Test 1 – Zybooks part

1) In engineering notation, $2\text{GHz} - 250\text{MHz} =$ ___.

a. -248MHz

b. 1.975GHz

c. 1750MHz

d. 1.75GHz

$(2 \times 10^9)\text{Hz} - (250 \times 10^6)\text{Hz}$

1.75GHz

2) Current $i(t) = \frac{1}{2}e^{-t/2}$A The charge Q that passed from $t = 0$ to $t = 1$ is _____.

a. 0.61 C

b. -1.61 C

c. -0.61 C

d. 0.39 C

$$q = \int_0^1 \left(\frac{1}{2}e^{-\frac{t}{2}}\right)dt = \frac{1}{2}\int_0^1 e^{-\frac{t}{2}}\,dt \qquad u = -\frac{1}{2}t \quad du = -\frac{1}{2}$$

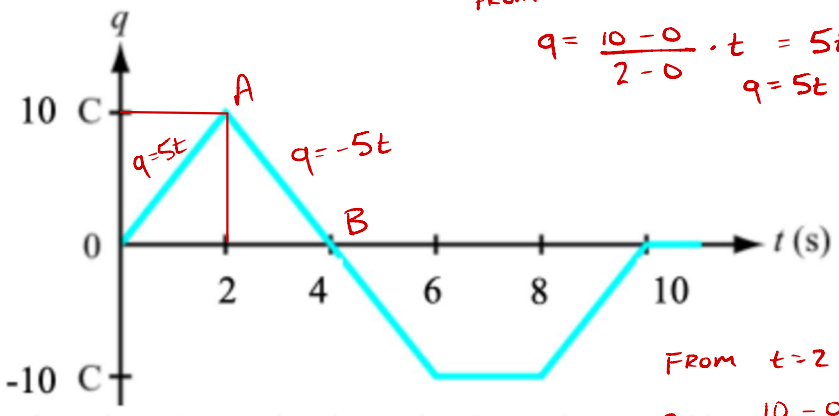
$$\rightarrow \frac{1}{2}\int_0^1 -2 \cdot e^u\,du = \frac{1}{2}\left(-2\int_0^1 e^u\,du\right)$$

$$= \frac{1}{2}\left(-2\left[e^u\right]_0^1\right)$$

$$= -e^{-\frac{t}{2}}\Big|_0^1$$

$$= \left(-e^{-\frac{1}{2}}\right) - \left(-e^{-\frac{0}{2}}\right)^0 = 0.3935\text{C}$$

3) What is the current $i(t)$ at $t = 4$ in the graph below of charge $q(t)$?



From $t=0$ to 2

$q = \frac{10-0}{2-0} \cdot t = 5t$

$q = 5t$

From $t=2$ to 4

$q = -\frac{10-0}{4-2} = -5t$

$I = \frac{dq}{dt} = \frac{d(-5t)}{dt} = -5\text{A}$

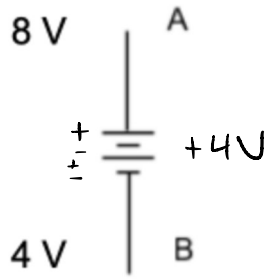
a. -10 A

b. 5 A

c. 0 A

d. -5 A

4) For the battery below, voltage V_{AB} = _____.



a. -12 V

b. -4 V

c. 12 V

d. 4 V

5) A 120V electric oven having current 4 A consumes 288 kJ of energy in _____ minutes.

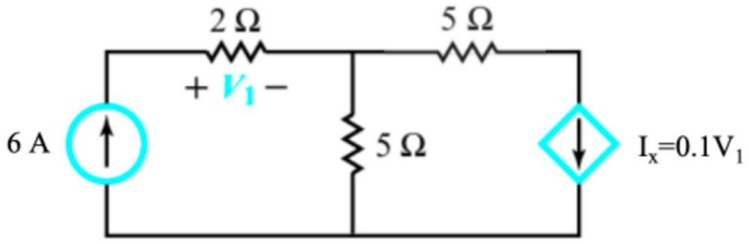
a. 10

b. 12

c. 6

d. 600

6) In the circuit below, I_x = _____ Amps, and the diamond-shaped device is a _____.



IT IS A VOLTAGE CONTROLLED CURRENT SOURCE

~~a. 0.3 A, current controlled voltage source (CCVS~~)

~~b. 1.2 A, current controlled current source (CCCS)~~

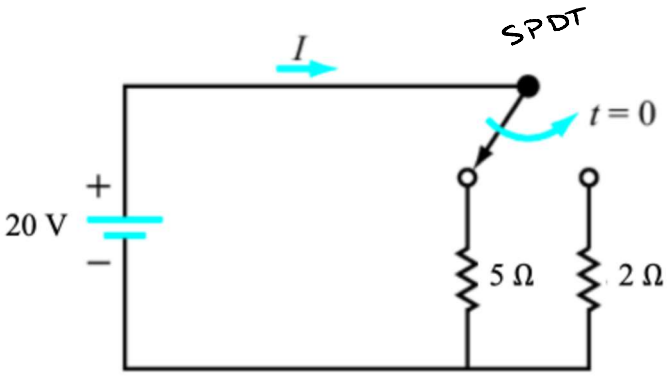
c. 0.3 A, voltage controlled current source (VCCS)

d. 1.2 A, voltage controlled current source (VCCS)

$V_1 = I R_2 = 6A \times 2\Omega$
$= 12V$

$I_x = 0.1(V_1)$
$\rightarrow 0.1(12V) = 1.2A$

7) This circuit's current I = ___Amps at $t = 3$ s, and the switch is a _____.



a. 4, SPDT

~~b. 10, SPST~~

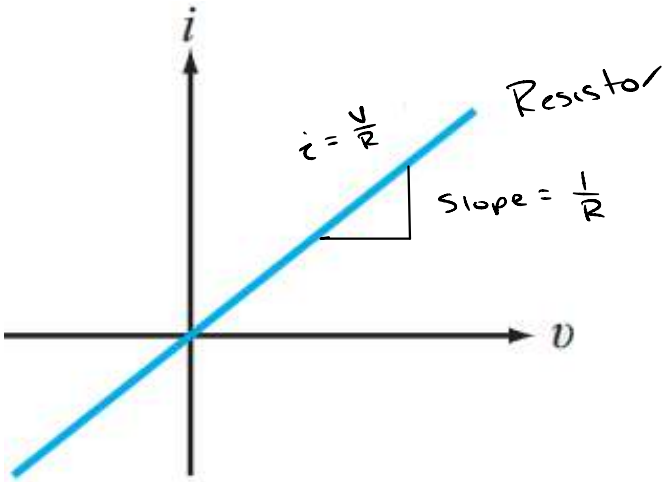
c. 10, SPDT

~~d. 4, SPST~~

$I = \frac{V}{R} = \frac{20V}{2\Omega}$

$I = 10A$

8) The curve below characterizes the behavior of a _____.



a. diode

b. resistor

c. linear voltage source

d. dependent voltage source

9) An AWG-10 (diameter 2.6 mm) copper wire 10 m long has _____ resistance vs. an AWG-14 (diameter 1.6 mm) copper wire 5 m long?

a. lower

b. higher

c. the same

d. Not enough information provided to determine.

AWG-14 ($\rho = 1.72 \times 10^{-8}$)
$d = 1.6\,mm$
$l = 5\,m$

$R = \frac{l}{\sigma A} = \rho \frac{l}{A}\ (\Omega) = (1.72 \times 10^{-8})\left(\frac{5\,m}{2.01\,mm^2}\right)$

$A = \pi r^2 = \pi (0.8\,mm)^2 = 2.01\,mm^2$

AWG-10 wire has larger diameter than the AWG-14 copper wire, lower resistance per unit length.

