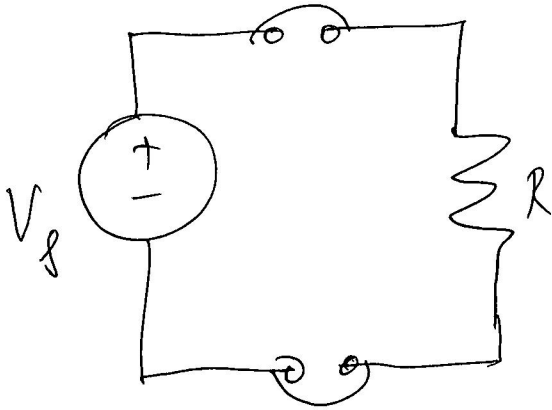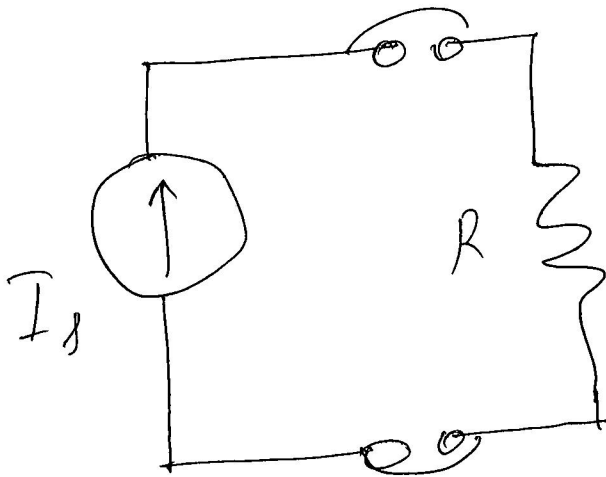# Voltage and Current Sources

Ideal Sources
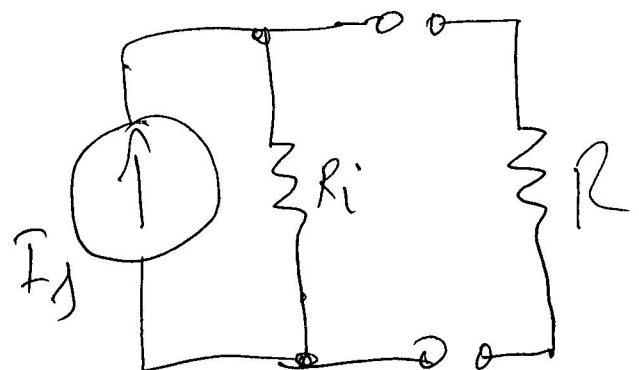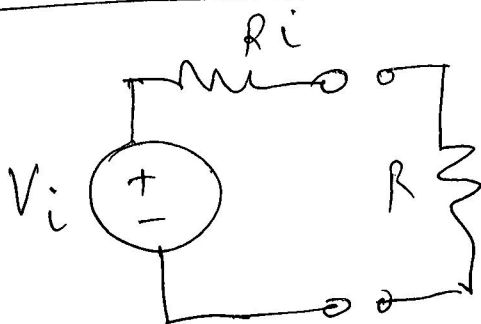

V_S is the voltage across R no matter what the value of R is

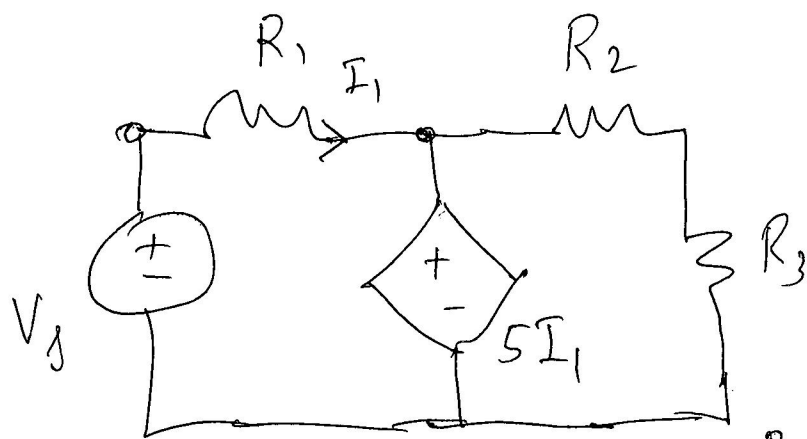I_S will be the current thro' R no matter what R is

Practical Sources

In a practical voltage source, the
voltage across R will vary depending
on the value of R

