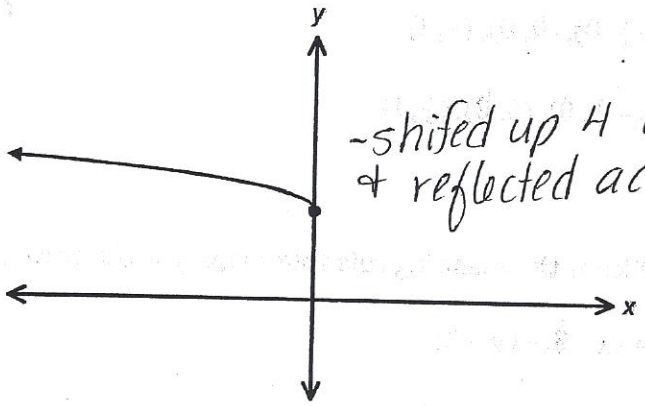
Mathematics 3200
Sample Test

Name: Key
Unit: Radical Functions

Part A: Selected Response: Place the letter of the correct response in the space provided. (8 marks)

1. Which function best represents the graph shown below? 1. D



-shifed up 4 units & reflected across y-axis.

A) $y = -\sqrt{x} - 4$

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

C) $y = \sqrt{-x} - 4$

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

2. The graph of the function $y = \sqrt{x}$ is stretched horizontally by a factor of 4 and translated 2 units left. What is the domain of the transformed function? 2. A

A) $\{x \mid x \geq -2, x \varepsilon R\}$ (B) $\{x \mid x \leq -2, x \varepsilon R\}$
(C) $\{x \mid x \geq 2, x \varepsilon R\}$ (D) $\{x \mid x \leq 2, x \varepsilon R\}$

3. If $f(x) = x + 1$, which point is on the graph of $y = \sqrt{f(x)}$? 3. B

(A) (0,0) (B) (0,1)
(C) (1,0) (D) (1,1)

4. Which function has a range of $\{y \mid y \leq 0, y \varepsilon R\}$? 4. A

A) $y = -\sqrt{x-3}$

B) $y = \sqrt{-x} - 3$

C) $y = \sqrt{-(x-3)}$

D) $y = -\sqrt{x} - 3$

5. Which are all of the invariant points for the graphs of $f(x) = 4x^2 + 3x$ and $y = \sqrt{f(x)}$?

5. D

$4x^2 + 3x = 0$

$x(4x+3) = 0$

$x = 0 \quad 4x+3 = 0$

$x = -\frac{3}{4}$

$4x^2 + 3x = 1$

$4x^2 + 3x - 1 = 0$

$(4x-1)(x+1) = 0$

$x = \frac{1}{4} \quad x = -1$

A) $(1,1), (\frac{3}{4}, 0), (0,0), (-\frac{1}{4}, 1)$,

B) $(-1,1), (\frac{3}{4}, 0), (0,0), (-\frac{1}{4}, 1)$

C) $(1,1), (-\frac{3}{4}, 0), (0,0), (\frac{1}{4}, 1)$

D) $(-1,1), (-\frac{3}{4}, 0), (0,0), (\frac{1}{4}, 1)$

6. Which is the mapping rule that maps $y = \sqrt{x}$ onto $y = -4\sqrt{x+3} - 2$?

6. A

A) $(x, y) \to (x-3, -4y-2)$

B) $(x, y) \to (x-3, -\frac{1}{4}y+2)$

C) $(x, y) \to (x+3, -4y-2)$

D) $(x, y) \to (x+3, -\frac{1}{4}y+2)$

7. If $y = \sqrt{x}$ is stretched horizontally by a factor of 4, which function results?

7. D

A) $y = \frac{1}{4}\sqrt{x}$

B) $y = 4\sqrt{x}$

C) $y = \sqrt{4x}$

D) $y = \sqrt{\frac{1}{4}x}$

8. What is the domain for $f(x) = \sqrt{6-3x}$?

8. A

$6 - 3x \geq 0$

$\frac{-3x}{-3} \geq \frac{-6}{-3}$

$x \leq 2$

(A) $\{x | x \leq 2, x \in R\}$

(B) $\{\{x | x \geq 2, x \in R\}$

(C) $\{x | x \leq 3, x \in R\}$

(D) $\{x | x \geq 3, x \in R\}\}$

Part B: Constructed Response: Show workings to all problems.

/2 9. Write the radical function that results from applying the following set of transformations to the graph $y = \sqrt{x}$:

- ✓ vertical stretch by a factor of 5
- ✓ horizontal stretch by a factor of $\frac{1}{2}$
- ✓ reflection in x- axis
- ✓ translation 5 units to the right.

$$y = -5\sqrt{2(x-5)}$$

/5 10. (i) Write the mapping rule that maps $y = \sqrt{x}$ onto the function $y = 3\sqrt{-2(x-4)} + 1$.

(ii) State the domain and range of the transformed function.

