

## ALGEBRA FRACTIONS - Simplify Expressions and Solve Equations

Page	Description
1	Simplify expressions involving adds, takes, times and divides
2	Simplify expressions by factorising the numerator and denominator and then cancelling
3	Solve equations by multiplying to get rid of the denominators. Just numbers in the denominators
4	Solve more complicated equations by multiplying to get rid of the denominators. Just numbers in the denominators
5	Solve equations by multiplying to get rid of the denominators. Numbers and algebra in the denominators

## Algebraic Fractions - Simplify these fractions

Follow the standard rules of fractions for add, take, times and divide

Adds and takes, cross multiply  $\frac{a}{b} \pm \frac{c}{d} = \frac{ad \pm cb}{bd}$

Multiply  $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$

Divide  $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

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

6)  $\frac{1}{x+1} + \frac{1}{x+2}$

2)  $\frac{a}{x} + \frac{b}{y}$

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

3)  $\frac{2}{x} - \frac{3}{y}$

8)  $\frac{x-1}{x+1} - \frac{x+1}{x+2}$

4)  $\frac{a}{x} \times \frac{b}{y}$

9)  $\frac{1}{x+1} \times \frac{1}{x+2}$

5)  $\frac{3}{x} \div \frac{2}{y}$

10)  $\frac{1}{x+1} \div \frac{1}{x+2}$

1)  $6x^2 + 5x + 1 = (3x + 1)(2x + 1)$

5)  $6x^2 - 5x + 1 = (3x - 1)(2x - 1)$

9)  $9x^2 - 4 = (3x - 2)(3x + 2)$

2)  $2x^2 + 11x + 12 = (x + 4)(2x + 3)$

6)  $4x^2 - 8x + 3 = (2x - 3)(2x - 1)$

10)  $9a^2 - b^2 = (3a - b)(3a + b)$

3)  $2x^2 - x - 6 = (2x + 3)(x - 2)$

7)  $x^2 - 16 = (x - 4)(x + 4)$

4)  $4x^2 - 7x - 2 = (4x + 1)(x - 2)$

8)  $x^2 - 4 = (x - 2)(x + 2)$

Simplify these fractions by factorising the quadratics in the numerators and denominators and then cancelling. The quadratics are all factorised above.

Qu. 1 
$$\frac{2x^2 + 11x + 12}{2x^2 - x - 6}$$

Qu. 4 
$$\frac{2x^2 + 11x + 12}{x^2 - 16}$$

Qu. 2 
$$\frac{2x^2 - x - 6}{4x^2 - 7x - 2}$$

Qu. 5 
$$\frac{2x^2 - x - 6}{x^2 - 4}$$

Qu. 3 
$$\frac{6x^2 - 5x + 1}{4x^2 - 8x + 3}$$

Qu. 6 
$$\frac{9x^2 - 4}{4x^2 - 8x + 3}$$

Multiply each term by the lowest common multiple of all the denominators, then cancel, simplify and solve

$$1) \quad \frac{2}{3}y + \frac{1}{2}y = 7$$

The lowest common multiple of 2 and 3 is 6

Multiply each term by 6

$$\boxed{6 \times} \frac{2y}{3} + \boxed{6 \times} \frac{1y}{2} = \boxed{6 \times} 7$$

Cancel the denominators

$$2 \times 2y + 3 \times y = 42$$

$$4y + 3y = 42$$

$$7y = 42$$

$$y = 6$$

$$2) \quad \frac{1}{4}y + \frac{1}{2}y = 6$$

$$\boxed{\phantom{6}} \times \frac{1y}{4} + \boxed{\phantom{6}} \times \frac{1y}{2} = \boxed{\phantom{6}} \times 6$$

$$3) \quad \frac{y+1}{3} = \frac{y-1}{4}$$

$$\boxed{\phantom{4}} \times \frac{(y+1)}{3} = \boxed{\phantom{4}} \times \frac{(y-1)}{4}$$

$$5) \quad \frac{2y-1}{6} + \frac{y+3}{3} = \frac{5}{2}$$

$$\boxed{\phantom{6}} \times \frac{(2y-1)}{6} + \boxed{\phantom{6}} \times \frac{(y+3)}{3} = \boxed{\phantom{6}} \times \frac{5}{2}$$

$$4) \quad \frac{2y-1}{3} = \frac{y}{2}$$

$$\boxed{\phantom{6}} \times \frac{(2y-1)}{3} = \boxed{\phantom{6}} \times \frac{y}{2}$$

$$6) \quad \frac{y-2}{3} + \frac{y+6}{4} = 16$$

$$\boxed{\phantom{12}} \times \frac{(y-2)}{3} + \boxed{\phantom{12}} \times \frac{(y+6)}{4} = \boxed{\phantom{12}} \times 16$$

③

Solving Equations with fractions Watch out for sign errors on questions 3,4,5,6,8,9,10

A)  $\frac{x}{2} + \frac{x}{3} = 10$

B)  $\frac{2x}{3} + \frac{x}{4} = 11$

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

6)  $\frac{c-2}{7} - \frac{3-c}{14} = 1$

2)  $\frac{y+5}{6} + \frac{y-1}{2} = 10$

7)  $\frac{d+12}{3} + \frac{d+3}{6} = \frac{3d+11}{2}$

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

8)  $\frac{2e+1}{6} - \frac{e-1}{3} = \frac{e-3}{2}$

4)  $\frac{a-4}{5} - \frac{a-2}{6} = 0$

9)  $\frac{p-1}{3} - \frac{p+2}{6} = \frac{p}{10}$

5)  $\frac{3b+5}{4} - \frac{5b-13}{3} = 1$

10)  $\frac{2x-5}{3} - \frac{2x-3}{4} = \frac{x-6}{12}$

4

## Equations with Fractions

$$1) \quad \frac{x}{2} = 4$$

$$8) \quad \frac{2x+1}{2} = \frac{2x+4}{4}$$

$$2) \quad \frac{2x}{3} = 8$$

$$9) \quad \frac{8}{x} = 4$$

$$3) \quad \frac{x+1}{2} = 4$$

$$10) \quad \frac{8}{x+2} = 2$$

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

$$11) \quad \frac{8}{x+2} = \frac{6}{x}$$

$$5) \quad \frac{x}{2} + \frac{x}{3} = 5$$

$$12) \quad \frac{12}{x+1} = \frac{20}{3x-1}$$

$$6) \quad \frac{x+2}{2} + \frac{x-2}{3} = 7$$

$$13) \quad \frac{24}{2x-1} = \frac{16}{3x-4}$$

$$7) \quad \frac{2x-4}{4} + \frac{3x+2}{8} = 8$$

5