# Railway Engineering Mathematics
# Tutorial Sheet 3

## General practice of solving equations

1. Solve the following equations:

   (a) $6x - 4 = 8$

   (b) $6x - 4 = 9x + 8$

   (c) $8q + 6 = 4q - 14$

   (d) $14 + 13y = 20y - 21$

   (e) $-15b + 21 + 5b = -19$

   (f) $-10x + 90 = -21x + 2$

## Solving equations with brackets

2. Solve the following equations:

   (a) $3(x + 10) = 63$

   (b) $2(x + 4) = x + 10$

   (c) $-3(7p + 5) = 27$

   (d) $7 - (5t - 13) = -25$

   (e) $3(x - 4) = 2(-2x + 1)$

(f) $2(h+4) = 3(h+10) - 2$

(g) $3\big(x + 2(x-2)\big) - 2\big(x - 3(x-1)\big) = 0$

(h) $4(x^2+2) = 44$

## Solving equations with fractions

3. Solve the following equations:

(a) $\dfrac{-8-3k}{2} = 11$

(b) $9 = \dfrac{p+4}{p+12}$

(c) $\dfrac{5b+10}{5} = -b + 10$

(d) $\dfrac{3y+2}{2} = 6y + 4$

(e) $\dfrac{3\delta+9}{6} = \dfrac{2\delta+10}{3}$

(f) $\dfrac{7x}{4} - 3 = 2 + \dfrac{9x}{2}$

(g) $\dfrac{3c+8}{3} = \dfrac{1}{2} + \dfrac{c}{4}$

(h) $3\left(a - \dfrac{2}{3}\right) = \dfrac{3a}{4} + \dfrac{9}{4}$

## General practice of transposition

4. Manipulate the equation $PV = RT$ to obtain a formula for:

   (a) $V$ (c) $T$

   (b) $R$ (d) $P$

5. Transpose the following formulae for the variable stated in the brackets:

   (a) $v^2 = u^2 + 2as$ $(u)$

   (b) $s = ut + \frac{1}{2}at^2$ $(u)$

   (c) $m = k\sqrt{a(1-x)}$ $(x)$

   (d) $V = \pi r^2 l + \frac{1}{3}\pi r^2 h$ $(l)$

   (e) $P = \mu_1 c_1 + \mu_2 c_2$ $(c_1)$

   (f) $\rho = \frac{M}{V}$ $(M)$

   (g) $T = \frac{V}{A} + d$ $(V)$

   (h) $F = \frac{x}{k} + E$ $(x)$

   (i) $V = \frac{jI}{\omega C} + V_1$ $(I)$