Honors Math 2 – Review for Unit 3 Test

3.1 Simplify Rational (Fractional) Exponents and Radicals:

1) $81^{\frac{3}{4}}$

$\sqrt[4]{81^3}$

$(\sqrt[4]{81})^3$

$3^3 = \boxed{27}$

2) $64^{\frac{2}{3}}$

$\sqrt[3]{64^2}$

$(\sqrt[3]{64})^2 = 4^2 = \boxed{16}$

3) $8^{\frac{5}{3}}$

$\sqrt[3]{8^5}$

$(\sqrt[3]{8})^5$

$2^5 = \boxed{32}$

4) $x^3\sqrt{24x^3}\cdot\sqrt{6x^2}$

$x^3\sqrt{144x^5}$

$x^3 \cdot 12 \cdot x^2\sqrt{x}$

$\boxed{12x^5\sqrt{x}}$

5) $\left(\frac{\sqrt[5]{a^4}}{\sqrt{b}}\right)^{-10}$

$\left(\frac{a^{4/5}}{b^{1/2}}\right)^{-10} = \frac{a^{-40/5}}{b^{-10/2}}$

$\frac{a^{-8}}{b^{-5}}$ $\boxed{\frac{b^5}{a^8}}$

6) $\left(-4x^5y^7z^{-1}\right)^2$

$(-4)^2(x^5)^2(y^7)^2(z^{-1})^2$

$\boxed{\frac{16x^{10}y^{14}}{z^2}}$

7) $\left(\frac{x^{-4}y^{-8}}{x^7y^{-3}}\right)^{-2}$

$\left(x^{-4-7}\ y^{-8-3}\right)^{-2}$

$\left(x^{-11}\ y^{-5}\right)^{-2}$

$\boxed{x^{22}\ y^{10}}$

8) $x^{\frac{3}{5}}\cdot x^{\frac{1}{7}}$

$3/5 + 1/7$

$x^{21/35 + 5/35}$

$\boxed{x^{26/35}}$ or $\sqrt[35]{x^{26}}$

9) $x^{\frac{2}{3}}\cdot x^{\frac{-3}{4}}$

$x^{2/3 - 3/4}$

$x^{8/12 - 9/12} = x^{-1/12}$

$= \boxed{\frac{1}{x^{1/12}}}$ or $\frac{1}{\sqrt[12]{x}}$

10) $\left(\frac{36x^{\frac{1}{12}}y^{-3}}{25x^{-\frac{1}{12}}y^8}\right)^{\frac{3}{2}}$

$\frac{(36)^{3/2}\ x^{\frac{3}{24}}\ y^{\frac{-9}{2}}}{(25)^{3/2}\ x^{-3/24}\ y^{24/2}}$

$\frac{(\sqrt{36})^3\ x^{1/8+1/8}}{(\sqrt{25})^3\ y^{\frac{24}{2}+\frac{9}{2}}} = \boxed{\frac{216\ x^{1/4}}{125\ y^{33/2}}}$ or $\frac{216\sqrt[4]{x}}{125y^{16}\sqrt{y}}$

$125\sqrt{y^{33}}$

11) $\left(\frac{\sqrt[4]{16x^3}}{\sqrt{x^3}}\right)^8$

$\frac{\left((16x^3)^{1/4}\right)^8}{(x^{3/2})^8} = \frac{16^{8/4}\ x^{3/4\cdot 8}}{x^{24/2}}$

$\frac{16^2\ x^6}{x^{12}} = \boxed{\frac{256}{x^6}}$

3.2 Graphing Radicals and Identifying Domain and Range:

1) Graph FRED $y=\sqrt{x}$ and the transformation of FRED $y=\sqrt{x+4}-1$. Show 5 points in a table and state the Domain and Range.

