



Heinemann  
Higher Maths Text Book  
Worked Solutions

Ex 3G  
Sketching graphs of  $y = -f(x)$

<b>Shifts</b>		
For $c > 0$ , to obtain the graph of:		
$f(x) + c$	shift the graph of $f(x)$	<b>upward</b> $c$ units
$f(x) - c$	shift the graph of $f(x)$	<b>downward</b> $c$ units
$f(x + c)$	shift the graph of $f(x)$	<b>left</b> $c$ units
$f(x - c)$	shift the graph of $f(x)$	<b>right</b> $c$ units

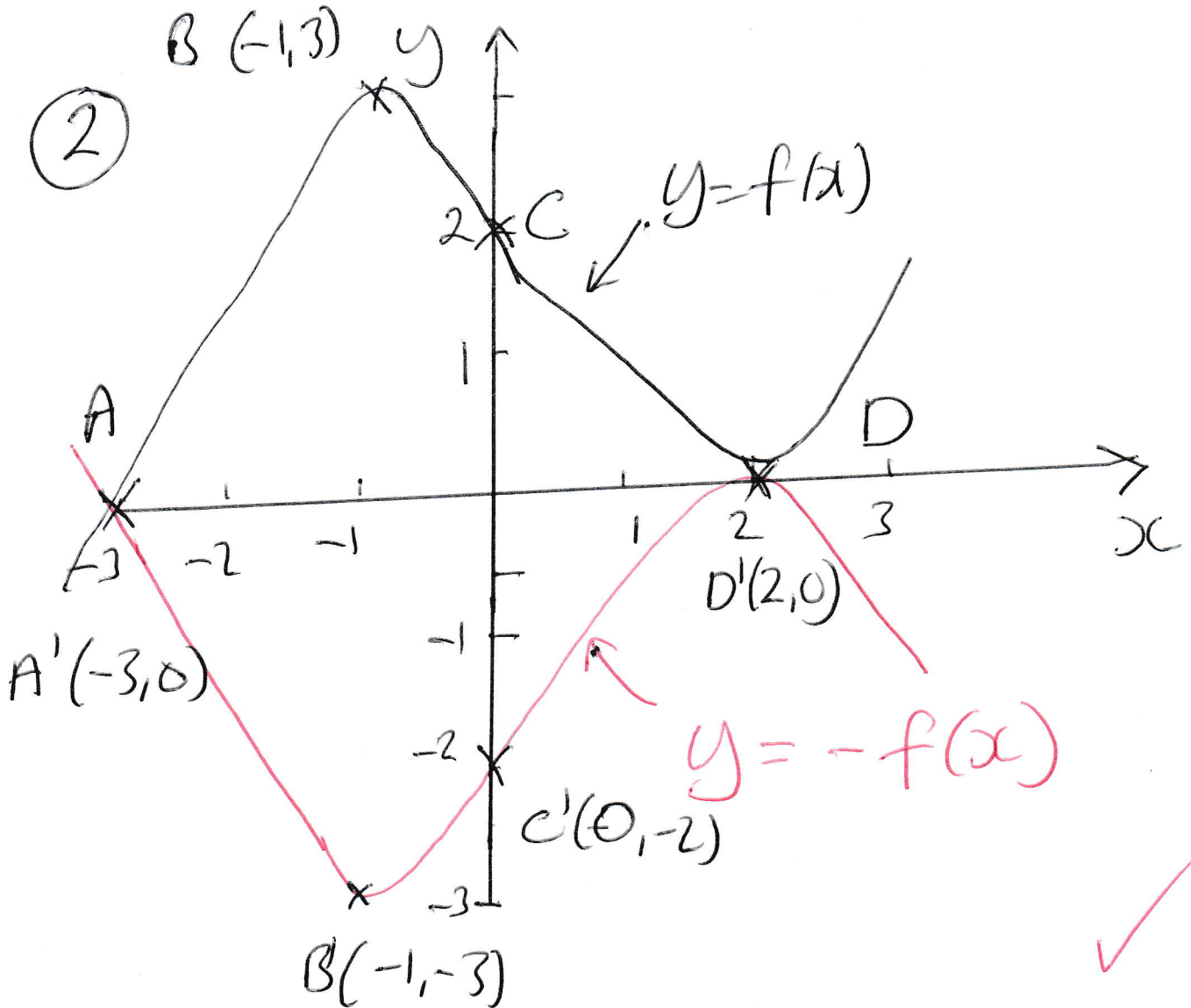
<b>Stretches and compressions</b>		
For $c > 1$ , to obtain the graph of:		
$cf(x)$	<b>stretch</b> the graph of $f(x)$	<b>vertically</b> by a factor of $c$
$(1/c)f(x)$	<b>compress</b> the graph of $f(x)$	<b>vertically</b> by a factor of $c$
$f(cx)$	<b>compress</b> the graph of $f(x)$	<b>horizontally</b> by a factor of $c$
$f(x/c)$	<b>stretch</b> the graph of $f(x)$	<b>horizontally</b> by a factor of $c$

