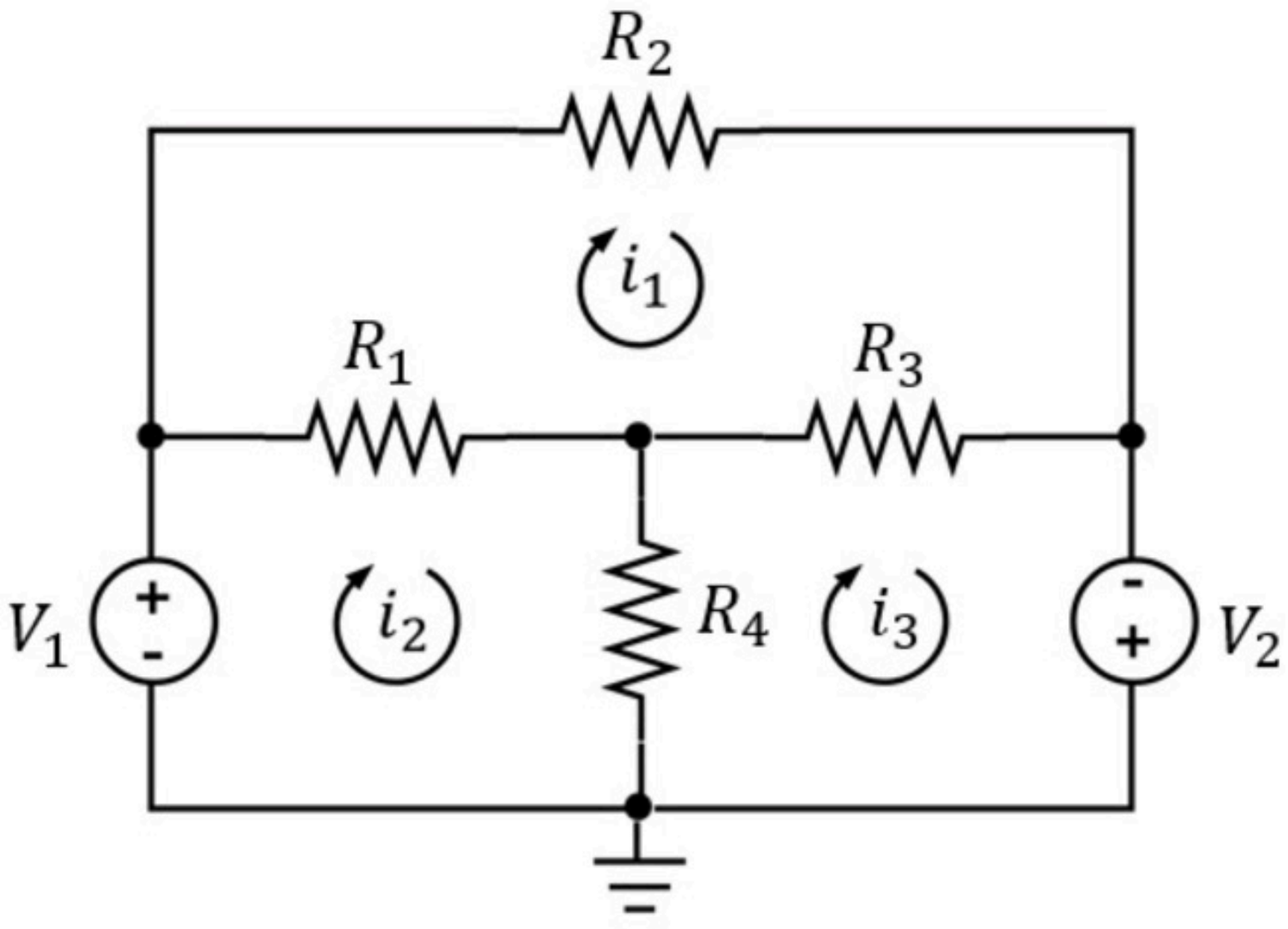
Nodal Mesh 006

Problem has been graded.

Find the mesh currents i_1, i_2, and i_3.



