

PC11 Ch 2 Hand-in Partial Key

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PC11 Ch 2 Hand-in 2023

PreCalc 11 Chapter 2 Assignment – hand in for completion marks

Name: Key

Complete the following questions showing all work and steps where applicable.

1. Order these radicals from smallest to largest:

a) $\sqrt{17}$, $-3\sqrt{5}$, $4\sqrt{3}$, $-5\sqrt{2}$, $2\sqrt{6}$

$$\begin{array}{l} \sqrt{17} \\ \textcircled{3} \end{array} \quad \begin{array}{l} -3\sqrt{5} \\ = -\sqrt{3^2 \cdot 5} \\ = -\sqrt{9 \cdot 5} \\ = -\sqrt{45} \\ \textcircled{2} \end{array} \quad \begin{array}{l} 4\sqrt{3} \\ = \sqrt{4^2 \cdot 3} \\ = \sqrt{16 \cdot 3} \\ = \sqrt{48} \\ \textcircled{5} \end{array} \quad \begin{array}{l} -5\sqrt{2} \\ = -\sqrt{5^2 \cdot 2} \\ = -\sqrt{25 \cdot 2} \\ = -\sqrt{50} \\ \textcircled{1} \end{array} \quad \begin{array}{l} 2\sqrt{6} \\ = \sqrt{2^2 \cdot 6} \\ = \sqrt{4 \cdot 6} \\ = \sqrt{24} \\ \textcircled{4} \end{array}$$

in order: $-5\sqrt{2}$, $-3\sqrt{5}$, $\sqrt{17}$, $2\sqrt{6}$, $4\sqrt{3}$

b) $8\sqrt[3]{7}$, $-\sqrt[3]{7}$, $2\sqrt[3]{7}$

Same radicand and index, so we can order by looking at the coefficients:

in order: $-\sqrt[3]{7}$, $2\sqrt[3]{7}$, $8\sqrt[3]{7}$

c) $4\sqrt[3]{11}$, $3\sqrt[5]{28}$, $2\sqrt{10}$

different indices, so we use calculator values:

$$4\sqrt[3]{11} = 8.8959 \dots \textcircled{3}$$

$$3\sqrt[5]{28} = 5.84188 \dots \textcircled{1}$$

$$2\sqrt{10} = 6.324 \dots \textcircled{2}$$

in order: $3\sqrt[5]{28}$, $2\sqrt{10}$, $4\sqrt[3]{11}$

2. State for which values of each variable the radical is defined, then simplify the radical.

a) $\sqrt{50x^2y^7}$ $\begin{array}{l} x \in \mathbb{R} \\ y \geq 0 \end{array}$

$$= \sqrt{25x^2y^6 \cdot 2y}$$

$$= \boxed{5|x|y^3\sqrt{2y}}$$

b) $\sqrt[3]{-24a^6b^5}$ $\begin{array}{l} a \in \mathbb{R} \\ b \in \mathbb{R} \end{array}$

$$= \sqrt[3]{-8a^6b^3 \cdot 3b^2}$$

$$= \boxed{-2a^2b\sqrt[3]{3b^2}}$$

c) $\sqrt{45pq^2}$

No answer given - you can do it!!

3. Simplify each of the following.

a) $\sqrt{54} + \sqrt{32} - \sqrt{96} + \sqrt{18}$

No answer given -
you can do it!!

b) $2x\sqrt{48x^4y} + x^3\sqrt{25xy} - 4\sqrt{27x^6y} \quad x, y \geq 0$

$$\begin{aligned} &= 2x\sqrt{16x^4 \cdot 3y} + x^3\sqrt{25 \cdot xy} - 4\sqrt{9x^6 \cdot 3y} \\ &= 2x \cdot 4x^2\sqrt{3y} + x^3 \cdot 5\sqrt{xy} - 4 \cdot 3x^3\sqrt{3y} \\ &= \underline{8x^3\sqrt{3y}} + 5x^3\sqrt{xy} - \underline{12x^3\sqrt{3y}} \\ &= (8x^3 - 12x^3)\sqrt{3y} + 5x^3\sqrt{xy} \\ &= \boxed{-4x^3\sqrt{3y} + 5x^3\sqrt{xy}} \end{aligned}$$

4. Expand and simplify fully.

a) $\sqrt{10}(\sqrt{2} - \sqrt{15}) = \sqrt{10}\sqrt{2} - \sqrt{10}\sqrt{15}$

$$\begin{aligned} &= \sqrt{20} - \sqrt{150} \\ &= \sqrt{4 \cdot 5} - \sqrt{25 \cdot 6} \\ &= \boxed{2\sqrt{5} - 5\sqrt{6}} \end{aligned}$$

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

$$\begin{aligned} &= 8\sqrt{12} - 4\sqrt{6} \\ &= 8\sqrt{4 \cdot 3} - 4\sqrt{6} \\ &= 8 \cdot 2\sqrt{3} - 4\sqrt{6} \\ &= \boxed{16\sqrt{3} - 4\sqrt{6}} \end{aligned}$$

