Multiplication and Division of Rational Expressions

1. $\frac{a}{x}\cdot\frac{x}{b}=\frac{a}{b}$

2. $\frac{3}{x^2}\cdot\frac{x}{6}=\frac{1}{2x}$

3. $\frac{a}{b}\cdot\frac{b}{c}\cdot\frac{c}{d}=\frac{a}{d}$

4. $\frac{3x}{5y}\cdot\frac{10y}{9x}=\frac{2}{3}$

5. $\frac{2x^2y}{7z^3}\cdot\frac{49z^2}{8x^3y}=\frac{7}{4xz}$

6. $\frac{3}{x}\div\frac{2}{y}=\frac{3}{x}\cdot\frac{y}{2}=\frac{3y}{2x}$

7. $\frac{9x}{12y}\div\frac{21x}{16y}=\frac{9x}{12y}\cdot\frac{16y}{21x}=\frac{3\cdot3\cdot x\cdot2\cdot2\cdot2\cdot2\cdot y}{2\cdot2\cdot3\cdot y\cdot3\cdot7\cdot x}=\frac{2\cdot2}{7}$

8. $\frac{5x}{3y}\div\frac{30y}{9x}=\frac{5x}{3y}\cdot\frac{9x}{30y}=\frac{5\cdot x\cdot3\cdot3\cdot x}{3\cdot y\cdot2\cdot3\cdot5\cdot y}=\frac{x^2}{2y^2}$

9. $\frac{18a^2b}{33ac^2}\div\left(-\frac{6b^2c}{11ab}\right)=\frac{18a^2b}{33ac^2}\cdot-\frac{11ab}{6b^2c}=\frac{2\cdot3\cdot3\cdot a^2\cdot b\cdot-11\cdot a\cdot b}{3\cdot11\cdot a\cdot c^2\cdot2\cdot3\cdot b^2\cdot c}=-\frac{a^2}{c^3}$

10. $\frac{60x^2y}{63xz}\div\frac{20x^2z}{21yz^2}=\frac{60x^2y}{63xz}\cdot\frac{21yz^2}{20x^2z}=\frac{2\cdot2\cdot3\cdot5\cdot x^2\cdot y\cdot3\cdot7\cdot y\cdot z^2}{3\cdot3\cdot7\cdot x\cdot z\cdot2\cdot2\cdot5\cdot x^2\cdot z}=\frac{y^2}{x}$

11. $(x-2)\cdot\frac{x+2}{5x-10}=\frac{(x-2)(x+2)}{5(x-2)}=\frac{(x+2)}{5}$

12. $\frac{2x-8}{x+4}\cdot\frac{1}{x-4}=\frac{2(x-4)}{(x+4)(x-4)}=\frac{2}{(x+4)}$

13. $\frac{2x-5}{15x^4}\cdot\frac{40x^2}{2x-5}=\frac{(2x-5)\cdot2\cdot2\cdot2\cdot5\cdot x^2}{3\cdot5\cdot x^4\cdot(2x-5)}=\frac{2^3}{3x^2}$

14. $\frac{2x+6}{6x-18}\cdot\frac{3x-9}{7x+21}=\frac{2(x+3)\cdot3(x-3)}{6(x-3)\cdot7(x+3)}=\frac{1}{7}$

15. $\frac{x^2-9}{8y}\cdot\frac{4y^2}{x+3}=\frac{(x+3)(x-3)\cdot2\cdot2\cdot y^2}{2\cdot2\cdot2\cdot y\cdot(x+3)}=\frac{(x-3)\cdot y}{2}$

16. $\frac{x-2y}{3x}\cdot\frac{2x^2}{x^2-4y^2}=\frac{(x-2y)\cdot 2\cdot x^2}{3\cdot x\cdot(x+2y)(x-2y)}=\frac{2x}{3(x+2y)}$

17. $\frac{x^2+7x+12}{x^2-9}\cdot\frac{x-3}{x+3}=\frac{(x+4)(x+3)(x-3)}{(x+3)(x-3)(x+3)}=\frac{(x+4)}{(x+3)}$

18. $\frac{x^2+x-6}{3x-6}\cdot\frac{x^2-2x}{2x+6}=\frac{(x+3)(x-2)\cdot x\cdot(x-2)}{3(x-2)\cdot 2(x+3)}=\frac{x(x-2)}{6}$

19. $\frac{x^2+5x+5}{x^2-9}\cdot\frac{x^2-7x+12}{2x+4}=\frac{(x^2+5x+5)\cdot(x-3)(x-4)}{(x+3)(x-3)\cdot 2(x+2)}=\frac{(x^2+5x+5)(x-4)}{2(x+3)(x+2)}$

20. $\frac{x^2-9x+14}{x^2+7x+12}\cdot\frac{4x^3+16x^2}{3x^2-21x}=\frac{(x-7)(x-2)\cdot 4\cdot x^2\cdot(x+4)}{(x+3)(x+4)\cdot 3\cdot x\cdot(x-7)}=\frac{4x(x-2)}{3(x+3)}$

21. $\frac{2x^2-3x-9}{2x^2-18}\cdot\frac{x^2+x-6}{2x^2-x-6}=\frac{(2x+3)(x-3)\cdot(x+3)(x-2)}{2(x+3)(x-3)\cdot(2x+3)(x-2)}=\frac{1}{2}$

22. $\frac{2x^2+3x-20}{6x^2-18x}\cdot\frac{2x^2-6x}{2x^2+x-15}=\frac{(2x-5)(x+4)\cdot 2x(x-3)}{6x(x-3)\cdot(2x-5)(x+3)}=\frac{(x+4)}{3(x+3)}$

23. $\frac{18x^2+3x-36}{9x^2-16}\cdot\frac{6x^2-x-12}{8x^2+20x-48}=\frac{3(3x-4)(2x+3)\cdot(3x+4)(2x-3)}{(3x+4)(3x-4)\cdot 4(2x-3)(x+4)}=\frac{3(2x+3)}{4(x+4)}$

24. $\frac{x^2-x-20}{x^2-9}\div\frac{x^2-16}{x^2-x-12}=\frac{x^2-x-20}{x^2-9}\cdot\frac{x^2-x-12}{x^2-16}=\frac{(x-5)(x+4)\cdot(x-4)(x+3)}{(x+3)(x-3)\cdot(x-4)(x+4)}=\frac{(x-5)}{(x-3)}$

25. $\frac{x^2+2x-3}{x^2+x-2}\div\frac{x^2+6x+9}{x^2+5x+6}=\frac{x^2+2x-3}{x^2+x-2}\cdot\frac{x^2+5x+6}{x^2+6x+9}=\frac{(x+3)(x-1)\cdot(x+3)(x+2)}{(x+2)(x-1)\cdot(x+3)(x+3)}=1$

26. $\frac{3x^2+8x+4}{9x^2-4}\div\frac{2x^2+5x+2}{3x^2-5x+2}=\frac{3x^2+8x+4}{9x^2-4}\cdot\frac{3x^2-5x+2}{2x^2+5x+2}=$
$\frac{(3x+2)(x+2)\cdot(3x+1)(x-2)}{(3x+2)(3x-2)\cdot(2x+1)(x+2)}=\frac{(3x+1)(x-2)}{(3x-2)(2x+1)}$