Adding and Subtracting Radicals

Example 1:

Evaluate:

a.) $\sqrt{3} + 2\sqrt{3}$

Since these terms are like terms, we simply add.

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

b.) $4\sqrt{2} + \sqrt{8}$

Since these terms are NOT like terms, we cannot combine them. We need to simplify each term completely to make sure they can't be written as like terms. If they can, then we will add!

$$4\sqrt{2} + \sqrt{8} = 4\sqrt{2} + \sqrt{4 \cdot 2}$$

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

$$= 4\sqrt{2} + 2\sqrt{2}$$

Now they are like terms!

$$= 6\sqrt{2}$$

c.) $5\sqrt{7} - 2\sqrt{28} + 6\sqrt{63}$

d.) $2\sqrt{125x^2z} + 8x\sqrt{80z}$

Adding and Subtracting Radicals

Practice Problems

Evaluate

1. $\mathbf{4\sqrt{5} + \sqrt{5} - 2\sqrt{5}}$

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

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

2. $\mathbf{3\sqrt{2} - \sqrt{12}}$

$4 \cdot 3$

$\boxed{3\sqrt{2} - 2\sqrt{3}}$

3. $\mathbf{\sqrt{2x^2} + 3x\sqrt{50}}$ $25 \cdot 2$

$x\sqrt{2} + 15x\sqrt{2}$

$\boxed{16x\sqrt{2}}$

4. $\mathbf{\sqrt{20x^2} - 3x\sqrt{5}}$

$4 \cdot 5$

$2x\sqrt{5} - 3x\sqrt{5}$

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

More Practice with Adding & Subtracting Radicals

Name_____ Date_____

Simplify completely.

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

$3\sqrt{6}-\sqrt{6}-2\sqrt{6}-\sqrt{3}$

$\cancel{2\sqrt{6}-2\sqrt{6}}-\sqrt{3}$

$-\sqrt{3}$

2. $-2\sqrt{5}-\sqrt{2}-\sqrt{5}+2\sqrt{6}$

$-2\sqrt{5}-\sqrt{5}-\sqrt{2}+2\sqrt{6}$

$-3\sqrt{5}-\sqrt{2}+2\sqrt{6}$

3. $2\sqrt{3}-\sqrt{3}-2\sqrt{2}+2\sqrt{3}$

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

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

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

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

5. $2\sqrt{6}-\sqrt{3}+\cancel{2\sqrt{6}-2\sqrt{6}}$

$2\sqrt{6}-\sqrt{3}$

6. $-2\sqrt{12}+2\sqrt{3}+3\sqrt{45}$

2 3

$4\cdot 3$ $9\cdot 5$

$-4\sqrt{3}+2\sqrt{3}+9\sqrt{5}$

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

7. $-\sqrt{45}+2\sqrt{27}+2\sqrt{5}$

3 3

$9\cdot 5$ $9\cdot 3$

$-3\sqrt{5}+6\sqrt{3}+2\sqrt{5}$

$-\sqrt{5}+6\sqrt{3}$

8. $-2\sqrt{6}-\sqrt{54}+2\sqrt{24}$

3 2

$9\cdot 6$ $4\cdot 6$

$-2\sqrt{6}-3\sqrt{6}+4\sqrt{6}$

$-\sqrt{6}$

9. $-2\sqrt{5}+3\sqrt{8}-3\sqrt{18}$

$4\cdot 2 \quad 9\cdot 2$

$-2\sqrt{5}+6\sqrt{2}-9\sqrt{2}$

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

10. $3\sqrt{45}-2\sqrt{54}+2\sqrt{6}$

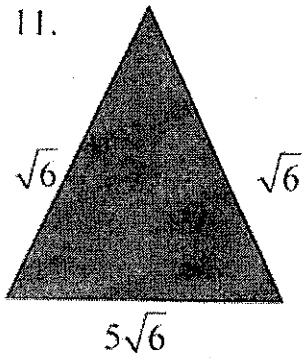
$9\cdot 5 \quad 9\cdot 6$

$9\sqrt{5}-6\sqrt{6}+2\sqrt{6}$

$9\sqrt{5}-4\sqrt{6}$

Find the perimeter of the following figures.

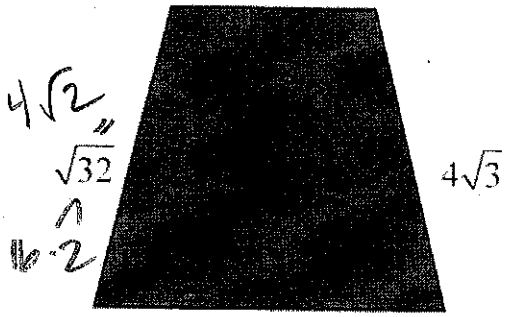
11.



$P=\sqrt{6}+\sqrt{6}+5\sqrt{6}$

$P=7\sqrt{6}$

12. $\sqrt{18}=3\sqrt{2}$



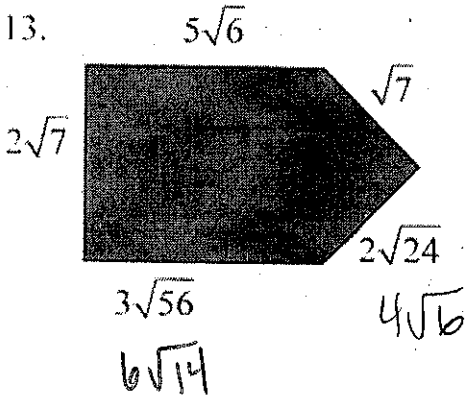
$2\sqrt{45}=6\sqrt{5}$

$9\cdot 5$

$P=3\sqrt{2}+4\sqrt{2}+6\sqrt{5}+4\sqrt{3}$

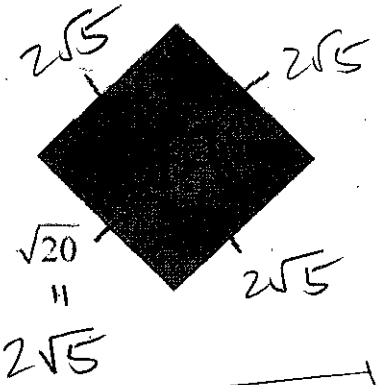
$P=7\sqrt{2}+6\sqrt{5}+4\sqrt{3}$

13.



$P=6\sqrt{14}+9\sqrt{6}+3\sqrt{7}$

14.



$P=8\sqrt{5}$