Given Variables:

R1 : 1 ohm

R2 : 1 ohm

R3 : 2 ohm

R4 : 1 ohm

V1 : 4 V

V2 : 3 V

Calculate the following:

i1 (A) :

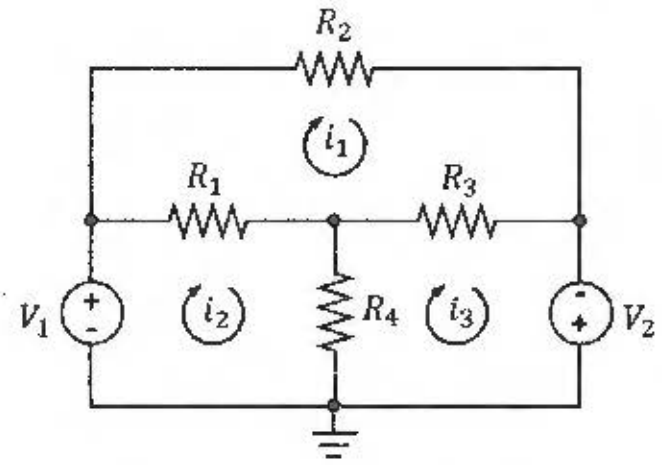
---

i2 (A) :

---

i3 (A) :

Find the mesh currents i_1, i_2, and i_3.



R1 = 1 Ω

R2 = 1 Ω

R3 = 2 Ω

R4 = 1 Ω

V1 = 4 V

V2 = 3V

⊗ MESH 1 : $1 \cdot i_1 + 2(i_1 - i_3) + 1(i_1 - i_2) = 0 \Rightarrow 4i_1 - i_2 - 2i_3 = 0$ (1)

⊗ MESH 2 : $-4 + 1(i_2 - i_1) + 1 \cdot (i_2 - i_3) = 0 \Rightarrow -i_1 + 2i_2 - i_3 = 4$ (2)

⊗ MESH 3 : $1 \cdot (i_3 - i_2) + 2 \cdot (i_3 - i_1) - 3 = 0 \Rightarrow -2i_1 - i_2 + 3i_3 = 3$ (3)

(1). $i_2 = 4i_1 - 2i_3$

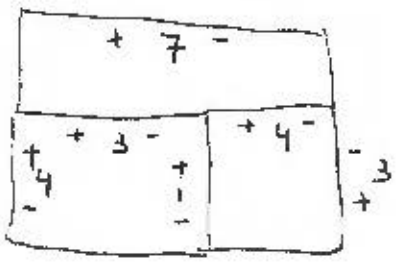
(1) IN (2): $-i_1 + 8i_1 - 4i_3 - i_3 = 4 \Rightarrow 7i_1 - 5i_3 = 4$ (4)

(1) IN (3). $-2i_2 - 4i_1 + 2i_3 + 3i_3 = 3 \Rightarrow -6i_1 + 5i_3 = 3$ (5)

