Worksheet #24 Section 4.2 — Multiplying and Dividing Rational Expressions

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Simplify each of the following.

(1) $\dfrac{5\,x\,y^2}{6\,x^3\,y^2} \cdot \dfrac{12\,x^5\,y}{10\,x^9\,y^4}$

(2) $\dfrac{12\,a\,b^3}{5\,a} \cdot \dfrac{6\,a\,b^2}{8\,b^2} \div \dfrac{5\,a^2}{6\,b}$

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

(4) $\dfrac{2\,x+2}{3\,x-5} \div \dfrac{3\,x-5}{x+1}$

(5) $\dfrac{x^2-8\,x-9}{y^2-y-12} \cdot \dfrac{3\,y-12}{2\,x-18}$

(6) $\dfrac{x^2-1}{x-3} \cdot \dfrac{x^2-9}{x+1}$

(7) $\dfrac{3\,a^2\,b}{14\,a^5\,b^2} \cdot \dfrac{56\,a^3\,b^2}{21\,a\,b^5}$

(8) $\dfrac{x^2+x-2}{x^2+5\,x+6} \cdot \dfrac{x^2+5\,x+6}{3\,x^2-3\,x}$

(9) $\dfrac{2\,x^2+4\,x}{x^2-16} \cdot \dfrac{x^2-3\,x-4}{2\,x^2+6\,x+4}$

(10) $\dfrac{3\,x^3-3\,x^2}{x^2+2\,x-3} \cdot \dfrac{15\,x^2+45\,x}{6\,x^2+12\,x}$

(11) $\dfrac{12\,x+8}{3\,x^2+21\,x} \cdot \dfrac{2\,x^2+15\,x+7}{36\,x^2+42\,x+12}$

(12) $\dfrac{4\,x^2-1}{2\,x^2-x-1} \div \dfrac{4\,x^2-4\,x+1}{x^2-2\,x+1}$

(13) $\dfrac{2}{5\,s^2+9\,s-2} \cdot \dfrac{2\,s^2-8}{3\,s}$

(14) $\dfrac{x^2-2\,x+1}{2\,x-4} \cdot \dfrac{x^2-4}{x^2+x-2}$

(15) $\dfrac{3\,b\,(4\,a-5)}{(4\,a-5)\,(3\,a+2)} \cdot \dfrac{(3\,a+2)\,(a+3)}{2\,b\,(a+3)}$

(16) $\dfrac{3\,x^2-x-4}{5\,x^2+15\,x+10} \div \dfrac{6\,x^2+x-12}{2\,x^2+7\,x+6}$

(17) $(2\,x+4) \cdot \dfrac{2\,x}{3\,x+6}$

(18) $\dfrac{x-3}{x^2-3\,x+2} \cdot \dfrac{x-2}{x^2-4\,x+3}$

(19) $\dfrac{3}{x+3} \cdot \dfrac{2\,x+6}{12\,x^2}$

(20) $\dfrac{2\,x^2+10\,x-48}{x^2+3\,x-18} \cdot \dfrac{x^2+5\,x-6}{2\,x^2+14\,x-16}$

(21) $\dfrac{2\,x-4}{3-x} \cdot \dfrac{2\,x-6}{2-x}$

(22) $\dfrac{27\,a^3\,b^5\,c}{8\,a\,b\,c^2} \div \dfrac{b^3\,c^9}{12\,a^2\,c}$

(23) $\dfrac{2\,x}{6\,x-9} \cdot \dfrac{3-2\,x}{9\,x^3}$

(24) $\left(2\,x^2+9\,x-5\right) \left(\dfrac{x^2+3\,x-10}{2\,x^2-5\,x+2}\right)$

(25) $\dfrac{27\,x^3\,y\,z}{15\,x\,z} \cdot \dfrac{10\,x^2\,y}{21\,y^3\,z^5}$

(26) $\dfrac{12\,x^2-4\,x}{5\,x-10} \cdot \dfrac{x^2-2\,x}{6\,x-2}$

(27) $\dfrac{5\,x\,y}{6\,x^2\,y^4} \cdot \dfrac{3\,x^3\,y^5}{10\,x\,y^2}$

(28) $\dfrac{x^2-y^2}{x^2-2\,y^2} \cdot \dfrac{x^4-x^2\,y^2-2\,y^4}{x^5\,y-x\,y^5}$

(29) $\dfrac{x}{2\,x+4} \div \dfrac{3\,x^2+7\,x+2}{9\,x+3}$

(30) $\dfrac{8\,x-16}{x^4-16} \cdot \dfrac{x^4+6\,x^2+8}{2\,x+4}$

Answers: (1) $\frac{1}{x^6\,y^3}$ (2) $\frac{54\,b^4}{25\,a}$ (3) $\frac{x^2\,y^4\,z}{3}$ (4) $\frac{2\,(x+1)^2}{(3\,x-5)^2}$ (5) $\frac{3\,(x+1)}{2\,(y+3)}$

(6) $(x-1)\,(x+3)$ (7) $\frac{4}{7\,a\,b^4}$ (8) $\frac{x+2}{3\,x}$ (9) $\frac{x}{x+4}$ (10) $\frac{15\,x^2}{2\,(x+2)}$ (11) $\frac{2}{9\,x}$

(12) $\frac{x-1}{2\,x-1}$ (13) $\frac{4\,(s-2)}{3\,s\,(5\,s-1)}$ (14) $\frac{x-1}{2}$ (15) $\frac{3}{2}$ (16) $\frac{1}{5}$ (17) $\frac{4\,x}{3}$

(18) $\frac{1}{x-1^2}$ (19) $\frac{1}{2\,x^2}$ (20) 1 (21) 4 (22) $\frac{81\,a^4\,b}{2\,c^9}$ (23) $\frac{-2}{27\,x^2}$ (24) $(x+5)^2$

(25) $\frac{6\,x^4}{7\,y\,z^5}$ (26) $\frac{2\,x^2}{5}$ (27) $\frac{x}{4}$ (28) $\frac{1}{x\,y}$ (29) $\frac{3\,x}{2\,(x+2)^2}$ (30) $\frac{4\,\left(x^2+2\right)}{(x+2)^2}$