F Michaelmas Equations Consolidation

1. Solve:

   (a) $4x - 2 = 3x + 8$. $\boxed{x = 10}$

   (b) $3 - 5x = 2x - 1$. $\boxed{x = \frac{4}{7}}$

   (c) $2x - 7 = 5x - 7$. $\boxed{x = 0}$

2. Solve:

   (a) $2(x + 3) + 4(2x + 1) = 1$. $\boxed{x = -\frac{9}{10}}$

   (b) $3(2x - 1) - 2(x + 4) = 2x - 7$. $\boxed{x = 2}$

   (c) $2x - 3(8 - x) = 7(2 - 5x)$. $\boxed{x = \frac{19}{20}}$

   (d) $2 - (2x - 19) = 2(7 - 8x)$. $\boxed{x = -\frac{1}{2}}$

   (e) $(x - 3)(x - 7) = (x + 1)(x - 2)$. $\boxed{x = \frac{23}{9}}$

   (f) $(2x + 1)(5 - x) = 6 - (3 - x)(7 - 2x)$. $\boxed{x = 5}$

3. In the equation $x - a = b$ the solution is $x = b + a$. Therefore in the following equations attempt to solve them by isolating the x.

   (a) $ax - b = c$. $\boxed{x = \frac{b+c}{a}}$

   (b) $ax + b = b$. $\boxed{x = 0}$

   (c) $\dfrac{x}{a} + b = c$. $\boxed{x = a(c - b)}$

   (d) $a = \dfrac{b}{x}$. $\boxed{x = \frac{b}{a}}$

   (e) $\dfrac{ax}{b + c} = a$. $\boxed{x = b + c}$

   (f) $ax + d = 3x - 2$. $\boxed{x = \frac{2+d}{3-a}}$

   (g) $\dfrac{ax}{bx + c} = d$. $\boxed{x = \frac{cd}{a-bd}}$

   (h) $\dfrac{x - e}{x + ax - f} = d$. $\boxed{x = \frac{e-df}{1-d-ad}}$

   (i) $(ax + 2)(x - 3) = a(x - 3)(x - k)$. $\boxed{x = \frac{3ak+d}{2+ak}}$

4. Solve:

   (a) $\dfrac{x}{3} + 7 = \dfrac{2x}{4}$. $\boxed{x = 42}$

   (b) $\dfrac{2x + 1}{4} + \dfrac{3x - 1}{5} = 1$. $\boxed{x = \frac{19}{22}}$

   (c) $\dfrac{3x - 2}{2} - \dfrac{2 - x}{5} = \dfrac{x + 1}{10}$. $\boxed{x = \frac{15}{16}}$

   (d) $\dfrac{2(x + 1)}{3} - 2 = \dfrac{4x - 1}{7} + \dfrac{2}{3}$. $\boxed{x = \frac{39}{2}}$

   (e) $\dfrac{2x + 5}{x} = 3\dfrac{2}{3}$. $\boxed{x = 3}$

5. Solve the following simultaneous equations:

   (a) $\begin{aligned} x + y &= 5 \\ x - y &= 1 \end{aligned}$. $\boxed{(x, y) = (3, 2)}$

(b) $\begin{array}{l} 2x + y = 7 \\ x - y = 5 \end{array}$. $\qquad$ $(x, y) = (4, -1)$

(c) $\begin{array}{l} 2x + y = 5 \\ 4x + 3y = 14 \end{array}$. $\qquad$ $(x, y) = \left(\frac{1}{2}, 4\right)$

(d) $\begin{array}{l} x + 2y = 6 \\ 3x - 2y = 0 \end{array}$. $\qquad$ $(x, y) = \left(\frac{3}{2}, \frac{9}{4}\right)$

(e) $\begin{array}{l} 2x + 3y = 42 \\ 3x - 4y = -5 \end{array}$. $\qquad$ $(x, y) = (9, 8)$

6. A couple of slightly more challenging questions to get you thinking…

(a) $\dfrac{2x + \frac{2x-1}{3}}{3} + 2x - 3 = 1$. $\qquad$ $x = \frac{37}{26}$

(b) $\begin{array}{l} \dfrac{x + 2y}{5} + \dfrac{5x - 2y}{2} = \dfrac{3}{2} \\ 2x - y = 0 \end{array}$. $\qquad$ $(x, y) = (1, 2)$