Simplifying Expressions Using the Laws of Exponents

In problems 1-11, simplify each of the following expressions

1. $2^{\frac{1}{3}} \cdot 2^{\frac{11}{3}}$	2. $\dfrac{4^{\frac{4}{3}}}{4^{\frac{1}{3}}}$
3. $3^{\frac{1}{5}} \cdot 3^{\frac{-1}{2}}$	4. $\dfrac{x^{\frac{1}{7}}}{x^{\frac{2}{3}}}$
5. $\left(x^{\frac{8}{5}}\right)^{\frac{10}{8}}$	6. $\left(16^{\frac{3}{4}} \cdot 25^{\frac{-1}{4}}\right)^{2}$
7. $\left(x^{\frac{2}{3}} y^{\frac{1}{4}}\right)^{\frac{12}{5}}$	8. $\left(x^{\frac{-1}{2}} \cdot y^{\frac{2}{3}}\right)\left(x^{\frac{2}{5}} y^{\frac{-1}{6}}\right)$
9. $\left(2x^{\frac{3}{2}} y\right)^{4}$	10. $\left(\dfrac{x^{\frac{1}{2}} y}{4x^{\frac{1}{4}} y^{\frac{1}{3}}}\right)^{\frac{-3}{2}}$
11. $\left(\dfrac{x^{\frac{1}{4}} y^{\frac{1}{2}}}{16x^{\frac{5}{4}} y^{\frac{7}{2}}}\right)^{\frac{-1}{4}}$	

In problems 12-19, use rational exponents to simplify each radical. Assume all variables are positive.

12. $\sqrt{x^{12}}$	13. $\sqrt[8]{16^4}$
14. $\sqrt[5]{32x^5 y^{20}}$	15. $\dfrac{\sqrt[3]{x}}{\sqrt[5]{x}}$
16. $\sqrt[3]{x} \cdot \sqrt[4]{x}$	17. $\sqrt[3]{\sqrt{x^5}}$
18. $\sqrt{5} \cdot \sqrt[3]{25}$	19. $\dfrac{\sqrt[3]{4}}{\sqrt[4]{8}}$

In problems 20-21, simplify by factoring

20. $5x^{\frac{3}{2}} + x^{\frac{1}{2}}(x-7) \quad by \quad x^{\frac{1}{2}}$	21. $(x+2)^{\frac{3}{2}} + (x+2)^{\frac{5}{2}} \quad by \quad (x+2)^{\frac{3}{2}}$