

# Mr. Kuncik Physics: Analyze Circuits 3: One-Step Accordion Circuits

## G: Analyze Circuits 3: One-Step Accordion Circuits

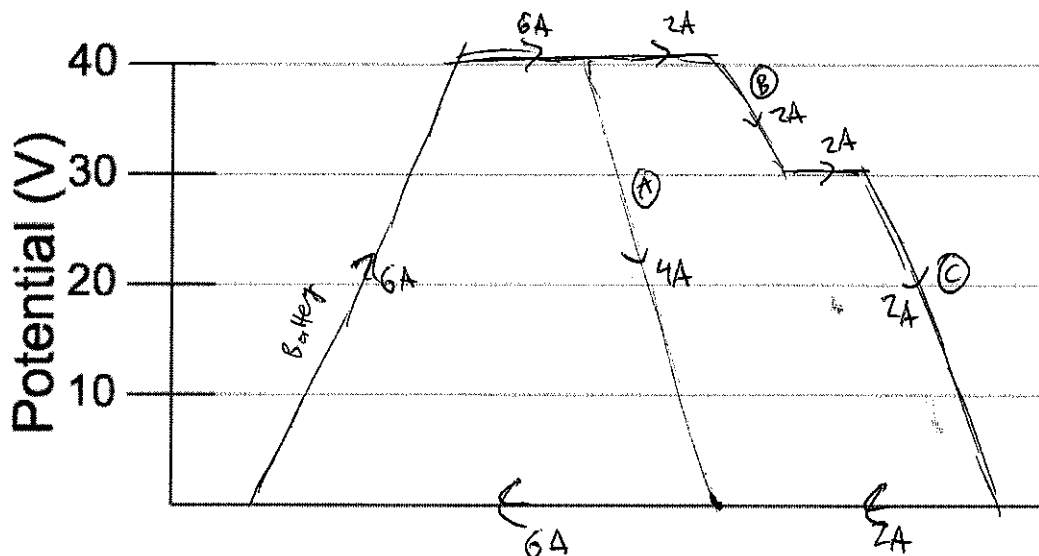
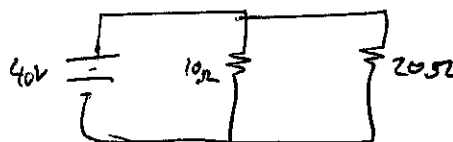
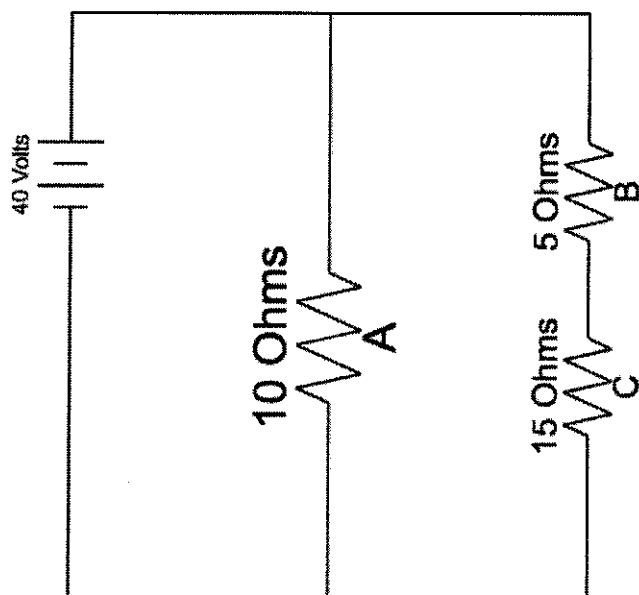
- Unit:
- Objective: Solve circuits with series components inside of parallel components or parallel sections in series.
- Level: 3