10) A _____ Ω resistor has color code blue, red, orange, red, as shown.

a. 52

b. 62

c. 52 k

d. 62 k

11) A cylindrical germanium resistor (resistivity $\rho = 0.47\Omega$-m) 4 mm long has cross sectional diameter 2 mm, and a power rating of 0.5 W. The maximum rated current is _____ A.

a. 2.9 m

b. 29 m

c. 83 m

d. 2.9

$\ell = 4mm$

$R = \rho \frac{\ell}{A}$

$= 0.47\,\Omega\text{-m} \times \frac{0.004\,m}{\pi(1\times10^{-3})^2} = 598\,\Omega$

$P = I^2 R \rightarrow I = \sqrt{\frac{P}{R}} \rightarrow I = \sqrt{\frac{0.5W}{598\Omega}} = 0.0289A$

12) A diode with $i - v$ curve $i \approx 2v^2$ for $0 \le v \le 1$ has _____ Ω equivalent resistance at $V = 0.5$ V .

a. 4

b. 2

c. 0.25

d. 0.5

$\frac{di}{dv} = 4v \rightarrow R = \frac{dv}{di}$

$R = \frac{1}{4(0.5)} = 0.125\Omega$

$G = \frac{di}{dv} = \frac{d(2v^2)}{dv} = \frac{4v}{dv}$ $\quad R = \frac{1}{G} = \frac{1}{4v}$

13) A resistor $R =$ _____ Ω has 50 mS conductance.

a. 2

b. 0.02

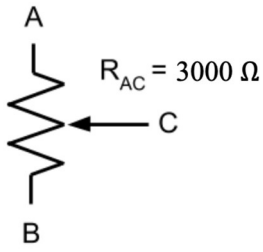
c. 20

d. 0.05

$G = \frac{1}{R}$

$R = \frac{1}{G} = \frac{1}{50mS} \rightarrow \frac{1}{0.05S} = 20\Omega$

14) Total resistance $R_{AB} =$ _____ Ω for the potentiometer below, given that the wiper C is positioned 40% of the way from A to B?



a. 7.5 k

b. 75 k

c. 12 k

d. 750

15) A _____ Ω resistor has conductance $G = 0.2$ siemens.

a. 2

b. 1/5

c. 5

d. 0.5

$$G = \frac{1}{R}$$

$$0.2 = \frac{1}{R} \cdot R$$

$$\frac{R \cdot 0.2}{0.2} = \frac{1}{0.2}$$

$$R = \frac{1}{0.2} \quad R = 5$$

16) The maximum rated current for a $220\Omega, 1$ watt resistor is _____ A.

a. 4.5 m

b. 14.8 m

c. 67 m

d. 14.8

$$P = i^2 R$$

$$i = \sqrt{\frac{P}{R}}$$

17) The maximum rated voltage for a $220\Omega, 1$ watt resistor is _____ V.

a. 1.48

b. 4.5

c. 6.7

$$V = IR$$

$$V = (0.067\,A)(220\,\Omega)$$

d. 14.8

18) A diode $i - v$ relationship for $v > 0$ is approximated by a _____ curve.

a. linear

b. quadratic

c. cubic

d. logarithmic

19) Kirchhoff's current law (KCL) demonstrates the conservation of _____, stating that the sum of all currents entering a _____ equals zero.

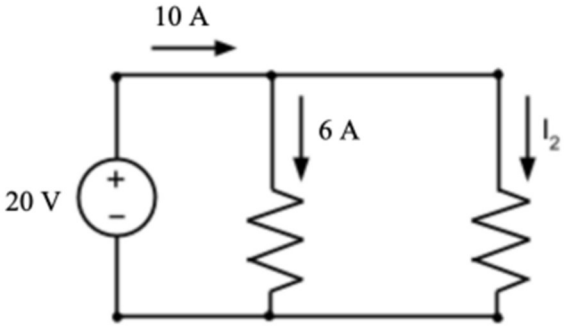
a. energy, node

b. charge, node

c. energy, loop

d. charge, loop

20) Current I_2 in the circuit below is _____A.



$10 = 6 + I_2$
$-I_2$

$10 - I_2 = 6$
$-10 \quad -10$

$-I_2 = -4$

$I_2 = 4$

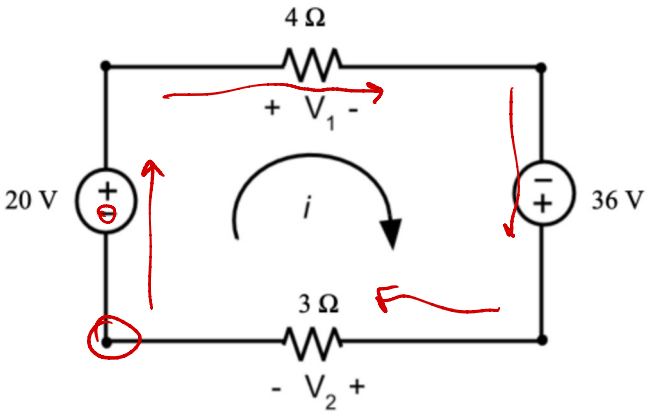
a. -4

b. 4

c. 10

d. 16

21) Current i in the circuit below is _____ A.



a. -8 A

b. 8 A

c. 2.286 A

d. -2.286 A

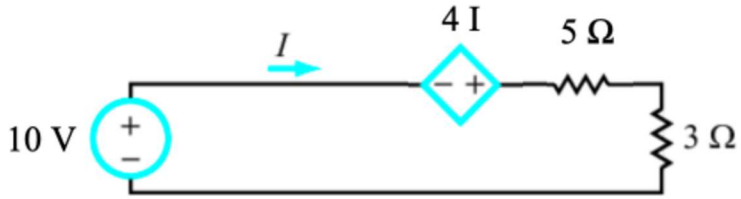
$-20 + 4I - 36 + 3I = 0$

$\frac{-56}{7} = \frac{7I}{7}$ $I = -8$

$I = 8$ $-56 = -7I$

$\frac{56}{7} = \frac{7I}{7}$

22) Current I in the circuit below is _____.



a. 2 A

b. 0.83 A

c. -2.5 A

d. 2.5 A

$-10 - 4I + 5I + 3I = 0$

$\frac{-10}{-} = -4$

$I = 2.5$ $\frac{10}{4} = I$

23) Kirchhoff's voltage law (KVL) demonstrates the conservation of _____, stating that the sum of all voltages in a _____ equals zero.

ENERGY, LOOP

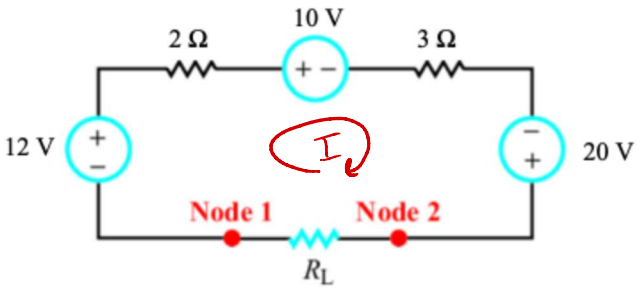
a. charge, loop

b. energy, loop

c. energy, node

d. charge, node

24) Which circuit is the simplest equivalent to the following circuit, when observed at nodes 1, 2?



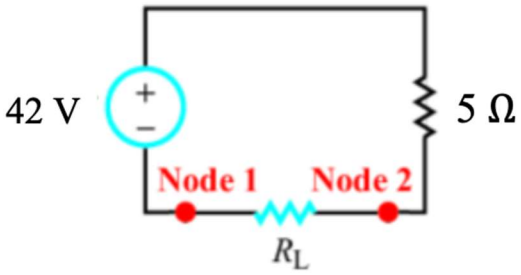
$V_{eq} = V_1 - V_2 + V_3$

$V = 12 - 10 + 20 =$

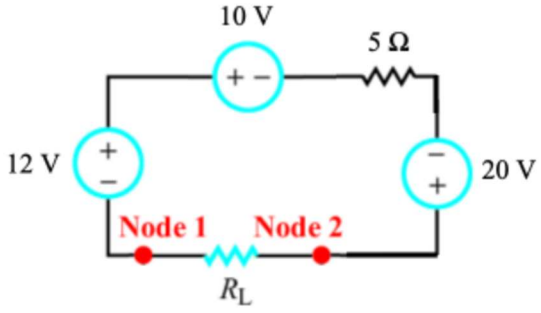
$2 + 20 = 22\,V$

$R_{eq} = R_1 + R_2 = 5\,\Omega$

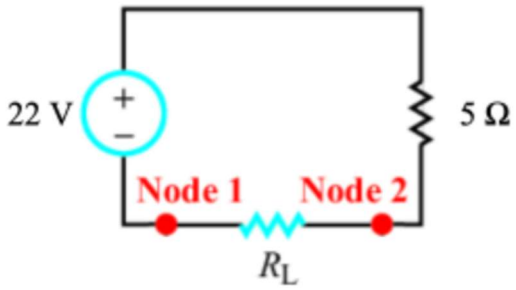
a.



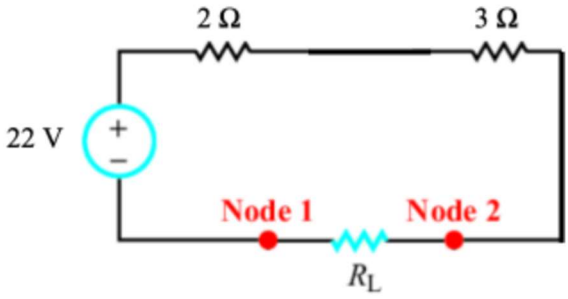
b.



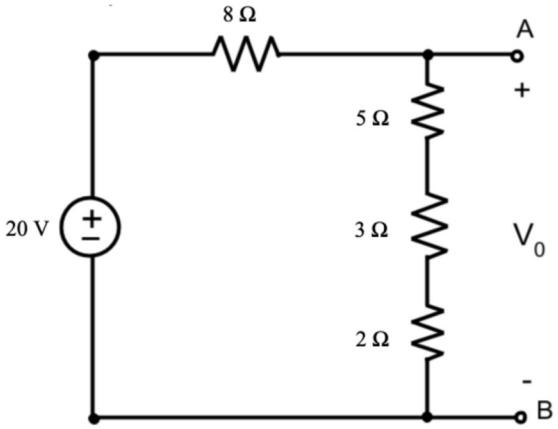
c.

