

RATIONAL EXPRESSIONS (FRACTIONS) - EXERCISES

5

$$(b) \left(\frac{6x^2 - x - 2}{x-1} \cdot \frac{x-1}{9x^2 - 4} \right) \div \frac{2x+1}{3x+2}$$

$$(c) \left(\frac{x^2 - x - 20}{x^2 - 25} \cdot \frac{x^2 - x - 2}{x^2 + 2x - 8} \right) \div \frac{x+1}{x^2 + 5x}$$

$$(d) \left(\frac{x^2 - x - 6}{x-2} \div \frac{x^2 - 4x}{x^2 - x - 2} \right) \cdot \frac{x-4}{x^2 + x}$$

$$(e) \frac{y^2}{x+1} \cdot \frac{x^2 + 2x + 1}{x^2 - 1} \div \frac{3y}{xy - y}$$

$$(f) \frac{2x^2 - x}{4x^2 - 1} \cdot \frac{4x^2 + 4x + 1}{3x} \div \frac{4x^2 - 2x - 2}{6x^2 - 6x}$$

$$(g) \frac{4x^2 - 25}{3x + 3} \cdot \frac{7x - 1}{2x^2 - 9x + 10} \div \frac{2x + 5}{3x^2 - 3x - 6}$$

$$(h) \frac{a^2 - ax}{3ax - 2x^2} \cdot \frac{4ax + 2x^2}{ax - x^2} \div \frac{4a^2 + 2ax}{9a - 6x}$$

$$(i) \frac{x^4 - 8x}{x^2 - 4x - 5} \cdot \frac{x^2 + 2x + 1}{x^3 - x^2 - 2x} \div \frac{x^2 + 2x + 4}{x - 5}$$

6 Add or subtract and simplify:

$$(a) \frac{5x}{18} + \frac{7x}{18}$$

$$(b) \frac{4x}{x-6} - \frac{24}{x-6}$$

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

$$(d) \frac{3x}{x-5} - \frac{2x-25}{5-x}$$

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

$$(f) \frac{2x^2}{x-5} - \frac{25+x^2}{x-5}$$

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

$$(h) \frac{3x^2}{x^2-1} - \frac{x+4}{x^2-1}$$

$$(i) \frac{3x^2-6}{x^2+x-20} + \frac{x-9}{x^2+x-20} - \frac{2x^2+x+1}{x^2+x-20}$$

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7) Add or subtract and simplify:

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

(b) $\frac{2x+9}{9x} - \frac{x-5}{5x}$

(c) $\frac{2x-3}{3} + \frac{3x-2}{2} - \frac{4x-1}{5}$

(d) $\frac{x}{x-1} - \frac{2}{x^2-1}$

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

(f) $\frac{x}{x^2-4} - \frac{2}{4-x^2}$

(g) $\frac{x}{x-y} - 2 - \frac{x}{y-x}$

(h) $\frac{3x-1}{x^2-10x+25} - \frac{3}{x-5}$

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

(j) $\frac{2}{1+x} - \frac{3}{1-x} - \frac{4}{x^2-1}$

(k) $\frac{4x+1}{x-8} - \frac{3x+2}{x+4} - \frac{49x+4}{x^2-4x-32}$

(l) $\frac{x^2-11}{x^2+7x+6} - \frac{x}{x+6} + \frac{2}{x+1}$

(m) $\frac{2-5x}{x+3} - \frac{3+x}{3-x} + \frac{2x(2x+1)}{x^2-9}$

(n) $\frac{1}{1-2x} - \frac{3}{1+2x} + \frac{2(4x-1)}{4x^2-1}$

8) Simplify the complex fractions:

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

(b) $\frac{\frac{12}{5x+5y}}{\frac{18}{x+y}}$

(c) $\frac{1 + \frac{x}{y}}{\frac{x}{y} - 1}$

(d) $\frac{x - \frac{y^2}{x}}{1 + \frac{y}{x}}$

(e) $\frac{\frac{1}{y} + \frac{1}{x}}{\frac{1}{y^2} - \frac{1}{x^2}}$

(f) $\frac{\frac{1}{7} - \frac{1}{x}}{x-7}$

(g) $\frac{\frac{1}{x} - \frac{1}{x+1}}{\frac{1}{x+1}}$

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

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(8)
$$\frac{x - \frac{9}{x}}{x + 4 + \frac{3}{x}}$$