(4) + (5). $\boxed{i_1 = 7A}$

$\boxed{i_3 = 9A}$ $\boxed{i_2 = 10A}$

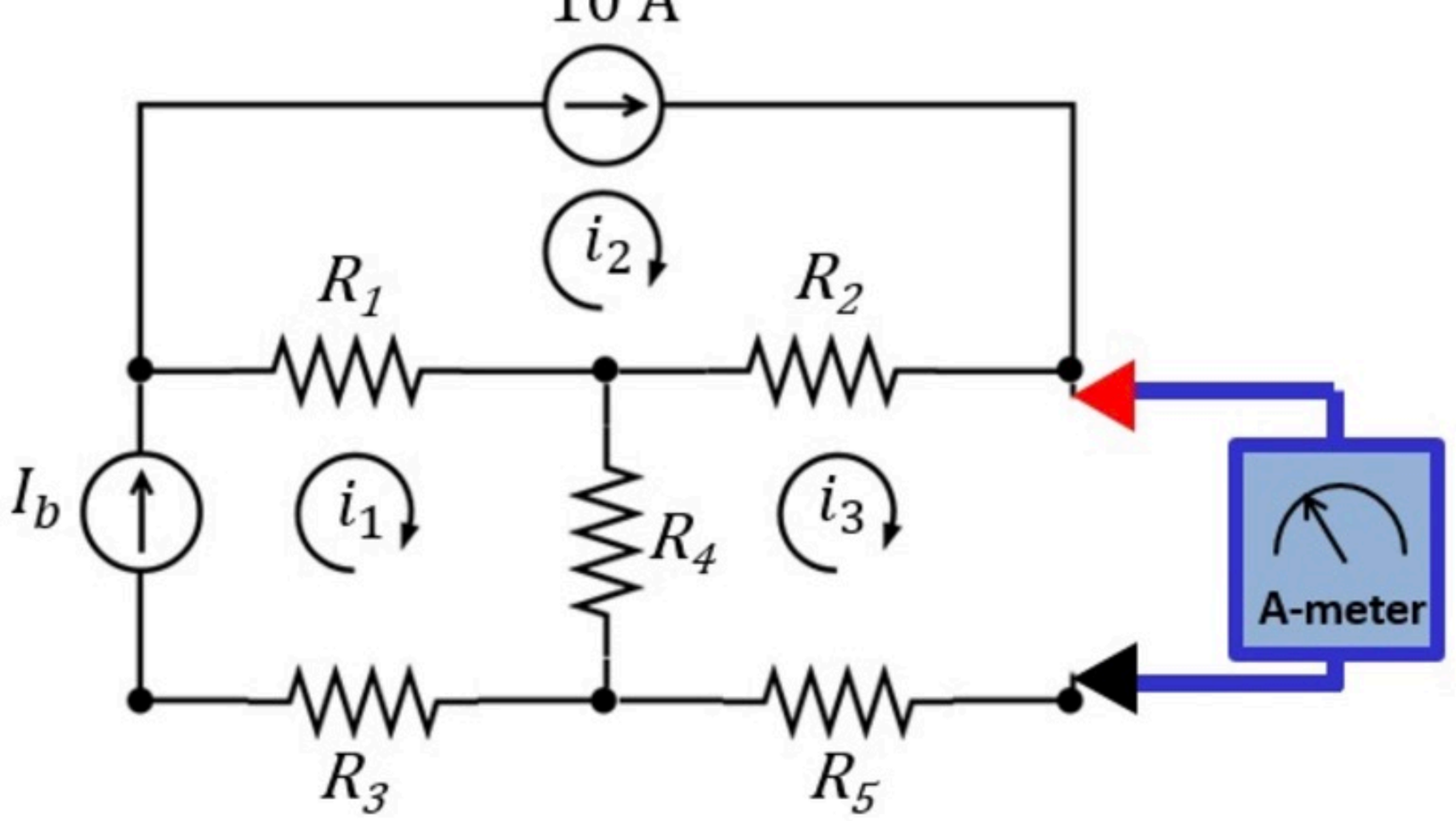
CHECK KVL



Nodal Mesh 007

Problem has been graded.

Given the ammeter reading X,
find the value of resistance R_4.



Given Variables:
R1 : 2 ohm
R2 : 3 ohm
R3 : 2 ohm
R5 : 5 ohm
X : 3 A
Ib : 1 A

Calculate the following:

R4 (ohm) :

> Hint: Find the voltage over R4 using KVL in any loop

Given the ammeter reading X,
find the value of resistance R_4.

