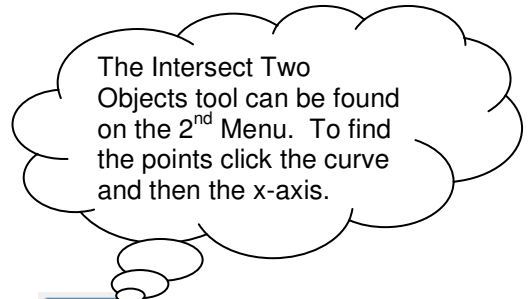
2. Add a slider  and set its name to **b**.

3. Add a slider  and set its name to **c**.

4. In the Input bar type  $y = x^2 + b \cdot x + c$  and press enter.

5. Use the Intersect Two Objects tool (2<sup>nd</sup> menu)  to find the points where the curve cuts the x-axis.

6. Select the cursor  or  and vary the sliders for **b** and **c**.



### Questions

- Can you find values of **b** and **c** so the curve cuts the x-axis at points with integer coordinates?
- What is the relationship between **b** and **c** the points where the curve cuts the x-axis?
- What is the relationship between the points where the curve cuts the x-axis and the point where it cuts the y-axis?
- Where is the line of symmetry of the curve?