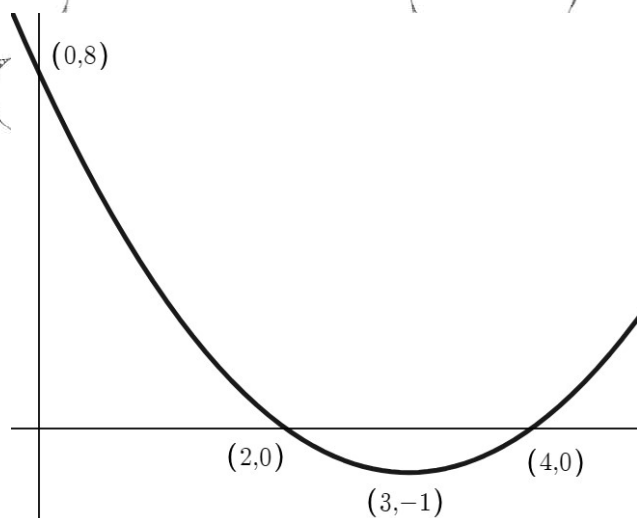


(24) Transforming Graphs (Stretching/Reflecting)

WORKING AT D/E

(1) The graph of $y = f(x)$ is shown below.



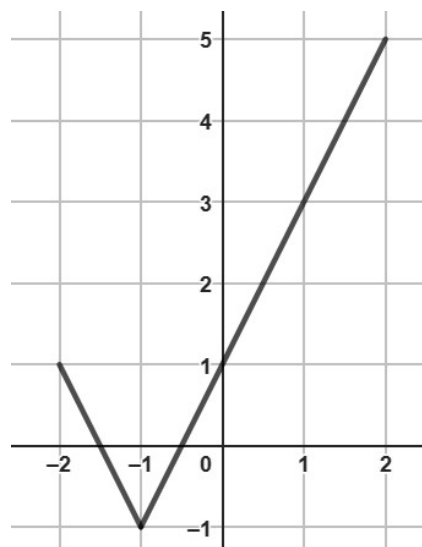
Sketch the graphs of the following showing the coordinates on each graph:

- (a) $y = 3f(x)$ (b) $y = f(2x)$ (c) $y = -f(x)$
 (d) $y = f(-x)$ (e) $y = f(0.5x)$ (f) $y = -4f(x)$
 (g) $y = -f(-x)$ (h) $y = 0.5f(x)$ (i) $y = 1 - f(x)$

WORKING AT B/C

(1) The graph of $y = f(x)$ is transformed to the graph of $y = 5f(x - 1)$. State fully the transformations that map the graphs of $y = f(x)$ to $y = 5f(x - 1)$.

(2) The graph of $y = g(x)$ is shown below. The minimum point has coordinates $(-2, -1)$.



Sketch the graph of $y = -2g\left(\frac{x}{2}\right)$ stating the coordinates of the maximum point.

- (3) (a) Sketch the graph of
 $y = (x - 4)(x + 8)(x - 12)(x - 1)$
 (b) **HENCE** Sketch the graph of
 $y = (4x - 4)(4x + 8)(4x - 12)(4x - 1)$

WORKING AT A*/A

(1) $f(x) = x^2 - 6x + 9$ and
 $g(x) = 4x^2 - 12x + 9$

State **fully**, the transformations that maps the graph of $y = f(x)$ to the graph of $y = g(x)$.

(2) $h(x) = (x - 2)^2(x - 4)$

The graph of $y = h(x)$ is transformed to the graph of $y = kh(x)$ where k is a constant. Given that the graph of $y = kh(x)$ crosses the y axis at the point $(0, 24)$ find the value of k .

(3) Sketch $y = 3(x - 2)(x + 1)(x - a)^2$ where $a > 2$

Show where the graph meets or crosses the coordinate axes giving your answers in terms of a where appropriate.