

## Rational Expressions — Adding and Subtracting

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Add and 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.

$$(1) \frac{x}{2} + \frac{x}{5}$$

$$(2) \frac{a}{3} + \frac{a}{4}$$

$$(3) \frac{2a}{5} - \frac{3a}{4}$$

$$(4) \frac{3b}{4} - \frac{2b}{7}$$

$$(5) a + \frac{3a}{4}$$

$$(6) b - \frac{2a}{5}$$

$$(7) \frac{2}{3} - \frac{1}{5} + \frac{3}{10}$$

$$(8) \frac{5}{4} + \frac{1}{6} - \frac{3}{8}$$

$$(9) \frac{3s}{s+3} + \frac{9}{s+3}$$

$$(10) \frac{5t}{t-2} - \frac{10}{t-2}$$

$$(11) \frac{2}{y} + \frac{5}{2y}$$

$$(12) \frac{3}{x} + \frac{2}{3x}$$

$$(13) 7 - \frac{2}{x+2}$$

$$(14) 8 + \frac{3}{y+3}$$

$$(15) \frac{s}{s+2} - \frac{s+2}{s}$$

$$(16) \frac{t}{t+1} - \frac{t+1}{t}$$

$$(17) \frac{4}{3y} - \frac{5}{2y} + \frac{3}{y}$$

$$(18) \frac{3}{2x} - \frac{5}{x} + \frac{2}{3x}$$

$$(19) \frac{3}{a^2} - \frac{4}{a}$$

$$(20) \frac{5}{b^2} + \frac{6}{b}$$

$$(21) \frac{5}{3x} - \frac{5}{6x^2} - \frac{2}{6x}$$

$$(22) \frac{5}{3x} - \frac{5}{6x^2} - \frac{2}{6x}$$

$$(23) \frac{2x-3}{x+3} - 4$$

$$(24) \frac{3y+2}{y+4} - 5$$

$$(25) \frac{2}{a+1} + \frac{5}{a+2}$$

$$(26) \frac{5}{b-2} - \frac{3}{b+1}$$

$$(27) \frac{3b-2}{4} - \frac{2b+1}{6}$$

$$(28) \frac{5a+1}{2} - \frac{2a-1}{4}$$

$$(29) \frac{5}{3x+1} - \frac{3}{2x}$$

$$(30) \frac{4}{3y} - \frac{2}{2y+3}$$

$$(31) \frac{3}{x-1} - \frac{6}{x^2-1}$$

$$(32) \frac{2}{y-2} - \frac{8}{y^2-4}$$

$$(33) x - \frac{3}{2x+1}$$

$$(34) y + \frac{2}{3y-2}$$

$$(35) \frac{5}{2y} - \frac{2}{y^2 - 2y}$$

$$(37) \frac{x}{x-3} + \frac{2}{x^2 - 2x - 3}$$

$$(39) \frac{5x}{2x-1} + \frac{5x+10}{2x^2+3x-2}$$

$$(41) \frac{5}{n-3} - \frac{3n-2}{n^2-2n-3}$$

$$(43) \frac{2a+1}{3a-2} + \frac{3a^2-a}{6a^2-a-2}$$

$$(45) \frac{x}{x-2} + \frac{2x}{x^2-4} - \frac{3x}{x+2}$$

$$(47) \frac{1 + \frac{1}{x}}{2 - \frac{3}{x}}$$

$$(49) \frac{\frac{1}{x+1} + 2}{\frac{2}{x+1} - 3}$$

$$(51) \frac{\frac{2}{x} - \frac{3}{y}}{\frac{5}{2x} - \frac{3}{y}}$$

$$(36) \frac{3}{x^2-x} - \frac{5}{3x}$$

$$(38) \frac{x}{2x+1} + \frac{3}{2x^2+5x+2}$$

$$(40) \frac{2y}{y-4} + \frac{2y-2}{y^2-5y+4}$$

$$(42) \frac{2}{s-1} - \frac{2s-1}{s^2-4s+3}$$

$$(44) \frac{3b-2}{2b+1} + \frac{2b^2-1}{4b^2-4b-3}$$

$$(46) \frac{1}{y^2-y-12} + \frac{2y+1}{y-4} - \frac{2y}{y+3}$$

$$(48) \frac{\frac{2}{x} - 1}{\frac{3}{x} - 2}$$

$$(50) \frac{3 + \frac{2}{y+2}}{2 + \frac{1}{y+2}}$$

$$(52) \frac{\frac{3}{2a} - \frac{2}{b}}{\frac{4}{a} - \frac{5}{b}}$$

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The following are review problems. Work all of them.

