1.11

$$i(t) = \begin{cases} 40te^{-500t} A, & t \geq 0 \\ 0A, & t \leq 0 \end{cases} \qquad i(t) = \frac{dq(t)}{dt}$$

a.

$$\int i(t)\, dt + q(t_0) \qquad 40\int te^{-500t}\, dt = \boxed{-\frac{(500t+1)e^{-500t}}{6250} + C}$$

b.

$$-\frac{501e^{-500}}{6250} = \boxed{-0.000146\ C}$$

1.12

a. $\boxed{\text{car B}}$

$$\int_0^{90} 480t \Big|_0^{90} = \boxed{432,00\ J}$$

$$w(t) = \int_0^{90} P(t)\, dt \qquad V = 12V \quad I = 40A$$
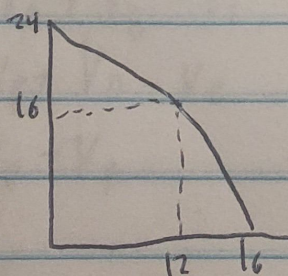
$$P(t) = 480W, \quad \cancel{w(t) = 480t}$$

1.19 $\quad v = 15e^{-250t} V, \quad i = 40e^{-250t}$

$$\boxed{P(t) = (15e^{-250t}) \cdot (40e^{-250t}) = 600e^{-500t}\ W}$$

a. $\boxed{P(0.01) = 4.04W}$

b.

$$\int_0^{0.01} 600e^{-500t}\, dt = -\frac{6}{5}e^{-500t}\Big|_0^{0.01} = \boxed{1.19\ J}$$

1.27

$8 \times 12 \cdot \frac{1}{2} = 48$

$4 \times 16 \cdot \frac{1}{2} = 32 \qquad 48+32+192 = \boxed{272C}$ a.

$16 \times 12 = 192$

$$V = \frac{dw}{dq}$$

$\int$ Voltage eq. $\times$ current eq.

$$v(t) = \begin{cases} \frac{1}{4}t + 8, & t \lneq 16 \\ 12, & t \geq 16 \end{cases}$$
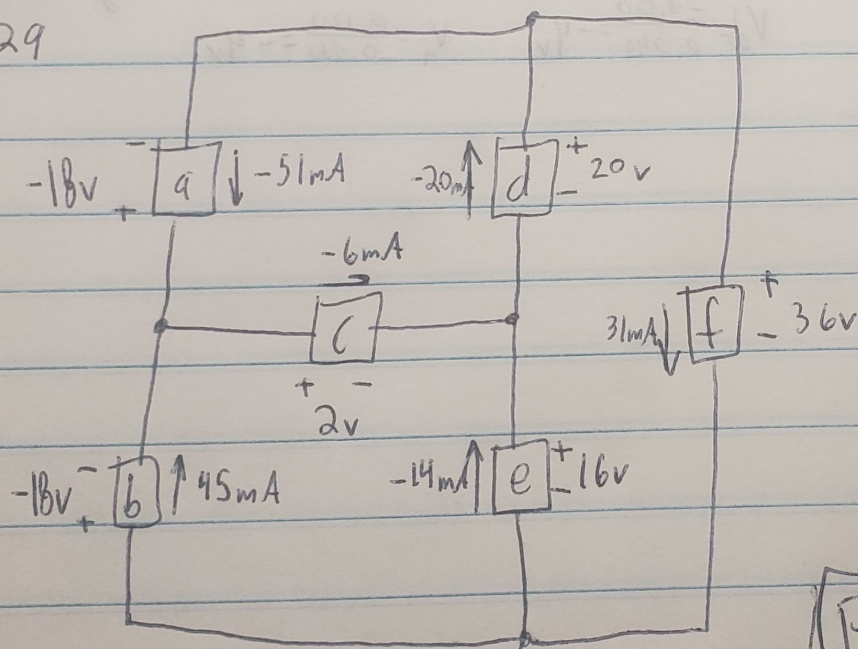
$$i(t) = \begin{cases} \frac{-2}{3}t + 24, & t < 12 \\ -4t + 64, & t \geq 12 \end{cases}$$