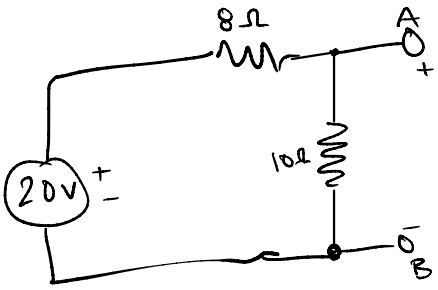


d.



25) In the circuit below, voltage V_0 = _____ V.





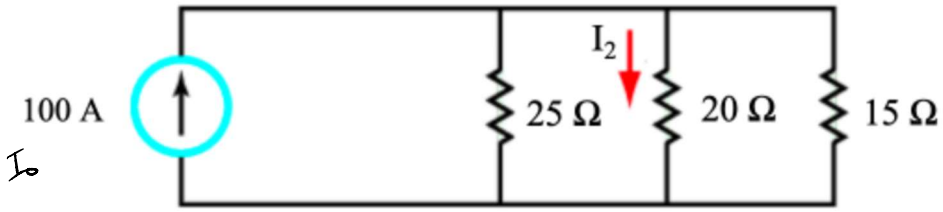
a. 8.89

b. 10

c. 11.1

d. 6

26) In the circuit below, current I_2 = _____ A.



a. 31.9 A

b. 5.0 A

c. 15.96 A

d. 68.1 A

$$I_2 = \left(\frac{R_{eq}}{R_2}\right) I_o$$

$$I_2 = \left(\frac{R_2}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}\right) 100\,A$$

27) A current source I_s in parallel with a resistor R is equivalent to a _____.

a. voltage source $V_s = I_s R$ in parallel with R

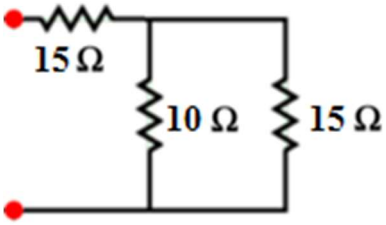
b. voltage source $V_s = I_s R$ in series with R

c. voltage source $V_s = I_s / R$ in parallel with R

d. voltage source $V_s = I_s / R$ in series with R

28) The total equivalent resistance in the circuit below is _____ Ω.

2.4.6



a. 4.29

b. 17.5

c. 21.0

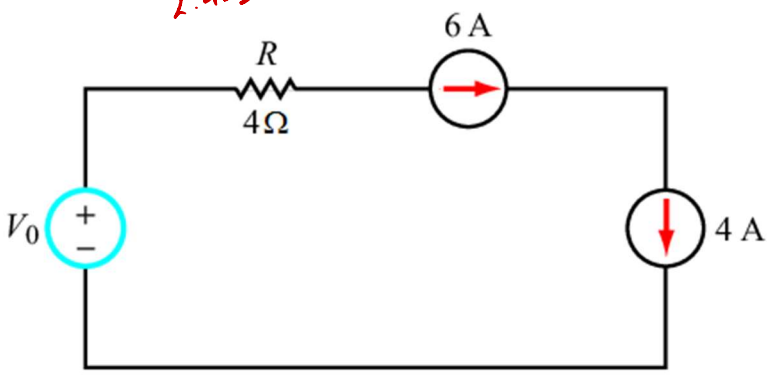
d. 40.0

$$R_{eq} = 15\,\Omega + \frac{10 \cdot 15}{10+15}$$

$$= 21.0$$

29) The resistor's current in the circuit below is _____ A.

2.4.3



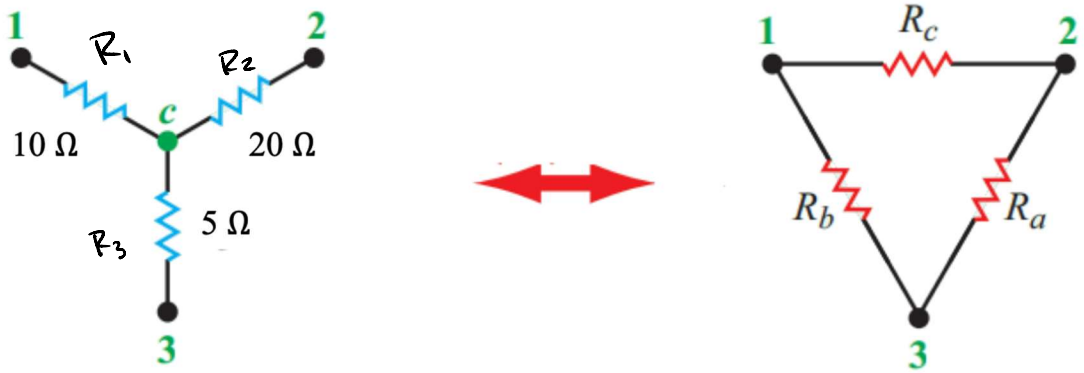
a. 4

b. 6

c. 10

d. undeterminable

30) For the Δ equivalent circuit of the Y-circuit below, R_c = _____ Ω.



a. 5.71

b. 70

c. 30

d. 75

$$R_c = \frac{R_1R_2 + R_2R_3 + R_1R_3}{R_3} \rightarrow \frac{(10)(20) + (20)(5) + (10)(5)}{5}$$

31) For the Y-equivalent circuit of the Δ -circuit below, R_2 = _____ Ω.

$$R_2 = \frac{R_a R_c}{R_a + R_b + R_c} \rightarrow \frac{(16)(25)}{16 + 30 + 25} = 5.63$$

a. 54.3

b. 41.0

c. 9.76

d. 5.63

32) The wye-delta transformation is a circuit simplification tool to combine resistors that are _____.

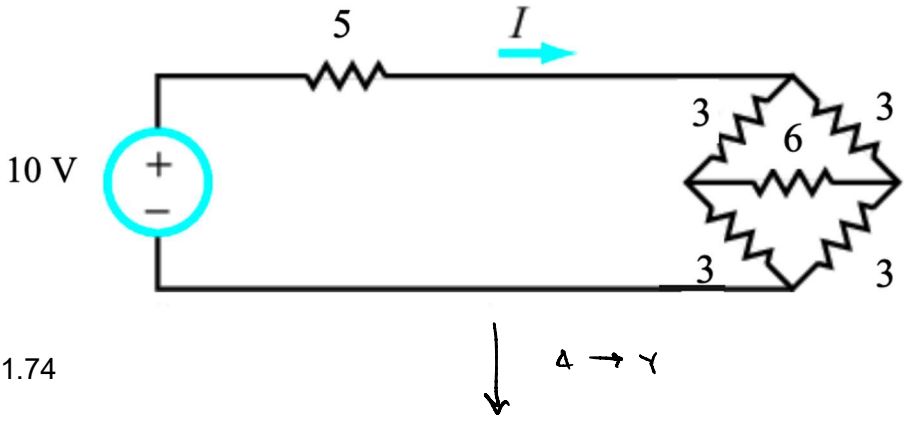
a. neither in series nor parallel

b. both in series and parallel

c. in series

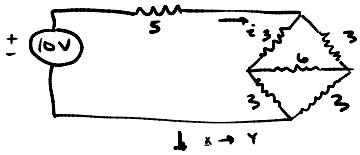
d. in parallel

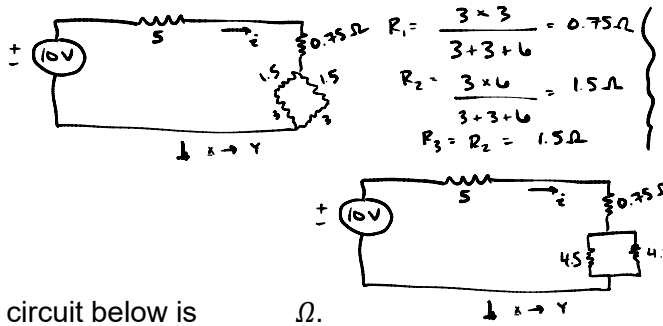
33) The current I in the circuit below is _____ A. All resistances are in ohms.



a. 1.74

Δ → Y



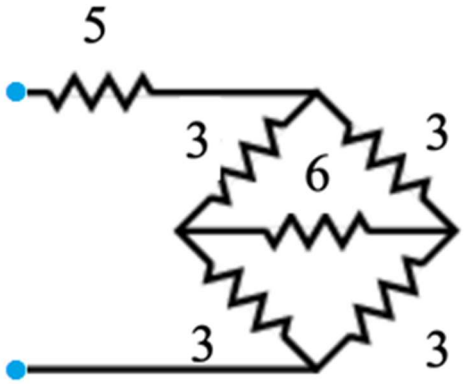


b. 1.14

c. 0.5

d. 1.25

34) Total equivalent resistance of the circuit below is _____ Ω.



