

Assignment

1. Add or subtract as indicated.

a) $\frac{5}{8} + \frac{3}{4}$

b) $\frac{4}{7} - \frac{2}{5}$

c) $\frac{7}{9} - \frac{1}{3} + 2$

d) $\frac{3}{2} - \frac{4}{3} + \frac{5}{4}$

2. Simplify.

a) $\frac{4x}{5} + \frac{3x}{10} - \frac{2x}{3}$

$$\frac{24x}{30} + \frac{9x}{30} - \frac{20x}{30}$$

$$= \frac{13x}{30}$$

b) $\frac{c}{2} - \frac{c+2}{6}$

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

$$\frac{2c-2}{6} = \frac{2(c-1)}{6}$$

$$= \frac{c-1}{3}$$

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

$$\frac{5a+10}{15} + \frac{3a-9}{15}$$

$$= \frac{8a+1}{15}$$

d) $\frac{(t-2)^4}{4} - \frac{(t-3)^4}{5}$

$$\frac{5t-10}{20} - \frac{(4t-12)}{20}$$

$$\frac{t+2}{20}$$

e) $\frac{(2y-3)^4}{4} - \frac{(y+4)^4}{7}$

$$\frac{14y-21}{28} - \frac{(4y+16)}{28}$$

$$\frac{10y-37}{28}$$

f) $\frac{(2x-3)^3}{3} - \frac{(5-2x)^3}{9}$

$$\frac{6x-9}{9} - \frac{(5-2x)}{9}$$

$$\frac{8x-14}{9}$$

3. Simplify.

a) $\frac{x^3}{4} + \frac{x^2(x+3)}{6} + \frac{(3x)^6}{2}$

$$\frac{3x}{12} + \frac{2x+6}{12} + \frac{18x}{12}$$

$$\frac{23x+6}{12}$$

b) $\frac{(4-2p)^{20}}{3} + \frac{(7-3p)^{18}}{4} - \frac{p}{5}$

$$\frac{80-40p+105-45p}{60} - \frac{12p}{60}$$

$$\frac{-97p+185}{60}$$

c) $\frac{(6x+3)^5}{5} - \frac{(2x+1)^5}{2} - \frac{x-3}{10}$

$$\frac{12x+6}{10} - \frac{(10x+5)}{10} - \frac{(x-3)}{10}$$

$$\frac{x+4}{10}$$

$$\begin{array}{l}
 \text{d) } \frac{(35)^1}{2} - \frac{(y-5)}{5} + \frac{(6y)^5}{7} \\
 \frac{70}{35} - \frac{(7y-35)}{35} + \frac{30y}{35} \\
 \frac{23y - 105}{35}
 \end{array}
 \quad
 \begin{array}{l}
 \text{e) } \frac{(3a+4)^2}{12} + \frac{(5-4a)^2}{18} - \frac{1(36)}{1} \\
 \frac{9a+12}{36} + \frac{(10-8a)}{36} - \frac{36}{36} \\
 \frac{a-14}{36}
 \end{array}
 \quad
 \begin{array}{l}
 \text{f) } \left(\frac{t}{7} - \frac{t}{1} - \frac{(t-3)}{3}\right) \cdot 7 \\
 \frac{3t}{21} - \frac{21t}{21} - \frac{(7t-21)}{21} \\
 = \frac{-25t+21}{21} = \frac{-1+1}{7}
 \end{array}$$

4. Simplify. Express answers in lowest terms, and indicate nonpermissible values.

a) $\frac{2}{y} + \frac{3}{y} + \frac{4}{y}$
 $\frac{9}{y}, y \neq 0$

b) $\frac{1}{2x} + \frac{3}{2x} - \frac{5}{2x}$
 $\frac{-1}{2x}, x \neq 0$

c) $\frac{7y}{3y+8} - \frac{4y}{3y+8}$
 $\frac{3y}{3y+8}, y \neq -\frac{8}{3}$

d) $\frac{a+2}{a^2} - \frac{(2-a)}{a^2}$
 $\frac{2a}{a^2} = \frac{2}{a}$
 $a \neq 0$

e) $\frac{4b+1}{b+3} - \frac{(2b-5)}{3+b}$
 $\frac{2b+b}{b+3}$
 $\frac{2(b+3)}{(b+3)} = 2, b \neq -3$

f) $\frac{15x}{4(3x+5)} + \frac{25}{4(3x+5)}$
 $\frac{15x+25}{4(3x+5)} = \frac{5(3x+5)}{4(3x+5)}$
 $= \frac{5}{4}, x \neq -\frac{5}{3}$

