

1. $10^m 10^2 = 10^{m+2}$

2. $\left(\frac{1}{4}\right)^{-2} = 4^2 = 16$

3. $\left(-\frac{1}{4}\right)^{-2} = (-4)^2 = 16$

4. $\left(\frac{1}{4}\right)^{-2} = -16$

5. $\frac{(2ab^3c^2)^2 (4ab^2c)^{-3}}{-6a^3b^9c^3} = \frac{8a^4b^6c^4}{-6a^3b^9c^3} = \frac{-b^3c^3}{8}$

6. $\frac{-8a^3b^2c^5}{16a^{-2}b^{-3}c^{-8}} = \frac{-8a^3b^2c^5}{16c^5} \cdot \frac{a^5b^5c^3}{2} = \frac{-a^5b^5c^3}{2}$

7. $\left(\frac{3x^{-6}y^4}{1}\right)^2 \left(\frac{1}{3xy}\right)^{-1} = \frac{9x^{-12}y^8}{4} \cdot \frac{3}{xy} = \frac{27y^7}{4x^{13}}$

8. $\frac{(a+b)^{-1}}{a^{-1}+b^{-1}} \cdot \frac{1}{a+b} = \frac{1}{a+b} \cdot \frac{ab}{a+b} = \frac{ab}{(a+b)^2}$

9. $(a^{-1}+b^{-1})^{-1} = \left(\frac{1}{a} + \frac{1}{b}\right)^{-1} = \left(\frac{a+b}{ab}\right)^{-1} = \frac{ab}{a+b}$

10. $\frac{ab}{ab^{-1}+ba^{-1}} = \frac{ab}{\frac{a}{b} + \frac{b}{a}} = \frac{ab}{\frac{a^2+b^2}{ab}} = ab \left(\frac{ab}{a^2+b^2}\right) = \frac{a^2b^2}{a^2+b^2}$

11. $\frac{ab}{(ab)^{-1}+(ba)^{-1}} = \frac{ab}{\frac{1}{ab} + \frac{1}{ab}} = \frac{ab}{\left(\frac{2}{ab}\right)} = ab \cdot \frac{ab}{2} = \frac{a^2b^2}{2}$

12. $\frac{-a^2b^3c^{-2}d^4}{a^{-3}b^5c^4d^3} = \frac{-a^5d}{b^2c^6}$

13. $(x^{-1}-y^{-1})(x-y)^{-1} = \frac{1}{x} - \frac{1}{y} \cdot \frac{1}{x-y} = \frac{y-x}{xy} \cdot \frac{1}{x-y} = \frac{-1}{xy}$

14. $3x^{-1} = \frac{3}{x}$

15. $(3x)^{-1} = \frac{1}{3x}$

16. $6(6^{x+1})^{x-1} = 6(6^{x^2-1}) = 6^{x^2}$

17. $2^x + 2^x = 2 \cdot 2^x = 2^{1+x}$

18. $3(9^x) = 3 \cdot 3^{2x} = 3^{1+2x}$
(hint: write 9 as 3^2)

19. $(x^a + y^b)(x^{2a} - x^a y^b + y^{2b}) = x^{3a} - x^{2a} y^b + x^a y^{2b} + x^{2a} y^b - a^a y^{2b} + y^{3b} = x^{3a} + y^{3b}$