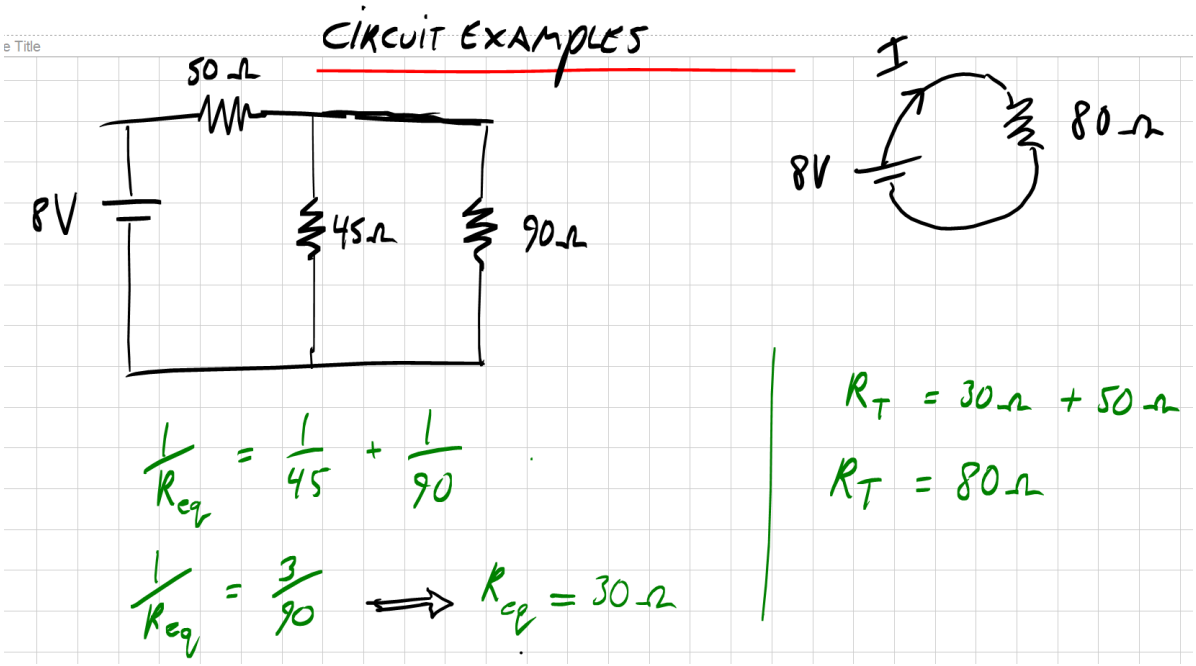
Essential Circuit Example Solutions



(1) $V_T = I_T R_T$

$8V = I_T (80\Omega)$

$I_T = 0.1A$

(2) Voltage Drop Across 50Ω Resistor

$V_1 = I_1 R_1$

$= (0.1A)(50)$

$V_1 = 5V$

(3) Voltage Drop Across 45Ω or 90Ω

$8V = 5V + ?$

3V Drop Across 45Ω

3V Drop Across 90Ω

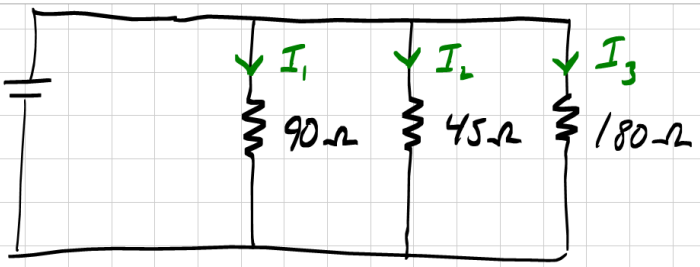
(4) Current Through 45Ω Resistor

$V = IR$

$3V = I\ 45\Omega$

$I = 0.066$ Amps

#2



a) NOTE VOLTAGE DROP ACROSS EACH RESISTOR IS 9V!

