

SM3 4.4: Adding & Subtracting Rationals

For problems 1-7, simplify each rational expression. State any restrictions on x .

1) $\frac{3}{x} + \frac{7}{5x}$

$$\frac{22}{5x}, x \neq 0$$

2) $\frac{11}{x} - \frac{x}{x-1}$

$$\frac{-x^2 + 11x - 11}{x(x-1)},$$
$$x \neq 0, 1$$

3) $\frac{x^2 + 3}{8} - \frac{4}{x}$

$$\frac{x^3 + 3x - 32}{8x},$$
$$x \neq 0$$

4) $\frac{x+1}{5} + \frac{1}{x}$

$$\frac{x^2 + x + 5}{5x},$$
$$x \neq 0$$

5) $\frac{9x}{x+1} + 5x$

$$\frac{5x^2 + 14x}{x+1},$$
$$x \neq -1$$

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

$$\frac{5x^2 - 7x + 1}{(x+1)(x-2)},$$
$$x \neq -1, 2$$

7) $\frac{8x+1}{6x^2-7x-3} - \frac{4}{3x+1} + \frac{11x}{2x-3}$

$$\frac{33x^2 + 11x + 13}{(2x-3)(3x+1)}, x \neq \frac{3}{2}, -\frac{1}{3}$$

- 8) Sam walks $\frac{3}{8}$ km to school. After school, he walks another $\frac{x+1}{3}$ km to get to work. What simplified rational expression describes the total length of both of his walks?

$$\frac{3}{8} + \frac{x+1}{3} = \frac{8x+17}{24} \text{ km}$$

- 9) Emma's strawberry farm has a total of $5x$ hectares of arable land. This past season, Emma planted $\frac{x^2+3}{x+7}$ hectares of strawberries. What simplified rational expression represents the total amount of land, in hectares, that was **not** planted last season?

$$5x - \frac{x^2+3}{x+7} = \frac{4x^2+35x-3}{x+7} \text{ hectares}$$

- 10) The width of a rectangle is $\frac{x+2}{5}$ cm. The rectangle's length is $\frac{x^2+3x+2}{x+3}$ cm. What expression represents the perimeter of this rectangle?

$$P = 2l + 2w \rightarrow P = 2 \cdot \frac{x^2+3x+2}{x+3} + 2 \cdot \frac{x+2}{5} = \frac{12x^2+40x+32}{5(x+3)} \text{ cm}$$