Similarly, the current thro' R will
vary depending on what its value is

Controlled Sources

In this Circuit

represents a
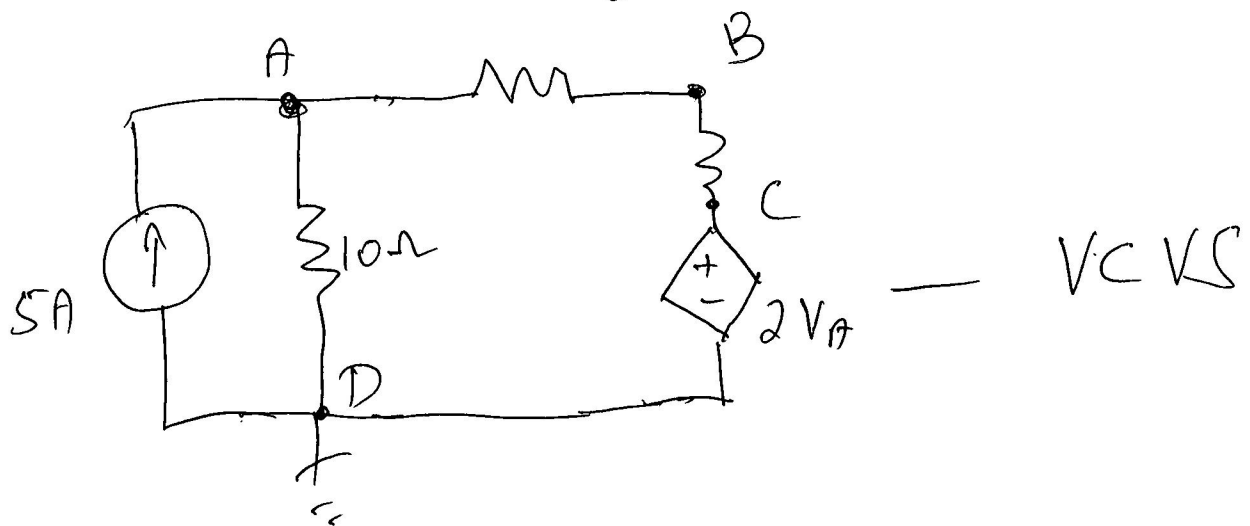
Controlled voltage Source and its value

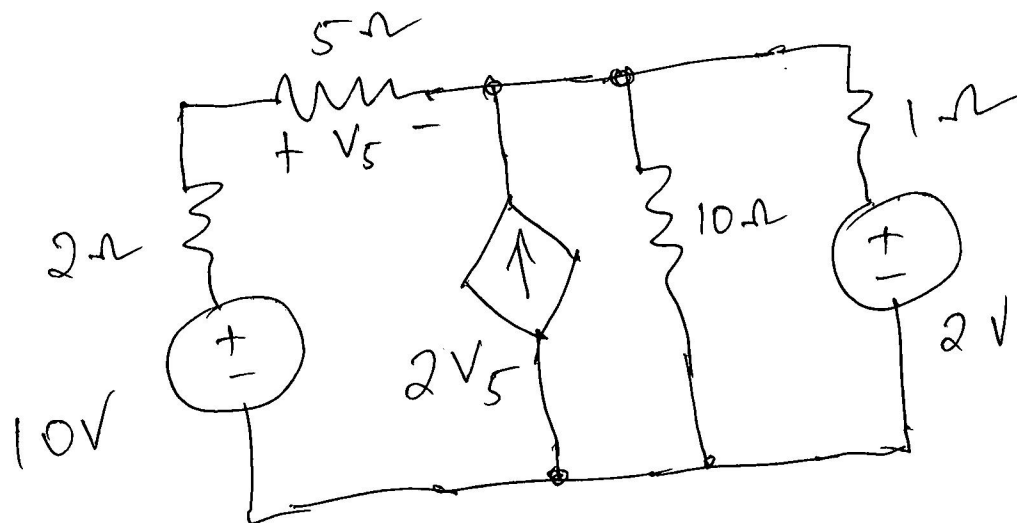is $5I_1$ where I_1 is the Current thro' R_1

