

## Section 2.3 – Practice Problems

Simplify each expression

1.  $6\sqrt{2} + 3\sqrt{2}$

$$\boxed{9\sqrt{2}}$$

Treat  $\sqrt{2}$  as  
a object  
like an  $x$ 

2.  $5\sqrt{3} - 9\sqrt{3}$

$$\boxed{-4\sqrt{3}}$$

3.  $7\sqrt{32} + 4\sqrt{2}$

$$7\sqrt{16}\sqrt{2} + 4\sqrt{2}$$

$$7 \cdot 4\sqrt{2} + 4\sqrt{2}$$

$$28\sqrt{2} + 4\sqrt{2} = \boxed{32\sqrt{2}}$$

Need them to be  
the same  
radical

4.  $7\sqrt{48} + 4\sqrt{3}$

$$7\sqrt{16}\sqrt{3} + 4\sqrt{3}$$

$$28\sqrt{3} + 4\sqrt{3} = \boxed{32\sqrt{3}}$$

5.  $3\sqrt[3]{54} + 5\sqrt[3]{16}$

$$3\sqrt[3]{27}\sqrt[3]{2} + 5\sqrt[3]{8}\sqrt[3]{2}$$

$$9\sqrt[3]{2} + 10\sqrt[3]{2}$$

$$\boxed{19\sqrt[3]{2}}$$

6.  $5\sqrt[4]{48} - 2\sqrt[4]{243}$

$$5\sqrt[4]{16}\sqrt[4]{3} - 2\sqrt[4]{81}\sqrt[4]{3}$$

$$5(2)\sqrt[4]{3} - 2(3)\sqrt[4]{3}$$

$$10\sqrt[4]{3} - 6\sqrt[4]{3} = \boxed{4\sqrt[4]{3}}$$

7.  $7\sqrt{63} - 2\sqrt{28}$

$$7\sqrt{9}\sqrt{7} - 2\sqrt{4}\sqrt{7}$$

$$7 \cdot 3\sqrt{7} - 2 \cdot 2\sqrt{7}$$

$$21\sqrt{7} - 4\sqrt{7} = \boxed{17\sqrt{7}}$$

8.  $3\sqrt{40} - 8\sqrt{90}$

$$3\sqrt{4}\sqrt{10} - 8\sqrt{9}\sqrt{10}$$

$$6\sqrt{10} - 24\sqrt{10}$$

$$\boxed{-18\sqrt{10}}$$

9.  $4\sqrt{12} + 2\sqrt{27} - 3\sqrt{75}$

$$4\sqrt{4}\sqrt{3} + 2\sqrt{9}\sqrt{3} - 3\sqrt{25}\sqrt{3}$$

$$4 \cdot 2\sqrt{3} + 2 \cdot 3\sqrt{3} - 3 \cdot 5\sqrt{3}$$

$$8\sqrt{3} + 6\sqrt{3} - 15\sqrt{3}$$

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

10.  $5\sqrt{18} - 4\sqrt{50} - 2\sqrt{72}$

$$5\sqrt{9}\sqrt{2} - 4\sqrt{25}\sqrt{2} - 2\sqrt{36}\sqrt{2}$$

$$5 \cdot 3\sqrt{2} - 4 \cdot 5\sqrt{2} - 2 \cdot 6\sqrt{2}$$

$$15\sqrt{2} - 20\sqrt{2} - 12\sqrt{2}$$

$$\boxed{-17\sqrt{2}}$$

Simplify each expression

$$\begin{aligned}
 11. \sqrt{3x^2} + \sqrt{12x^2} &\rightarrow \sqrt{4\sqrt{3}\sqrt{x^2}} \\
 &x\sqrt{3} + x \cdot 2\sqrt{3} \\
 &x\sqrt{3} + 2x\sqrt{3} \\
 &\boxed{3x\sqrt{3}}
 \end{aligned}$$

$$12. 3\sqrt{2x^3} + 5x\sqrt{8x}$$

$$\begin{aligned}
 &3x\sqrt{2x} + 5x \cdot 2\sqrt{2x} \\
 &3x\sqrt{2x} + 10x\sqrt{2x} \\
 &\boxed{13x\sqrt{2x}}
 \end{aligned}$$