### Series Circuit Inside of a Parallel Circuit

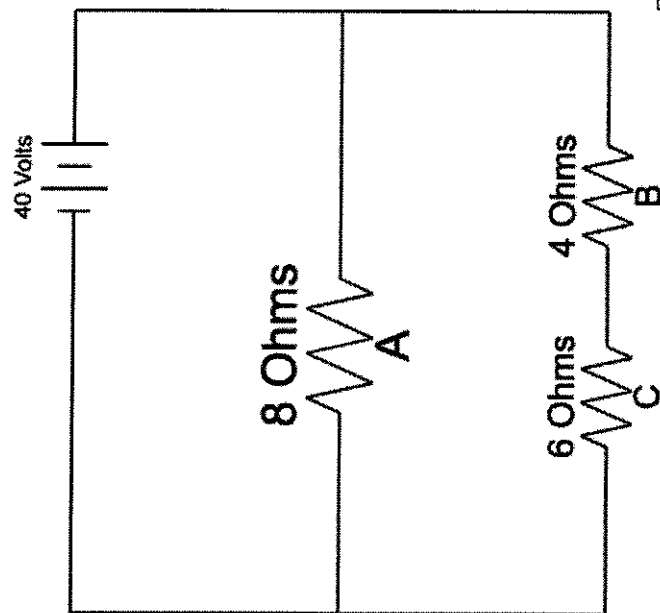
Draw equivalent circuit here.

*Answer*

①

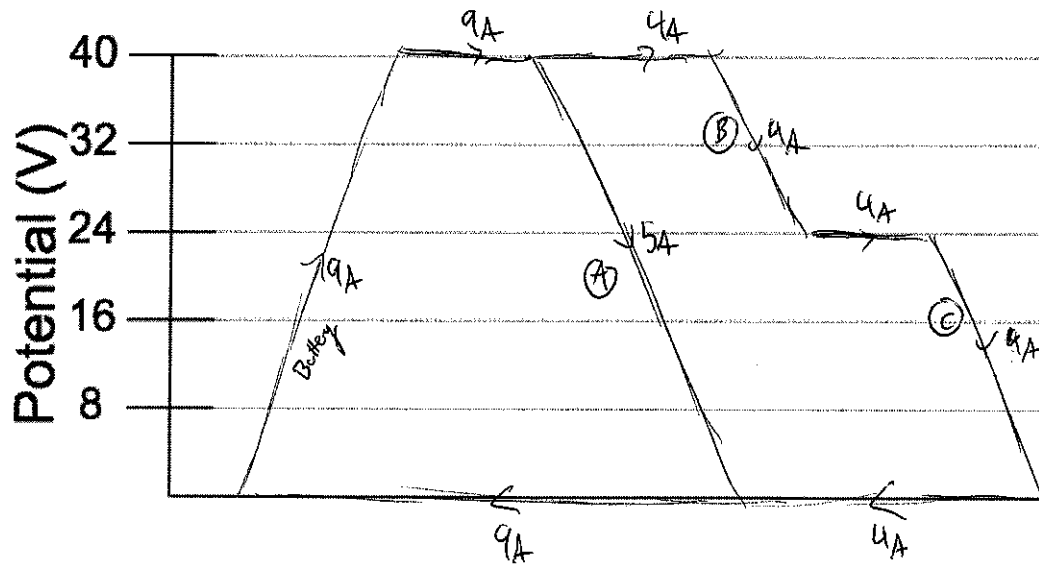
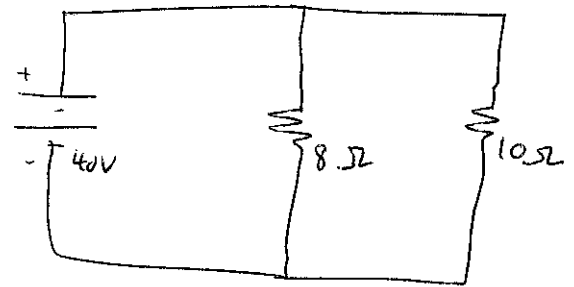


2



Draw equivalent circuit here.

