

## Simplifying Radicals

Simplify. Use absolute value signs when necessary.

1)  $\sqrt{24} = \sqrt{4 \cdot 6} = 2\sqrt{6}$

2)  $\sqrt[3]{1000} = 10$

3)  $\sqrt[3]{-162} = \sqrt[3]{(-1)(2) \cdot 81}$   
 $= -\sqrt[3]{2 \cdot (3 \cdot 3 \cdot 3) \cdot 3} = -3\sqrt[3]{6}$

4)  $\sqrt[3]{750} = \sqrt[3]{25 \cdot 3 \cdot 10} = \sqrt[3]{5 \cdot 5 \cdot 5 \cdot 2 \cdot 3}$   
 $= 5\sqrt[3]{6}$

5)  $\sqrt[4]{162} = \sqrt[4]{2 \cdot 81}$   
 $= \sqrt[4]{2 \cdot (3 \cdot 3 \cdot 3 \cdot 3)} = 3\sqrt[4]{2}$

6)  $\sqrt{512} = \sqrt{2 \cdot 256} = \sqrt{2 \cdot 2 \cdot 128}$   
 $= \sqrt{2 \cdot 2 \cdot 2 \cdot 64} = 2 \cdot 8\sqrt{2} = 16\sqrt{2}$

7)  $\sqrt[4]{128n^8} = \sqrt[4]{2 \cdot 64n^8}$   
 $= \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2n^8} = 2n^2\sqrt[4]{8}$

8)  $\sqrt{98k} = \sqrt{49 \cdot 2k}$   
 $= 7\sqrt{2k}$

9)  $\sqrt[5]{224r^7} = \sqrt[5]{2 \cdot 112r^7}$   
 $= \sqrt[5]{2 \cdot 2 \cdot 56r^7} = \sqrt[5]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7r^7}$   
 $= 2r\sqrt[5]{7r^2}$

10)  $\sqrt[3]{24m^3} = \sqrt[3]{8 \cdot 3m^3} = 2m\sqrt[3]{3}$

11)  $\sqrt{392x^2}$   
 $= \sqrt{2 \cdot 2 \cdot 2 \cdot 49x^2}$   
 $= 2 \cdot 7\sqrt{2x^2} = 14x\sqrt{2}$

12)  $\sqrt{512x^2} = \sqrt{2 \cdot 2 \cdot 2 \cdot 64x^2}$   
 $= 2 \cdot 8x\sqrt{2} = 16x\sqrt{2}$

13)  $\sqrt[4]{405x^3y^2}$   
 $= \sqrt[4]{81 \cdot 5x^3y^2} = 3\sqrt[4]{5x^3y^2}$

14)  $\sqrt[3]{-16a^3b^8} = \sqrt[3]{(-1)(8) \cdot 2a^3b^8}$   
 $= -2ab^2\sqrt[3]{2b^2}$

15)  $\sqrt[4]{128x^7y^7} = \sqrt[4]{16 \cdot 8x^7y^7}$   
 $\sqrt[4]{8 \cdot 8 \cdot 6x^7y^7} = \sqrt[4]{16 \cdot 8x^7y^7}$   
NOT quite start  
 $= 2xy\sqrt[4]{8y^3x^3}$

16)  $\sqrt[3]{16xy} = \sqrt[3]{8 \cdot 2xy}$   
 $= 2\sqrt[3]{2xy}$

17)  $\sqrt[6]{448x^7y^7}$   
 $\sqrt[6]{64 \cdot 7x^7y^7} = 2xy\sqrt[6]{7xy}$

18)  $\sqrt[3]{56x^5y} = \sqrt[3]{8 \cdot 7x^5y}$   
 $= 2x\sqrt[3]{7x^2y}$

Critical thinking questions:

19) What simplifies into  $2mn^2\sqrt[3]{5mn^2}$ ?

$$(2mn^2)^3 = 8m^3n^6$$
$$8m^3n^6 \cdot 5mn^2 = 40m^4n^8$$
$$\sqrt[3]{40m^4n^8}$$

20) Simplify  $\sqrt[n]{3 \cdot 2^n \cdot x^{2n} \cdot y^{n+3}}$

$$2x^2y\sqrt[n]{3y^3}$$

ck:  $(2x^2y)^n = 2^n x^{2n} y^n$   
 $2^n x^{2n} y^n \cdot 3y^3 = 3 \cdot 2^n x^{2n} y^{n+3}$