$V = IR$

$I_1 = \frac{V}{R} = \frac{9}{90} = 0.1 \text{ Amps}$, $I_2 = \frac{V}{R} = \frac{9V}{45\Omega} = 0.2\ A$

$I_3 = \frac{V}{R} = \frac{9}{180V} = 0.05\ A$ $\quad I_T = I_1 + I_2 + I_3$

$I_T = 0.1 + 0.2 + 0.05$

$I_T = \boxed{0.35\ A}$

b) $\frac{1}{R_T} = \frac{1}{90} + \frac{1}{45} + \frac{1}{180}$

$\frac{1}{R_T} = 0.011 + 0.0222 + 0.00555$

$\boxed{R_T = 26\Omega}$

#3

FIND R

$V_T = I_T R_T$

$10V = 2A(R_T)$

$R_T = 5\Omega$

(TOTAL RESISTANCE) OF CIRCUIT

$R = 5\Omega - 2\Omega$

$R = 3\Omega$

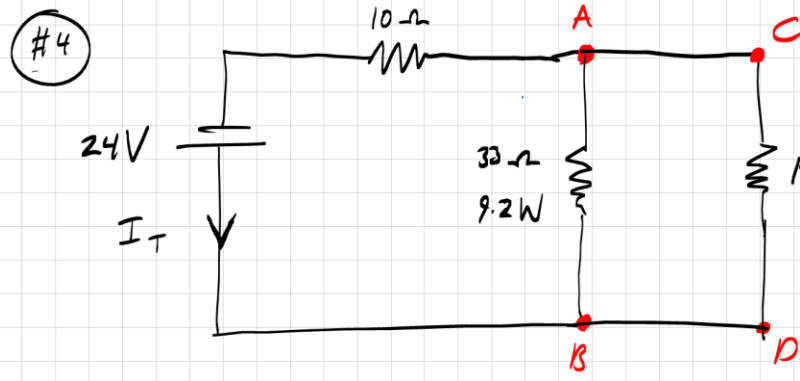
FIND POWER GIVEN OFF BY R:

$P = I^2 R$

$P = (2)^2 (3\Omega)$

$P = 12$ WATTS

#4



FIND ANY VALUES YOU CAN SOLVE FOR THEN... SOLVE FOR MORE

① V_{AB}

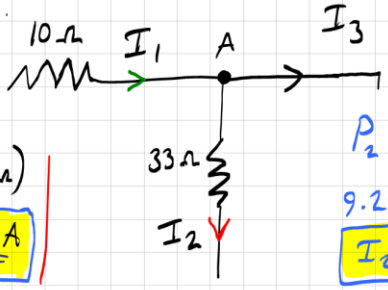
$P = \frac{V^2}{R}$

$9.2W = \frac{V^2}{33}$

$V_{AB} = 17.4V$ ✓

② $V_{10\Omega}$ → $24V - 17.4V = 6.6V$ ✓

ALSO → ③ V_{CD} → $V_{CD} = V_{AB}$ {PARALLEL} $V_{CD} = 17.4V$ ✓



$V_1 = I_1 R_1$

$6.6V = I_1(10\Omega)$

$I_1 = 0.66A$

$P_2 = I_2^2 R_2$

$9.2W = I_2^2(33)$

$I_2 = 0.528$

$I_1 = I_2 + I_3$

$0.66A = 0.528 + I_3$

$I_3 = 0.132A$

$P_T = P_1 + P_2 + P_3$ (ADD UP ALL POWER DISSIPATION)

$P_T = \frac{(6.6V)^2}{(10\Omega)} + (9.2W) + (0.132A)(17.4V)$

$P_T = 4.356 + 9.2 + 2.29$

$P_T = 15.85W$ ← TOTAL POWER USED UP BY CIRCUIT.

#5

$V_T = I_T R_T$

$80V = I_T R_T$

$80V = I_T (26.8\Omega)$

$I_T = 2.985\,A$

TOTAL

$R_T = 12 + 10 + R_{eq}$

$R_T = 12 + 10 + 4.8$

$R_T = 26.8\,\Omega$

$\frac{1}{R_{eq}} = \frac{1}{12} + \frac{1}{8}$

$R_{eq} = 4.8\,\Omega$

12 Ω RESISTOR

$V_1 = I_T (R_1)$

$V_1 = (2.985A)(12\Omega)$

$V_1 = 35.8V$

$V_2 = I_2 R_2$

$V_2 = (2.985A)(10\Omega)$

$V_2 = 29.85V$

10 Ω RESISTOR

$P = \frac{V^2}{R}$

V_3

$80V = V_1 + V_2 + V_3$

$80V = 35.8V + 29.85V + V_3$

$V_3 = 14.35V$

(VOLTAGE OVER 8 Ω AND 12 Ω RESISTORS IN PARALLEL)

$P = \frac{(14.35V)^2}{8\Omega}$

$P = 25.74\,W$

POWER DISSIPATED BY 8 Ω RESISTOR.