R1 = 19 Ω

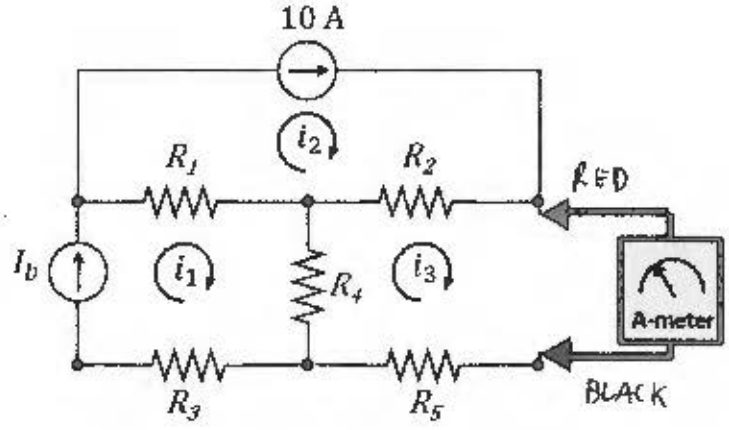
R2 = 2 Ω

R3 = 3 Ω

R5 = 2 Ω

X = 3 A

Ib = 1 A



$i_3 = X = 3$

$i_1 = I_b = 1$

$i_2 = 10$

A-METER

KVL MESH 3. $R_4(i_3 - i_1) + R_2(i_3 - i_2) + 0 + R_5 i_3 = 0$

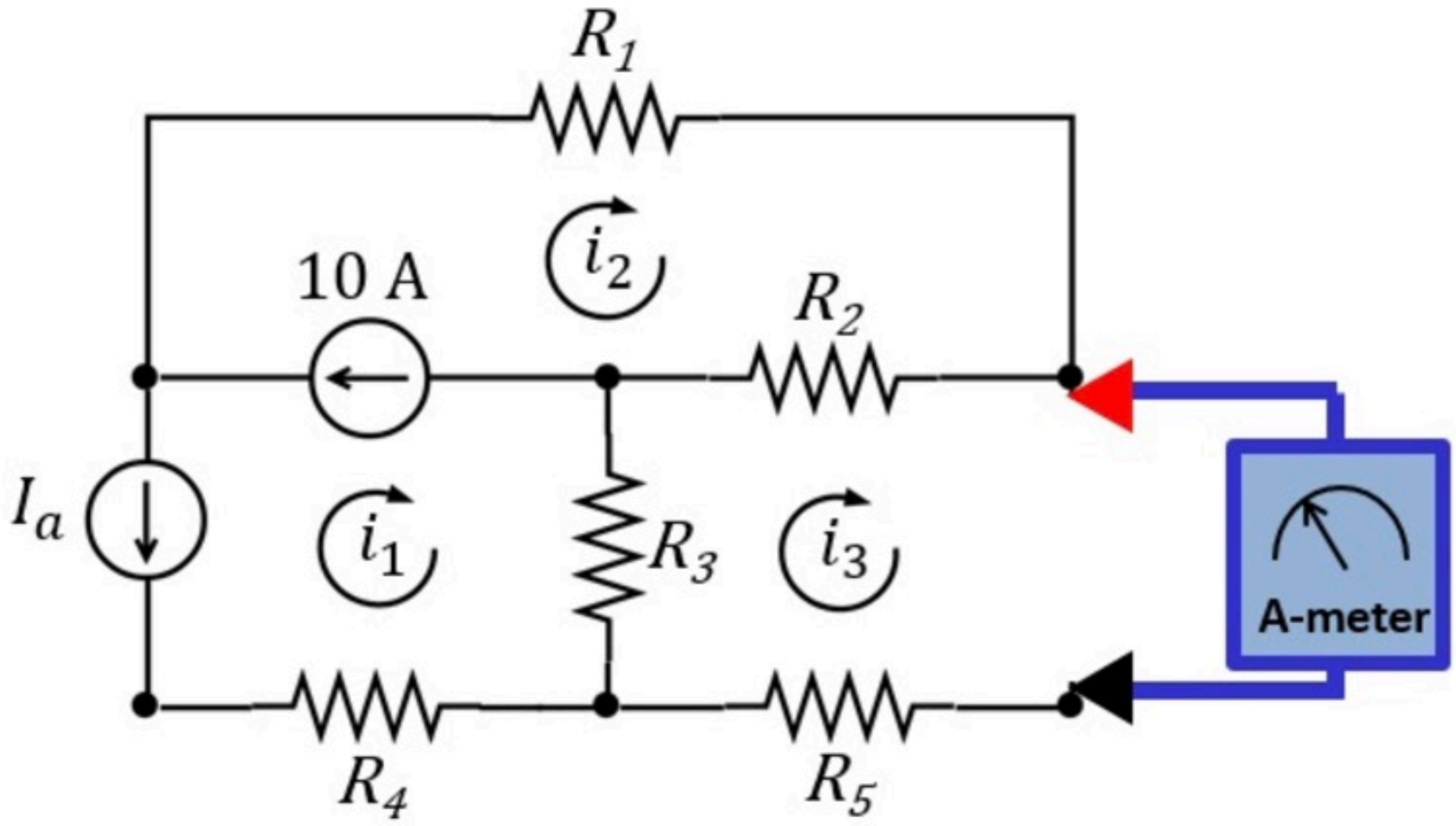
$R_4 \cdot 2 + 2 \cdot (-7) + 2 \cdot 3 = 0$

$\boxed{R_4 = 4\,\Omega}$

Nodal Mesh 008

Problem has been graded.

Given the ammeter reading X,
find the value of resistance R_3.



