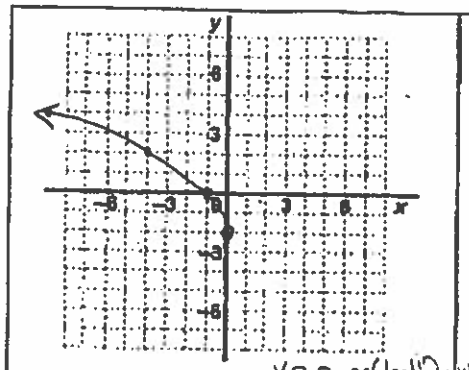
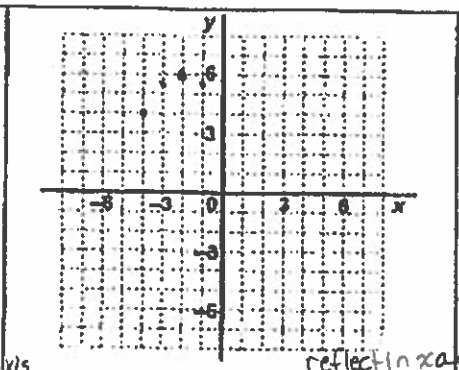
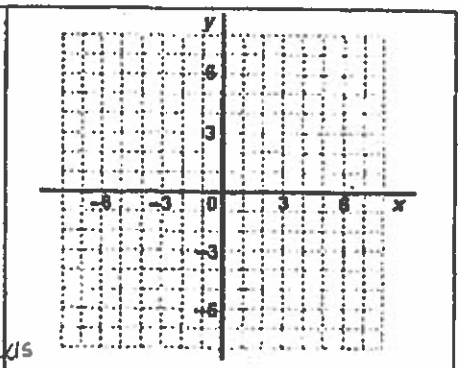


g) $y=2\sqrt{-x}-2$ VS 2 reflect y-axis D 2



h) $y=-\frac{1}{2}(x+2)^2+6$ VC $\frac{1}{2}$ reflect in x-axis L 2 U 6



i) $y=-\sqrt{-(x-2)}+4$

7. Determine the inverse equation for the following functions. See next page.

a) $y=5x-6$ b) $f(x)=(x+4)^2-1$ c) $f(x)=9x^2+1$

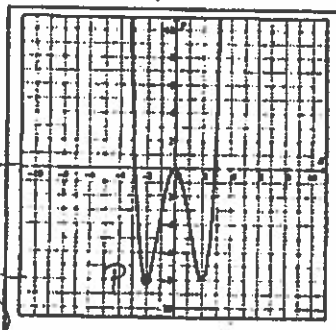
8. For $f(x)=\sqrt{x-3}$, write the equations for each of the following, do NOT simplify.

a) $-f(x)=-\sqrt{x-3}$ b) $f(-x)=\sqrt{-x-3}$ c) $f(x+7)=\sqrt{x+7-3}$ d) $8f(x)=8\sqrt{x-3}$

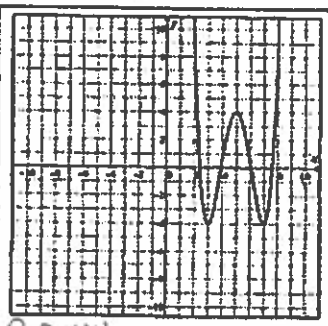
9. Describe how each of the functions below can be obtained from the graph of $f(x)$.

a) $y=f(x+3)-7$ L 3, D 7 b) $y=3f(-x)$ VS 3, reflect in y-axis c) $y=-f\left(\frac{1}{3}x\right)-4$ reflect in x-axis HS 3, D 4

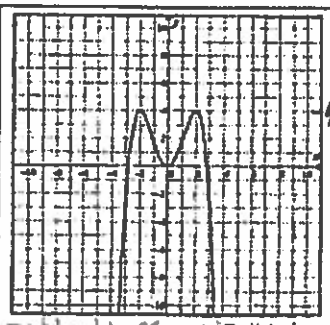
10. Given $f(x)$ in the first graph below, give expressions in function notation for the remaining graphs.