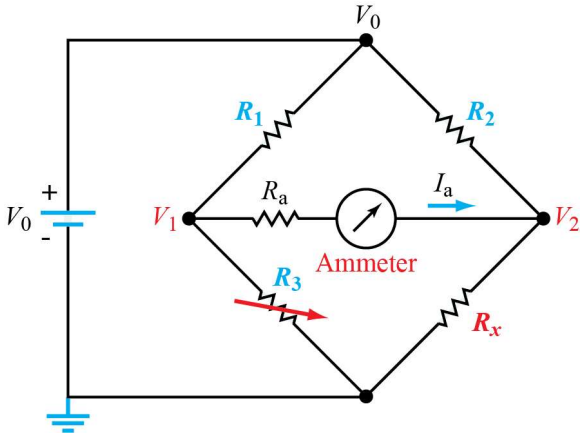
a. 3

b. 8

c. 20

d. 23

35) $R_x =$ _____ to balance the bridge below.



$$\frac{R_3 V_0}{R_1 + R_3} = \frac{R_x V_0}{R_2 + R_x}$$

$$\frac{R_1 V_0}{R_1 + R_3} = \frac{R_2 V_0}{R_2 + R_x}$$

$$\frac{R_3}{R_1} = \frac{R_x}{R_2}$$

$$R_x = \left(\frac{R_2}{R_1}\right) R_3 \quad \text{balanced}$$

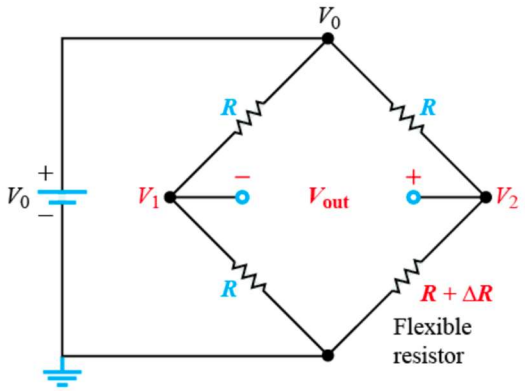
a. $\frac{R_1 R_2}{R_3}$

b. $\frac{R_1 R_a}{R_2}$

c. $\frac{R_1 R_3}{R_2}$

d. $\frac{R_2 R_3}{R_1}$

36) Given $V_0 = 4\text{V}, R = 1\text{k}\Omega$, and $\Delta R = 2\text{k}\Omega$ for the bridge below, V_{out} = _____ V.



$$V_1 = \frac{V_0 R}{R+R} = \frac{V_0}{2}$$

$$V_2 = \frac{V_0(R+\Delta R)}{R+(R+\Delta R)} = \frac{V_0(R+\Delta R)}{2R+\Delta R}$$

$$V_{out} = \frac{V_0}{4}\left(\frac{\Delta R}{R}\right)$$

$$\Delta R = 4 \times R \times \frac{V_{out}}{V_0}$$

$$= 4 \times 1000 \times \frac{2}{4}$$

$$= 2000\,\Omega$$

$$1 \times \frac{2k\Omega}{4}$$

$$2$$

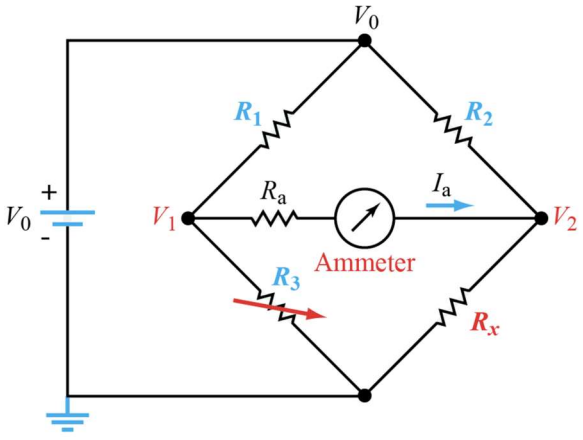
a. 0

b. -1

c. 2

d. 1

37) For the circuit below with $R_1 = 15\Omega, R_2 = 12\Omega$, and $R_x = 6\Omega, R3 =$ _____Ω to balance the bridge.



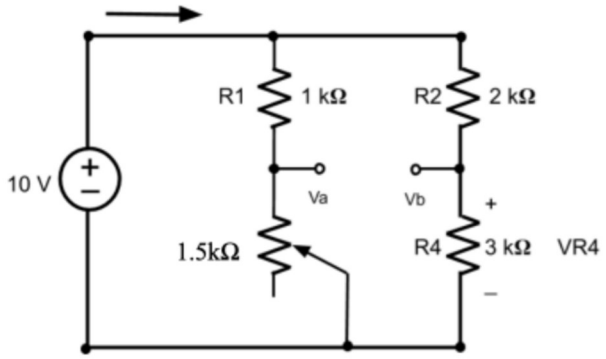
a. 4.8

b. 30

c. 7.5

d. 3.5

38) If the potentiometer slider below is adjusted to the bottom to yield $1.5\text{k}\Omega$, then $V_{ab} = V_a - V_b$ = _____.



a. 6 V

b. 0 V

c. 4.29 V

d. 5.71 V

$V_a = 10 \frac{R_3}{R_1 + R_3} = 10 \frac{1.5}{2.5} = 6V$

$V_b = 10 \frac{R_4}{R_2 + R_4} = 10 \frac{3}{5} = 6V$

$6 - 6 = 0$

39) Which circuit element would produce a linear current-voltage response?

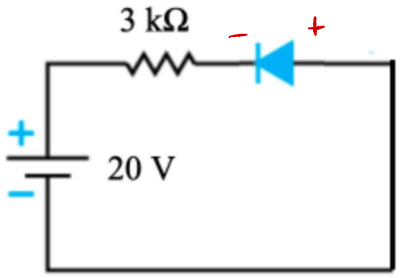
a. Fuse

b. Light bulb

c. Resistor

d. LED

40) In the circuit below, the diode's _____ is electrically closer to the positive end of the voltage source, making the diode _____ biased.



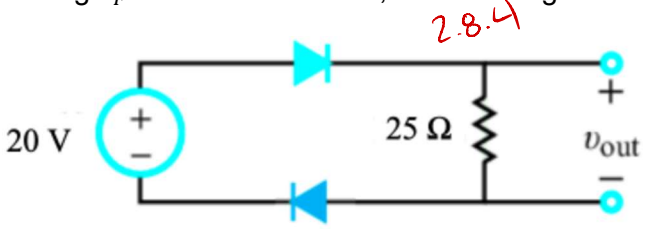
a. anode, reverse

b. cathode, reverse

c. anode, forward

d. cathode, forward

41) Assuming $V_F = 0.7$ V for a diode, the following circuit has v_{out} = _____ V.



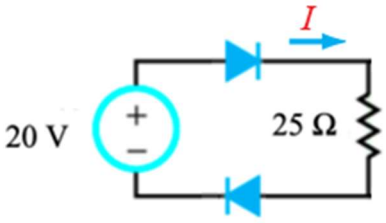
a. 18.6 V

b. 0 V

c. 19.3 V

d. 20 V

42) Assuming $V_F = 0.7$ V for a diode, the following circuit has current I = _____ A.



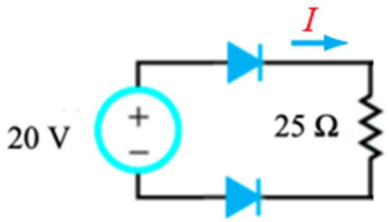
a. 0

b. 0.744

c. 0.8

d. -0.8

43) Assuming $V_F = 0.7$ V for a diode, the following circuit has current I = _____ A.



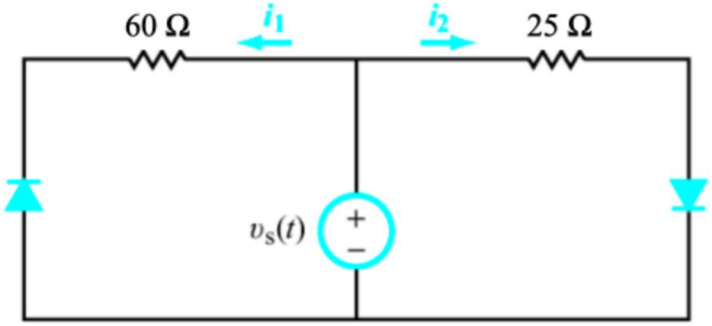
a. 0

b. 0.744

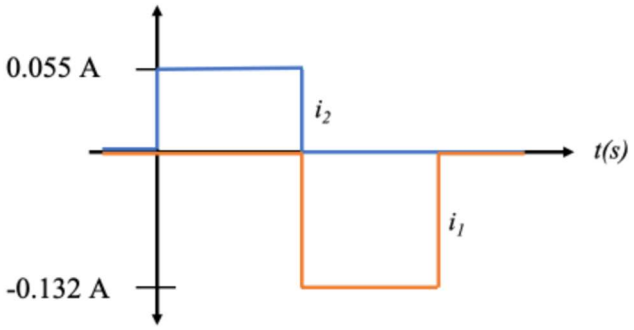
c. 0.8

d. -0.8

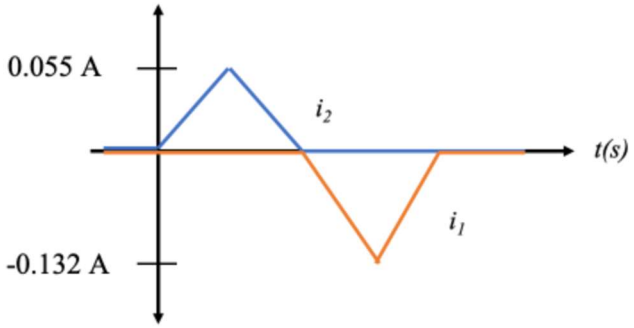
44) Assuming $V_F = 0.7$ V for a diode, and $v_s(t)$ is a square wave supply with an amplitude ± 4 V, which plot correctly represents currents i_1 and i_2 for the circuit below?