Given Variables:

R1 : 2 ohm

R2 : 2 ohm

R4 : 2 ohm

R5 : 2 ohm

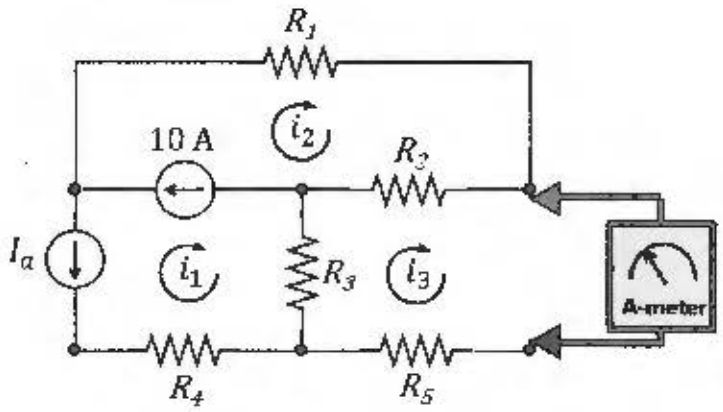
X : 2 A

Ia : 2 A

Calculate the following:

R3 (ohm) :

Given the ammeter reading X,
find the value of resistance R_3.



R1 = 23 Ω

R2 = 2 Ω

R4 = 34 Ω

R5 = 2 Ω

X = 2 A

Ia = 2 A

$i_3 = X = 2$

$i_1 = -I_a = -2$

$i_1 - i_2 = -10 \Rightarrow i_2 = i_1 + 10 = 8$

⊗ KVL IN MESH 3. $R_3 (i_3 - i_1) + R_2 (i_3 - i_2) + 0 + R_5 i_3 = 0$

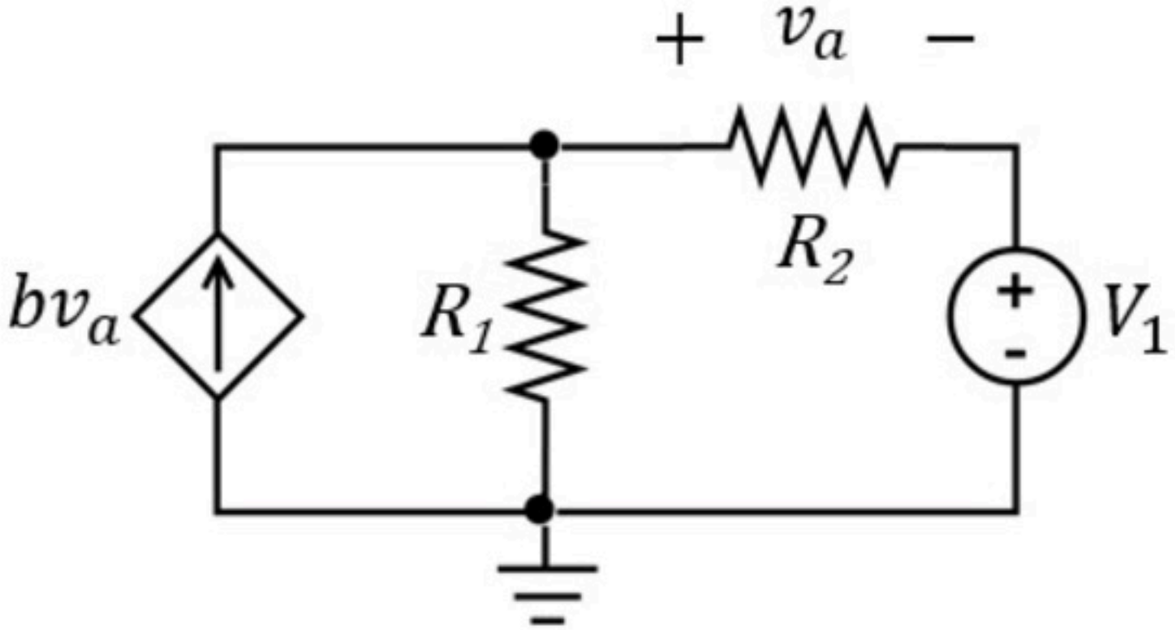
$R_3 \cdot 4 + 2 \cdot (-6) + 2\ 2 = 0$

$R_3 = 2\ \Omega$

Nodal Mesh 009

Problem has been graded.

Find the voltage v_a.
Use mesh analysis.



Given Variables:

R1 : 3 ohm

R2 : 4 ohm

b : 1 A/V

V1 : 10 V

Calculate the following:

va (V) :

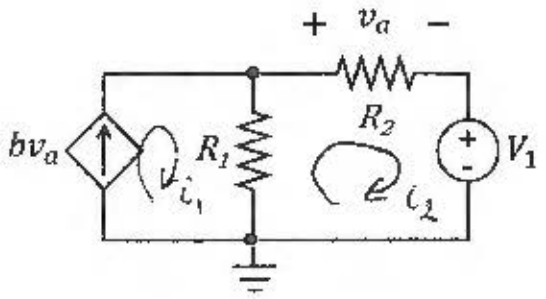
R1 = 3 Ω

R2 = 2 Ω

b = 1.5 A/V

V1 = 10 V

Find the voltage v_a.
Use mesh analysis.