$$v(t) = \left(\frac{1}{4}t + 8\right)\,U(t) - \left(\frac{1}{4}t + 8\right)\,U(t-16) + 12\,U(t-16)$$

$$i(t) = \left(\frac{-2}{3}t + 24\right)U(t) - \left(\frac{-2}{3}t + 24\right)U(t-12) + (-4t + 64)\,U(t-12)$$

$$W(t) = \int v(t)\,i(t)\,dt$$

1.29

$$P_T = P_a + P_b + P_c + P_d + P_e + P_f$$

$$P_a = -18 \cdot -0.051 = 0.918$$

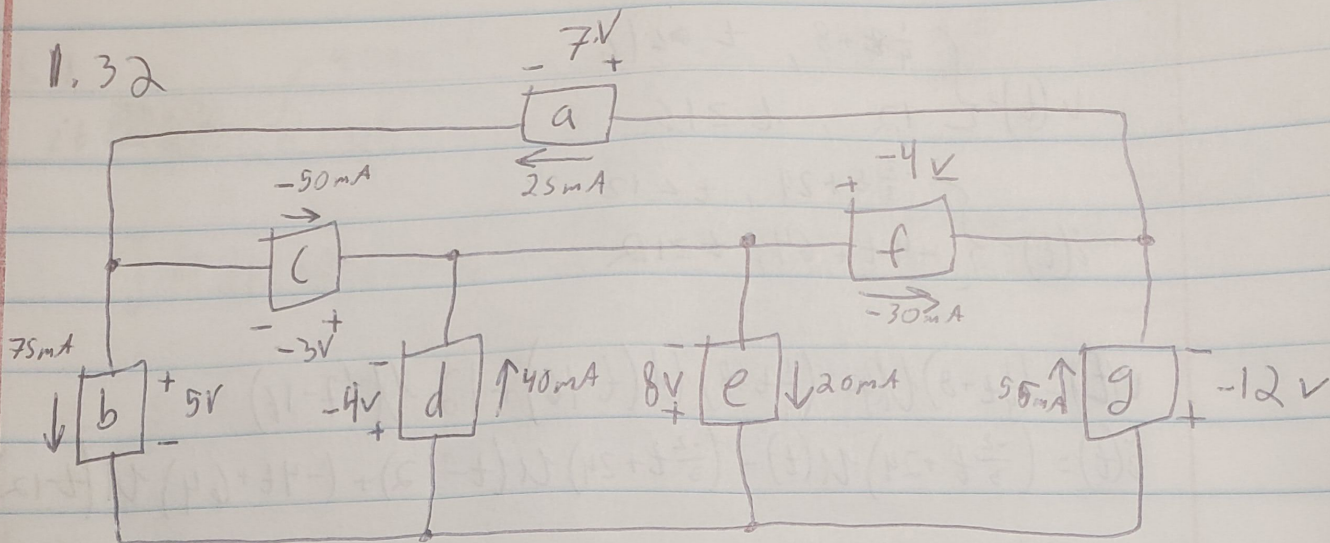$$P_b = -18 \cdot 0.045 = -0.81$$

$$P_c = 2 \cdot -0.006 = -0.012$$

$$P_d = 20 \cdot -0.02 = -0.4$$

$$P_e = 16 \cdot -0.014 = -0.224$$

$$P_f = 36 \cdot 0.031 = 1.116$$

$$\boxed{P_T = 0.588\,W}$$

1.32

b. Elements a, b, c, e, f absorb power

c. $V_a = \dfrac{0.175}{0.025} = 7v$ $V_c = \dfrac{0.150}{-0.050} = -3v$ $V_e = \dfrac{0.160}{0.020} = 8v$ $V_g = \dfrac{-0.660}{0.055} = -12v$

$V_b = \dfrac{0.375}{0.075} = 5v$ $V_d = \dfrac{-0.320}{0.040} = -4v$ $V_f = \dfrac{0.120}{-0.030} = -4v$