$$13. \sqrt{4x^7} - 5x^2\sqrt{x^3} + 3x\sqrt{x^5}$$

$$\begin{aligned}
 &2x^3\sqrt{x} - 5x^2 \cdot x\sqrt{x} + 3x \cdot x^2\sqrt{x} \\
 &2x^3\sqrt{x} - 5x^3\sqrt{x} + 3x^3\sqrt{x} \\
 &\boxed{0}
 \end{aligned}$$

$$14. \sqrt{9x^3} - \sqrt{25x^3} + x\sqrt{16x}$$

$$\begin{aligned}
 &3x\sqrt{x} - 5x\sqrt{x} + 4x\sqrt{x} \\
 &\boxed{2x\sqrt{x}}
 \end{aligned}$$

$$15. 3\sqrt{125x^2y} + 6x\sqrt{80y}$$

$$\begin{aligned}
 &3\sqrt{25\sqrt{5}\sqrt{x^2y}} + 6x\sqrt{16\sqrt{5}\sqrt{y}} \\
 &3 \cdot 5 \cdot x\sqrt{5y} + 6x \cdot 4\sqrt{5y} \\
 &15x\sqrt{5y} + 24x\sqrt{5y} \\
 &\boxed{39x\sqrt{5y}}
 \end{aligned}$$

$$16. 5\sqrt{12x} - 3\sqrt{27x}$$

$$\begin{aligned}
 &5\sqrt{4\sqrt{3}\sqrt{x}} - 3\sqrt{9\sqrt{3}\sqrt{x}} \\
 &10\sqrt{3x} - 9\sqrt{3x} \\
 &\boxed{\sqrt{3x}}
 \end{aligned}$$

$$17. 5x\sqrt{63y} + 3\sqrt{28x^2y}$$

$$\begin{aligned}
 &5x\sqrt{9\sqrt{7y}} + 3\sqrt{4x^2\sqrt{7y}} \\
 &15x\sqrt{7y} + 6x\sqrt{7y} \\
 &\boxed{21x\sqrt{7y}}
 \end{aligned}$$

$$18. 3y\sqrt{24x^2y^2} + 6x\sqrt{54y^3}$$

$$\begin{aligned}
 &3y \cdot \sqrt{4\sqrt{x^2y^2}\sqrt{6}} + 6x\sqrt{9\sqrt{y^3}\sqrt{6}} \\
 &6xy^2\sqrt{6} + 18xy\sqrt{6y} \\
 &\boxed{6xy^2\sqrt{6} + 18xy\sqrt{6y}}
 \end{aligned}$$

