Rearranging equations examples

(1) Make v the subject of the formula $m = -\frac{v}{u}$.

Equation	Action
$m = -\frac{v}{u}$	Multiply both sides by u
$mu = -v$	Multiply both sides by -1
$-mu = v$	

(2) Solve for d in the equation $\frac{P}{bd} = f$

Equation	Action
$\frac{P}{bd} = f$	Multiply both sides by d
$\frac{P}{b} = fd$	Divide both sides by f
$\frac{P}{bf} = d$	

(3) Make I_G the subject of the formula $h_P = h_G + \frac{I_G}{Ah_G}$

Equation	Action
$h_P = h_G + \frac{I_G}{Ah_G}$	Subtract h_G from both sides
$h_P - h_G = \frac{I_G}{Ah_G}$	Multiply both sides by Ah_G
$Ah_G(h_P - h_G) = I_G$	

(4) Make ρ_w the subject of the formula $\rho_d = \dfrac{G_s\rho_w}{1+e}$.

Equation	Action
$\rho_d = \dfrac{G_s\rho_w}{1+e}$	Multiply both sides by $1+e$
$\rho_d(1+e) = G_s\rho_w$	Divide both sides by G_s
$\rho_w = \dfrac{\rho_d(1+e)}{G_s}$	

(5) Solve for V in the equation $q_{max} = \dfrac{V}{B} + \dfrac{6Ve}{B^2}$.

Equation	Action
$q_{max} = \dfrac{V}{B} + \dfrac{6Ve}{B^2}$	Multiply both sides by B^2
$q_{max}B^2 = BV + 6Ve$	Factor V on the right hand side
$q_{max}B^2 = V(B+6e)$	Divide both sides by $B+6e$
$V = \dfrac{q_{max}B^2}{B+6e}$	

(6) Make E the subject of the formula $\omega = \sqrt{\dfrac{3EI}{ML^3}}$.

Equation	Action
$\omega = \sqrt{\dfrac{3EI}{ML^3}}$	Square both sides
$\omega^2 = \dfrac{3EI}{ML^3}$	Multiply both sides by ML^3
$\omega^2 ML^3 = 3EI$	Divide both sides by $3E$
$I = \dfrac{\omega^2 ML^3}{3E}$	

(7) Transpose the formula $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$ to make u the subject.

Equation	Action
$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$	Multiply both sides by uvf
$vf + uf = uv$	Subtract uf from both sides
$vf = uv - uf$	Factor u on the right hand side
$vf = u(v - f)$	Divide both sides by $v - f$
$\frac{vf}{v - f} = u$	

(8) Solve for ζ in the equation $\omega_d = \omega\sqrt{1 - \zeta^2}$.

Equation	Action
$\omega_d = \omega\sqrt{1 - \zeta^2}$	Divide both sides by ω
$\frac{\omega_d}{\omega} = \sqrt{1 - \zeta^2}$	Square both sides
$\left(\frac{\omega_d}{\omega}\right)^2 = 1 - \zeta^2$	Subtract 1 from both sides
$\frac{\omega_d^2}{\omega^2} - 1 = -\zeta^2$	Multiply both sides by -1
$-\left(\frac{\omega_d^2}{\omega^2} - 1\right) = \zeta^2$	Take the square root of both sides
$\pm\sqrt{-\frac{\omega_d^2}{\omega^2} + 1} = \zeta$	

(9) Solve for t in the formula $F = Pe^{rt}$.

Equation	Action
$F = Pe^{rt}$	Divide both sides by P
$\frac{F}{P} = e^{rt}$	Take ln of both sides
$\ln\left(\frac{F}{P}\right) = rt$	Divide both sides by r
$t = \frac{\ln\left(\frac{F}{P}\right)}{r}$	

(10) Make R the subject of the formula $V = V_s(1 - e^{-t/RC})$.

Equation	Action
$V = V_s(1 - e^{-t/RC})$	Divide both sides by V_s
$\frac{V}{V_s} = 1 - e^{-t/RC}$	Subtract 1 from both sides
$\frac{V}{V_s} - 1 = -e^{-t/RC}$	Multiply both sides by -1
$-\frac{V}{V_s} + 1 = e^{-t/RC}$	Take ln of both sides
$\ln(1 - \frac{V}{V_s}) = \frac{-t}{RC}$	Multiply both sides by R
$R\ln(1 - \frac{V}{V_s}) = \frac{-t}{C}$	Divide both sides by $\ln(1 - \frac{V}{V_s})$
$R = \frac{-t/C}{\ln(1 - \frac{V}{V_s})}$	