5. Simplify. Express answers in lowest terms, and state any restrictions on the variables.

a) $\frac{1}{4x} + \frac{1(2x)}{2}$
 $\frac{1}{4x} + \frac{2x}{4x}$
 $\frac{1+2x}{4x}, x \neq 0$

b) $\frac{1}{3a} - \frac{1}{4a}$

c) $\frac{(20)}{3t} + \frac{1(15)}{4t} + \frac{1(12)}{5t}$
 $\frac{20}{60t} + \frac{15}{60t} + \frac{12}{60t}$
 $\frac{47}{60t}, t \neq 0$

d) $\frac{1}{2t} - \frac{2}{3t} - \frac{3}{4t}$

e) $\frac{(3)6}{5x} + \frac{2(5)}{3x}$
 $\frac{18}{5x} + \frac{10}{15x}$
 $\frac{28}{15x}, x \neq 0$

f) $\frac{7}{5p} - \frac{5}{7p}$

g) $\frac{2(12)}{x} - \frac{3(6)}{2x} + \frac{4(4)}{3x} - \frac{5(3)}{4x}$
 $\frac{24}{12x} - \frac{18}{12x} + \frac{16}{12x} - \frac{15}{12x}$
 $\frac{7}{12x}$

h) $\frac{3}{x} + 1$

6. Simplify. Express answers in lowest terms, and state any restrictions on the variables.

a) $\frac{9}{2x} + \frac{1}{x^2}$

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

c) $\frac{8}{3b^2} + \frac{7}{b^3}$

d) $\frac{4(2c^2)}{3c^2} - \frac{5(3c)}{2c^3} + \frac{6(6)}{c^4}$

$$\frac{9}{12a^2} - \frac{20a}{12a^2}$$

$$\frac{9-20a}{12a^2} \quad a \neq 0$$

$$\frac{8c^2}{6c^4} - \frac{15c}{6c^4} + \frac{36}{6c^4}$$

$$\frac{8c^2 - 15c + 36}{6c^4}, \quad c \neq 0$$

7. Simplify. Express answers in lowest terms, and indicate nonpermissible values.

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

b) $\frac{2(bt+1)}{b+3} + \frac{3(bt+3)}{b+2}$

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

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

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

$a \neq \pm 1$

$$\frac{2bt+1}{(bt+3)(b+2)} + \frac{3bt+9}{(bt+2)(b+3)}$$

$$\frac{5b+13}{(bt+2)(b+3)}$$

$b \neq -2, -3$

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

$$\frac{3x+21}{(x+2)(x+5)} = \frac{3(x+7)}{(x+2)(x+5)}$$

$x \neq -2, -5$

d) $\frac{4(x-1)}{x-3} + \frac{6(x-3)}{x-1}$

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

f) $\frac{5t}{2t+1} - \frac{3t}{4t+1}$

$$\frac{4x-4}{(x-3)(x-1)} + \frac{6x-18}{(x-3)(x-1)}$$

$$\frac{10x-22}{(x-3)(x-1)}$$

$x \neq 3, 1$

$$\frac{3y-21}{(y+2)(y-7)} - \frac{(y+2)}{(y+2)(y-7)}$$

$$\frac{2y-23}{(y+2)(y-7)}$$

$y \neq -2, 7$

$$\frac{2t^2+5t}{(2t+1)(4t+1)} - \frac{(6t^2+3t)}{(2t+1)(4t+1)}$$

$$\frac{14t^2+2t}{(2t+1)(4t+1)}, \quad t \neq -\frac{1}{2}, -\frac{1}{4}$$

8. Simplify

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

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

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

$$\frac{x^2-7x+10}{3(x-2)} + \frac{12x}{3(x-2)}$$

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

$x \neq 2$

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

$$\frac{2p^2+6p+1}{(p+2)(p+3)}$$

$p \neq -2, -3$

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

$$\frac{3x^2-8x-3}{(x+2)(2x-1)} \quad x \neq -2, \frac{1}{2}$$

d) $\frac{2}{2x-3} + \frac{3}{3x-2} + \frac{4}{4x-1}$

$$2(3x-2)(4x-1) + 3(2x-3)(4x-1) + 4(3x-2)(2x-3)$$

$$2(12x^2 - 11x + 2) + 3(8x^2 - 14x + 3) + 4(6x^2 - 13x + 6)$$

$$24x^2 - 22x + 4 + 24x^2 - 42x + 9 + 24x^2 - 52x + 24$$

$$\frac{72x^2 - 116x + 37}{(2x-3)(3x-2)(4x-1)}, x \neq \frac{3}{2}, \frac{2}{3}, \frac{1}{4}$$

e) $\frac{2}{t} - \frac{t+3}{t+2} - \frac{t+4}{t+3}$

$$2(t+2)(t+3) - (t+3)(t)(t+3) - (t+4)t(t+2)$$

$$= \frac{2t^2 + 10t + 12 - (t^3 + 6t^2 + 9t) - (t^3 + 6t^2 + 8t)}{t(t+2)(t+3)}$$

$$= \frac{-2t^3 + 10t^2 - 7t + 12}{t(t+2)(t+3)}, t \neq -3, -2, 0$$

Multiple Choice

9. $\frac{a}{a+2} + \frac{2}{a+2}, a \neq -2$, is equal to

- A. $\frac{2a}{a+2}$ B. $\frac{a^2}{a+2}$
 C. 1 D. $a+2$

$$\frac{a+a}{a+2} = 1$$

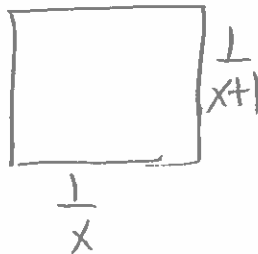
10. For all $t \neq \pm 1$, the reduced form of $\frac{t+1}{t-1} - \frac{t-1}{t+1}$ is