⊛ $i_1 = b \cdot v_a = b\, R_2\, i_2 = 3\, i_2$

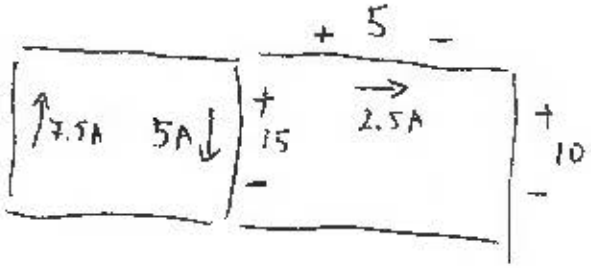
⊛ KVL IN ②: $3(\underbrace{i_2 - i_1}_{-2i_2}) + 2 \cdot i_2 + 10 = 0$

$-4 i_2 = -10$

$i_2 = 2.5\ A \qquad i_1 = 7.5\ A$

$v_a = i_2 \cdot R_2 = 5V \Rightarrow \boxed{v_a = 5V}$

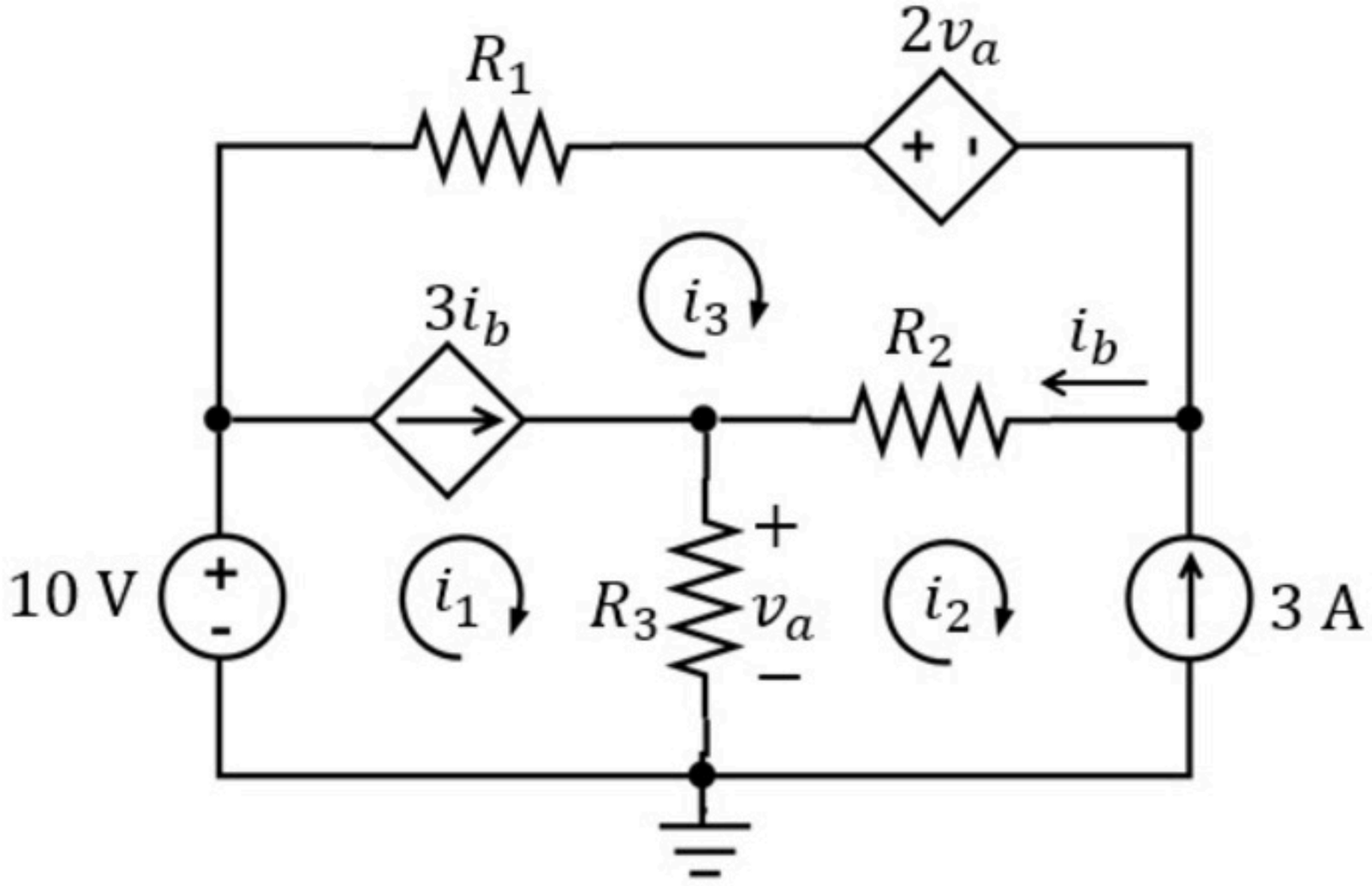
CHECK: KVL



Nodal Mesh 010

Problem has been graded.

Find the mesh currents i_1, i_2, and i_3.



Given Variables:

R1 : 8 ohm

R2 : 2 ohm