Answers



# Parallel Circuit inside of a Series Circuit

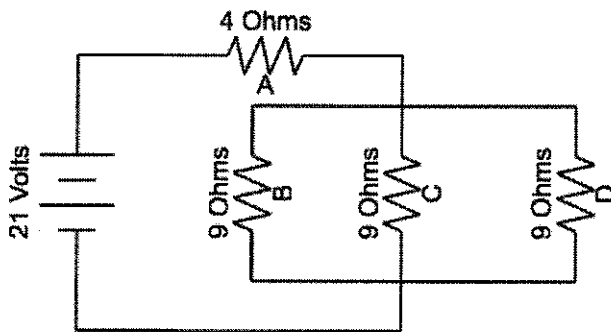
Answer

Formual For Equivalent Resistance of two resistors in parallel.

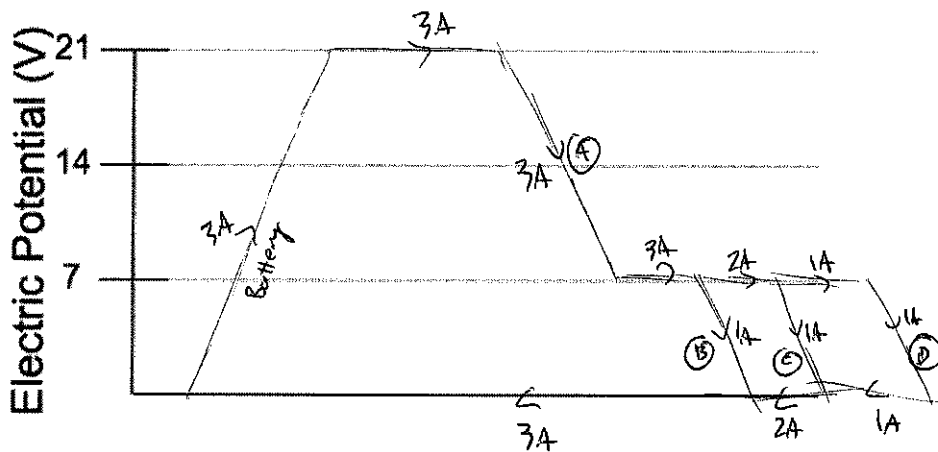
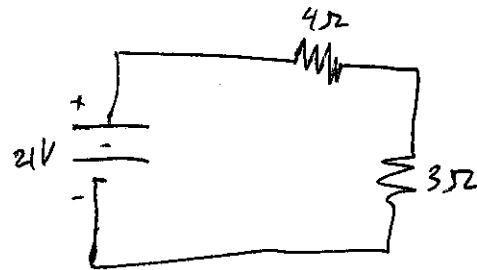
$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

## Steps

1. Use the formula above in order to figure out the *equivalent resistance* of the parallel element.
2. Draw an *equivalent circuit* in which the parallel element is replaced by a single element with one resistor of the equivalent resistance.
3. Draw an electric potential diagram for the equivalent circuit. It should look like a series circuit with two resistors. Make sure to indicate the current on this diagram using arrows.
4. Move your circuit back to the original circuit. Erase the equivalent resistance element on your electric potential diagram, and replace it with a parallel element. Indicate the current on each branch of the new parallel element.



Draw equivalent circuit here.