- A. 1 B. $\frac{2}{t^2-1}$
 C. $\frac{2t}{t^2-1}$ D. $\frac{4t}{t^2-1}$

$$\frac{(t^2+2t+1) - (t^2-2t+1)}{(t-1)(t+1)} = \frac{4t}{(t-1)(t+1)}$$

11. A rectangle has length $\frac{1}{x}$ cm and width $\frac{1}{x+1}$ cm. The perimeter of the rectangle (in cm) is

- A. $\frac{4}{4x+2}$ B. $\frac{4x+2}{x(x+1)}$
 C. $\frac{2x+1}{x(x+1)}$ D. $\frac{1}{x(x+1)}$



$$P = \frac{1}{x} + \frac{1}{x} + \frac{1}{x+1} + \frac{1}{x+1}$$

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

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

$$= \frac{4x+2}{x(x+1)}$$

Numerical Response

12. For some whole number k , the reduced form of $\frac{x-k}{2x} + \frac{x+1}{4x}$ is $\frac{3x-5}{4x}$.
The value of k is _____.

(Record your answer in the numerical response box from left to right.)

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$$\frac{x-k}{2x} + \frac{x+1}{4x} = \frac{3x-5}{4x}$$

$$2x - 2k + x + 1 = 3x - 5$$

$$3x - 2k + 1 = 3x - 5$$

$$-2k = -6$$

$$k = 3$$

Answer Key

1. a) $\frac{11}{8}$ b) $\frac{6}{35}$ c) $\frac{22}{9}$ d) $\frac{17}{12}$
2. a) $\frac{13x}{30}$ b) $\frac{c-1}{3}$ c) $\frac{8a+1}{15}$ d) $\frac{t+2}{20}$ e) $\frac{10y-37}{28}$ f) $\frac{8x-14}{9}$
3. a) $\frac{23x+6}{12}$ b) $\frac{185-97p}{60}$ c) $\frac{x+4}{10}$ d) $\frac{23y+105}{35}$ e) $\frac{a-14}{36}$ f) $\frac{21-25r}{21}$
4. a) $\frac{9}{y}, y \neq 0$ b) $-\frac{1}{2x}, x \neq 0$ c) $\frac{3y}{3y+8}, y \neq -\frac{8}{3}$ d) $\frac{2}{a}, a \neq 0$ e) $2, b \neq -3$ f) $\frac{5}{4}, x \neq -\frac{5}{3}$
5. a) $\frac{1+2x}{4x}, x \neq 0$ b) $\frac{1}{12a}, a \neq 0$ c) $\frac{47}{60t}, t \neq 0$ d) $-\frac{11}{12t}, t \neq 0$
- e) $\frac{28}{15x}, x \neq 0$ f) $\frac{24}{35p}, p \neq 0$ g) $\frac{7}{12x}, x \neq 0$ h) $\frac{3+x}{x}, x \neq 0$
6. a) $\frac{9x+2}{2x^2}, x \neq 0$ b) $\frac{9-20a}{12a^2}, a \neq 0$ c) $\frac{8b+21}{3b^3}, b \neq 0$ d) $\frac{8c^2-15c+36}{6c^4}, c \neq 0$
7. a) $\frac{2a}{(a-1)(a+1)}, a \neq \pm 1$ b) $\frac{5b+13}{(b+3)(b+2)}, b \neq -3, -2$ c) $\frac{3x+21}{(x+2)(x+5)}, x \neq -5, -2$
- d) $\frac{10x-22}{(x-3)(x-1)}, x \neq 1, 3$ e) $\frac{2y-23}{(y+2)(y-7)}, y \neq -2, 7$ f) $\frac{14t^2+2t}{(2t+1)(4t+1)}, t \neq -\frac{1}{2}, -\frac{1}{4}$
8. a) $\frac{x^2+5x+10}{3(x-2)}, x \neq 2$ b) $\frac{2p^2+6p+1}{(p+2)(p+3)}, p \neq -3, -2$ c) $\frac{3x^2-8x-3}{(x+2)(2x-1)}, x \neq -2, \frac{1}{2}$
- d) $\frac{72x^2-116x+37}{(2x-3)(3x-2)(4x-1)}, x \neq \frac{1}{4}, \frac{2}{3}, \frac{3}{2}$ e) $\frac{-2t^3-10t^2-7t+12}{t(t+2)(t+3)}, t \neq -3, -2, 0$

9. C

10. D

11. B

12.

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