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$$(53) \frac{3}{x} - 2x^2 + \frac{5}{2x}$$

$$(55) 2x + 1 - \frac{3}{3x-1}$$

$$(57) \frac{5}{2x} - \frac{4}{5x-1}$$

$$(59) \frac{3x}{x^2-4} + \frac{3}{x-2} + \frac{3}{2x+4}$$

$$(61) \frac{2 - \frac{1}{2x-1}}{3 - \frac{2}{x+1}}$$

$$(54) 2x - \frac{3}{x-2}$$

$$(56) \frac{2}{2y-1} - \frac{3y-2}{2y^2+3y-2}$$

$$(58) \frac{2 - \frac{1}{a}}{3 + \frac{2}{b}}$$

$$(60) \frac{2}{x-4} - \frac{2x-1}{x^2-5x+4}$$

$$(62) \frac{2x}{x^2-2x-3} - \frac{3x-1}{x^2-x-6}$$

Answers: (1)  $\frac{7x}{10}$  (2)  $\frac{7a}{12}$  (3)  $\frac{-7a}{20}$  (4)  $\frac{13b}{28}$  (5)  $\frac{7a}{4}$  (6)  $\frac{5b-2a}{5}$

(7)  $\frac{23}{30}$  (8)  $\frac{25}{24}$  (9) 3 (10) 5 (11)  $\frac{9}{2y}$  (12)  $\frac{11}{3x}$  (13)  $\frac{7x+12}{x+2}$

(14)  $\frac{8y+27}{y+3}$  (15)  $\frac{-4(s+1)}{s(s+2)}$  (16)  $\frac{-2t-1}{t(t+1)}$  (17)  $\frac{11}{6y}$  (18)  $\frac{-17}{6x}$  (19)  $\frac{-4a+3}{a^2}$

(20)  $\frac{6b+5}{b^2}$  (21)  $\frac{8x-5}{6x^2}$  (22)  $\frac{8x-5}{6x^2}$  (23)  $\frac{-2x-15}{x+3}$  (24)  $\frac{-2(y+9)}{y+4}$

(25)  $\frac{7a+9}{(a+1)(a+2)}$  (26)  $\frac{2b+11}{(b-2)(b+1)}$  (27)  $\frac{5b-8}{12}$  (28)  $\frac{8a+3}{4}$  (29)  $\frac{x-3}{2x(3x+1)}$

(30)  $\frac{2(y+6)}{3y(2y+3)}$  (31)  $\frac{3}{x+1}$  (32)  $\frac{2}{y+2}$  (33)  $\frac{2x^2+x-3}{2x+1}$  (34)  $\frac{3y^2-2y+2}{3y-2}$

(35)  $\frac{5y-14}{2(y-2)y}$  (36)  $\frac{-5x+14}{3(x-1)x}$  (37)  $\frac{x^2+x+2}{(x-3)(x+1)}$  (38)  $\frac{x^2+2x+3}{(x+2)(2x+1)}$  (39)  $\frac{5(x+1)}{2x-1}$

(40)  $\frac{2(y+1)}{y-4}$  (41)  $\frac{2n+7}{(n-3)(n+1)}$  (42)  $\frac{-8x+3s+5}{(s-1)(-4x+s^2+3)}$  (43)  $\frac{7a^2+3a+1}{(2a+1)(3a-2)}$

(44)  $\frac{8b^2-13b+5}{(2b-3)(2b+1)}$  (45)  $\frac{-2(x^2-5x)}{(x-2)(x+2)}$  (46)  $\frac{15y+4}{(y-4)(y+3)}$  (47)  $\frac{x+1}{2x-3}$  (48)  $\frac{x-2}{2x-3}$

(49)  $\frac{-2x-3}{3x+1}$  (50)  $\frac{3y+8}{2y+5}$  (51)  $\frac{2(-2y+3x)}{-5y+6x}$  (52)  $\frac{-3b+4a}{2(-4b+5a)}$  (53)  $\frac{-4x^3+11}{2x}$

(54)  $\frac{2x^2-4x-3}{x-2}$  (55)  $\frac{6x^2+x-4}{3x-1}$  (56)  $\frac{-y+6}{(y+2)(2y-1)}$  (57)  $\frac{17x-5}{2x(5x-1)}$

(58)  $\frac{2ab-b}{a(3b+2)}$  (59)  $\frac{3(5x+2)}{2(x-2)(x+2)}$  (60)  $-\frac{1}{(x-4)(x-1)}$  (61)  $\frac{4x^2+x-3}{(2x-1)(3x+1)}$

(62)  $\frac{-x^2+2x+1}{(x-3)(x+1)(x+2)}$