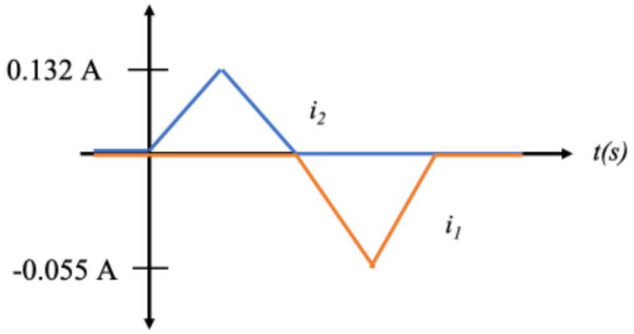
a.


0.055 A
i_2
$t(s)$
i_1
-0.132 A

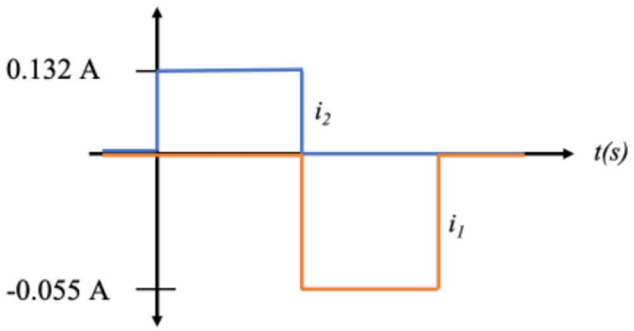
b.


0.055 A
i_2
$t(s)$
i_1
-0.132 A

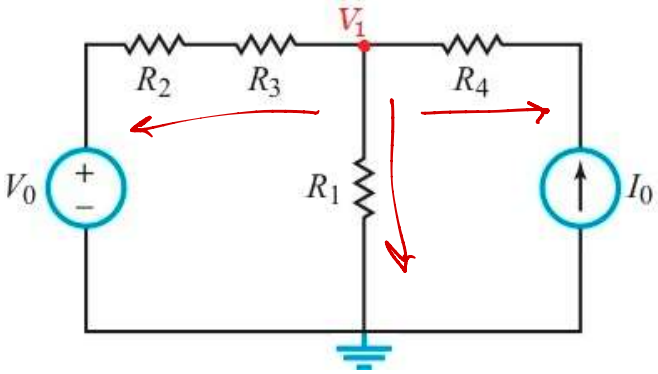
c.


0.132 A
i_2
$t(s)$
i_1
-0.055 A

d.


0.132 A
i_2
$t(s)$
i_1
-0.055 A

45) The unsimplified nodal equation for the circuit below is _____.



$\frac{V_1 - V_0}{R_2+R_3} + \frac{V_1}{R_1} + \frac{V_1 - I_0}{R_4}$

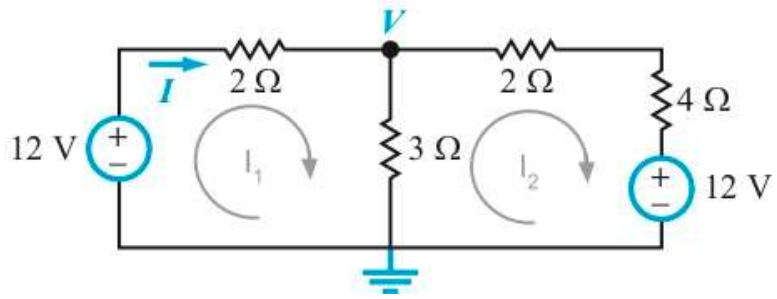
a. $\frac{V_1-V_0}{R_2+R_3} + \frac{V_1}{R_1} + \frac{V_1-I_0}{R_4} = 0$

b. $\frac{V_1-V_0}{R_2+R_3} + \frac{V_1}{R_1} + I_0 = 0$

c. $\frac{V_1-V_0}{R_2+R_3} + \frac{V_1}{R_1} - I_0 = 0$

d. $\frac{V_1-V_0}{R_2+R_3} + \frac{V_1}{R_1} + \frac{V_1}{R_4} = 0$

46) The following circuit yields nodal equation _____ and current I = _____ A.



KCL at node V

$\frac{V-12}{2} + \frac{V}{3} + \frac{V-12}{2+4} = 0$

$V\left(\frac{1}{2}+\frac{1}{3}+\frac{1}{6}\right) = \frac{12}{2}+\frac{12}{6}$

$6+2$

$V = 8$ V

$I = -\frac{(V-12)}{2} = -\frac{(8-12)}{2} = 2$ A

a. $(3+2+4)I_2 - 3(I_2 - I_1) = 12$,2

b. $\frac{V-12}{2} + \frac{V}{3} + \frac{V-12}{6} = 0$, 8

c. $\frac{V-12}{2} + \frac{V}{3} + \frac{V-12}{6} = 0$, 2

d. $\frac{V-12}{2} + \frac{V}{3} + \frac{V-12}{2} = 0$, 8

47) A supernode consists of two nodes surrounding only a _____.

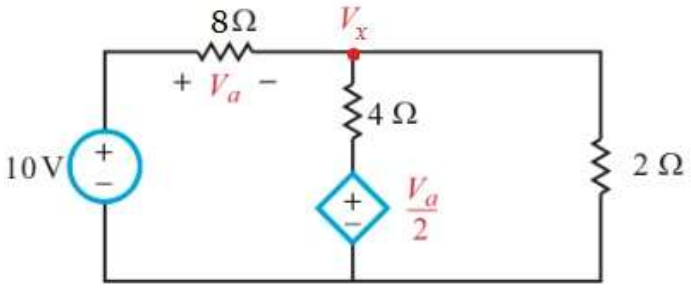
a. voltage source

b. current source

c. conductor

d. resistor

48) The following circuit's nodal equation is _____ and voltage V_x = _____ V.



$\frac{V_x - 10}{8} + \frac{V_x - \frac{V_a}{2}}{4} + \frac{V_x}{2} = 0$

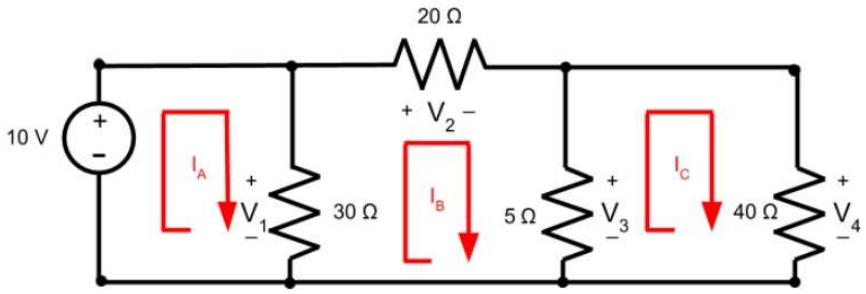
a. $\frac{V_x}{8} + \frac{V_x}{4} + \frac{V_x}{2} = 10 + \frac{V_a}{2}, V_x = 2.5$

b. $\frac{V_x - 10}{8} + \frac{V_x - V_a/2}{4} + \frac{V_x}{2} = 0, V_x = 2.5$

c. $\frac{V_x}{8} + \frac{V_x}{4} + \frac{V_x}{2} = 10, V_x = 8.75$

d. $\frac{V_x - 1}{8} + \frac{V_x - V_a/2}{4} + \frac{V_x}{2} = 0, V_x = 8.75$

49) The unsimplified mesh equation for I_B is _____.