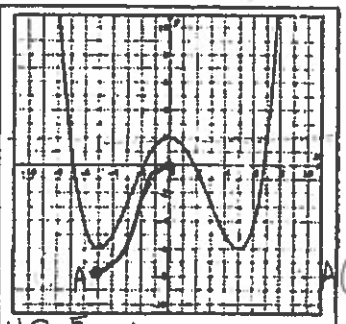
Given $y=f(x)$



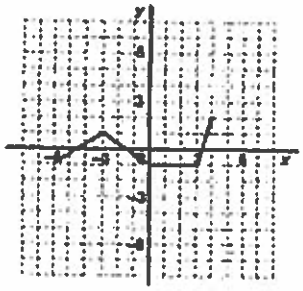
R 5 U 4
a) $y=f(x-5)+4$



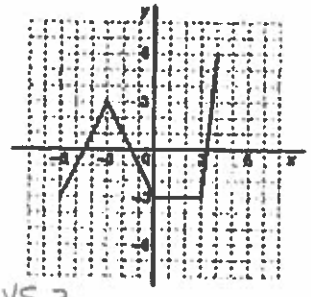
reflect in x-axis VC $\frac{1}{2}$
b) $y=-\frac{1}{2}f(x)$



HS $\frac{5}{2}$ U 2
c) $y=f\left(\frac{2}{5}x\right)+2$



Given $y=f(x)$



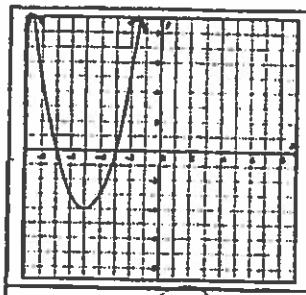
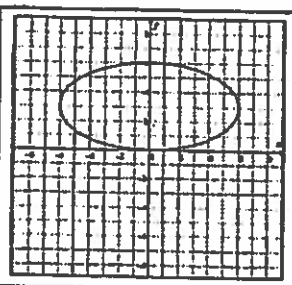
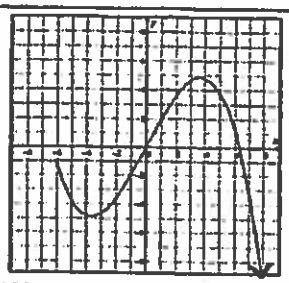
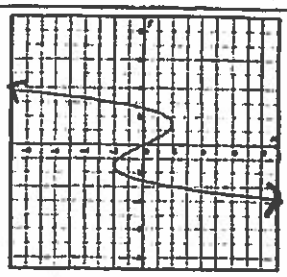
VS 3
d) $y=3f(x)$

HC $\frac{3}{2}$ D 2
e) $y=f\left(\frac{3}{2}x\right)-2$

reflect in both axes.
f) $y=-f(-x)$

Extra Review Unit 3 Solutions

1. For each of the following graphs, state whether it represents a function, then give its domain and range.

			
Function? (yes / no)	Function? (yes / no)	Function? (yes / no)	Function? (yes / no)
Domain: $\{x \in \mathbb{R}\}$	Domain: $\{x \in \mathbb{R}, -6 \le x \le 6\}$	Domain: $\{x \in \mathbb{R}, x \ge -6\}$	Domain: $\{x \in \mathbb{R}\}$
Range: $\{y \in \mathbb{R}, y \ge -4\}$	Range: $\{y \in \mathbb{R}, 0 \le y \le 6\}$	Range: $\{y \in \mathbb{R}, y \le 5\}$	Range: $\{y \in \mathbb{R}\}$

2. If $f(x) = 3x - 2$, determine, simplifying your answers where possible:

a) $f(3) = 9 - 2 = 7$ b) $f(-2) = -6 - 2 = -8$ c) $f(2k^3) = 6k^3 - 2$ d) $f(4x-1) = 3(4x-1) - 2 = 12x - 5$

