Paul's Additional Exercises - Linear Equations

① $13 + 2(1-u) = 8u - 5(u+7)$

$\Rightarrow 13 + 2 - 2u = 8u - 5u - 35$

$\Rightarrow 15 - 2u = 3u - 35$

$-15 \quad -3u \quad -3u \quad -15$

$\Rightarrow -5u = -50$

$\Rightarrow u = \frac{-50}{-5} \Rightarrow \boxed{u = 10}$

② $8(2+3z) + 1 = z - 10(z+1)$

$\Rightarrow 16 + 24z + 1 = z - 10z - 10$

$\Rightarrow 17 + 24z = -9z - 10$

$-17 \quad +9z \quad +9z \quad -17$

$\Rightarrow 33z = -27$

$\Rightarrow z = \frac{-27}{33} \Rightarrow \boxed{z = -\frac{9}{11}}$

(3) $8-(4-12t)+2 = 3t+2(7-3t)$

$\Rightarrow 8-4+12t+2 = 3t+14-6t$

$\Rightarrow 6+12t = -3t+14$

$-6 \quad +3t \qquad +3t \quad -6$

$15t = 8$

$t = \frac{8}{15}$

(4) $2x(6x-1)+21 = 8x-x(3-12x)$

$\Rightarrow 12x^2-2x+21 = 8x-3x+12x^2$

$\Rightarrow 12x^2-2x+21 = 5x+12x^2$

$-12x^2-5x-21 \qquad -5x \quad -12x^2 \quad -21$

$\Rightarrow -7x = -21$

$\Rightarrow x = \frac{-21}{-7} \Rightarrow x = 3$

(5) $\frac{3w-1}{5} + 1 = \frac{7w+2}{15}$

$\Rightarrow 15 \cdot \left[\frac{3w-1}{5} + 1 \right] = \frac{7w+2}{15} \cdot 15$

$\Rightarrow 3(3w-1) + 15 = 7w + 2$

$\Rightarrow 9w - 3 + 15 = 7w + 2$

$\Rightarrow 9w + 12 = 7w + 2$

$-7w \quad -12 \qquad -7w \quad -12$

$\Rightarrow 2w = -10 \Rightarrow \boxed{w = -5}$

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

$\Rightarrow 9 \cdot \left[\frac{10y}{9} + \frac{1}{3} \right] = \frac{2y-1}{9} \cdot 9$

$\Rightarrow 10y + 3 = 2y - 1$

$-2y \quad -3 \qquad -2y \quad -3$

$\Rightarrow 8y = -4 \Rightarrow y = -\frac{4}{8} \Rightarrow \boxed{y = -\frac{1}{2}}$

(7) $2\left(3-\frac{x}{4}\right)=\frac{2x+5}{3}-\frac{1}{3}$

$\Rightarrow \quad 6-\frac{2x}{4}=\frac{2x+5-1}{3}$

$\Rightarrow \quad \frac{24}{4}-\frac{2x}{4}=\frac{2x+4}{3}$

$\Rightarrow \quad \frac{24-2x}{4}=\frac{2x+4}{3}$ → cross multiply

$\Rightarrow \quad 4(2x+4)=3(24-2x)$

$\Rightarrow \quad 8x+16=72-6x$

$+6x \quad -16 \qquad -16 \quad +6x$

$\Rightarrow \quad 14x=56 \Rightarrow \boxed{x=4}$