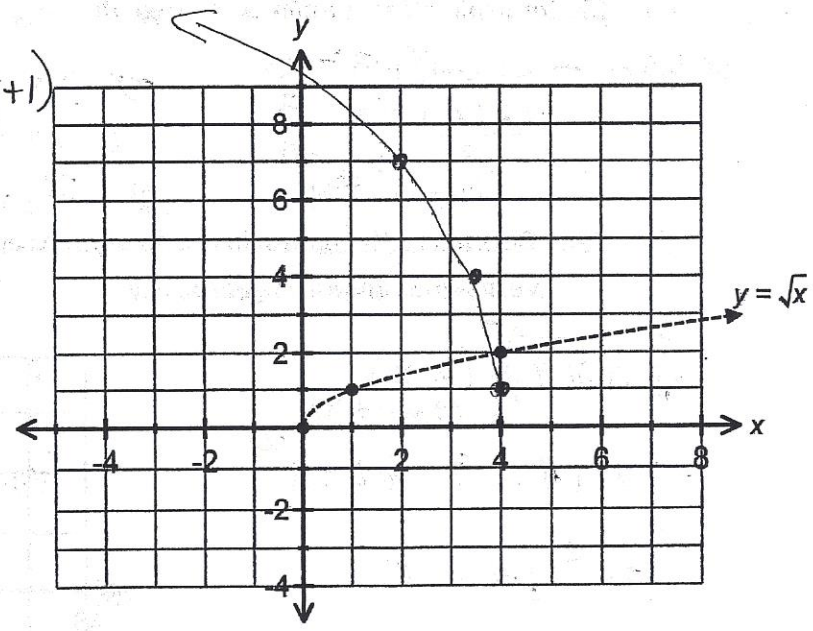
(iii) Sketch the graph on the grid provided, showing the image points for those shown on the graph of $y = \sqrt{x}$.

Mapping Rule: $(x, y) \to (-\frac{1}{2}x + 4, 3y + 1)$

x	y
0	0
1	1
4	2

→

x	y
4	1
3.5	4
2	7



Domain: $x \leq 4$

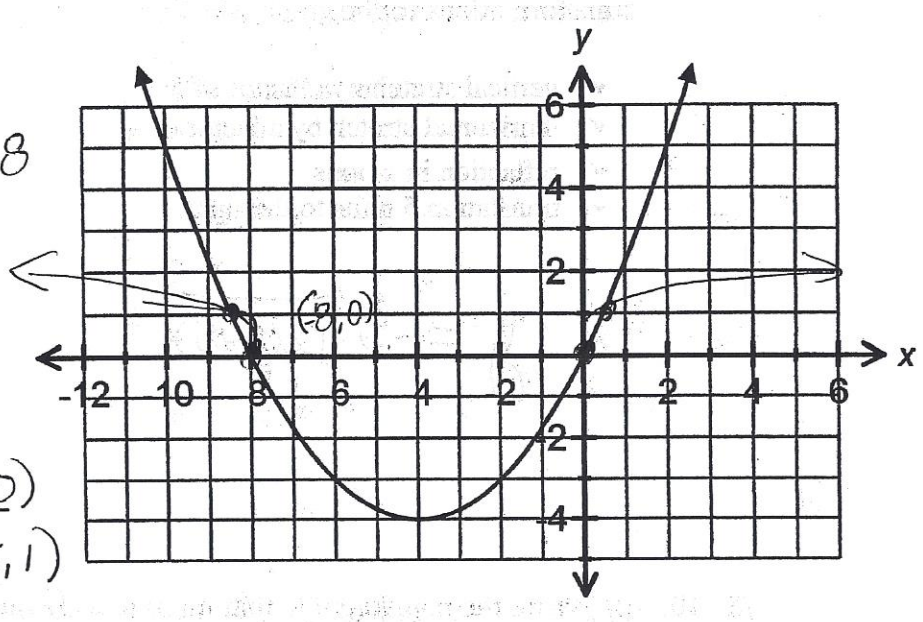
Range: $y \geq 1$

$$\frac{-2(x-4)}{-2} \geq \frac{0}{-2}$$

$$x - 4 \leq 0$$

$$x \leq 4$$

/5 11. The graph of $y = f(x)$ is shown. On the same grid, sketch the graph of the function $y = \sqrt{f(x)}$, including all invariant points. State the domain and range of $y = \sqrt{f(x)}$.



Domain: $x \geq 0$ or $x \leq -8$

Range: $y \geq 0$

Invariant points: $(-8,0), (0,0)$

$(-8.5, 1)$ $(0.5, 1)$

/3 12. Determine the domain and range of $y = \sqrt{-2(x-1)^2 + 8}$. Show algebraic workings.

$(1,8)$

x-int $-2(x-1)^2 + 8 = 0$

$\frac{-2(x-1)^2}{-2} = \frac{-8}{-2}$

$(x-1)^2 = 4$

$x - 1 = \pm 2$

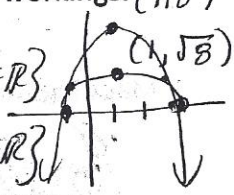
$x = 1 \pm 2$

$x = 3, -1$

V $(1,8)$

D: $\{x \mid -1 \leq x \leq 3, x \in \mathbb{R}\}$

R: $\{y \mid 0 \leq y \leq 2.8, y \in \mathbb{R}\}$



/4 13. Determine the approximate solution to each equation graphically $\sqrt{-2x^2 + 9} = 3 - x$

Verify your answer algebraically.

$\left(\sqrt{-2x^2+9}\right)^2 = (3-x)^2$

$= (3-x)(3-x)$

$-2x^2 + 9 = 9 - 6x + x^2$

$3x^2 - 6x = 0$

$3x(x-2) = 0$

$3x = 0 \quad x - 2 = 0$

$x = 0 \quad x = 2$