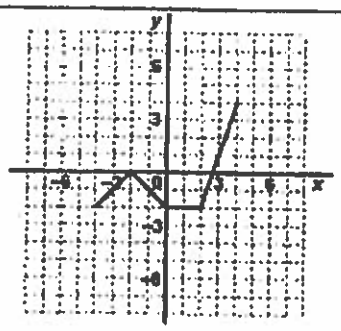
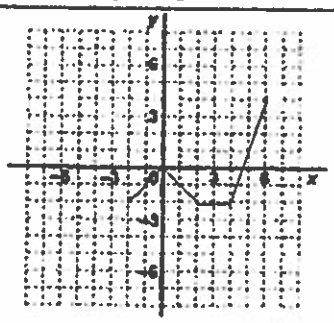
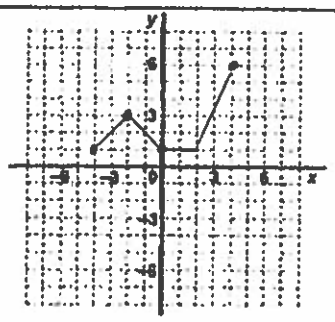
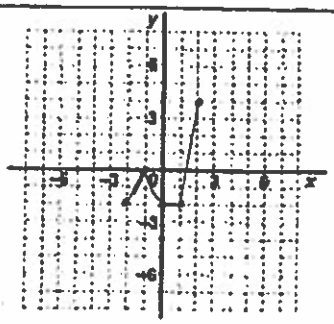
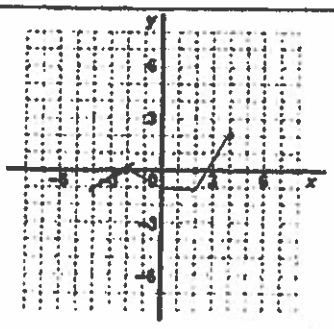
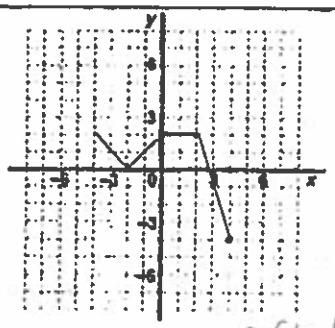
3. If $f(x) = 2x^2 + 3x - 4$, determine, simplifying your answers where possible:

a) $f(3) = 18 + 9 - 4 = 23$ b) $f(-2) = 8 - 6 - 4 = -2$ c) $f(3a-2) = 2(9a^2 - 12a + 4) + (9a - 6) - 4 = 18a^2 - 15a - 2$

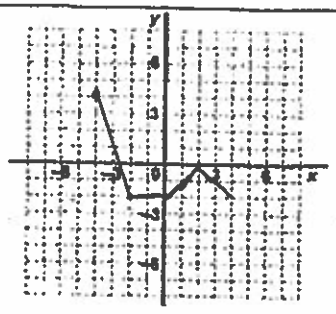
4. If $f(x) = \dfrac{2}{x+3}$, determine, ***without simplifying answers:***

a) $f(4x) = \dfrac{2}{4x+3}$ b) $4f(x) = \dfrac{8}{x+3}$ c) $f(a+b)+c = \dfrac{2}{a+b+3} + c$

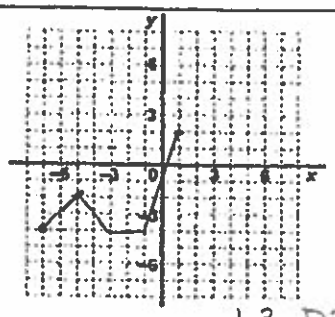
5. Sketch each of the indicated functions on the grids provided.

 a) $y = f(x)$	 b) $y = f(x-2)$ R 2	 c) $y = f(x) + 3$ U 3
 d) $y = f(2x)$ HC $\frac{1}{2}$	 e) $y = \frac{1}{2}f(x)$ VC $\frac{1}{2}$	 f) $y = -f(x)$ reflect in x-axis.

