## *Chapter 6 Review Worksheet*

Name: KEY

**Evaluate the expression without using a calculator. (Lesson 6.1)**

1.) $256^{3/4}$

$(\sqrt[4]{256})^3$

$(4)^3$

$\boxed{64}$

2.) $27^{-2/3}$

$\frac{1}{(\sqrt[3]{27})^2}$

$\frac{1}{(3)^2}$

$\boxed{\frac{1}{9}}$

3.) $8^{7/3}$

$(\sqrt[3]{8})^7$

$(2)^7$

$\boxed{128}$

4.) $\frac{1}{(\sqrt[5]{-32})^{-3}}$

$(\sqrt[5]{-32})^3$

$(-2)^3$

$\boxed{-8}$

**Simplify the expression. Assume all variables are positive. (Lesson 6.2)**

5.) $(25a^{10}b^{16})^{1/2}$

$25^{1/2}a^{10\cdot 1/2}b^{16\cdot 1/2}$

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

6.) $\sqrt[5]{\frac{c}{d^8}}\cdot\frac{\sqrt[5]{d^2}}{\sqrt[5]{d^2}}$

$\sqrt[5]{\frac{cd^2}{d^{10}}}$

$\frac{\sqrt[5]{cd^2}}{\sqrt[5]{d^{10}}}$ $\boxed{\frac{\sqrt[5]{cd^2}}{d^2}}$

7.) $\sqrt[4]{28x^9y^3}\cdot\sqrt[4]{4x^4y^5}$

$\sqrt[4]{112x^{13}y^8}$

$\sqrt[4]{16\cdot 7\cdot x^4\cdot x^4\cdot x^4\cdot x\cdot y^4\cdot y^4}$

$\boxed{2x^3y^2\sqrt[4]{7x}}$

8.) $8\sqrt[5]{160}+2\sqrt[5]{1215}$

$8\sqrt[5]{32}\sqrt[5]{5}+2\sqrt[5]{243}\sqrt[5]{5}$

$8\cdot 2\cdot\sqrt[5]{5}+2\cdot 3\cdot\sqrt[5]{5}$

$16\sqrt[5]{5}+6\sqrt[5]{5}$

$\boxed{22\sqrt[5]{5}}$

9.) $\frac{81}{\sqrt[6]{81}}\cdot\frac{\sqrt[6]{9}}{\sqrt[6]{9}}$

$\frac{81\sqrt[6]{9}}{\sqrt[6]{729}}$

$\frac{81\sqrt[6]{9}}{3}$

$\boxed{27\sqrt[6]{9}}$

10.) $\frac{6xy^{3/4}}{3x^{1/2}y^{1/2}}$

$2x^{1-1/2}y^{3/4-1/2}$

$\boxed{2x^{1/2}y^{1/4}}$

11.) $\left(\frac{a^{3/4}}{b^{3/4}}\right)^{-8}$

$\left(\left(\frac{a}{b}\right)^{3/4}\right)^{-8}$

$\left(\frac{a}{b}\right)^{3/4\cdot -8}$

$\left(\frac{a}{b}\right)^{-6}$

$\frac{a^{-6}}{b^{-6}}$

$\boxed{\frac{b^6}{a^6}}$

12.) $4x^{3/7}\cdot 9x^{5/2}$

$36x^{3/7+5/2}$

$\boxed{36x^{41/14}}$

13.) $\sqrt[3]{x^{2/5}}$

$(x^{2/5})^{1/3}$

$x^{2/5\cdot 1/3}$

$\boxed{x^{2/15}}$

D: $[0,\infty)$ D: $[0,\infty)$

**Let $f(x) = -3x^{1/3} + 4x^{1/2}$, $g(x) = 5x^{1/3} + 4x^{1/2}$. Perform the indicated operation and state the domain. (Lesson 6.3)**