$30(I_B - I_A) - 20I_B - 5(I_B - I_C) = 0$

$I_B(30 - 20 - 5) - 30I_A + 5I_C = 0$

$5I_B - 30I_A + 5I_C = 0$

$30(I_B - I_A) - 20I_B - 5(I_B - I_C) = 0$

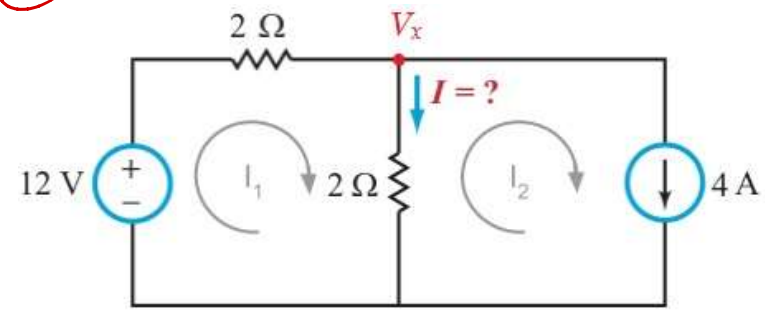
a. $30I_A + 20I_B + 5I_C = 0$

b. $30(I_B - I_A) - 20I_B + 5(I_B - I_C) = 0$

c. $\frac{30}{V_1} + 20I_B + 5(I_B - I_C) = 0$

d. $30(I_B - I_A) + 20I_B + 5(I_B - I_C) = 0$

50) The following circuit's mesh analysis equation is _____ and current I = _____ A.



a. $-12 + 4I_1 - 2I_2 = 0, I = 1$?

b. $12 + 2I_1 + 2(I_1 - I_2) = 0, I = 9$

c. $\frac{V_x - 12}{2} + \frac{V_x}{2} + 4 = 0, I = 1$

d. $\frac{V_x - 12}{2} + \frac{V_x}{2} + 4 = 0, I = 2$

$\frac{V_x - 12V}{2} + \frac{V_x}{2} + V_x -$

$4I_1 - 2I_2 = 12$, $I_2 = 4A$

$4I_1 - 2(4) = 12$

$4I_1 - 8 = 12$

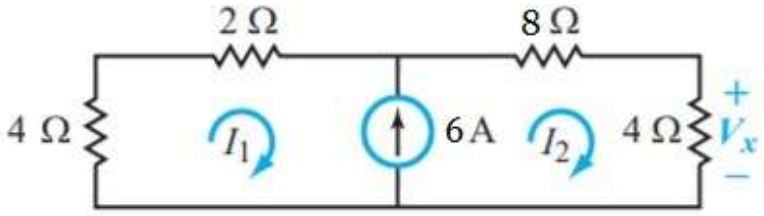
$+8 \quad +8$

$\frac{4I_1}{4} = \frac{20}{4}$ $I_1 = 5$

$I = I_1 - I_2$

$= 5 - 4 = 1A$

51) The following circuit's mesh analysis equation is _____ and current I_1 = _____ A.



$6I_1 + 12I_2$

a. $6I_1 + 12I_2 = 6, I_1 = -4$

b. $I_2 - I_1 = 6, I_1 = 2$

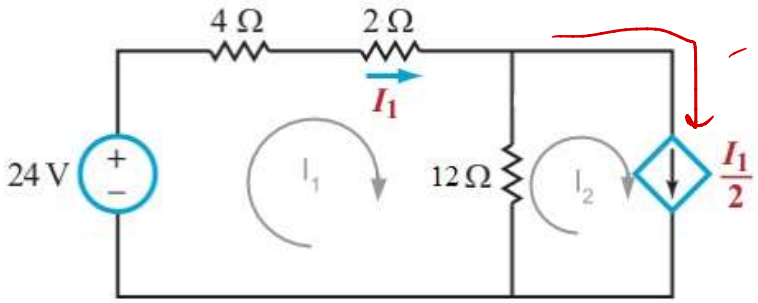
c. $6(I_1 - 6) + 12(I_2 + 6) = 0, I_1 = 2$

d. $6I_1 + 12I_2 = 0, I_1 = -4$

$I_1(4 + 2) + (8+4)I_2 = 0$

$I_2 - I_1 = 6A$

52) The following circuit's mesh analysis equation is _____ and current I_1 = _____ A.



a. $-24 + 6I_1 + 12(I_1 - I_1/2) = 0, I_1 = 2$

b. $-24 + 6I_1 + 12(I_1 + I_1/2) = 0, I_1 = 1$

~~c. $-24 + 6I_1 - 12(I_1 + I_1/2) = 0, I_1 = -2$~~

~~d. $24 + 6I_1 + 12(I_1 - I_1/2) = 0, I_1 = -2$~~

4+2+12 = 18

$I_1 : 18I_1 - 12I_2 = 24V$

53) Conductance G is the _____ of resistance R .

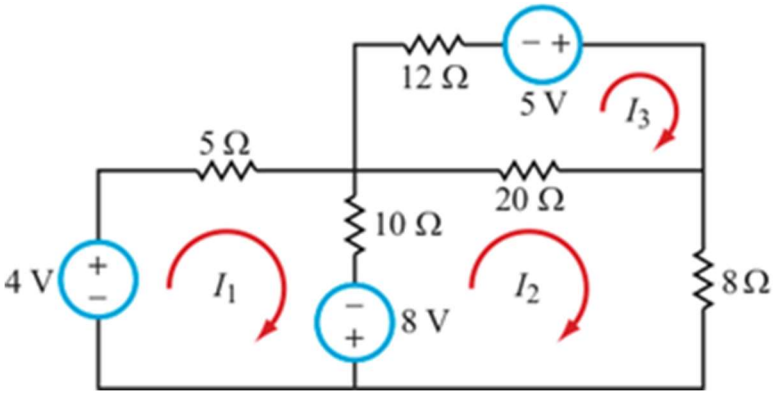
a. reciprocal

b. square root

c. negative

d. absolute value

54) The second row (for mesh I_2) of the resistance matrix for mesh analysis by-inspection on this circuit is _____.



$R_{11} = 5+10 = 15\Omega$

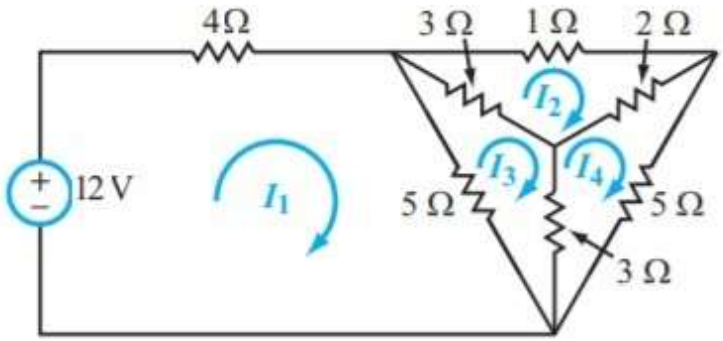
a. -10 38 -20

b. 15 -10 0

c. -1/10 1/38 -1/20

d. 10 20 6

55) The mesh-current matrix equation that describes this circuit is _____.



a.

$$\begin{bmatrix} 9 & 0 & -5 & 0 \\ 6 & 0 & -3 & -2 \\ 11 & -5 & -3 & -3 \\ 10 & 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} 12 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 9 & 0 & -5 & 0 \\ 0 & 6 & -3 & -2 \\ -5 & -3 & 11 & -3 \\ 0 & -2 & -3 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} 12 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

b.

$$\begin{bmatrix} 9 & 0 & -5 & 0 \\ 0 & 6 & -3 & -2 \\ -5 & -3 & 11 & -3 \\ 0 & -2 & -3 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} 12 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

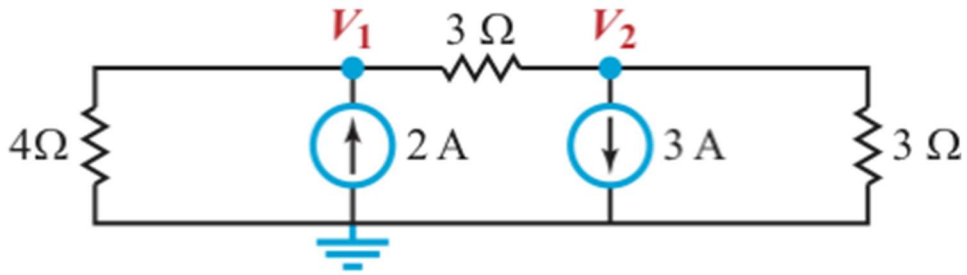
c.

$$\begin{bmatrix} 9 & 0 & -5 & 0 \\ 0 & 6 & -3 & -2 \\ -5 & -3 & 11 & -3 \\ 0 & -2 & -3 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} -12 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

d.

$$\begin{bmatrix} 9 & 0 & -2 & -1 \\ 0 & 6 & -5 & -4 \\ -2 & -5 & 11 & -1 \\ -1 & -4 & -1 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix} = \begin{bmatrix} 12 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

56) The first row of the nodal analysis by inspection conductance matrix of this circuit is _____.



a. $4, -3$

b. $\frac{1}{7}, -\frac{1}{3}$

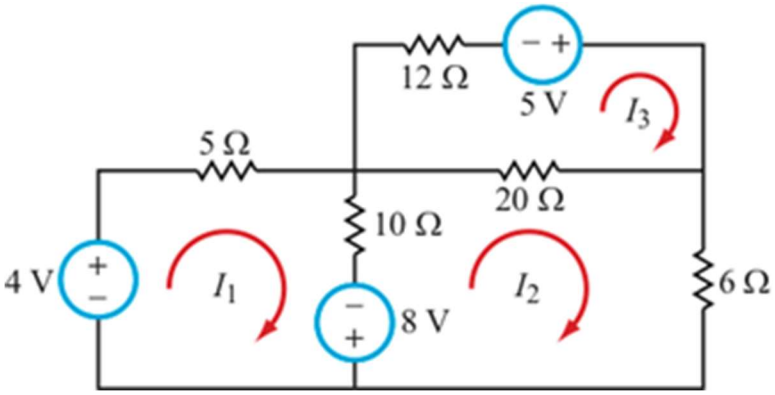
c. $7, -3$

d. $\frac{7}{12}, -\frac{1}{3}$

$G_{11} = \frac{1}{4} + \frac{1}{3} = \frac{7}{12}$

$G_{12} = -\frac{1}{3}$

57) The source vector (for meshes 1, 2, and 3) for by-inspection analysis on this circuit is _____.



