1) $R_{eq} = (84\|112+15)\|(174\|87+26) = (48+15)\|(58+26) = 63\|84 = \underline{36\,\Omega}$

2) Resistance between nodes b & c is 0. Thus $\underline{R_2 = R_3 = 0}$.
Resistance between node a and either b or c is $80\|80 = 40\,\Omega$. Thus $\underline{R_1 = 40\,\Omega}$.
Using transformation equations yields same thing.

3) All elements are in parallel and always have 100V across them.

a) $p = -iV = -(10A)(100V) = \underline{-1\,kW}$ ← KCL: $i_g + i_L - 10A = 0$

b) $R_L = 1\,\Omega \Rightarrow$ i) $i_L = \frac{100V}{1\,\Omega} = \underline{100A}$, ii) $i_g = 10 - i_L = \underline{-90A}$
iii) $p = i_g(100V) = (-90A)(100V) = \underline{-9\,kW}$

c) $R_L = 100\,\Omega \Rightarrow$ i) $i_L = \frac{100V}{100\,\Omega} = \underline{1A}$, ii) $i_g = 10 - 1 = \underline{9A}$
iii) $p = i_g(100V) = (9A)(100V) = \underline{900W}$

4) a) $(0.5A)(36\,\Omega\|45\,\Omega) = (0.5A)(20\,\Omega) = \underline{10V = V_\Delta}$ ← current division

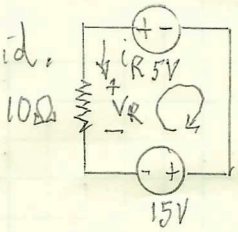
b) $60\|90 = 36\,\Omega$, $(0.3\frac{A}{V})V_\Delta = (0.3\frac{A}{V})(10V) = 3A$, $i_R = \frac{36}{60}3A = \underline{1.8A}$

c) Resistance seen by source: $4 + 60\|90 = 50\,\Omega$, $\Rightarrow V_g = (3A)(50\,\Omega) = \underline{150V}$

d) $R_{eq} = 10 + 36\|45 = 30\,\Omega$, $p = -i^2R = -(0.5A)^2 30\,\Omega = \underline{-7.5\,W}$

5) a) Invalid. 1A flows to right of circuit but 2A flow to the left.
$\Rightarrow$ Violates KCL.

b) Valid.



KVL: $-V_R + 5V + 15V = 0 \Rightarrow V_R = 5V + 15V = 20V$

$V_R = (10\,\Omega)i_R = 20V \Rightarrow i_R = \underline{2A}$

6) a) Switch should be closed. Power $= -\frac{V^2}{R_{eq}}$

open → $\frac{(40V)^2}{10+20}$ vs. $\frac{(40V)^2}{10+20\|20} = \frac{(40V)^2}{10+10}$ ← closed

b) Switch should be open. Power $= \frac{V_2^2}{R_2}$

open → $V_2 = \frac{20}{10+20}(40V)$ vs. $V_2 = \frac{20\|20}{10+20\|20}(40V)$ ← closed

↖ ↗ Voltage division.

V is not changing. To minimize R_{eq}, closing switch puts resistors in parallel, reducing resistance.
V_2 is increased by increasing the resistance from the bottom to the top right of circuit. This is achieved by opening switch.