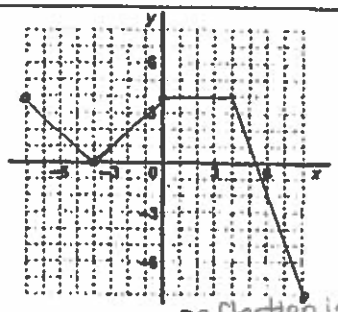
Extra Review Solutions



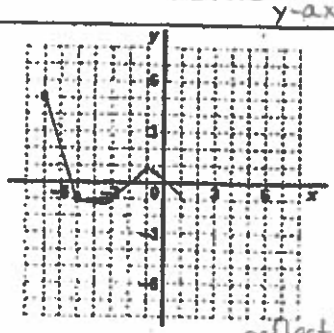
g) $y=f(-x)$ reflect in y-axis



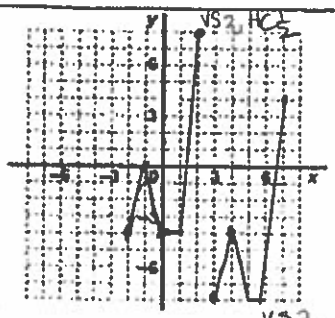
h) $y=f(x+3)-2$ L3, D2



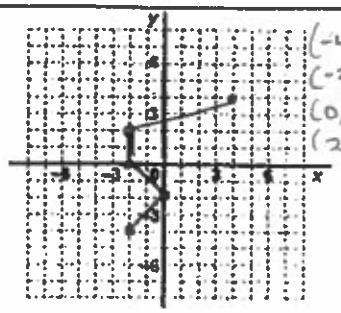
i) $y=-2f\left(\frac{1}{2}x\right)$ reflection in x-axis VS 2 HS 2



j) $y=f(-(x+3))+1$ reflect in y-axis L3, U1

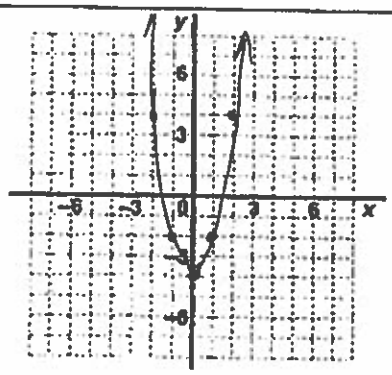


k) $y=2f(2(x-5))-4$ VS 2, HC $\frac{1}{2}$, VS 2 HC $\frac{1}{2}$ R5 D4

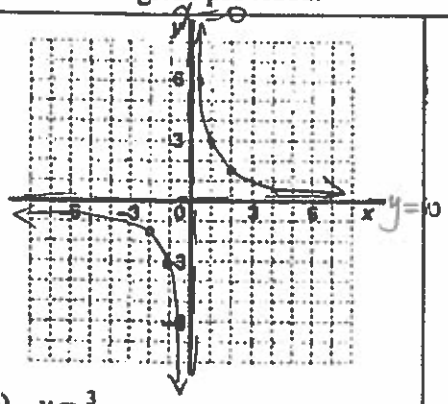


l) $y=f^{-1}(x)$ $(-4,-2)\to(-2,-4)$, $(-2,0)\to(0,-2)$, $(0,-2)\to(-2,0)$, $(2,-2)\to(-2,2)$

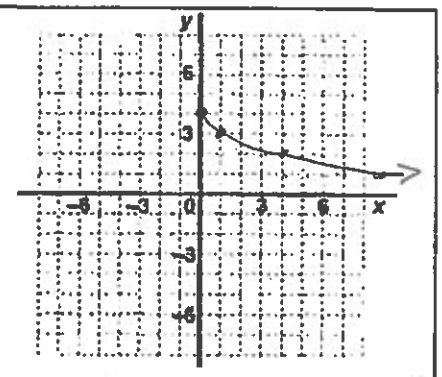
6. Sketch each of the indicated functions on the grids provided.



