Simplify completely. Your answers should have only positive exponents.

7.1 Practice

1. $(4^4)^2$

$= 4^8$

2. $(2x^4)^3$

$= 2^3 x^{12}$

$= 8x^{12}$

3. $(x^{-3}y^4)^2$

$x^{-6} y^8 = \frac{y^8}{x^6}$

4. $\left(\frac{f}{f^6}\right)^2 = \frac{f^2}{f^{12}} = f^{-10}$

$= \frac{1}{f^{10}}$

5. $\frac{4x^3}{6x^5} = \frac{2}{3}x^{-2}$

$= \frac{2}{3x^2}$

6. $\frac{p}{4p^6} = \frac{1}{4p^5}$

$\frac{1}{4p^5}$

7. $\frac{4y}{2x^4y^3} = \frac{2}{x^4y^2}$

8. $12^3 \cdot 12^4$

$= 12^7$

9. $3x^2y^3 \cdot 2x^3y^2$

$= 6x^5y^5$

10. $(-3x^2)^4$

$(-3)^4 x^8$

$= 81x^8$

11. $(-2x^2)^3$

$(-2)^3 x^6$

$-8x^6$

12. $(-x^2y^7)^5$

$(-1)^5 x^{10} y^{35}$

$= -x^{10}y^{35}$

13. $\left(\frac{7}{7^3}\right)^{-3} = \frac{7^{-3}}{7^{-9}}$

$-3 - -9 = 6$

$= 7^6$

14. $-x^2y^{-3} \cdot x^{-2}y^2$

$= -x^0 y^{-1}$

$= -\frac{1}{y}$

15. $\frac{-3w^3}{6w^5} = -\frac{1}{2}w^{-2}$

$= -\frac{1}{2w^2}$

16. $I \cdot 8^{-1} = \frac{I}{8}$

(BECAUSE I WAS SO HUNGRY!)

17. $\frac{12a^{-2}b^4}{2a^4b^{-3}} = 6a^{-6}b^7$

$= \frac{6b^7}{a^6}$

18. $\left(\frac{2^4}{2^4 \cdot 2^3}\right)^2 = \left(\frac{2^4}{2^7}\right)^2$

$= \frac{2^8}{2^{14}} = 2^{-6} = \frac{1}{2^6}$

19. $\left(\frac{2 \cdot 2^2}{2^{-2} \cdot 2^2}\right)^2 = \left(\frac{2^3}{2^0}\right)^2$

$= (2^3)^2 = 2^6$

20. $\left(\frac{2m^2n^3}{(n^8)^2 m^4 n^7}\right)^0$

$= 1$

21. $\left(\frac{2yx^3}{(2x^2y^3)^3 \cdot 2(x^8)^2}\right)^{-2}$

$\left(\frac{2x^3y}{2^3x^6y^9 \cdot 2x^{16}}\right)^{-2}$

$= \left(\frac{2x^3y}{16x^{22}y^9}\right)^{-2} = \left(\frac{1}{8x^{19}y^8}\right)^{-2}$

$= \frac{1^{-2}}{8^{-2} x^{-38} y^{-16}} = 64x^{38}y^{16}$

22. $\left(\frac{3a^2b^3}{9(a^8)^{-2}b^4a^7}\right)^2$

$= \left(\frac{3a^2b^3}{9a^{-16}b^4a^7}\right)^2 = \left(\frac{1a^2b^3}{3a^{-9}b^4}\right)^2$

$= \left(\frac{1}{3}a^{11}b^{-1}\right)^2 = \frac{a^{22}}{9b^2}$

23. $(-2x^4y^5z)^{-1} = \frac{1}{-2x^4y^5z}$

$= -\frac{1}{2x^4y^5z}$

24. $\left(\frac{(3m^2)^2(mn)^3}{(n^8)^2(9m^4n^7)}\right)^2 = \left(\frac{3^2 m^4 m^3 n^3}{n^{16} 9 m^4 n^7}\right)^2$

$\left(\frac{9m^7n^3}{9m^4n^{23}}\right)^2 = \left(\frac{m^3}{n^{20}}\right)^2$

$= \frac{m^6}{n^{40}}$