

I. Simplifying Radicals:

1) $\sqrt{500}$

$= \sqrt{100 \cdot 5}$
 $= \boxed{10\sqrt{5}}$



2) $\sqrt{75x^3}$

$\sqrt{25 \cdot 3 \cdot x^2 \cdot x}$
 $\boxed{5x\sqrt{3x}}$

3) $\sqrt[3]{250}$

$\sqrt[3]{125 \cdot 2}$
 $\boxed{5\sqrt[3]{2}}$

II. Basic Properties of Radicals

$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$
 $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Ex: $\sqrt{3} \cdot \sqrt{2} = \boxed{\sqrt{6}}$

Ex: $\sqrt{\frac{9}{16}} = \frac{\sqrt{9}}{\sqrt{16}} = \boxed{\frac{3}{4}}$

4) $\sqrt{6x} \cdot \sqrt{3x}$

$= \sqrt{18x^2}$
 $= \boxed{3x\sqrt{2}}$

5) $\sqrt{2x^2} \cdot \sqrt{6x}$

$= \sqrt{12x^3}$
 $= \boxed{2x\sqrt{3x}}$

6) $\sqrt{\frac{75}{4}} = \frac{\sqrt{75}}{\sqrt{4}} = \boxed{\frac{5\sqrt{3}}{2}}$

7) $\frac{\sqrt{32b^3}}{\sqrt{b}}$

$= \sqrt{\frac{32b^3}{b}} = \sqrt{32b^2} = \boxed{4b\sqrt{2}}$

8) $\frac{\sqrt{48x^3}}{\sqrt{6x}} = \sqrt{\frac{48x^3}{6x}} = \sqrt{8x^2} = \boxed{2x\sqrt{2}}$

III. Adding/Subtracting Radicals

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

$= \boxed{7\sqrt{3}}$

10) $7\sqrt{3} + \sqrt{12}$

$7\sqrt{3} + 2\sqrt{3}$
 $\boxed{9\sqrt{3}}$

11) $2\sqrt{48} - 3\sqrt{27}$

$4 \cdot 2\sqrt{16 \cdot 3} - 3 \cdot 3\sqrt{9 \cdot 3}$
 $8\sqrt{3} - 9\sqrt{3}$
 $= \boxed{-\sqrt{3}}$

12) $4\sqrt{50x} - 6\sqrt{32x}$

$20\sqrt{2x} - 24\sqrt{2x}$
 $\boxed{-4\sqrt{2x}}$

IV. Rationalizing the Denominator (with one term)

13) $\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$

14) $\frac{15}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{15\sqrt{6}}{6} = \boxed{\frac{5\sqrt{6}}{2}}$

15) $\frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{5\sqrt{3}}{3}}$

16) $\frac{2}{\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} = \frac{2\sqrt{8}}{8} = \frac{\sqrt{8}}{4}$

$\frac{\sqrt{8}}{4} = \frac{2\sqrt{2}}{4} = \boxed{\frac{\sqrt{2}}{2}}$

17) $\frac{5}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{5\sqrt{3}}{6}}$

18) $\frac{6}{\sqrt{12}} \cdot \frac{\sqrt{12}}{\sqrt{12}} = \frac{6\sqrt{12}}{12} = \frac{\sqrt{12}}{2} = \frac{2\sqrt{3}}{2} = \boxed{\sqrt{3}}$

V. Rationalizing the Denominator (with 2 terms)

19) $\frac{9}{4+\sqrt{5}} \cdot \frac{(4-\sqrt{5})}{(4-\sqrt{5})} = \frac{36-9\sqrt{5}}{11}$

$16 - 5 = 11$

20) $\frac{1}{\sqrt{10}-3} \cdot \frac{(\sqrt{10}+3)}{(\sqrt{10}+3)} = \frac{\sqrt{10}+3}{1} = \boxed{\sqrt{10}+3}$

$10 - 9 = 1$