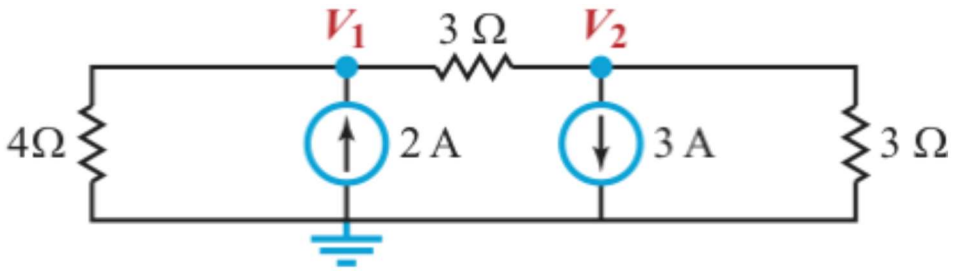
a. 12 -8 5

b. 4 -8 -5

c. -4 -8 5

d. 12 8 5

58) The source vector in the nodal analysis by inspection of this circuit is _____.



a. $2, -3$

b. $2,3$

c. $-2,3$

d. $V_1, \; V_2$

59) In source-superposition analysis, all voltage sources except the one being analyzed are replaced with _____.

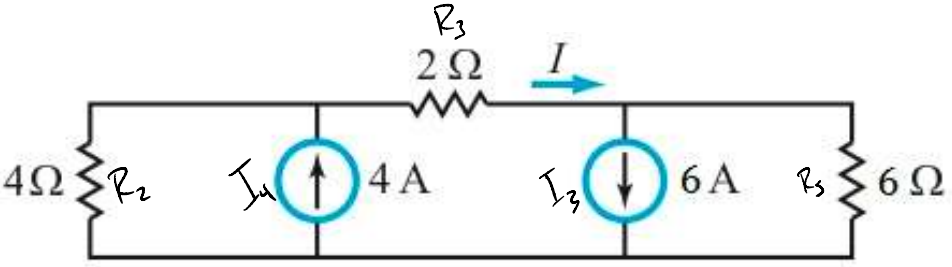
a. the sum of all voltage sources

b. an open circuit

c. a short circuit

d. current sources

60) In the superposition method, the current through the 2Ω resistor is calculated as $I =$ _____ A.



a. $4/3 + 3$

b. $4 + 6$

c. $4/3 - 3$

d. $4 - 6$

$I = I_4 + I_3$

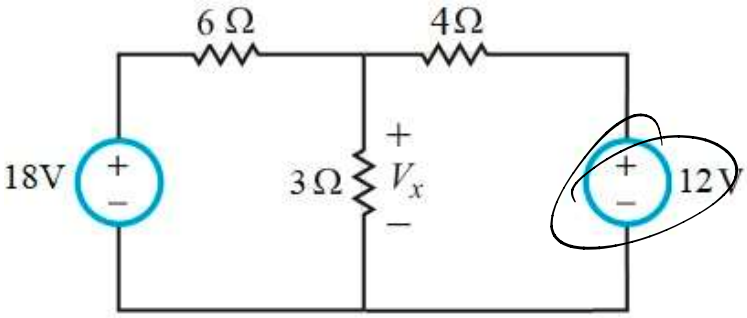
$I_4 = \frac{R_2}{R_2+R_3+R_5} \times 4$

$I_4 = \frac{4}{4+2+6} \times 4 = 1.333$

$I_3 = \frac{R_5}{R_2+R_3+R_5} \times 6$

$= \frac{6}{4+2+6} \times 6 = 3$

61) Using the superposition method, the voltage across the 3Ω resistor from only the 12 V source is $V_x =$ _____ V.



$V_{x_1} = 18 \times \frac{3}{3+6} = 6V$

$V_{x_2} = 12 \times \frac{3}{3+4} = 5.14V$

$6 + 5.14V =$

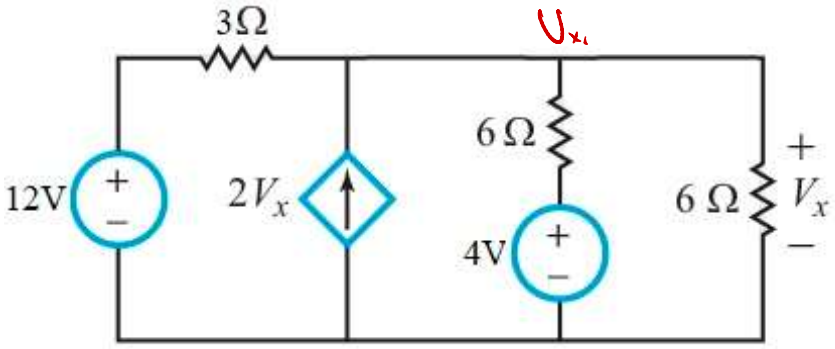
a. 3

b. 4

c. 36/7

d. 6

62) Using the superposition method, the voltage V_x from the 4 V source alone is _____ V.



a. 1

b. 0.25

c. 1.75

d. 1.5

63) In source-superposition analysis, all current sources except the one being analyzed are replaced with _____.

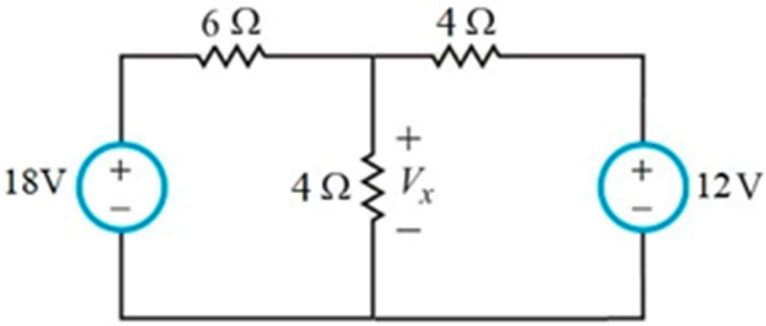
a. the sum of all current sources

b. an open circuit

c. a short circuit

d. voltage sources

64) Using the superposition method, the voltage across the 3Ω resistor is calculated as $V_x =$ _____ V.



$4\Omega \| 4\Omega = \frac{4\times4}{4+4} = \frac{16}{8} = 2\Omega$

$V_1 = \frac{2\times18V}{2+6} = \frac{36}{8} = 4.5V$

$6\Omega \| 4\Omega = \frac{6\times4}{6+4} = \frac{24}{10} = 2.4\Omega$

$V_2 = \frac{2.4\times12}{2.4+4} = \frac{28.8}{6.4} = \frac{9}{2} = 4.5V$

$V_x = V_1 + V_2$

$V_x = 4.5 + 4.5$

a. $4(18+12)/(6+4+4)$

b. $4.5 + 4.5$

c. $5 + 4$

d. $6 + 3$

65) To provide the highest possible voltage across the load of a Thévenin circuit, the load resistance should be _____.

a. zero

b. large

c. equal to the Thevenin resistance

d. 0.707 times the Thèvenin resistance

66) The Thévenin equivalent voltage of a two-terminal circuit is $V_{\text{Th}} =$ _____.