left +4

$\sqrt{x}$
0 | 0
1 | 1
4 | 2
9 | 3

$y=\sqrt{x}$

D: $[0,\infty)$

R: $[0,\infty)$

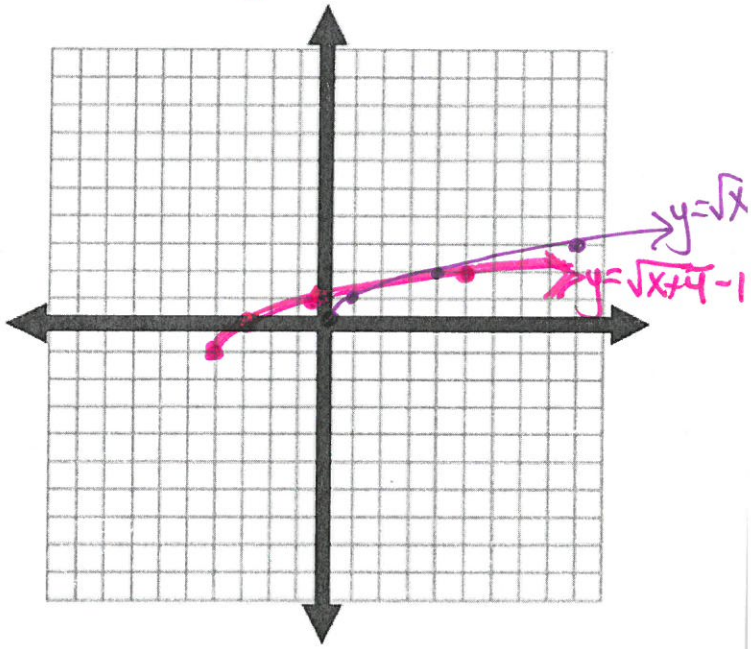
$y=\sqrt{x+4}-1$
-4 | $-1=\sqrt{-4+4}-1$
-3 | $0=\sqrt{-3+4}-1$
0 | $1=\sqrt{0+4}-1$
5 | $2=\sqrt{5+4}-1$

for $y=\sqrt{x+4}-1$

D: $[-4,\infty)$

R: $[-1,\infty)$

translated left 4, down 1



2) Graph FRED $f(x)=\sqrt[3]{x}$ and the transformation of FRED $h(x)=-2\sqrt[3]{x+1}-4$. Show 5 points in a table and state the Domain and Range.

refl over x-axis, vert str by 2, left 1, down 4

left 1

-8	-2
-1	-1
0	0
1	1
8	2

$y=\sqrt[3]{x}$

D: $(-\infty,\infty)$

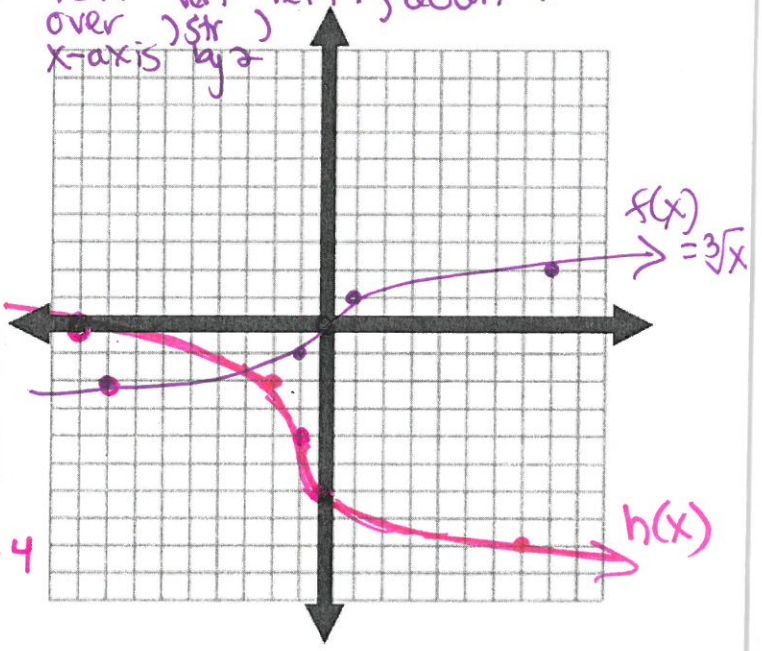
R: $(-\infty,\infty)$

$y=-2\sqrt[3]{x+1}-4$
-9 | $0=-2\sqrt[3]{-8}-4$
-2 | $-2=-2\sqrt[3]{-1}-4$
-1 | $-4=-2\sqrt[3]{0}-4$
0 | $-6=-2\sqrt[3]{1}-4$
7 | $-8=-2\sqrt[3]{8}-4$

for $y=-2\sqrt[3]{x+1}-4$

D: $(-\infty,\infty)$

R: $(-\infty,\infty)$



3.3 Solving Radical Equations

Solve the following equations for x.