R3 : 2 ohm

Calculate the following:

i1 (A) :

---

i2 (A) :

---

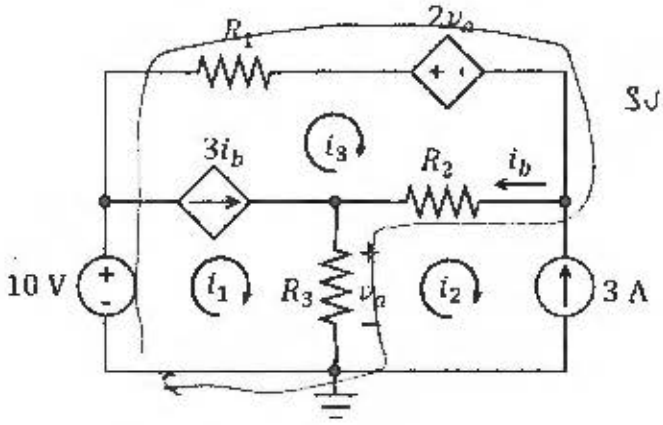
i3 (A) :

Find the mesh currents i_1, i_2, and i_3.

R1 = 16 Ω

R2 = 1 Ω

R3 = 1 Ω



⊗ $\boxed{i_2 = -3\,A}$

⊗ $i_1 - i_3 = 3 \cdot i_b = 3\,(i_3 - i_2) = 3i_3 + 9 \Rightarrow i_1 = 4i_3 + 9$ (1)

⊗ KVL SUPERMESH: $-10 + 16 \cdot i_3 + 2 \cdot (R_3)(i_1 + 3)$

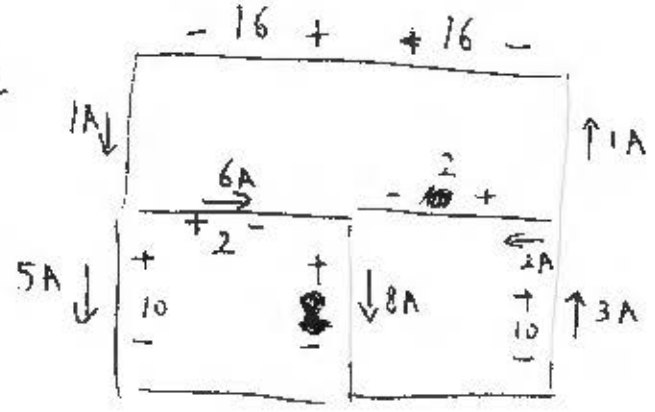
$+ 1\,(i_3 + 3) + 1 \cdot (i_1 + 3) = 0$

