

Name: Key

TA: \_\_\_\_\_

Math 11 Pre-Calculus LG 9 Ver B

1. Convert to a mixed radical.

a)  $\sqrt{48} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3}$

$4\sqrt{3}$

b)  $\sqrt{98x^3y^4} = \sqrt{2 \cdot 7 \cdot 7 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y}$

$7xy^2\sqrt{2x}$

2. Order the following radicals from least to greatest by converting each one to an entire radical.

$\begin{matrix} \textcircled{4} & \textcircled{3} & \textcircled{2} & \textcircled{1} \\ 4\sqrt{2}, & 3\sqrt{3}, & 2\sqrt{5}, & 2\sqrt{4} \\ \downarrow & \downarrow & \downarrow & \downarrow \\ \sqrt{32} & \sqrt{27} & \sqrt{20} & \sqrt{16} \end{matrix}$

$2\sqrt{4}, 2\sqrt{5}, 3\sqrt{3}, 4\sqrt{2}$

3. Simplify.

a)  $9\sqrt{2} - 2\sqrt{18}$

$9\sqrt{2} - 2\sqrt{9 \cdot 2}$   
 $9\sqrt{2} - 6\sqrt{2}$

$3\sqrt{2}$

b)  $-2\sqrt[3]{54} + 2\sqrt{7} + 5\sqrt[3]{24} - 2\sqrt{28}$

$-2\sqrt[3]{27 \cdot 2} + 2\sqrt{7} + 5\sqrt[3]{8 \cdot 3} - 2\sqrt{4 \cdot 7}$   
 $-6\sqrt[3]{2} + 2\sqrt{7} + 10\sqrt[3]{3} - 4\sqrt{7}$

$-6\sqrt[3]{2} + 10\sqrt[3]{3} - 2\sqrt{7}$

4. Multiply and then simplify.

a)  $(\sqrt{6})(\sqrt{8})$

$$= \sqrt{48} = \sqrt{16 \cdot 3}$$
$$= \boxed{4\sqrt{3}}$$

b)  $-2\sqrt{21x^2}(\sqrt{6x^3}) = -2\sqrt{126x^5}$

$$= -2\sqrt{2 \cdot 3 \cdot 3 \cdot 7 \cdot x \cdot x \cdot x \cdot x \cdot x}$$
$$= -2 \cdot 3 \cdot x \cdot x \sqrt{2 \cdot 7 \cdot x}$$
$$= \boxed{-6x^2\sqrt{14x}}$$

5. Expand and simplify.

a)  $(3\sqrt{5} - \sqrt{10})^2$

$$(3\sqrt{5} - \sqrt{10})(3\sqrt{5} - \sqrt{10})$$
$$9\sqrt{25} - 3\sqrt{50} - 3\sqrt{50} + \sqrt{100}$$
$$45 - 6\sqrt{50} + 10$$
$$55 - 6\sqrt{25 \cdot 2}$$
$$\boxed{55 - 30\sqrt{2}}$$

b)  $(5\sqrt{3} - 5\sqrt{2})(4 + 3\sqrt{6})$

$$20\sqrt{3} + 15\sqrt{18} - 20\sqrt{2} - 15\sqrt{12}$$
$$20\sqrt{3} + 45\sqrt{2} - 20\sqrt{2} - 30\sqrt{3}$$
$$\boxed{25\sqrt{2} - 10\sqrt{3}}$$

6. Divide then rationalize the denominator.

$$\frac{-16\sqrt{14}}{4\sqrt{21}} = \frac{-4\sqrt{2} \cdot \sqrt{7}}{\sqrt{3} \cdot \sqrt{3}}$$
$$= \frac{-4\sqrt{6}}{\sqrt{9}} = \boxed{\frac{-4\sqrt{6}}{3}}$$

7. Rationalize the denominator. Simplify.

$$\frac{(2\sqrt{5})(\sqrt{5}+2)}{(\sqrt{5}-2)(\sqrt{5}+2)} = \frac{2\sqrt{25} + 4\sqrt{5}}{\sqrt{25} + 2\sqrt{5} - 2\sqrt{5} - 4}$$

$$= \frac{10 + 4\sqrt{5}}{1} = \boxed{10 + 4\sqrt{5}}$$

8. Solve the following equations.

a)  $(\sqrt{3x+1})^2 = 7^2$

$$\begin{array}{r} 3x+1 = 49 \\ -1 \quad -1 \\ \hline 3x = 48 \\ \frac{3x}{3} = \frac{48}{3} \end{array}$$

Test  $7=7$

$x = 16$  ✓

b)  $\sqrt{5-x} + 6 = 3$

$$\begin{array}{r} \sqrt{5-x} = -3 \\ \sqrt{5-x}^2 = (-3)^2 \\ 5-x = 9 \\ -5 \quad -5 \\ \hline -x = 4 \\ x = -4 \end{array}$$

Test  $\sqrt{5-(-4)} + 6 = 3$   
 $3 + 6 = 3$   
 $9 \neq 3$

~~$x = -4$~~

**No Solution**

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

$$\begin{array}{r} 4-2x = x+7 \\ -4 \quad -x \quad -x \quad -4 \\ \hline -3x = 3 \\ \frac{-3x}{-3} = \frac{3}{-3} \end{array}$$

Test  $\sqrt{6} = \sqrt{6}$

$x = -1$  ✓

d)  $\sqrt{\frac{x^2}{2} + 7} = (x-1)^2$

$$\begin{array}{r} \frac{x^2}{2} + 7 = x^2 - 2x + 1 \\ \frac{x^2}{2} + 7 \quad -7 \\ \hline \frac{x^2}{2} = x^2 - 2x - 6 \\ 2\left(\frac{x^2}{2}\right) = 2(x^2 - 2x - 6) \\ x^2 = 2x^2 - 4x - 12 \\ -x^2 \quad -x^2 \\ \hline 0 = x^2 - 4x - 12 \\ 0 = (x-6)(x+2) \end{array}$$

Test  $5=5$

$x = 6$  ✓

~~$x = -2$~~   $3 \neq 3$

9. When an object is dropped from the top of a building that is 50 ft tall, the object will be  $h$  feet above the ground after  $t$  seconds, where  $t = \frac{1}{4} \sqrt{50-h}$ . How far above the ground will the object be after 1 second?

$$4 \times 1 = \frac{1}{4} \sqrt{50-h}$$

$$(4)^2 = (\sqrt{50-h})^2$$

$$16 = 50-h$$

-50      -50

$$-34 = -h$$

$$h = 34 \text{ ft.}$$