1) $145 = 5\sqrt{3x}$

$29 = \sqrt{3x}$

$(29)^2 = (\sqrt{3x})^2$

$\frac{841}{3} = \frac{3x}{3}$

$x = \frac{841}{3}$

2) $(\sqrt{12x+13})^2 = (x)^2$

$12x + 13 = x^2$

$0 = x^2 - 12x - 13$

$0 = (x-13)(x+1)$

$x = 13, -1$

check

$\sqrt{12 \cdot 13 + 13} \stackrel{?}{=} 13$ ✓

$\sqrt{12 \cdot -1 + 13} \stackrel{?}{=} -1$ ✗

3) $\sqrt[3]{x-7} = 5$

$x - 7 = 5^3$

$x - 7 = 125$

$x = 132$

4) $\sqrt{5x+14} - x = 0$

check

$\sqrt{5 \cdot 7 + 14} - 7 \stackrel{?}{=} 0$ ✓

$\sqrt{5 \cdot -2 + 14} - -2 \stackrel{?}{=} 3$ ✗

$\sqrt{5x+14} = x$

$5x + 14 = x^2$

$0 = x^2 - 5x - 14$

$0 = (x-7)(x+2)$

$x = 7, -2$

5) $(x+2)^{\frac{3}{2}} + 2 = 66$

convert to radical

$(x+2)^{3/2} = 64$

$\sqrt{(x+2)^3} = 64$

$(x+2)^3 = (64)^2$

$x + 2 = (\sqrt[3]{64})^2$

$x + 2 = 4^2$

$x = 14$

check

$(14+2)^{3/2} + 2 \stackrel{?}{=} 66$ ✓

6) $\sqrt{2x-7} - x = -3$

$\sqrt{2x-7} = x - 3$

$2x - 7 = (x-3)^2$

$2x - 7 = (x-3)(x-3)$

$2x - 7 = x^2 - 6x + 9$

$0 = x^2 - 8x + 16$

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

$x = 4$

☑ FIX

x (NOT ✓)

check

$\sqrt{2 \cdot 4 - 7} - 4 \stackrel{?}{=} -3$ ✓

3.4 Inverse Applications: Find the Inverse equation

1) $y = x^3 - 5$

$x = y^3 - 5$

$x + 5 = y^3$

$\sqrt[3]{x+5} = y^{-1}$

2) $f(x) = \frac{1}{5}x + 8$

$y = \frac{1}{5}x + 8$

$x = \frac{1}{5}y + 8$

$x - 8 = \frac{1}{5}y$

$5x - 40 = y^{-1}$

3.6 Write and Solve Inverse Variation Equations

1) Given table of values, complete the table and find the equation. of inverse variation. Fix

x	Y
2	15
3	10
5	6
6	5

$y = \frac{k}{x}$ $15 = \frac{k}{2}$ $k = 30$ $y = \frac{30}{x}$

Fix Write a general equation of variation...

Fix #3

2) Write an equation where x and y vary inversely. $y = \frac{k}{x}$
3) Write and equation where y varies directly with x. $y = kx$
4) Write an equation where x varies jointly with y and z. $x = kyz$

"x varies" so x=

If y=15 when x=2: $15 = \frac{k}{2}$ $k = 30$ $y = \frac{30}{x}$

$15 = k \cdot 2$ $k = 7.5$ $y = 7.5x$

If z=3 when y=15 and x=2, then $\frac{2}{45} = \frac{k(15)(3)}{45}$ $k = \frac{2}{45}$ $x = \frac{2}{45}yz$