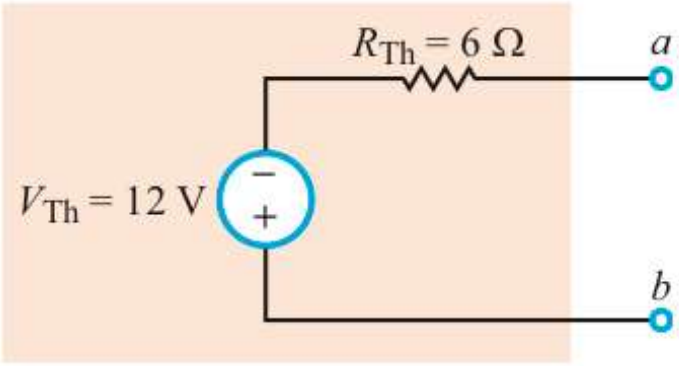
a. equivalent resistance of the circuit R_{Th} times the current through the load, \ $\boldsymbol{I_L}$

b. load resistance R_L times the current through the load $\boldsymbol{I_L}$

c. the short-circuit current $\boldsymbol{i_{sc}}$ times load resistance R_L

d. The open circuit voltage V_{OC} measured at the terminals

67) The Norton equivalent for the circuit shown is:



a. $i_N = -12A, R_N = 6\Omega$

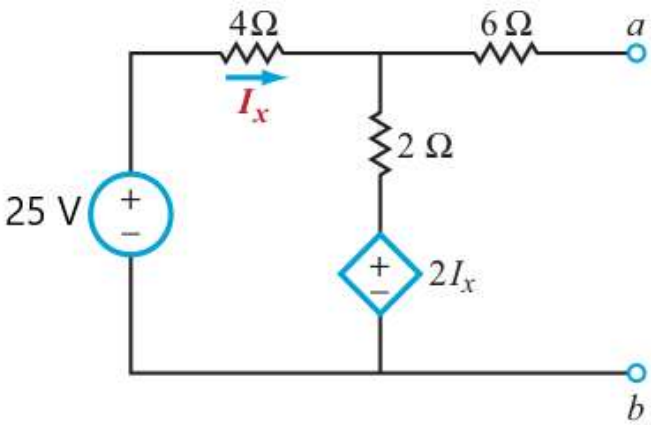
b. $i_N = -2A, R_N = 6\Omega$

$i_N = \frac{V_{TH}}{R_{TH}} = \frac{12}{6}$

c. $i_N = -72A, R_N = 3\Omega$

d. $i_N = 2A, R_N = 72\Omega$

68) For the circuit below, Thévenin resistance $R_{\text{Th}} =$ _____ Ω .



$-25 + 4I_1 + 2I_2 + 2I_x = 0$

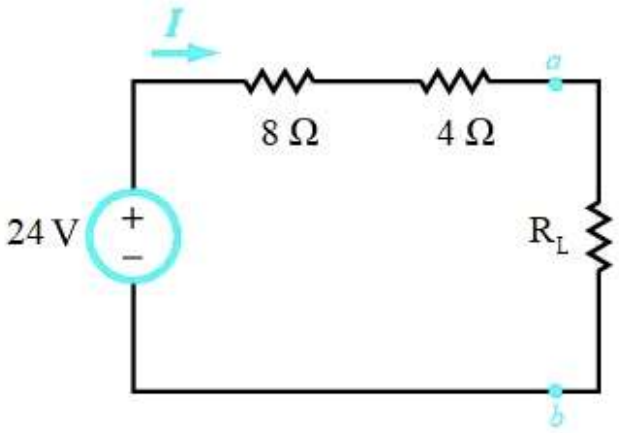
a. 7

b. 7.33

c. 8

d. 10

69) In the circuit below, the maximum power possible in the load resistor R_L is _____ W.



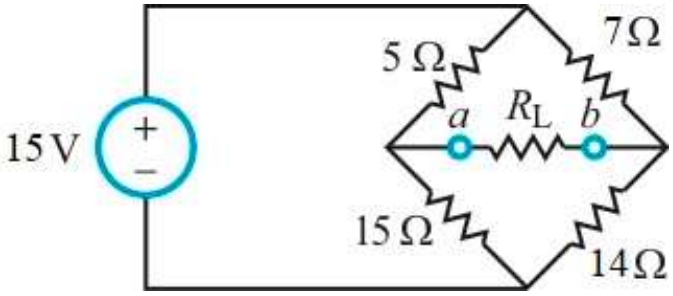
a. 3

b. 12

c. 24

d. 48

70) In the circuit below, maximum load power occurs for load resistor $R_L =$ _____ Ω .



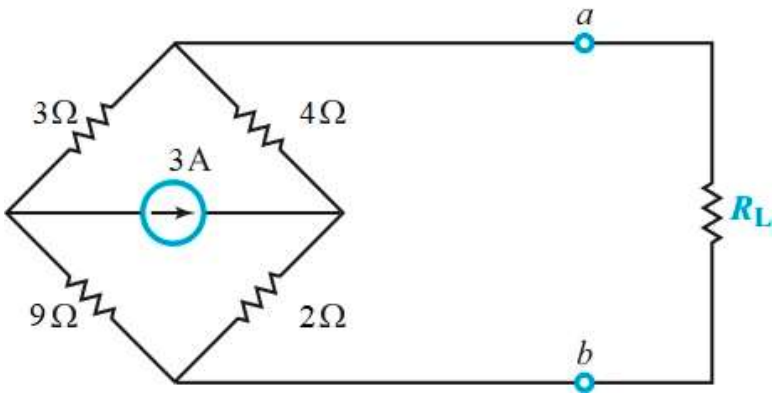
a. 6.25

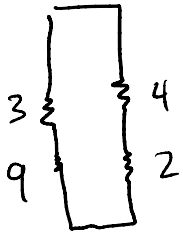
b. 8.4167

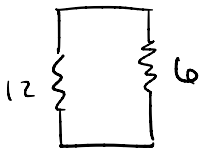
c. 15

d. 41

71) In the circuit below, maximum load power occurs for load resistor $R_L =$ _____ Ω .







12116

$\frac{12 \times 6}{12+6} = 4$

a. 9

b. 3.35

c. 4

d. 18

$(4+3)I_1 = (9+2)I_2$

$I_1 + I_2 = 0.002A$

$\frac{7I_1}{7} = \frac{11I_2}{7}$

$I_1 = \frac{11I_2}{7}$ $\quad \frac{11I_2}{7} + I_2 = 0.002A$

$\frac{11(0.7)}{7} = 1.1$ $\quad I_2 = 0.7mA$

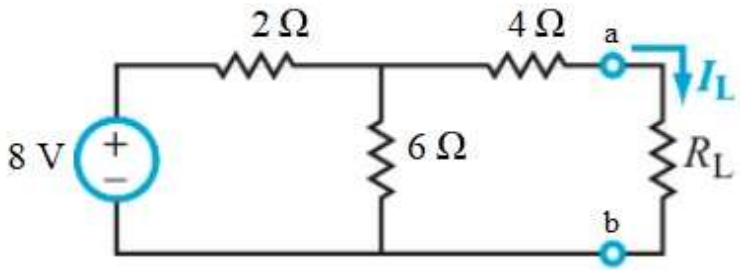
$I_1 = 1.1mA$

$V_{ab} = (-4I_1 + 2I_2) \times 10^3$

$= -4 \times 1.1 + 2 \times 0.7 = -3$

$V = IR$

72) In the circuit below, the maximum voltage is _____ V at terminals (a) and (b) for any value of R_L , and the maximum power possible for any R_L is _____ W.



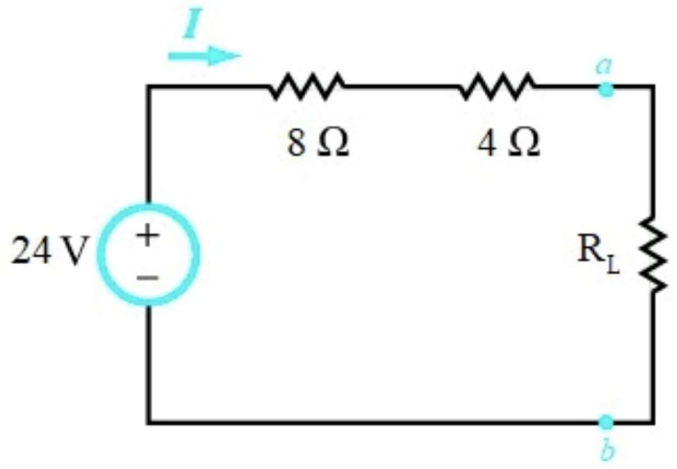
a. 2 V, 0.73 W

b. 4 V, 0.73 W

c. 6 V, 1.64 W

d. 6 V, 0.82 W

73) In the circuit below, maximum load power occurs for load resistor $R_L =$ _____ Ω .



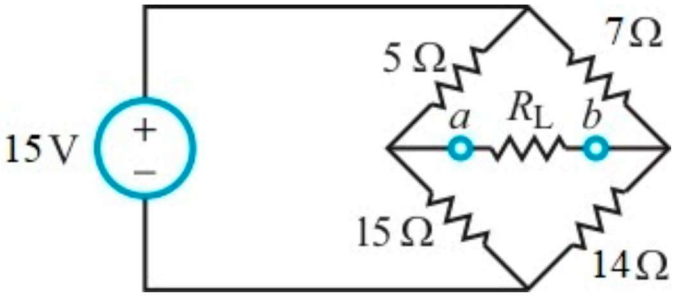
a. 4

b. 8

c. 12

d. 24

74) In the circuit below, the maximum power possible in the load resistor R_L is _____ W.



$V_1 = 15 + \frac{V_1}{}$

a. 0.0464

b. 6.683

c. 8.4167

d. 225