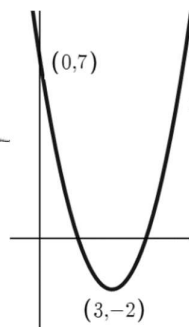


(11) Multiple Graph Transformations

WORKING AT D/E

(1) The diagram below shows part of the curve with equation $y = f(x)$. The coordinates of the minimum point and where the curve crosses the y axis is shown.



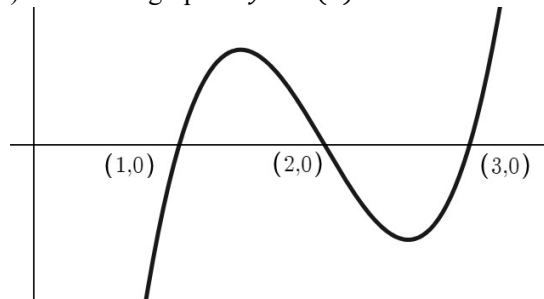
On separate diagrams, sketch each of the following:

- $y = 2f(x) + 1$ stating the coordinates of the minimum point and the y intercept.
- $y = f(2x - 5)$ stating the coordinates of the minimum point.
- $y = -f(x) + 3$ stating the coordinates of the maximum point and the y intercept.
- $y = |f(x)| - 2$ stating the coordinates of the maximum point and the y intercept.
- $y = -3f(0.5x)$ stating the coordinates of the maximum point and the y intercept.

(2) Describe fully the transformations that map the graphs of $y = g(x)$ to $y = 1 - g(x - 2)$.

WORKING AT B/C

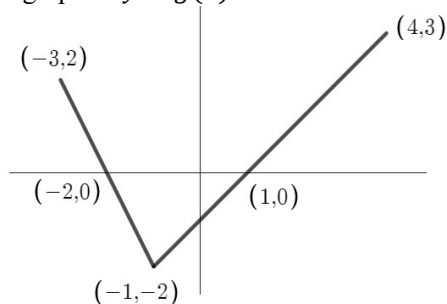
(1) Part of the graph of $y = h(x)$ is shown below



The coordinates shown are where $h(x) = 0$.

- Sketch the graphs of $y = h(2x - 1)$ showing where the graph crosses the x axis.
- Sketch the graph of $y = |h(x)|$ showing where the graph meets the x axis.
- Sketch the graph of $y = h(-x - 1)$ showing where the graph crosses the x axis.
- Doris wants to draw the graph of $y = ah(x)$ where a is a constant. State what will happen to the points $(1,0)$, $(2,0)$ and $(3,0)$ under the transformation.

(2) The graph of $y = g(x)$ is shown below

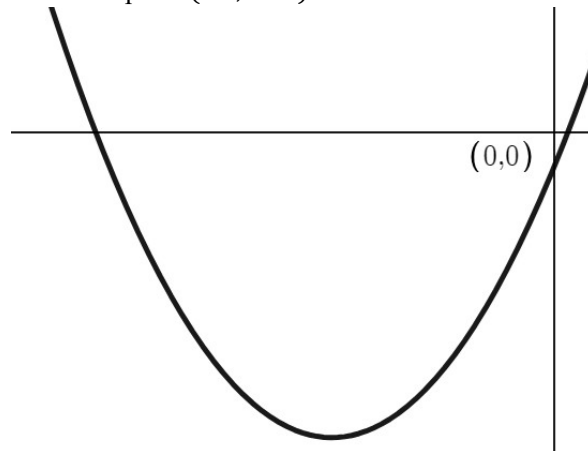


- Sketch the graph of $y = 0.5g(-x) + 2$
- Sketch the graph of $y = -g(|x|)$
- Sketch the graph of $y = 1 + g(2x)$
- Sketch the graph of $y = |g(x + 3)|$

WORKING AT A*/A

(1) $f(x) = x^2 + bx + c$, $x \in R$ where b and c are constants.

The graph of $y = 2f(x + 3)$ is shown below with minimum point $(-4, -18)$



Find the values of b and c

(2) $t(x) = x^3 - 4x^2 + x + 6$, $x \in R$

- Show that $t(-1) = 0$
- Hence, fully factorise $t(x)$
- Sketch the graph of $y = t(x)$ showing where the curve crosses the coordinated axes.
- Sketch the graph of $y = (4x - 2)^3 - 4(4x - 2)^2 + (4x - 2) + 6$ showing where the graph crosses the x axis.

(3) $f(x) = x^2 - 2x - 8$, $x \in R$

The equation $|f(x)| = a$ has 2 real solutions. Find the possible set of values of the constant a .