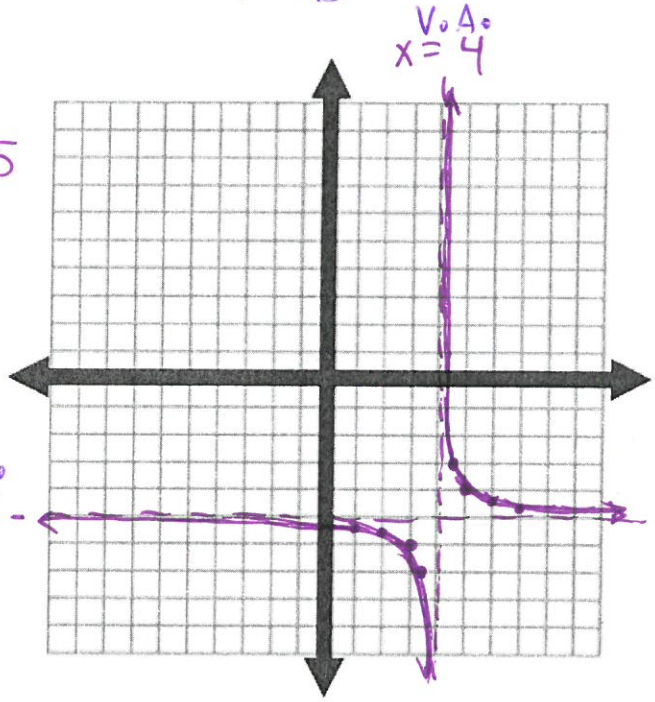
3.7 Graphing Inverse Variation Equations

1) Graph $y = \frac{1}{x-4} - 5$.

Show and label asymptotes. VA $x=4$; HA $y=-5$
Show 4 points in a table.
State the Domain and Range.

3.5	-7
3	-6
2	-5.5
1	$-5\frac{1}{3}$

4.5	-3
5	-4
6	-4.5
7	$-4\frac{2}{3}$



D: $(-\infty, 4) \cup (4, \infty)$

R: $(-\infty, -5) \cup (-5, \infty)$

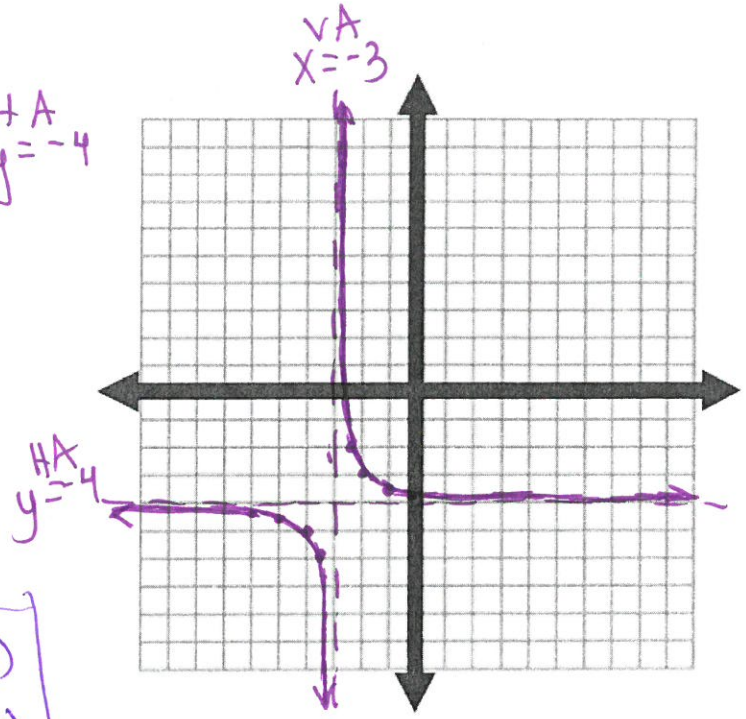
2) Graph $f(x)=\dfrac{1}{x+3}-4$.

Show and label asymptotes. VA $x=-3$; HA $y=-4$
Show 4 points in a table.
State the Domain and Range.

