LINEAR EQUATIONS INVOLVING FRACTIONS

For equations involving fractions, write the terms with a common denominator and then solve the equation given by the numerators.

If the equation has only one term on each side of the equals sign, you can multiply each numerator by the other term's denominator to achieve the same result (see Example **2(d)**).

Example 2

Solve:

(a) $\frac{x}{5}+\frac{4x}{3}=23$ **(b)** $\frac{2x+1}{4}-\frac{2x-3}{6}=\frac{7}{3}$ **(c)** $\frac{3}{x-4}=\frac{2}{x-2}$ **(d)** $\frac{3a-2}{2a-1}=\frac{3a+1}{2a+3}$

Solution

(a)
$$\frac{x}{5}+\frac{4x}{3}=23$$
$$\frac{3x}{15}+\frac{5\times 4x}{15}=23$$
$$\frac{23x}{15}=23$$
$$23x=15\times 23$$
$$x=15$$

(b)
$$\frac{2x+1}{4}-\frac{2x-3}{6}=\frac{7}{3}$$
$$\frac{3(2x+1)}{12}-\frac{2(2x-3)}{12}=\frac{28}{12}$$
$$6x+3-4x+6=28$$
$$2x+9=28$$
$$2x=19$$
$$x=9.5$$

(c) $\frac{3}{x-4}=\frac{2}{x-2}$, $x\neq 4, x\neq 2$
$$\frac{3(x-2)}{(x-4)(x-2)}=\frac{2(x-4)}{(x-2)(x-4)}$$
$$3(x-2)=2(x-4)$$
$$3x-6=2x-8$$
$$3x-2x=6-8$$
$$x=-2$$

(d) $\frac{3a-2}{2a-1}=\frac{3a+1}{2a+3}$, $a\neq 0.5, a\neq -1.5$
$$\frac{3a-2}{2a-1}=\frac{3a+1}{2a+3}$$
$$(3a-2)(2a+3)=(3a+1)(2a-1)$$
$$6a^2+5a-6=6a^2-a-1$$
$$6a=5$$
$$a=\frac{5}{6}$$

Solutions may have restrictions, which can be easy to miss. In **(c)**, $x\neq 4$ and $x\neq 2$, because these values would make the denominators zero. In **(d)**, $a\neq 0.5$ and $a\neq -1.5$.