Rational Expressions — Multiplying and Dividing

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Completely simplify each of the following. Write complete and correct steps for all problems. Do not use a calculator. Work the odd problems, if you have any trouble whatsoever also do the even problems. Work all the review problems.

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

(2) $\dfrac{14\,x^2\,y^3}{15\,x^5\,y^3} \cdot \dfrac{10\,x\,y^3}{21\,x^3\,y^5}$

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

(4) $\dfrac{6\,x^2}{5\,y} \cdot \dfrac{3\,x^2\,y^2}{10\,x\,y^2} \div \dfrac{y}{25\,x^3}$

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

(6) $3\,a\,b^2\,c^5 \left(\dfrac{4\,a^3\,b\,2}{36\,a^2\,b\,c^4}\right)$

(7) $(2\,x+4) \cdot \dfrac{3\,x}{3\,x+6}$

(8) $(3\,y+6) \cdot \dfrac{2\,y}{2\,y+4}$

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

(10) $\dfrac{6-2\,y}{5\,y-15}$

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

(12) $\dfrac{y-3}{2\,y+1} \div \dfrac{2\,y+1}{3\,y-9}$

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

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

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

(16) $\dfrac{y^2-4}{y-1} \cdot \dfrac{y^2-1}{y+2}$

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

(18) $\dfrac{5\,x\,y^3}{12\,x^2\,y^2} \cdot \dfrac{48\,x^4\,y}{10\,x\,y^4}$

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

(20) $\dfrac{y^2-2\,y-4}{y^2-2\,y-8} \cdot \dfrac{2\,y-8}{y^2-2\,y-4}$

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

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

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

(24) $\dfrac{4\,a^4+8\,a^3}{a^2-a-6} \cdot \dfrac{2\,a^2-6\,a}{12\,a^3+48\,a^2}$

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

(26) $\dfrac{6\,x^2+5\,x+1}{3\,x^2-5\,x-2} \cdot \dfrac{5\,x^2-10\,x}{4\,x+2}$

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

(28) $\dfrac{9\,x^2-1}{3\,x^2-5\,x-2} \div \dfrac{9\,x^2-6\,x+1}{x^2-4\,x+4}$

(29) $\dfrac{12}{4\,s^2+7\,s-2} \cdot \dfrac{2\,s^3-8\,s}{3\,s}$

(30) $\dfrac{14}{7\,t^2+6\,t-1} \cdot \dfrac{3\,t^3-3\,t}{6\,t}$

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

(32) $\dfrac{a^2-4\,a+4}{2\,a-6} \cdot \dfrac{a^2-9}{a^2+a-6}$

(33) $\dfrac{12\,a\,b-15\,b}{12\,a^2-7\,a-10} \cdot \dfrac{3\,a^2+11\,a+6}{2\,a\,b+6\,b}$

(34) $\dfrac{6\,x\,y-8\,y}{6\,x^2+x-12} \cdot \dfrac{2\,x^2+7\,x+6}{3\,x\,y+6\,y}$

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

(36) $\dfrac{2y^2 - 7y + 5}{4y^2 + 8y - 12} \div \dfrac{4y^2 - 8y - 5}{2y^2 + 7y + 3}$

The following are review problems. Work all of them.

(37) $(2a + 8) \cdot \dfrac{6a}{3a + 12}$

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

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

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

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

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

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

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

(45) $\dfrac{27x^3yz}{15xz} \cdot \dfrac{10x^2y}{21y^3z^5}$

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

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

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

Answers: (1) $\frac{1}{x^6\,y^3}$ (2) $\frac{4}{9\,x^5\,y^2}$ (3) $\frac{54\,b^4}{25\,a}$ (4) $\frac{9\,x^6}{y^2}$ (5) $\frac{x^2\,y^4\,z}{3}$ (6) $\frac{2\,a^2\,b^2\,c}{3}$

(7) $2\,x$ (8) $3\,y$ (9) $-\frac{2}{3}$ (10) $-\frac{2}{5}$ (11) $\frac{2\,(x+1)^2}{(3\,x-5)^2}$ (12) $\frac{3\,(y-3)^2}{(2\,y+1)^2}$

(13) $\frac{3\,(x+1)}{2\,(y+3)}$ (14) $\frac{3\,(y+2)}{2\,(x+3)}$ (15) $(x-1)\,(x+3)$ (16) $(y-2)\,(y+1)$ (17) $\frac{4}{7\,a\,b^4}$

(18) $\frac{2\,x^2}{y^2}$ (19) $\frac{x+2}{3\,x}$ (20) $\frac{2}{y+2}$ (21) $\frac{x}{x+4}$ (22) $\frac{x+2}{x}$ (23) $\frac{15\,x^2}{2\,(x+2)}$

(24) $\frac{2\,a^2}{3\,(a+4)}$ (25) $\frac{2}{9\,x}$ (26) $\frac{5\,x}{2}$ (27) $\frac{x-1}{2\,x-1}$ (28) $\frac{x-2}{3\,x-1}$ (29) $\frac{8\,(s-2)}{4\,s-1}$

(30) $\frac{7\,(t-1)}{7\,t-1}$ (31) $\frac{x-3}{3}$ (32) $\frac{a-2}{2}$ (33) $\frac{3}{2}$ (34) $\frac{2}{3}$ (35) $\frac{1}{5}$ (36) $\frac{1}{4}$

(37) $4\,a$ (38) $\frac{1}{x-1^2}$ (39) $\frac{1}{2\,x^2}$ (40) 1 (41) 4 (42) $\frac{81\,a^4\,b}{2\,c^9}$ (43) $\frac{-2}{27\,x^2}$

(44) $(x+5)^2$ (45) $\frac{6\,x^4}{7\,y\,z^5}$ (46) $\frac{2\,x^2}{5}$ (47) $\frac{3\,x}{2\,(x+2)^2}$ (48) $\frac{4\,\left(x^2+2\right)}{(x+2)^2}$