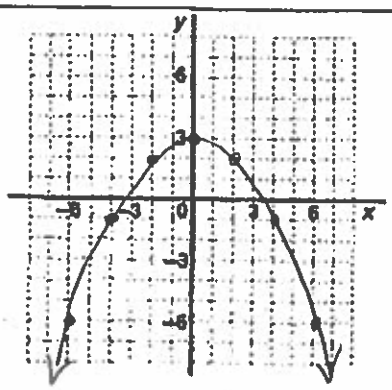
a) $y=2x^2-4$



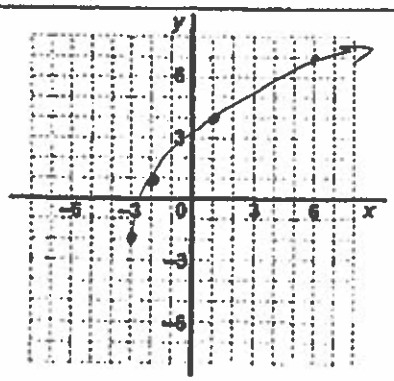
b) $y=\frac{3}{x}$ $y=0$



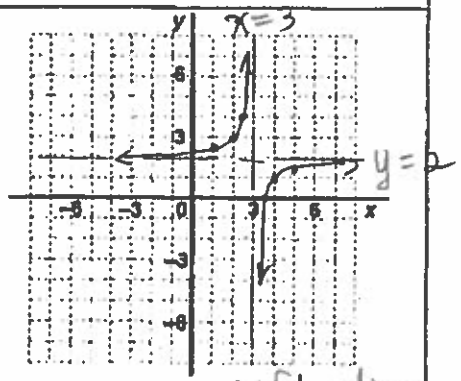
c) $y=-\sqrt{x}+4$



d) $y=-\left(\frac{1}{2}x\right)^2+3$ HS 2



e) $y=3\sqrt{x+3}-2$ VS 3 L3 D2



f) $y=\frac{-1}{x-3}+2$ $x=3$ $y=2$ reflection R3 U2

#7. a) $y = 5x - 6$ — $m = 5, b = -6$; sloped line is a function. $D: \{x \in \mathbb{R}\}$, $R: \{y \in \mathbb{R}\}$

for $f^{-1}(x)$,

$$5y - 6 = x$$
$$5y = x + 6$$
$$y = \frac{x+6}{5}$$

$\therefore f^{-1}(x) = \frac{1}{5}x + \frac{6}{5}$ — sloped line is a function. $m = \frac{1}{5}, b = \frac{6}{5}$; $D: \{x \in \mathbb{R}\}$, $R: \{y \in \mathbb{R}\}$.

ü b) $f(x) = (x+4)^2 - 1$ — $D: \{x \in \mathbb{R}\}$ $R: \{y \in \mathbb{R}, y \geq -1\}$; quadratic parabola is a function.

for $f^{-1}(x)$,

$$(y+4)^2 - 1 = x$$
$$(y+4)^2 = x + 1$$
$$(y+4) = \pm\sqrt{x+1}$$
$$y = \pm\sqrt{x+1} - 4$$

$\therefore f^{-1}(x) = \pm\sqrt{x+1} - 4$ → not a function (full parabola on side).

$D: \{x \in \mathbb{R}, x \geq -1\}$, $R: \{y \in \mathbb{R}\}$

$D: \{x \in \mathbb{R}\}$
ü $R: \{y \in \mathbb{R}, y \geq 1\}$

c) $f(x) = 9x^2 + 1$

for $f^{-1}(x)$,

$$9y^2 + 1 = x$$
$$9y^2 = x - 1$$
$$y^2 = \frac{x-1}{9}$$
$$y = \pm\sqrt{\frac{x-1}{9}}$$
$$y = \frac{\pm\sqrt{x-1}}{3}$$

$\therefore f^{-1}(x) = \pm\frac{1}{3}\sqrt{x-1}$ ← not a function (full parabola on side is not a function!) $D: \{x \in \mathbb{R}, x \geq 1\}$, $R: \{y \in \mathbb{R}\}$.

HS 9 → VS $\frac{1}{9}$... VC $\frac{1}{3}$