<b>Reflections</b>		
To obtain the graph of:		
$-f(x)$	reflect the graph of $f(x)$	<b>about the x-axis</b>
$f(-x)$	reflect the graph of $f(x)$	<b>about the y-axis</b>

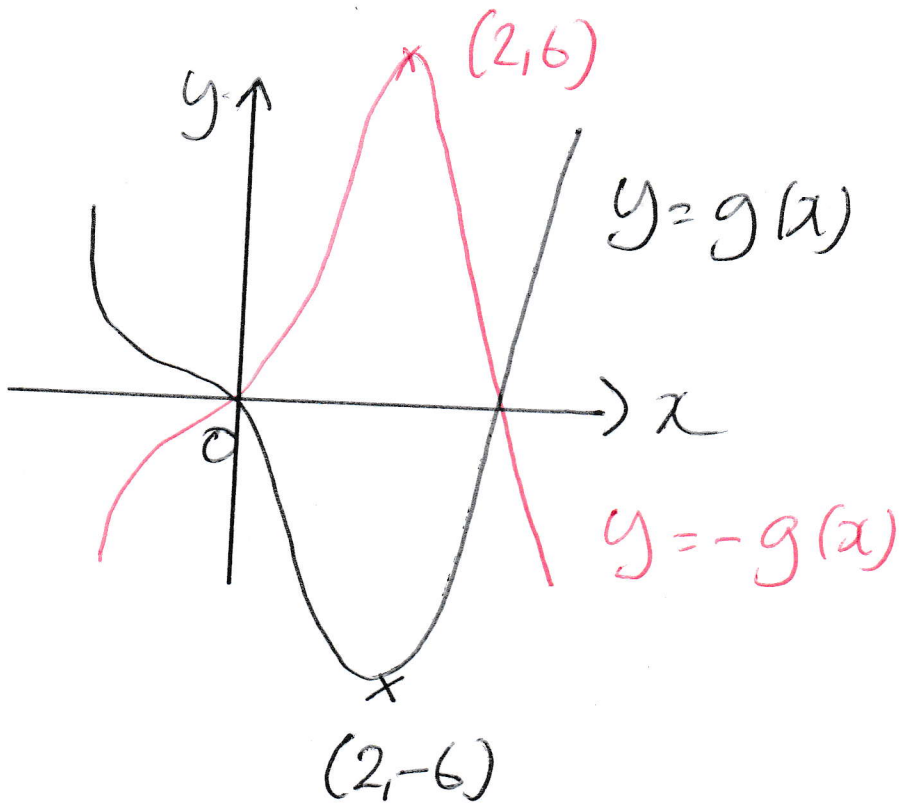


### Ex 3G Questions 2,3,4

Worked solutions courtesy of Mr R Milton

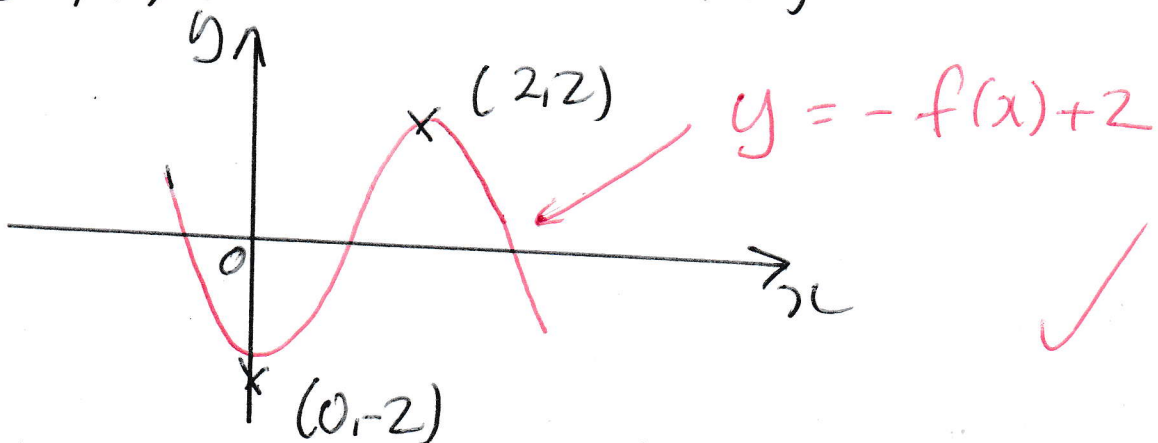


③



④

$f(x)$	$-f(x)$	$-f(x)+2$
$(0, 4)$	$(0, -4)$	$(0, -2)$
$(2, 0)$	$(2, 0)$	$(2, 2)$
$(-1, 0)$	$(-1, 0)$	$(-1, 2)$



(b)

$f(x)$	$-f(x)$	$-f(x+2)$
$(0, 4)$	$(0, -4)$	$(-2, -4)$
$(2, 0)$	$(2, 0)$	$(0, 0)$
$(-1, 0)$	$(-1, 0)$	$(-3, 0)$

