Secondary Math III
Unit 11 Review

Name: KEY
Period: _____

Convert the radical to exponent form and vice versa:

1. $(\sqrt[3]{x})^4$

$x^{4/3}$

2. $\sqrt[5]{2^9}$

$2^{9/5}$

3. $x^{\frac{8}{3}}$

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

4. $3^{\frac{4}{7}}$

$(\sqrt[7]{3})^4$

Simplify the following. Give *exact* answers:

5. $100^{\frac{1}{2}}$

$= \sqrt{100}$

$= \boxed{10}$

6. $27^{\frac{2}{3}}$

$= (\sqrt[3]{27})^2$

$= 3^2$

$= \boxed{9}$

7. $\sqrt{75}$

25 · 3

$\boxed{5\sqrt{3}}$

8. $\sqrt[3]{-135}$

27 · 5

9 · 3

3 · 3

$\boxed{-3\sqrt{5}}$

9. $\sqrt[5]{192}$

$\boxed{2\sqrt[5]{6}}$

2 · 96

2 · 48

6 · 8

2 · 3 · 4 · 2

2 · 2

10. $\sqrt{108x^3y^9z^4}$

9 · 12 · x · y

3 · 3 · 3 · 4

2 · 2

$\boxed{6xy^4z^2\sqrt{3xy}}$

12. $\sqrt[3]{128x^3y^2z^8}$

32 · 4 · z^2

8 · 4 · 2 · 2

4 · 2 · 2 · 2

2 · 2

$\boxed{4xz^2\sqrt[3]{2z^2}}$

13. $\sqrt{20} + \sqrt{45}$

5 · 4 · 3

5 · 9 · 5

$2\sqrt{5} + 3\sqrt{5}$

$= \boxed{5\sqrt{5}}$

13. $50^{\frac{1}{2}} - 4^{\frac{3}{2}}$

$\sqrt{50} - (\sqrt{4})^3$

10 · 5

5 · 2

$\boxed{5\sqrt{2} - 8}$

15. $(3\sqrt{5x})^2$

$= 9(5x)$

$= \boxed{45x}$

Solve the following equations, check for extraneous solutions:

15. $(\sqrt{x-1})^2 = (5)^2$

$x - 1 = 25$

$\boxed{x = 26}$

16. $(\sqrt[3]{2x-5})^3 = (3)^3$

$2x - 5 = 27$

$+5 \quad +5$

$\frac{2}{2}x = \frac{32}{2}$

$\boxed{x = 16}$

17. $\frac{3}{3}\sqrt{x+7} = \frac{12}{3}$

$(\sqrt{x+7})^2 = (4)^2$

$x + 7 = 16$

$-7 \quad -7$

$\boxed{x = 9}$

18. $-2\sqrt[3]{9x+10}-1=3$

$+1 \quad +1$

$\frac{-2\sqrt[3]{9x+10}}{-2}=\frac{10}{-2}$

$\left(\sqrt[3]{9x+10}\right)^3=(-5)^3$

$9x+10=-125$

$-10 \quad -10$

$\frac{9x}{9}=\frac{-135}{9}$

$x=-15$

NO SOLUTION

19. $-\sqrt{7x+2}-1=3$

$-\sqrt{7x+2}=4$

$\left(\sqrt{7x+2}\right)^2=(-4)^2$

$7x+2=16$

$-2 \quad -2$

$7x=14$

$\boxed{x=2}$

20. $\left(\sqrt[3]{4x-1}\right)^3=\left(\sqrt[3]{x+8}\right)^3$

$4x-1=x+8$

$3x=9$

$\boxed{x=3}$

21. $4+\sqrt{-3x+10}=x$

$(x-4)^2=\left(\sqrt{3x+10}\right)^2$

$(x-4)(x-4)=3x+10$

$x^2-8x+16=3x+10$

$x^2-11x+6=0$

$\frac{11\pm\sqrt{11^2-4(1)(6)}}{2}=\frac{11\pm\sqrt{97}}{2}$

$x=\frac{11}{2}\pm\frac{\sqrt{97}}{2}$

$\boxed{x=\frac{11}{2}-\frac{\sqrt{97}}{2}}$

22. $(x-6)^2=\left(\sqrt{18-3x}\right)^2$

$(x-6)(x-6)=18-3x$

$x^2-12x+36=18-3x$

$x^2-9x+18=0$

$(x-6)(x-3)=0$

$\boxed{x=6,3}$

23. $\sqrt{7x-54}-x=-6$

$+x \quad +x$

$\left(\sqrt{7x-54}\right)^2=(x-6)^2$

$7x-54=x^2-12x+36$

$-7x+54 \quad -7x+54$

$0=x^2-19x+90$

$0=(x-10)(x-9)$

$\boxed{x=10,9}$

24. $(x)^2=\left(\sqrt{40-3x}\right)^2$

$x^2=40-3x$

$x^2+3x-40=0$

$(x-5)(x+8)=0$

$\boxed{x=5,-8}$

Write the transformations from the parent function and state the domain and range:

25. $f(x)=\sqrt{x-5}+3$

Right 5

Up 3

D: $[5,\infty)$

R: $[3,\infty)$

26. $g(x)=-2\sqrt{\frac{1}{2}x-4}$

reflect over x-axis

vertical stretch by 2

Horizontal stretch by 2

Down 4

D: $[0,\infty)$

R: $[-4,\infty)$

27. $h(x)=-\sqrt[3]{\frac{1}{3}(x+2)}+3$

reflect over x-axis

horizontal stretch by 3

left 2 up 3

D: $[-2,\infty)$ R: $[3,\infty)$

28. $h(x)=\sqrt[3]{-(x+9)}$

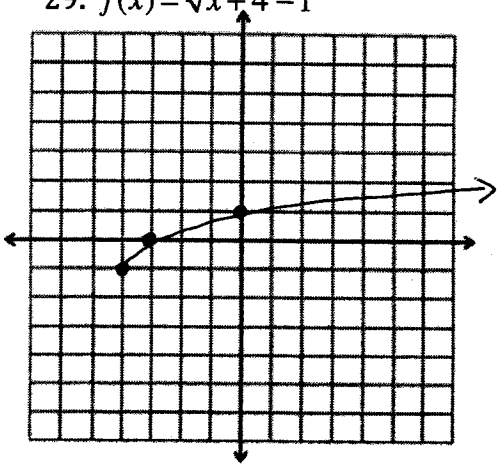
reflect over y-axis

left 9

D: $[-9,\infty)$ R: $[0,\infty)$

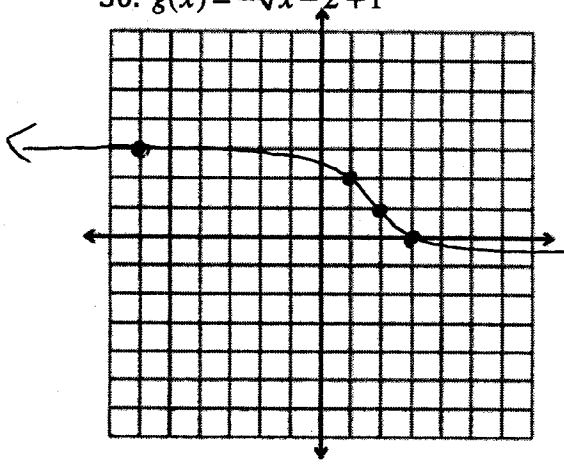
Graph the following and state the domain and range:

29. $f(x)=\sqrt{x+4}-1$



D: $[-4,\infty)$
R: $[-1,\infty)$

30. $g(x)=-\sqrt[3]{x-2}+1$

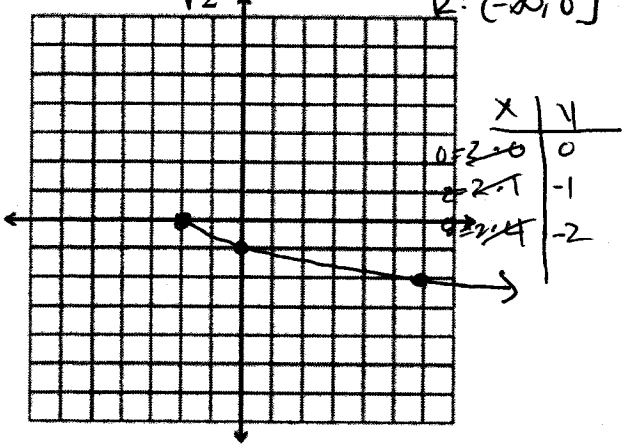


X	Y
-8	2
-1	1
0	0
1	-1
2	-2

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

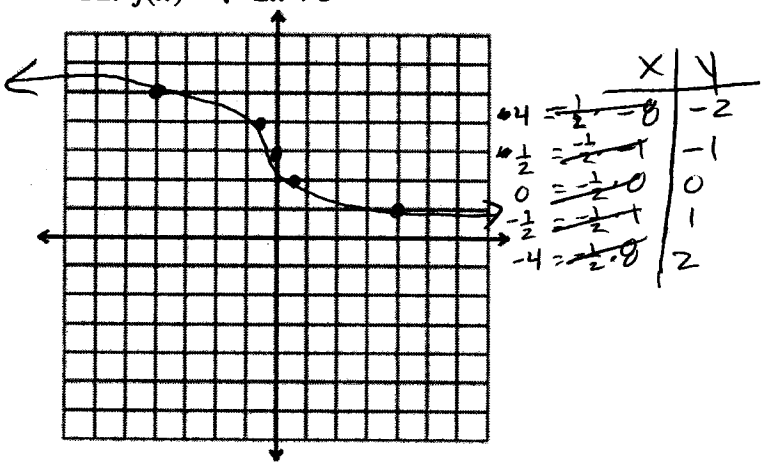
31. $h(x)=-\sqrt{\frac{1}{2}(x+2)}$

D: $[-2,\infty)$
R: $(-\infty,0]$



X	Y
-2	0
0	-1
2	-2

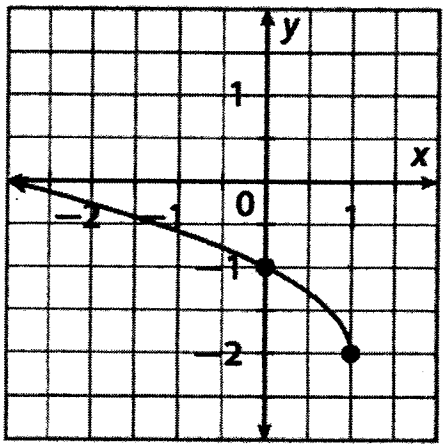
32. $j(x)=\sqrt[3]{-2x}+3$



X	Y
4	-2
1/2	-1
0	0
-1/2	1
-4	2

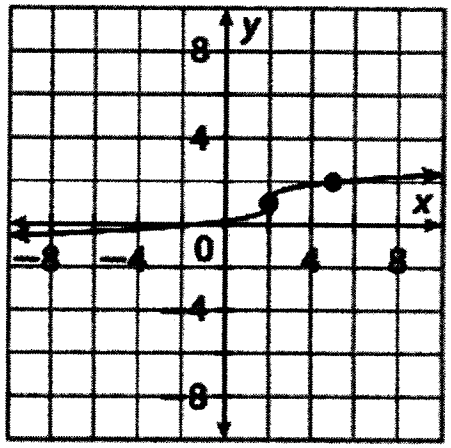
Write the equation for the following graphs:

33.



$f(x)=\sqrt{-(x-2)}-4$

34.



$f(x)=\sqrt[3]{\frac{1}{3}(x-2)}+1$

35. The diameter d in inches of a rope needed to life a weight of w tons is given by the formula $d = \frac{\sqrt{15w}}{\pi}$. How much weight can be lifted with a rope with a diameter of 1.5 inches? (Round to the nearest tenth.)

$\pi \cdot 1.5 = \frac{\sqrt{15w}}{\pi}$ $\cdot \pi$

$(1.5\pi)^2 = (\sqrt{15w})^2$

$\frac{22.2}{15} = \frac{15w}{15}$

$w = 1.48$

About 1.48 tons

36. For a spinning amusement park ride, the velocity in meters per second of a car moving around a curve with a radius r meters is given by $v = \sqrt{ar}$ where a is the cars acceleration in m/s². If the ride has a maximum acceleration of 25 m/s² and the cars on the ride have a maximum velocity of 10 m/s, what is the smallest radius that any curve on the ride may have?

$(10)^2 = (\sqrt{25r})^2$

$\frac{100}{25} = \frac{25r}{25}$

$r = 4$

smallest radius is 4