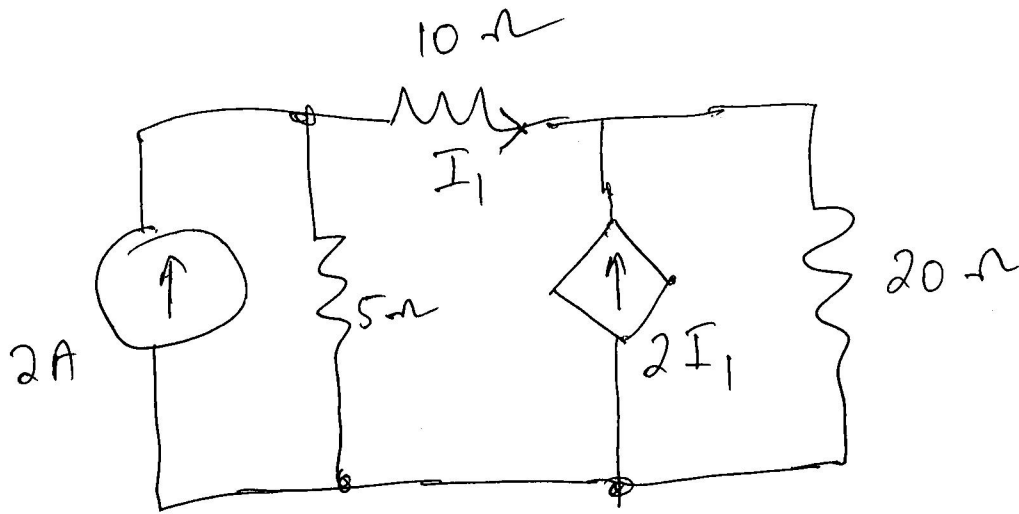We call this CCVS which stands for Current Controlled Voltage Source.

Other examples

1) VCVS — Voltage Controlled Voltage Source

A   B
[circuit diagram with current source 5A, resistor 10Ω between A and D, inductor, node C, dependent source $2V_A$ (+/−), node D]

$2V_A$ — VCVS

2) VCCS — Voltage Controlled Current Source

[circuit diagram with 5Ω resistor labeled $+ V_S -$, 2Ω resistor, 10V source (+/−), dependent current source $2V_S$, 10Ω resistor, 1Ω resistor, 2V source (+/−)]

3) CCCS — Current Controlled Current Source ④

10 Ω

I_1

2A

5 Ω

2I_1

20 Ω

Examples

Find I_0 for the Circuit shown below

A   4I_x B

2 Ω

+1

12 Ω

2 Ω

4 Ω

↓ I_x

12 A

↓ I_0
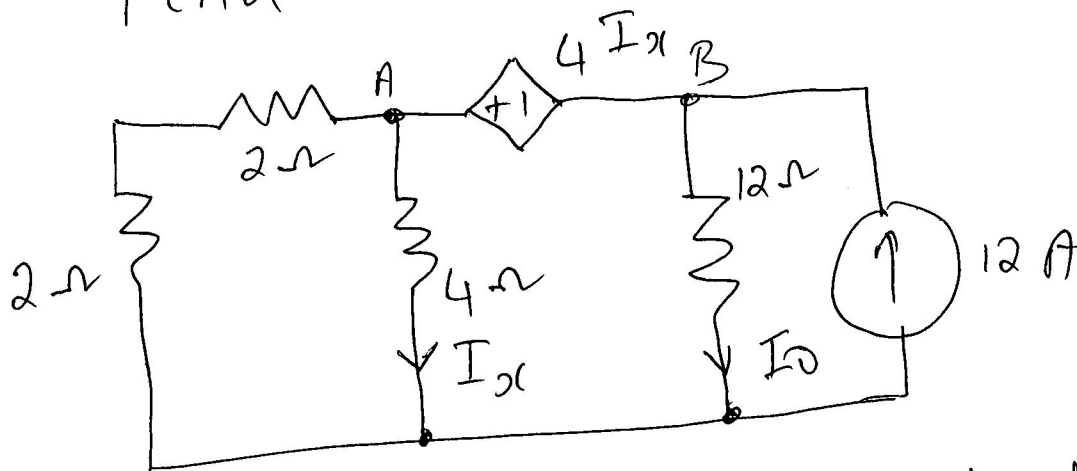
This problem can be Solved by manipulating the circuit.

