ALGEBRA 2
Unit 4, Test 1 Review

Name Key Block ____

Rational Exponents

1) **Rewrite** the following using rational exponent notation.

a. $\sqrt{24} = 24^{1/2}$

b. $\sqrt[3]{40} = 40^{1/3}$

c. $\sqrt[7]{12^2} = 12^{2/7}$

d) $\sqrt[8]{14^4} = 14^{4/8} = 14^{1/2}$ either is ok.

2) **Rewrite** using radical notation. (2 each)

a. $21^{2/7}$ $\sqrt[7]{21^2}$

b. $5^{1/4}$ $\sqrt[4]{5}$

c. $3^{-2/7}$ $\frac{1}{\sqrt[7]{3^2}}$ or $\frac{1}{\sqrt[7]{9}}$ (either)

3) **Evaluate** the expression:(3 each) No neg. exp.

a. $(\sqrt[3]{53})^{-3}$ = $(53^{1/3})^{-3} = 53^{-1} = \frac{1}{53}$

b. $16^{3/2}$ = $(\sqrt{16})^3$ 4^3 64

b. $4^{-5/2}$ = $2^{-5} = \frac{1}{32}$

4) Find the compositions of given values if: Let $f(x) = 5x - 4$ $g(x) = 7x^2$ $h(x) = \frac{3}{x-8}$

a) $f(g(3)) = f(63)$
$= 5(63) - 4$
$= 315 - 4$
$= 311$

b) $h(f(-1)) = h(-9)$
$= \frac{3}{-17}$

c) $g(g(x)) = g(7x^2)$
$= 7(7x^2)^2$
$= 7(49x^4)$
$= 343x^4$

d) $f(h(x)) = f\left(\frac{3}{x-8}\right)$
$= 5\left(\frac{3}{x-8}\right) - 4$
$= \frac{15}{x-8} - 4$

5) Find the equation of the inverse relation, then determine if the inverse is a function:

a) $y = -2x + 6$
$x = -2y + 6$
$\frac{x-6}{-2} = y$
$f^{-1}(x) = \frac{x-6}{-2}$

Function: Yes or No
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

b) $y = 6x^2 - 12;\ x \geq 0$
$x = 6y^2 - 12$
$\sqrt{\frac{x+12}{6}} = y$ $y \geq 0$

Function: Yes or No
D: $[-12, \infty)$
R: $[0, \infty)$

c) $y = \frac{3x-2}{3}$
$x = \frac{3y-2}{3}$
$3x + 2 = 3y$
$y^{-1} = \frac{3x+2}{3}$
$f^{-1}(x) = \frac{3x+2}{3}$

Function: Yes or No
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

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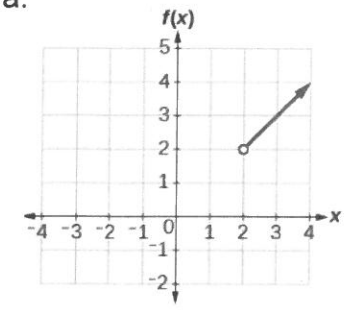
6) Name the domain and range of each graph using interval notation.

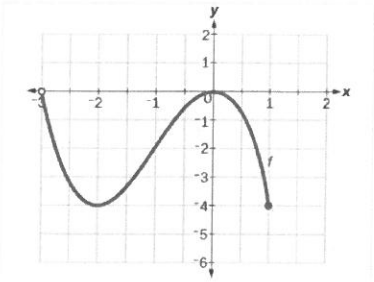
a.



D: $(2, \infty)$

R: $(2, \infty)$

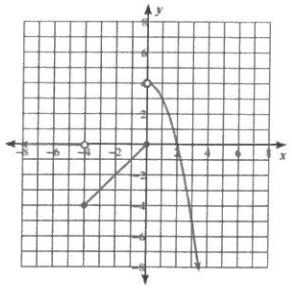
b.



D: $[-3, 1]$

R: $[-4, 0]$

c.



D: $[-4, \infty)$

R: $(-\infty, 3)$

7) Circle the expression that does **not** belong in a group with the other three? Justify your reasoning, including any necessary to work to support the explanation. (a little tricky ☺)

a) $(2^a)^{1/b}$ → $2^{a/b}$

b) $\left(\sqrt[a]{2}\right)^b$ → $2^{b/a}$

c) $(2)^{-b/-a}$ → $2^{b/a}$

d) $2^{a^{-1}b}$ → $2^{b/a}$

8) Simplify: no neg exp

a) $x^{3/2} \cdot x^{1/2}$

$x^{4/2} = x^2$

b) $\sqrt[4]{\frac{n^{10}p^3}{n^2p^{-1}}} = \sqrt[4]{n^8p^4} = (n^8p^4)^{1/4}$

$= n^4p$ (many ways to do but ans is)

c) $\frac{x^{7/8}y^{11/5}}{x^{1/2}y} = x^{3/8}y^{6/5}$

$\frac{7}{8} - \frac{1}{2} = \frac{3}{8}$ $\quad \frac{11}{5} - 1 = \frac{6}{5}$

d) $(x^{-2/7})^{7/2}$

$x^{-1} = \frac{1}{x}$

9) For $f(x) = 3x^{5/2}$ and $g(x) = (x)^{3/2}$ answer the following making sure to show all work.

a) $f(x) - g(x)$

$3x^{5/2} - x^{3/2}$

can't be combined

b) $f(x) + g(x)$

$3x^{5/2} + x^{3/2}$

c) $f(x) \cdot g(x)$

$(3x^{5/2})(x^{3/2})$

$3x^{8/2} = 3x^4$

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10) $f(x) = (x-2)^3$ is shown in the table alongside.
Is the inverse of $f(x)$ a function? yes Why/why not?

x	0	1	2	3	4
y	-8	-1	0	1	8

one-to-one

Each x has exactly one y

11) Use composition of functions to decide if $f(x)$ and $g(x)$ are inverse functions. Show work to prove your answer.

$$f(x) = x^2 - 3 \quad \textit{and} \quad g(x) = \sqrt{x+3}$$

$f(g(x)) = f(\sqrt{x+3})$

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

$= x+3-3$

$= x$ ☺

$g(f(x)) = g(x^2-3)$

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

$= \sqrt{x^2}$

$= x$ ☺

they are inverses

12) a) $f(x) - g(x)$

$3x^{5/2} - 2x^{5/2}$

$= x^{5/2}$

$= \sqrt{x^2 \cdot x^2 \cdot x}$

$= x^2\sqrt{x}$

b) $f(x) + g(x)$

$3x^{5/2} + 2x^{5/2}$

$= 5x^{5/2}$

$= 5x^2\sqrt{x}$

c) $f(x) \cdot g(x)$

$3x^{5/2} \cdot 2x^{5/2}$

$6x^{10/2}$

$= 6x^5$