5. Identify the values of the variables for which each expression is defined, then expand and simplify.

$$\begin{aligned}
 \text{a) } 2\sqrt{3x}(\sqrt{6}-5\sqrt{x}) &= (2\sqrt{3x})(\sqrt{6}) - (2\sqrt{3x})(5\sqrt{x}) \\
 \boxed{x \geq 0} \quad &= 2\sqrt{18x} - 10\sqrt{3x^2} \\
 &= 2\sqrt{9 \cdot 2x} - 10\sqrt{x^2 \cdot 3} \\
 &= 2 \cdot 3\sqrt{2x} - 10x\sqrt{3} \\
 &= \boxed{6\sqrt{2x} - 10x\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } (5\sqrt{a}+3\sqrt{b})^2 &= (5\sqrt{a}+3\sqrt{b})(5\sqrt{a}+3\sqrt{b}) \\
 \boxed{a, b \geq 0} \quad &= (5\sqrt{a})(5\sqrt{a}) + (5\sqrt{a})(3\sqrt{b}) + (3\sqrt{b})(5\sqrt{a}) + (3\sqrt{b})(3\sqrt{b}) \\
 &= 25\sqrt{a^2} + 15\sqrt{ab} + 15\sqrt{ab} + 9\sqrt{b^2} \\
 &= \boxed{25a + 30\sqrt{ab} + 9b}
 \end{aligned}$$

6. Simplify each of the following by rationalizing the denominators.

$$\text{a) } \frac{5\sqrt{2}-4}{\sqrt{3}}$$

No answer given -
you can do it!!

$$\begin{aligned}
 \text{b) } \frac{(2\sqrt{7}-5)(\sqrt{3}-1)}{(\sqrt{3}+1)(\sqrt{3}-1)} &= \frac{2\sqrt{21} - 2\sqrt{7} - 5\sqrt{3} + 5}{3 - \sqrt{3} + \sqrt{3} - 1} \\
 &= \boxed{\frac{2\sqrt{21} - 2\sqrt{7} - 5\sqrt{3} + 5}{2}}
 \end{aligned}$$

7. Solve the following radical equations. Remember to show restrictions and verify solutions. If a solution doesn't check out, clearly show that.

a) $8 + \sqrt{4x-2} = 10$

restrictions
 $4x-2 \geq 0$
 $4x \geq 2$
 $x \geq \frac{2}{4}$
 $x \geq \frac{1}{2}$

$\sqrt{4x-2} = 2$
 $(\sqrt{4x-2})^2 = (2)^2$
 $4x-2 = 4$
 $\frac{4x}{4} = \frac{6}{4}$
 $x = \frac{6}{4}$
 $x = \frac{3}{2}$

verify
 L.S. R.S.
 $8 + \sqrt{4(\frac{3}{2})-2}$
 $8 + \sqrt{4}$
 $8 + 2$
 10 ✓

b) $\frac{\sqrt{2x-7}}{5} = 1$

restrictions
 $2x-7 \geq 0$
 $2x \geq 7$
 $x \geq \frac{7}{2}$

$5 \cdot \left(\frac{\sqrt{2x-7}}{5}\right) = (1) \cdot 5$
 $(\sqrt{2x-7})^2 = (5)^2$
 $2x-7 = 25$
 $\frac{2x}{2} = \frac{32}{2}$
 $x = 16$

verify
 L.S. R.S.
 $\frac{\sqrt{2(16)-7}}{5}$
 $\frac{\sqrt{25}}{5}$
 $\frac{5}{5}$
 1 ✓

c) $\sqrt{5-10x} + 7 = 3$

restrictions
 $5-10x \geq 0$
 $\frac{5}{10} \geq \frac{10x}{10}$
 $\frac{1}{2} \geq x$
 $x \leq \frac{1}{2}$

$(\sqrt{5-10x})^2 = (-4)^2$
 $5-10x = 16$
 $\frac{-10x}{-10} = \frac{11}{-10}$
 ~~$x = \frac{11}{-10}$~~

verify
 L.S. R.S.
 $\sqrt{5-10(\frac{11}{-10})} + 7$
 $\sqrt{5+11} + 7$
 $\sqrt{16} + 7$
 $4 + 7$
 11 $\frac{no}{3}$

not a solution, there is no solution

d) $14 - \sqrt{6x} = 2$

No answer given - you can do it!!

8. A tsunami's speed can be determined using the formula $S = \sqrt{9.8d}$ where S is the speed of the tsunami in meters per second, and d is the mean depth of the water in meters. If a tsunami is travelling at a speed of 48 m/s, what is the mean depth of the water to the nearest meter?

$S = 48$

$S = \sqrt{9.8d}$
 $(48)^2 = (\sqrt{9.8d})^2$
 $\frac{2304}{9.8} = \frac{9.8d}{9.8}$

restrictions
 $\frac{9.8d}{9.8} \geq 0$
 $d \geq 0$

$d = 235.1020408$

$d \approx 235 \text{ m}$