Exponent Rules and Simplification Practice

Simpify the following. You should have no variables in your denominator and no roots left over; negative and fractional exponents are okay. Constants should be written at the front of their associated term. Anything that can be combined should be combined.

1. $4x^3 \cdot 3x^4$
2. $\dfrac{4x^9}{8x^{12}}$
3. $\left(\dfrac{x^3y^8}{y^8x^3}\right)^0$
4. $-9x^2$
5. $(-9x)^2$
6. $(x^2y)^4$
7. $\dfrac{x^{-2}}{x^{-8}}$
8. $\dfrac{4\sqrt[3]{x^2}}{2\sqrt{x^3}}$
9. $\left(\dfrac{2x^3y^{-4}}{8x^6y^6}\right)^2$
10. $\left(\dfrac{12b^9}{5c^{10}}\right)^2$
11. $(-4b^7)^3$
12. $\dfrac{9a^3b^2c^5}{18a^5b^7c^8}$
13. $(3x-4)^2$
14. $\dfrac{7x^2+3x-\sqrt{x}}{\sqrt[3]{x}}$
15. $\dfrac{5x^3e^x-x^3+3x^2-7\sqrt[4]{x^5}}{x^3}$
16. $\dfrac{14-2\sqrt{x}+3xe^x}{7x}$
17. $\dfrac{4\sqrt[4]{x}-5\sqrt{x}+4x^3}{\sqrt[3]{x}}$
18. $\dfrac{1}{2x-3}$
19. $(4\sqrt{x}-3x^3)^2$
20. $\dfrac{(5x+3\sqrt{x})^2}{x^2}$
21. $\dfrac{\sqrt[5]{x}+x^3e^x+6x^5}{3x^3}$
22. $\dfrac{6\sqrt[5]{x^2}+3\sqrt[3]{x^4}-8x^4}{2\sqrt{x}}$
23. $\dfrac{9x^5-12\sqrt[3]{x}}{30\sqrt{x^5}}$
24. $(8\sqrt[4]{x}+2x^2)^2$
25. $\dfrac{(3x^2-\sqrt[3]{x})^2}{3x^2}$
26. $(3x^{-1}+4)^2$
27. $\sqrt[3]{x}(3x-2\sqrt{x}+6)$
28. $(2x^2+9)^2$
29. $(3\sqrt{x}+4x)^2$
30. $4x-\sqrt[3]{x}(2x-5x^2)$
31. $\dfrac{(3+5x)(x^2+1)^2}{2x}$
32. $x\left(\dfrac{2}{x\sqrt{x}}-5\sqrt{x}\right)$
33. $x\left(6\sqrt[3]{x}-\dfrac{8}{\sqrt[3]{x^2}}\right)$
34. $\sqrt[3]{x}(3-x^2)$
35. $x^3(4-\sqrt[3]{x})$
36. $\dfrac{5}{3x+9}$

37. Use the following to build up to the final question

(a) $x^4x^6y^5$

(b) $\dfrac{x^4x^6y^5}{x^3y^2y^2}$

(c) $\left(\dfrac{x^4x^6y^5}{x^3y^2y^2}\right)^3$

(d) $\left(\dfrac{x^4x^6y^5z^6}{z^6x^3y^2y^2}\right)^3$

(e) $\left(\dfrac{x^4x^6y^5z^6}{z^6x^3y^2y^2}\right)^3 (xy)^{-2}$

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

(g) $\dfrac{x^{-2}y^3z^{-4}}{x^4y^{-6}z^{-2}}$

(h) $\left(\dfrac{x^{-2}y^3z^{-4}}{x^4y^{-6}z^{-2}}\right)^{-3}$

(i) $\left(\frac{x^4x^6y^5z^6}{z^6x^3y^2y^2}\right)^3 (xy)^{-2} \left(\frac{x^{-2}y^3z^{-4}}{x^4y^{-6}z^{-2}}\right)^{-3}$