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

(f)
$$\frac{x + \frac{a}{x}}{x - \frac{a^4}{x^3}}$$

(l)
$$\frac{1}{1 - \frac{1}{1+a}} + \frac{1}{1 - \frac{1}{1-a}}$$

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

(n)
$$\frac{1 - 25x^{-2}}{1 + 10x^{-1} + 25x^{-2}}$$

ANSWERS

(1) (a) $-\frac{5}{6}$ and 0 (b) 0 and -3 (c) $-\frac{1}{2}$ and 4 (d) 2 and ± 1 (e) -8 and -1.5 (f) 1 and none

(2) (a) $\frac{2y^2}{3x}$ (b) $\frac{3y}{y+1}$ (c) -1 (d) $\frac{5}{x^2}$ (e) $\frac{5}{3}$ (f) $2(2x+5)$ (g) $\frac{x-3}{x+3}$ (h) $x+2$ (i) $x-5$ (j) $\frac{x+5}{x-4}$ (k) $\frac{x+1}{x-1}$
 (l) $\frac{x+2}{2(x-2)}$ (m) $x^2 - 2x + 4$ (n) $a-2$ (o) $\frac{x^2+1}{x}$

(3) (a) 8 (b) $\frac{1}{x}$ (c) -1 (d) $\frac{10}{9}$ (e) $\frac{x+1}{x}$ (f) $\frac{x-1}{2}$ (g) x (h) 2 (i) 1 (j) -1 (k) 1 (l) $\frac{x+6}{x+3}$ (m) $\frac{3}{2}$ (n) $\frac{1}{2x}$

(4) (a) $\frac{6}{x}$ (b) $\frac{2(x+4)}{x}$ (c) $5y$ (d) -1 (e) $\frac{x+4}{x+2}$ (f) 1 (g) $\frac{5}{x-5}$ (h) $x+1$ (i) 1 (j) $3x$ (k) $x+5$ (l) $-(x+4)$
 (m) $\frac{1}{2}$ (n) $\frac{3x^2(3x-1)}{5x-2}$

(5) (a) $x-3$ (b) 1 (c) x (d) $\frac{(x+2)(x-3)}{x^2}$ (e) $\frac{4}{3}$ (f) x (g) $7x-1$ (h) $3x$ (i) 1

(6) (a) $\frac{2x}{3}$ (b) 4 (c) 2 (d) 5 (e) 0 (f) $x+5$ (g) $3x-5$ (h) $\frac{3x-4}{x-1}$ (i) $\frac{x+4}{x+5}$

(7) (a) $\frac{6x-7}{6}$ (b) $\frac{x+90}{45x}$ (c) $\frac{41x-54}{30}$ (d) $\frac{x+2}{x+1}$ (e) $\frac{x+2}{x-2}$ (f) $\frac{1}{x-2}$ (g) $\frac{2y}{x-y}$ (h) $\frac{14}{(x-5)^2}$

(i) $\frac{11}{x^2-4}$ (j) $\frac{9+x}{1-x^2}$ (k) $\frac{x-2}{x+4}$ (l) $\frac{1}{x+6}$ (m) $\frac{1}{x-3}$ (n) 0

(8) (a) $x-1$ (b) $\frac{7}{15}$ (c) $\frac{x+2}{x-2}$ (d) $x-y$ (e) $\frac{x^4}{x-y}$ (f) $\frac{1}{7x}$ (g) $\frac{1}{x}$ (h) $\frac{1}{x}$ (i) $\frac{x-3}{x+1}$

(j) $\frac{2(a-3)}{a+6}$ (k) $\frac{x^2}{x^2-a^2}$ (l) 2 (m) 2 (n) $\frac{x-5}{x+5}$