

Worksheet: Adding and Subtracting Algebraic Fractions

This worksheet has questions that will test your ability to add and subtract algebraic fractions (fractions with x's or y's or other letters in them). The method is no different to the method used to add and subtract numerical fractions. You must first find a common denominator, then make the denominators the same in both fractions, only then can you add or subtract the numerators. Remember, **you cannot add or subtract fractions unless the denominators are the same.**

Adding and
Subtracting
Algebraic Fractions
study guide



Model answers
to this sheet



1. Add or subtract the following:

- (a) $\frac{1}{x} + \frac{1}{x}$ (b) $\frac{1}{x} - \frac{1}{x}$ (c) $\frac{1}{x} + \frac{y}{x}$ (d) $\frac{1}{3x} + \frac{4}{3x}$
(e) $\frac{5}{2a} - \frac{1}{2a}$ (f) $\frac{1}{1+x} + \frac{7}{1+x}$ (g) $\frac{3x}{p+q} - \frac{2x}{p+q}$
(h) $\frac{s+t}{2u-v} + \frac{s-t}{2u-v}$ (i) $-\frac{1}{c^2} + \frac{1}{c^2}$

2. For these questions you need to find a common denominator (remember that you cannot add/subtract fractions which have different denominators). Here the common denominators are found by multiplying together the denominators in the question.

Add or subtract the following fractions. None of them can be cancelled down.

- (a) $\frac{1}{x} + \frac{1}{y}$ (b) $\frac{1}{x} - \frac{1}{y}$ (c) $\frac{a}{b} + \frac{c}{d}$ (d) $\frac{4}{x} + \frac{3}{4y}$
(e) $\frac{7}{x+1} - \frac{5}{y+1}$ (f) $\frac{p}{p-q} - \frac{a}{a+b}$ (g) $\frac{v}{2u+v} - \frac{1}{s}$
(h) $\frac{uvw}{abc} + \frac{xyz}{def}$ (i) $\frac{1}{x^3} - \frac{2}{y^2}$

- Find the simplest common multiples for the following expressions:
- (a) $2x$ and 2 (b) $2x$ and x (c) x^2 and x
- (d) 9 and 3 (e) abc and ab and a (f) a^2bc^5 and $a^4b^2c^3$
4. If you do not use the simplest common denominator then you will still get the right answer, but your answers will have to be cancelled down. Therefore it is more effective to use the simplest common multiple when adding or subtracting fractions.

(a) $\frac{1}{2x} + \frac{1}{2}$ (b) $\frac{1}{2x} + \frac{1}{x}$ (c) $\frac{1}{x^2} + \frac{1}{x}$

(d) $\frac{7y}{9} - \frac{x}{3}$ (e) $\frac{2d}{abc} - \frac{3f}{ab} + \frac{1}{a}$ (f) $\frac{5}{a^2bc^5} - \frac{1}{a^4b^2c^3}$

- (a) $\frac{1}{2} + \frac{1}{x}$ (b) $\frac{1}{x+1} - \frac{1}{2}$ (c) $\frac{1+x}{2x} + \frac{x-1}{x}$ (d) $\frac{x-1}{x+2} - \frac{x-3}{x+1}$
- (e) $\frac{ab}{c^2d^3} - \frac{a}{bc^2d}$ (f) $\frac{ab}{c^2d^3} - \frac{a}{bc^2d} + \frac{b}{c^2d^2}$ (g) $\frac{x}{y} + \frac{y}{x}$

- (a) $1 + \frac{1}{x}$ (b) $x + \frac{1}{2}$ (c) $5x + \frac{1}{5x}$ (d) $x + 1 + \frac{1}{x}$

7. [Harder] Which of the following expressions are equivalent?

(a) $\frac{1}{x} + \frac{1}{y}$

(b) $1 + \frac{y}{x}$

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

(d) $\frac{y+x}{y}$

(e) $\frac{x+y}{xy}$

(f) $2 + \frac{x-y}{y}$

8. [Harder] Add the following:

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

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

(c) $\frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3} + \dots + \frac{1}{x^n}$



This worksheet is one of a series on mathematics produced by the [Dean of Students' Office](#) at the University of East Anglia.
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