Using Source Conversion we can redraw the circuit as
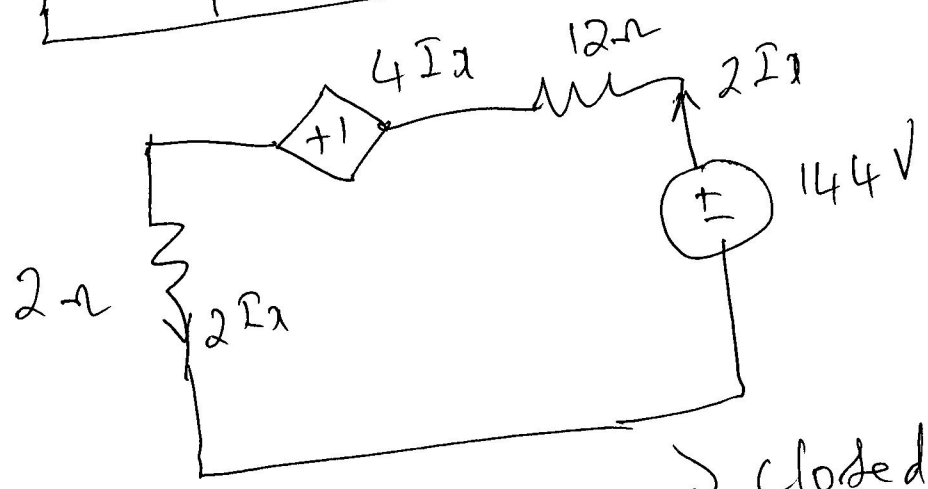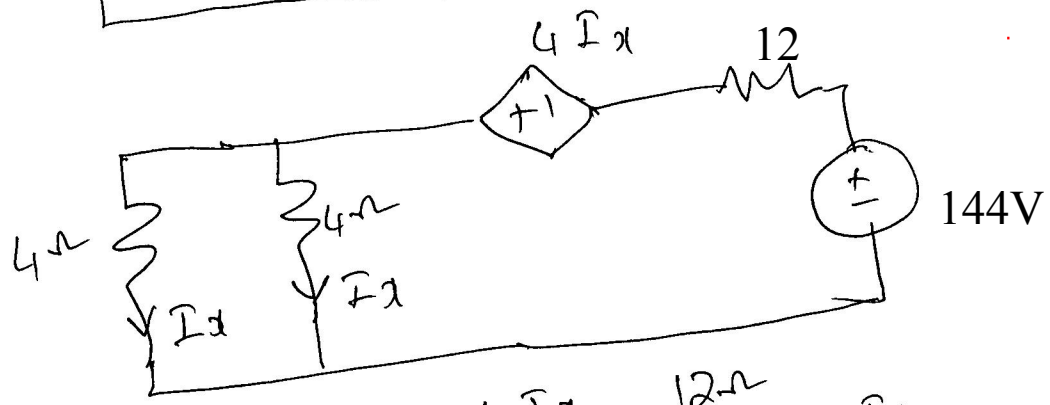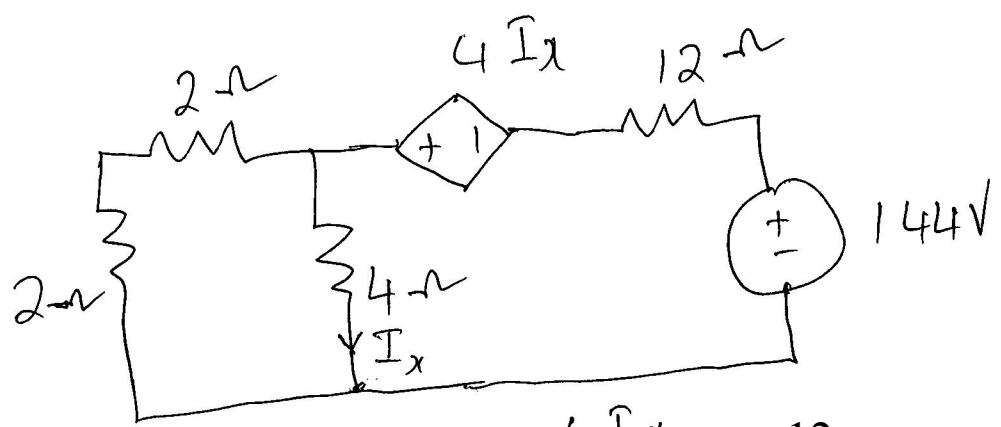
KVL says voltage around closed path add up to zero

$$4I_x - 24I_x + 144V - 4I_x = 0$$
$$24I_x = 144, \quad \boxed{I_x = 6A}$$

If $I_x = 6A$, then at node B in the original circuit, we apply KCL

~~$2I_x + I_0 - 12 = 0$~~

$2I_x + I_0 - 12 = 0$

$I_0 = 12 - 2I_x = 12 - 12 = 0$

$$\boxed{I_0 = 0A}$$