14.) $g(x) + f(x)$

$(5x^{1/3} + 4x^{1/2}) + (-3x^{1/3} + 4x^{1/2})$

$2x^{1/3} + 8x^{1/2}$

D: $[0,\infty)$

15.) $f(x) - g(x)$

$(-3x^{1/3} + 4x^{1/2}) - (5x^{1/3} + 4x^{1/2})$

$-8x^{1/3}$

D: $[0,\infty)$

16.) $g(x) - g(x)$

$(5x^{1/3} + 4x^{1/2}) - (5x^{1/3} + 4x^{1/2})$

0

D: $[0,\infty)$

D: $(-\infty,\infty)$ D: $[0,\infty)$

**Let $f(x) = 4x^{2/3}$, $g(x) = 5x^{1/2}$. Perform the indicated operation and state the domain. (Lesson 6.3)**

17.) $\frac{f(x)}{g(x)}$

$\frac{4x^{2/3}}{5x^{1/2}}$

$\frac{4x^{1/6}}{5}$

D: $(0,\infty)$

18.) $g(x) \cdot g(x)$

$(5x^{1/2})(5x^{1/2})$

$25x$

D: $[0,\infty)$

19.) $f(x) \cdot g(x)$

$(4x^{2/3})(5x^{1/2})$

$20x^{7/6}$

D: $[0,\infty)$

D: $\mathbb{R}, x \neq 0$ D: $(-\infty,\infty)$ D: $(-\infty,\infty)$

**Let $f(x) = 3x^{-1}$, $g(x) = 2x - 7$, and $h(x) = \frac{x+4}{3}$. Perform the indicated operation and state the domain. (Lesson 6.3)**