19.  $5\sqrt{8x^2y^3} - 3x\sqrt{32y^3}$

$$5 \cdot 2xy\sqrt{2y} - 3x \cdot 4y\sqrt{2y}$$

$$10xy\sqrt{2y} - 12xy\sqrt{2y}$$

$$\boxed{-2xy\sqrt{2y}}$$

20.  $\sqrt{9y+27} + \sqrt{y+3}$

$$\sqrt{9(y+3)} + \sqrt{y+3}$$

$$3\sqrt{y+3} + \sqrt{y+3}$$

$$\boxed{4\sqrt{y+3}}$$

Simplify each expression

21.  $\sqrt[3]{27} - 4\sqrt[3]{8}$

$$3 - 4(2)$$

$$3 - 8$$

$$\boxed{-5}$$

22.  $3\sqrt[3]{6} + 2\sqrt[3]{48}$

$$3\sqrt[3]{6} + 2 \cdot \sqrt[3]{8} \cdot \sqrt[3]{6}$$

$$3\sqrt[3]{6} + 4\sqrt[3]{6}$$

$$\boxed{7\sqrt[3]{6}}$$

23.  $\sqrt[3]{x^4} - \sqrt[3]{x^7}$

$$\boxed{x\sqrt[3]{x} - x^2\sqrt[3]{x}}$$

24.  $x\sqrt[3]{8x^5} + \sqrt[3]{27x^8}$

$$2x \cdot x\sqrt[3]{x^2} + 3\sqrt[3]{x^6 \cdot x^2}$$

$$2x^2\sqrt[3]{x^2} + 3x^2\sqrt[3]{x^2}$$

$$\boxed{5x^2\sqrt[3]{x^2}}$$

25.  $6\sqrt[3]{8x^2} - 2\sqrt[3]{27x^2}$

$$6 \cdot 2\sqrt[3]{x^2} - 2 \cdot 3\sqrt[3]{x^2}$$

$$12\sqrt[3]{x^2} - 6\sqrt[3]{x^2}$$

$$\boxed{6\sqrt[3]{x^2}}$$

26.  $4\sqrt[3]{27x^2} + 6\sqrt[3]{8x^2}$

$$4 \cdot 3\sqrt[3]{x^2} + 6 \cdot 2\sqrt[3]{x^2}$$

$$12\sqrt[3]{x^2} + 12\sqrt[3]{x^2}$$

$$\boxed{24\sqrt[3]{x^2}}$$

27.  $-4\sqrt[3]{256x^4} - 2x\sqrt[3]{32x}$

$$-4 \cdot \sqrt[3]{64} \cdot \sqrt[3]{4} \sqrt[3]{x^4} - 2x \sqrt[3]{8} \cdot \sqrt[3]{4x}$$

$$-4 \cdot 4 \cdot x \sqrt[3]{4x} - 2x \cdot 2 \cdot \sqrt[3]{4x}$$

$$-16x \sqrt[3]{4x} - 4x \sqrt[3]{4x}$$

$$\boxed{-20x \sqrt[3]{4x}}$$

28.  $\frac{5}{2}\sqrt[3]{16x^4y^5} + xy\sqrt[3]{54xy^2}$

$$\frac{5}{2} \sqrt[3]{8 \cdot 2 \cdot x^3 \cdot x \cdot y^3 \cdot y^2} + xy \sqrt[3]{27 \cdot 2 \cdot x \cdot y^2}$$

$$\frac{5}{2} \cdot 2 \cdot x \cdot y \sqrt[3]{2xy^2} + 3xy \sqrt[3]{2xy^2}$$

$$5xy \sqrt[3]{2xy^2} + 3xy \sqrt[3]{2xy^2}$$

$$\boxed{8xy \sqrt[3]{2xy^2}}$$

Find the perimeter (as simplified as possible) of a...

29. Rectangle with sides  $3\sqrt{12}$  and  $2\sqrt{8}$ 

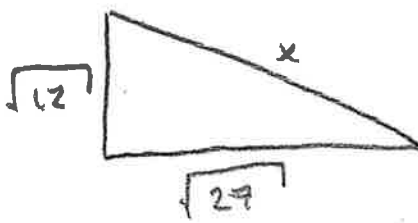
$$P = l + w + l + w$$

$$3\sqrt{12} + 3\sqrt{12} + 2\sqrt{8} + 2\sqrt{8}$$

$$6\sqrt{12} + 4\sqrt{8}$$

$$6\sqrt{4\sqrt{3}} + 4\sqrt{4\sqrt{2}} \rightarrow \boxed{12\sqrt{3} + 8\sqrt{2} \text{ cm}}$$

30. Right angle triangle with base  $\sqrt{27}$  and height  $\sqrt{12}$  (Hint: use Pythagorean Theorem to find hypotenuse)



$$x^2 = \sqrt{12}^2 + \sqrt{27}^2$$

$$x^2 = 12 + 27$$

$$x^2 = 39$$

$$x = \sqrt{39}$$

$$P = \sqrt{12} + \sqrt{27} + \sqrt{39}$$

$$\sqrt{4}\sqrt{3} + \sqrt{9}\sqrt{3} + \sqrt{39}$$

$$2\sqrt{3} + 3\sqrt{3} + \sqrt{39}$$

$$(5\sqrt{3} + \sqrt{39}) \text{ cm}$$

31. A rectangle with sides  $3\sqrt{20}$  and  $\sqrt{125}$

$$2L + 2W$$

$$6\sqrt{20} + 2\sqrt{125}$$

$$6\sqrt{4}\sqrt{5} + 2\sqrt{25}\sqrt{5}$$

$$12\sqrt{5} + 10\sqrt{5}$$

$$= 22\sqrt{5} \text{ cm}$$

32. Explain why  $\sqrt{a+b} \neq \sqrt{a} + \sqrt{b}$ . Give examples.

↑  
square root of  
the sum

↖ sum of the individual square roots

$$\text{Ex: } \sqrt{9+16} = \sqrt{25} = 5$$

$$\sqrt{9} + \sqrt{16} = 3 + 4 = 7$$