

Show all work on this test or on separate paper.

Turn in all work sheets. Simplify radicals completely.

1.  $\sqrt{16} =$

2.  $\sqrt[3]{125} =$

3.  $\sqrt{x^{16}} =$

4.  $\sqrt{50} =$

5.  $\sqrt[3]{72} =$

6.  $\sqrt{40x^5} =$

7.  $\sqrt{24x^3y^{10}} =$

8.  $\sqrt{48x^7y^{11}} =$

9.  $\sqrt{27} + \sqrt{12}$

10.  $3\sqrt{2} - 5\sqrt{8}$

11.  $3\sqrt{20} - 8\sqrt{125} + 6\sqrt{45}$

12.  $\sqrt{10} \cdot \sqrt{35}$

In 13-15, use distributive property and FOIL:

13.  $2\sqrt{6}(4\sqrt{3} + 3\sqrt{10})$

14.  $(4\sqrt{3} + 2\sqrt{6})(3\sqrt{3} - 7\sqrt{6})$

15. Mult:  $(3\sqrt{2} - 4\sqrt{3})^2$

In 16-21, simplify completely, rationalize all denominators, and reduce all fractions.

16.  $\frac{9\sqrt{3} + 6\sqrt{2}}{6}$

17.  $\frac{\sqrt{40}}{10}$

18.  $\frac{\sqrt{32} - \sqrt{8}}{40}$

19.  $\frac{12}{\sqrt{3}}$

20.  $\frac{12}{\sqrt{8}}$

21.  $\sqrt{\frac{5}{12}}$

Show all work on this test or on separate paper.  
Turn in all work sheets. Simplify radicals completely.

1.  $\sqrt{16} = 4$

2.  $\sqrt[3]{125} = 5$

3.  $\sqrt{x^{16}} = x^8$

4.  $\sqrt{50} = 5\sqrt{2}$

5.  $\sqrt[3]{72} =$   
 $\sqrt[3]{8} \sqrt[3]{9}$   
 $= 2\sqrt[3]{9}$

6.  $\sqrt{40x^5} = \sqrt{4x^4} \sqrt{10x}$   
 $= 2x^2 \sqrt{10x}$

7.  $\sqrt{24x^3y^{10}} =$   
 $\sqrt{4x^2y^{10}} \sqrt{6x}$   
 $= 2xy^5 \sqrt{6x}$

8.  $\sqrt{48x^7y^{11}} =$   
 $= \sqrt{16x^6y^{10}} \sqrt{3xy}$   
 $= 4x^3y^5 \sqrt{3xy}$

9.  $\sqrt{27} + \sqrt{12}$   
 $3\sqrt{3} + 2\sqrt{3} = 5\sqrt{3}$

10.  $3\sqrt{2} - 5\sqrt{8}$   
 $3\sqrt{2} - 5 \cdot 2\sqrt{2}$   
 $= 3\sqrt{2} - 10\sqrt{2} = -7\sqrt{2}$

11.  $3\sqrt{20} - 8\sqrt{125} + 6\sqrt{45}$   
 $= 3 \cdot 2\sqrt{5} - 8 \cdot 5\sqrt{5} + 6 \cdot 3\sqrt{5}$   
 $= 6\sqrt{5} - 40\sqrt{5} + 18\sqrt{5}$   
 $= -16\sqrt{5}$

12.  $\sqrt{10} \cdot \sqrt{35}$   
 $= \sqrt{5 \cdot 2 \cdot 7 \cdot 5}$   
 $= \sqrt{25} \sqrt{14} = 5\sqrt{14}$

In 13-15, use distributive property and FOIL:

13.  $2\sqrt{6}(4\sqrt{3} + 3\sqrt{10})$   
 $= 8\sqrt{18} + 6\sqrt{60}$   
 $= 8 \cdot 3\sqrt{2} + 6 \cdot 2\sqrt{15}$   
 $= 24\sqrt{2} + 12\sqrt{15}$

14.  $(4\sqrt{3} + 2\sqrt{6})(3\sqrt{3} - 7\sqrt{6})$   
 $= 12 \cdot 3 - 28\sqrt{18} + 6\sqrt{18} - 14 \cdot 6$   
 $= 36 - 22\sqrt{18} - 84$   
 $= -48 - 22 \cdot 3\sqrt{2} = -48 - 66\sqrt{2}$

$$\begin{aligned}
 15. \text{ Mult: } (3\sqrt{2} - 4\sqrt{3})^2 &= (3\sqrt{2} - 4\sqrt{3})(3\sqrt{2} - 4\sqrt{3}) \\
 &= 9 \cdot 2 - 12\sqrt{6} - 12\sqrt{6} + 16 \cdot 3 \\
 &= 18 - 24\sqrt{6} + 48 \\
 &= \boxed{66 - 24\sqrt{6}}
 \end{aligned}$$

In 16-21, simplify completely, rationalize all denominators, and reduce all fractions.

$$\begin{aligned}
 16. \quad \frac{9\sqrt{3} + 6\sqrt{2}}{6} \\
 &= \frac{3(3\sqrt{3} + 2\sqrt{2})}{6} \\
 &= \boxed{\frac{3\sqrt{3} + 2\sqrt{2}}{2}}
 \end{aligned}$$

$$\begin{aligned}
 17. \quad \frac{\sqrt{40}}{10} &= \frac{2\sqrt{10}}{10} \\
 &= \boxed{\frac{\sqrt{10}}{5}}
 \end{aligned}$$

$$\begin{aligned}
 18. \quad \frac{\sqrt{32} - \sqrt{8}}{40} \\
 &= \frac{4\sqrt{2} - 2\sqrt{2}}{40} = \frac{2\sqrt{2}}{40} \\
 &= \boxed{\frac{\sqrt{2}}{20}}
 \end{aligned}$$

$$\begin{aligned}
 19. \quad \frac{12}{\sqrt{3}} \frac{\sqrt{3}}{\sqrt{3}} &= \frac{12\sqrt{3}}{3} \\
 &= \boxed{4\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 20. \quad \frac{12}{\sqrt{8}} &= \frac{12\sqrt{2}}{2\sqrt{2}\sqrt{2}} \\
 &= \frac{12\sqrt{2}}{4} \\
 &= \boxed{3\sqrt{2}}
 \end{aligned}$$

$$\begin{aligned}
 21. \quad \sqrt{\frac{5}{12}} &= \frac{\sqrt{5}\sqrt{3}}{2\sqrt{3}\sqrt{3}} \\
 &= \boxed{\frac{\sqrt{15}}{6}}
 \end{aligned}$$