-3.5	-6
-4	-5
-5	-4.5
-6	-4 1/3

-2.5	-2
-2	-3
-1	-3.5
0	-3 2/3

D: $(-\infty,-3)\cup(-3,\infty)$
R: $(-\infty,-4)\cup(-4,\infty)$



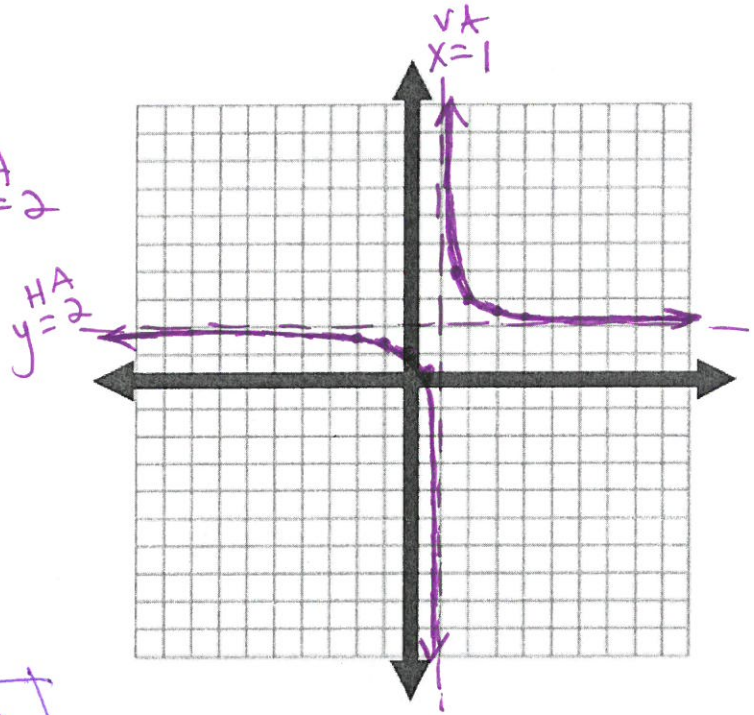
3) Graph $y=\dfrac{1}{x-1}+2$.

Show and label asymptotes. VA $x=1$; HA $y=2$
Show 4 points in a table.
State the Domain and Range.

0.5	0
0	1
-1	1.5
-2	1 2/3

1.5	4
2	3
3	2 1/2
4	2 1/3

D: $(-\infty,1)\cup(1,\infty)$
R: $(-\infty,2)\cup(2,\infty)$



3.7 Systems of Equations

Solve each system algebraically. Check with calculator.

1) $y = \sqrt{2x}$
$x - y = 4$

$x - 4 = y$

$x - 4 = \sqrt{2x}$

$(x-4)^2 = 2x$

$(x-4)(x-4) = 2x$

$x^2 - 8x + 16 = 2x$

$x^2 - 10x + 16 = 0$

$(x-8)(x-2) = 0$

$x = 8, 2$

$x = 8$

$y = \sqrt{2 \cdot 8}$

$y = \sqrt{16}$

$y = 4$

$(8, 4)$

$x = 2$

$y = \sqrt{2 \cdot 2}$

$y = \sqrt{4}$

$y = 2$

$(2, 2)$

use other equation to check

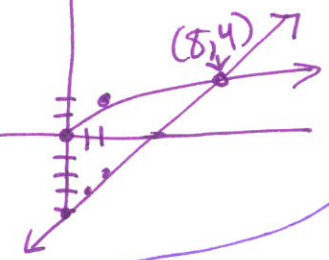
$x - y = 4$

$2 - 2 \neq 4$

check on graph

OR

use other equation to check



2) $y = \sqrt{3x}$
$3x - 3y = 9$

$y = \sqrt{4x}$

substitute 1st equation into 2nd equation

$3x - 9 = 3y$

$\div 3$ so second equation is easier to use

$x - 3 = y$

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

$(x-3)^2 = 4x$

$(x-3)(x-3) = 4x$

$x^2 - 6x + 9 = 4x$

$x^2 - 10x + 9 = 0$

$(x-9)(x-1) = 0$

$x = 9, 1$

$x = 9$

$y = \sqrt{4 \cdot 9}$

$y = \sqrt{36}$

$y = 6$

$(9, 6)$

$x = 1$

$y = \sqrt{4 \cdot 1}$

$y = \sqrt{4}$

$y = 2$

$(1, 2)$

check mother equation

$3 \cdot 9 - 3 \cdot 6 \stackrel{?}{=} 9$

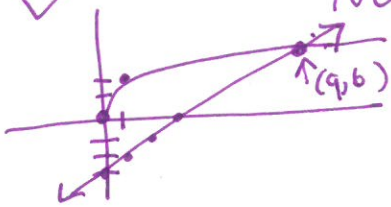
$27 - 18 \stackrel{?}{=} 9$

$3 \cdot 1 - 3 \cdot 2 \stackrel{?}{=} 9$

$3 - 6 \stackrel{?}{=} 9$

NO!!

check on graph



FIX

$y = \sqrt{3x}$

$y = \sqrt{4x}$