20.) $g(f(x))$

$g(3x^{-1})$

$2(3x^{-1}) - 7$

$6x^{-1} - 7$

$\frac{6}{x} - 7$

D: $\mathbb{R}, x \neq 0$

21.) $h(g(x))$

$h(2x-7)$

$\frac{(2x-7)+4}{3}$

$\frac{2x-3}{3}$

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

22.) $f(h(x))$

$f\left(\frac{x+4}{3}\right)$

$3\left(\frac{x+4}{3}\right)^{-1}$

$3\left(\frac{3}{x+4}\right)$

$\frac{9}{x+4}$

D: $\mathbb{R}, x \neq -4$

**Find the inverse of the function. (Lesson 6.4)**

23.) $f(x) = \frac{1}{3}x + 4$

$x = \frac{1}{3}y + 4$

$x - 4 = \frac{1}{3}y$

$3(x - 4) = y$

$\boxed{f^{-1}(x) = 3x - 12}$

24.) $y = 4x^2 + 9, x \geq 0$

$x = 4y^2 + 9$

$x - 9 = 4y^2$

$\frac{x-9}{4} = y^2$

$\sqrt{\frac{x-9}{4}} = y$

$\boxed{f^{-1}(x) = \frac{\sqrt{x-9}}{2}}$

25.) $f(x) = x^3 - 4$

$x = y^3 - 4$

$x + 4 = y^3$

$\sqrt[3]{x+4} = y$

$\boxed{f^{-1}(x) = \sqrt[3]{x+4}}$

**Verify that *f* and *g* are inverse functions. (Lesson 6.4)**

26.) $f(x) = \frac{1}{3}x^3 - 2,\ g(x) = \sqrt[3]{3x+6}$

$f(g(x))$

$f(\sqrt[3]{3x+6})$

$\frac{1}{3}(\sqrt[3]{3x+6})^3 - 2$

$\frac{1}{3}(3x+6) - 2$

$x + 2 - 2$

$\boxed{x}$ ✓

$g(f(x))$

$g(\frac{1}{3}x^3 - 2)$

$\sqrt[3]{3(\frac{1}{3}x^3 - 2) + 6}$

$\sqrt[3]{x^3 - 6 + 6}$

$\sqrt[3]{x^3}$

$\boxed{x}$

27.) $f(x) = -2x - 3;\ g(x) = -\frac{1}{2}x - \frac{3}{2}$

$f(g(x))$

$f(-\frac{1}{2}x - \frac{3}{2})$

$-2(-\frac{1}{2}x - \frac{3}{2}) - 3$

$x + 3 - 3$

$\boxed{x}$

$g(f(x))$

$g(-2x - 3)$

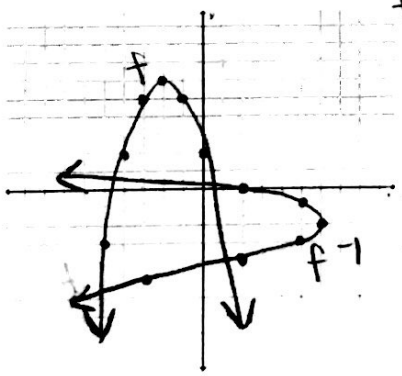
$-\frac{1}{2}(-2x - 3) - \frac{3}{2}$

$x + \frac{3}{2} - \frac{3}{2}$

$\boxed{x}$

**Graph the function *f*. Use the horizontal line test to determine whether the inverse of *f* is a function. Then graph the inverse of *f*. (Lesson 6.4)**

28.) $f(x) = -x^2 - 4x + 2$




| f | |
|---|---|
| x | y |
| -5 | -3 |
| -4 | 2 |
| -3 | 5 |
| -2 | 6 |
| -1 | 5 |
| 0 | 2 |

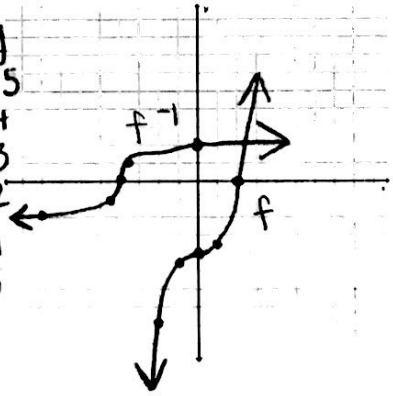
| $f^{-1}$ | |
|---|---|
| x | y |
| -3 | -5 |
| 2 | -4 |
| 5 | -3 |
| 6 | -2 |
| 5 | -1 |
| 2 | 0 |

Is $f^{-1}(x)$ a function? NO

$f^{-1}$ fails VLT OR

f fails HLT

29.) $f(x) = \frac{1}{2}x^3 - 4$




| f | |
|---|---|
| x | y |
| -2 | -8 |
| -1 | -4.5 |
| 0 | -4 |
| 1 | -3.5 |
| 2 | 0 |

| $f^{-1}$ | |
|---|---|
| x | y |
| -8 | -2 |
| -4.5 | -1 |
| -4 | 0 |
| -3.5 | 1 |
| 0 | 2 |

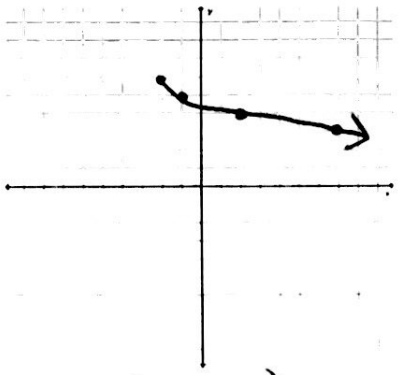
Is $f^{-1}(x)$ a function? YES

$f^{-1}$ passes VLT OR

f passes HLT

**Graph the function. Then state the domain and range. Lastly, compare the function with its parent function. (Lesson 6.5)**