$\Rightarrow -10 + 16\,i_3 + 8i_3 + 24 + i_3 + 3 + 4i_3 + 12 = 0$

$\Rightarrow 29\,i_3 = -29$

$\Rightarrow \boxed{i_3 = -1\,A}$ $\boxed{i_1 = 5\,A}$

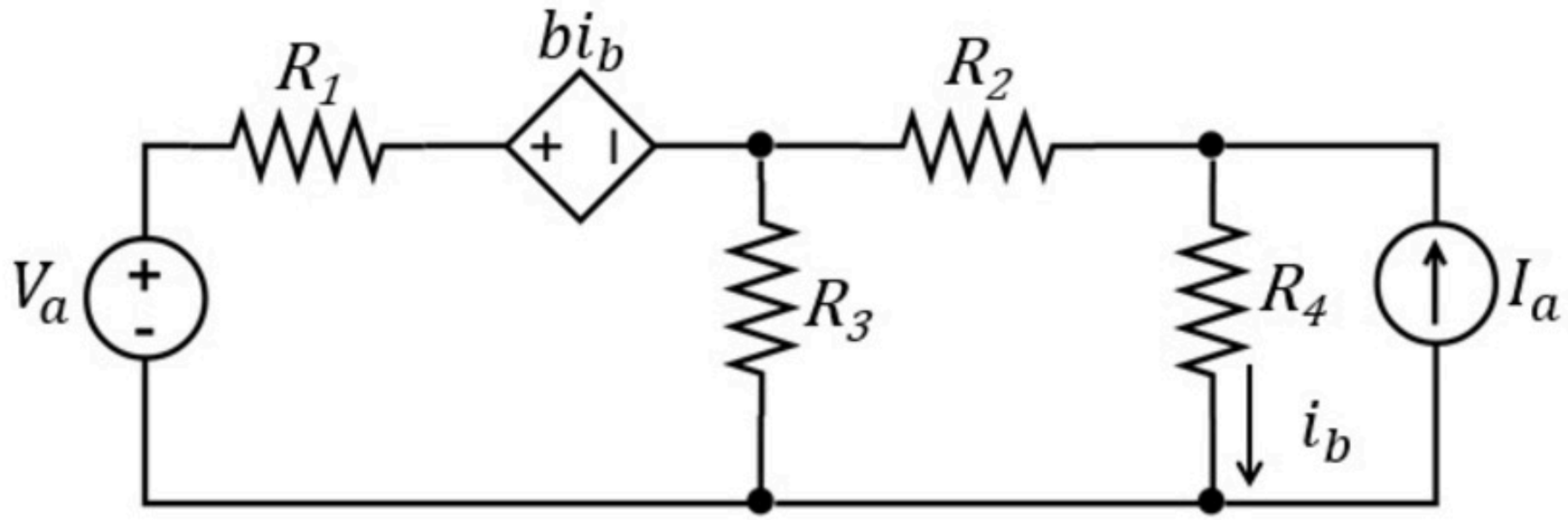
CHECK KVL



Nodal Mesh 011

Problem has been graded.

Find the value of the current i_b.
Use mesh analysis.



Given Variables:

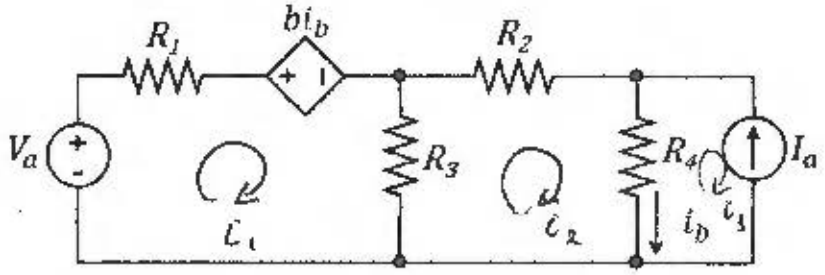
Va : 16 V
R1 : 2 ohm
R2 : 6 ohm
R3 : 8 ohm
R4 : 1 ohm
b : 2 V/A
Ia : 1 A

Calculate the following:

ib (A) :

> Hint: Do we need to use a supermesh?

Find the value of the current i_b.
Use mesh analysis.



Va = 16 V

R1 = 2 Ω

R2 = 6 Ω

R3 = 8 Ω

R4 = 1 Ω

b = 2 V/A

Ia = 1 A

$i_3 = -I_a = -1\,A$

$i_b = i_2 - i_3 = i_2 + 1$

MESH 1: $-16 + 2\cdot i_1 + 2\cdot i_b + 8(i_1 - i_2) = 0$

$-16 + 2i_1 + 2i_2 + 2 + 8i_1 - 8i_2 = 0$

$10\,i_1 - 6\,i_2 = 14$

$5i_1 - 3i_2 = 7 \quad (1)$

MESH 2: $8(i_2 - i_1) + 6i_2 + 1\cdot(i_2 + 1) = 0$

$-8i_1 + 15\,i_2 = -1 \quad (2)$

$5\times(1) + (2)$: $17\,i_1 = 34 \Rightarrow i_1 = 2A \Rightarrow i_2 = 1A$

$i_b = i_2 + 1 \Rightarrow \boxed{i_b = 2A}$

CHECK KVL