

F Michaelmas Equations

Patrons are reminded that they must be clear on *what they are doing to each side* of the equation. If they aren't clear on that, then they may well go wrong. Provided they do the same thing to each side, then they'll be OK.

1. Solve the following equations with brackets:

(a) $5(2x + 1) = 9.$	$x = \frac{2}{5}$	(h) $3x - 6(2 - 3x) = 3(x + 4) - 2(4 - 7x).$	$x = 4$
(b) $2(x - 3) = 5x - 2.$	$x = -\frac{4}{3}$	(i) $x = a(x - 4).$	$x = \frac{4a}{a-1}$
(c) $-3(x - 1) = 3(x + 7).$	$x = -3$	(j) $a(x + 1) = x + e.$	$x = \frac{e-a}{a-1}$
(d) $3(2 - 3x) = 1 + 2(x + 1).$	$x = \frac{3}{11}$	(k) $a(x - 2) = 3(x + 4).$	$x = \frac{2a+12}{a-3}$
(e) $2(2x + 5) = 3(x - 3) - 2(5 - 3x).$	$x = \frac{29}{5}$	(l) $3(2 - ax) + ax = -7(3 - x).$	$x = \frac{27}{7+2a}$
(f) $7 - (2x - 1) = 8(x - 1) + 3(4 - 3x).$	$x = 4$	(m) $a(bx - c) = b(cx + d).$	$x = \frac{ac+bd}{ab-bc}$
(g) $-2(x - 3) + 7x = x - 4 + 2(6x + 1).$	$x = 1$	(n) $a(x - a) - b(x - c) = a(x + a) - b(c - x).$	$x = \frac{bc-a^2}{b}$

2. Solve the following equations (in x):

(a) $\frac{2}{x+4} = 3.$	$x = -\frac{10}{3}$	(h) $-5 = \frac{3}{-2-7x}.$	$x = -\frac{1}{5}$
(b) $\frac{5}{2x+1} = 7.$	$x = -\frac{1}{7}$	(i) $\frac{a}{x+b} = c.$	$x = \frac{a-bc}{c}$
(c) $\frac{6+3x}{5x-2} = 8.$	$x = \frac{22}{37}$	(j) $a = \frac{x}{3x-1}.$	$x = \frac{a}{3a-1}$
(d) $\frac{7}{2-2x} = 9.$	$x = \frac{11}{18}$	(k) $\frac{2x}{5-cx} = 7.$	$x = \frac{35}{2+7c}$
(e) $6 = \frac{1+x}{3x+7}.$	$x = -\frac{41}{17}$	(l) $a = \frac{x+1}{ax-b}.$	$x = \frac{ab+1}{a^2-1}$
(f) $-1 = \frac{2-3x}{3-4x}.$	$x = \frac{5}{7}$	(m) $\frac{x-f}{c-2x} = -3c.$	$x = \frac{3c^2-f}{6c-1}$
(g) $\frac{-8}{5x+2} = -9.$	$x = -\frac{2}{9}$	(n) $a = \frac{bx+c}{dx-e}.$	$x = \frac{ae+c}{ad-b}$

3. Solve the following equations with denominators:

(a) $\frac{2x+7}{7} = 2.$	$x = \frac{7}{2}$	(g) $\frac{2x+1}{3} + \frac{1-x}{2} = 3x - \frac{x+1}{2}.$	$x = \frac{4}{7}$
(b) $\frac{3x-4}{6} = -3.$	$x = -\frac{14}{3}$	(h) $\frac{x-3}{6} - \frac{3-2x}{3} = \frac{x}{4} - 3x + 1.$	$x = \frac{30}{43}$
(c) $\frac{4-5x}{-2} = -6.$	$x = -\frac{8}{5}$	(i) $2x+1 + \frac{x}{5} = \frac{2x-3}{10} + \frac{3x+1}{2}.$	$x = -\frac{8}{5}$
(d) $\frac{7-x}{2} = -\frac{2}{3}.$	$x = \frac{25}{3}$	(j) $\frac{1}{3} + \frac{x-2}{2} + \frac{2x+7}{4} + \frac{x-3}{3} = x.$	$x = -\frac{1}{4}$
(e) $\frac{x+3}{2} + \frac{x}{3} = x + 2.$	$x = -3$	(k) $\frac{1}{2}x + 1 - \frac{x-6}{2} = 0.$	$x = 10$
(f) $\frac{x}{4} - \frac{x+4}{2} = \frac{x-1}{4} + 3.$	$x = -\frac{19}{2}$	(l) $5x - 1 + \frac{x}{2} = \frac{2x-3}{6} + 3x.$	$x = \frac{3}{13}$

$$(m) \frac{x-a}{2} - \frac{ax+2}{3} = 7x+2 - \frac{bx+e}{4}.$$

$$x = \frac{32-3e+6a}{3b-4a-78}$$

$$(n) \frac{\frac{5-x}{2} + \frac{4+ax}{3} + 1}{6} + x = 3.$$

$$x = \frac{79}{2a+33}$$