30.) $y = -\sqrt{x+2} + 6$



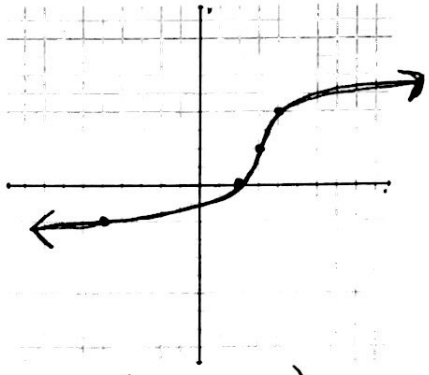
| X | y |
|---|---|
| -2 | 6 |
| -1 | 5 |
| 2 | 4 |
| 7 | 3 |

domain: $[-2, \infty)$

range: $(-\infty, 6]$

comparison:
- reflection over x-axis
- left 2
- up 6

31.) $y = 2\sqrt[3]{x-3} + 2$



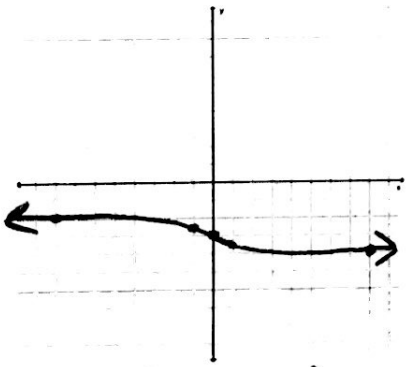
| X | y |
|---|---|
| -5 | -2 |
| 2 | 0 |
| 3 | 2 |
| 4 | 4 |
| 11 | 6 |

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

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

comparison:
- vertical stretch
- right 3
- up 2

32.) $y = -\frac{1}{2}\sqrt[3]{x} - 3$



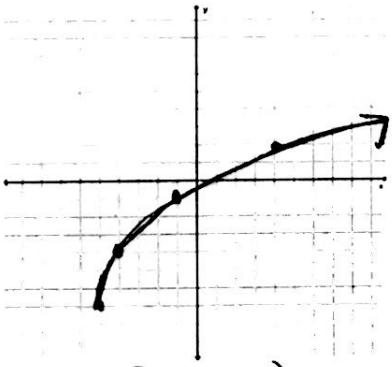
| X | y |
|---|---|
| -8 | -2 |
| -1 | -2.5 |
| 0 | -3 |
| 1 | -3.5 |
| 8 | -4 |

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

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

comparison:
- reflection over x-axis
- vertical shrink
- down 3

33.) $y = 3(x+5)^{1/2} - 7$



| X | y |
|---|---|
| -5 | -7 |
| -4 | -4 |
| -1 | -1 |
| 4 | 2 |
| 11 | 5 |

domain: $[-5, \infty)$

range: $[-7, \infty)$

comparison:
- vertical stretch
- left 5
- down 7

(plug back into original equation)

**Solve the equation. Check for extraneous solutions. (Lesson 6.6)**

34.) $\left(\sqrt[3]{5x-4}\right)^3 = (2)^3$

$5x - 4 = 8$

$5x = 12$

$\boxed{x = \frac{12}{5}}$

35.) $\frac{3x^{3/4}}{3} = \frac{24}{3}$

$x^{3/4} = 8$

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

$\left(\sqrt[4]{x}\right)^4 = (2)^4$

$\boxed{x = 16}$

36.) $-2\sqrt{3x-9} + 2 = 14$

$-2\sqrt{3x-9} = 12$

$\sqrt{3x-9} = -6$

$\left(\sqrt{3x-9}\right)^2 = (-6)^2$

$3x - 9 = 36$

$3x = 45$

$\boxed{x = 15}$

↑ extraneous

$\boxed{\text{NO SOLUTION}}$

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

$x^2 - 10 = 3x$

$x^2 - 3x - 10 = 0$

$(x-5)(x+2) = 0$

$\boxed{x = 5}$ $\boxed{x = -2}$ ← extraneous

38.) $(x-8)^2 = \left(\sqrt{18x}\right)^2$

$(x-8)(x-8)$

$x^2 - 16x + 64 = 18x$

$x^2 - 34x + 64 = 0$

$(x-32)(x-2) = 0$

$\boxed{x = 32}$ $\boxed{x = 2}$ ← extraneous

39.) ~~$\sqrt{x+6} - 2 = \sqrt{x-2}$~~

40.) ~~$\sqrt{x+1} = \sqrt{3x-3}$~~