12 Volts

4 Ohms  
A

3 Ohms  
B

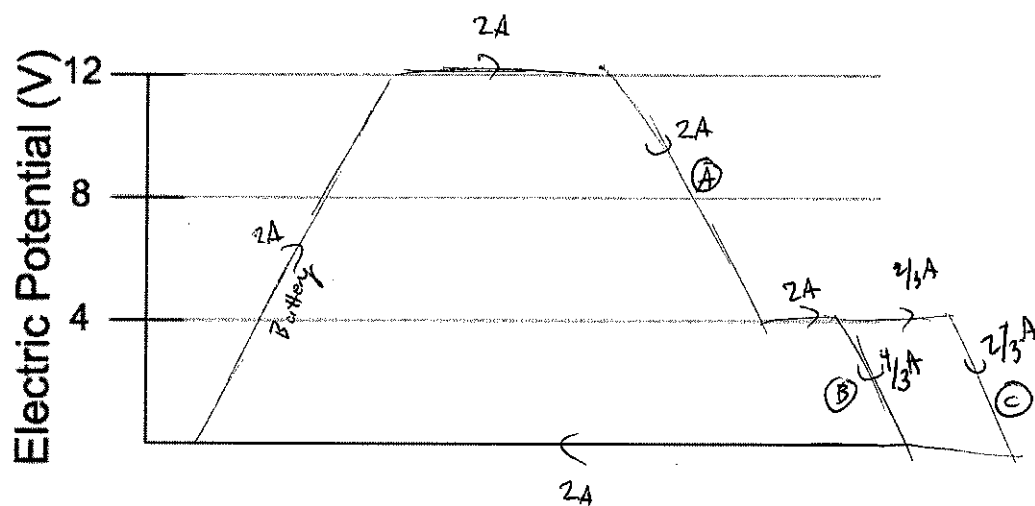
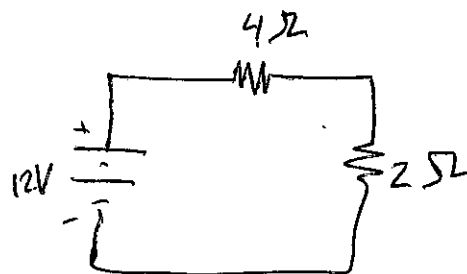
6 Ohms  
C

Draw equivalent circuit here.

12V

The diagram shows a 12V DC voltage source on the left. A wire from the positive terminal goes to a 4 Ohm resistor labeled 'A'. After resistor A, the circuit splits into two parallel branches. The first branch contains a 3 Ohm resistor labeled 'B'. The second branch contains a 6 Ohm resistor labeled 'C'. Both branches rejoin, and the wire returns to the negative terminal of the 12V source. To the right of this circuit, there is a space for drawing an equivalent circuit, with a 12V source symbol and a '+' sign indicating the positive terminal.

Answer

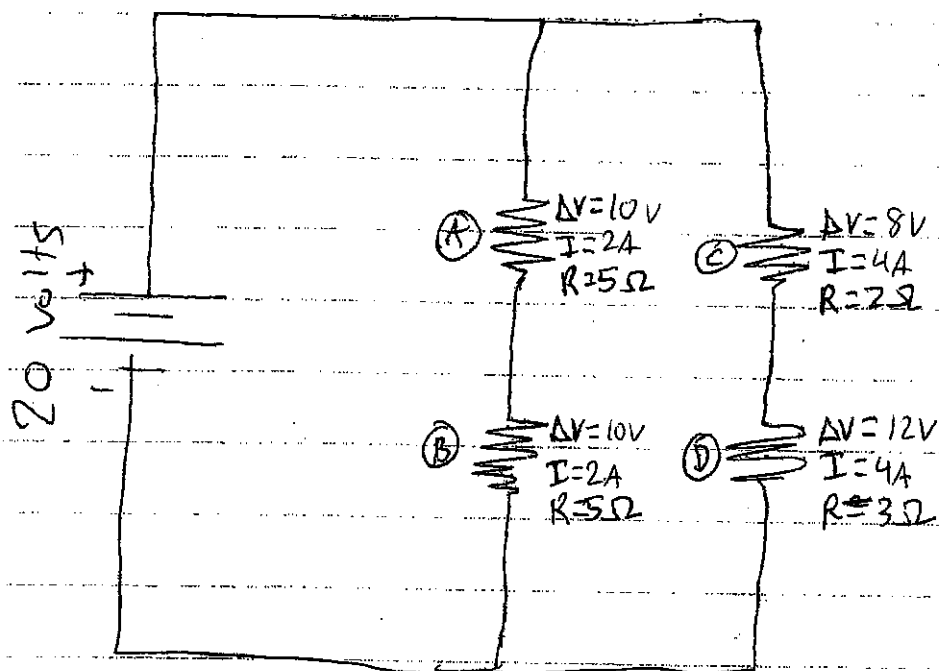


- Extra Problems!

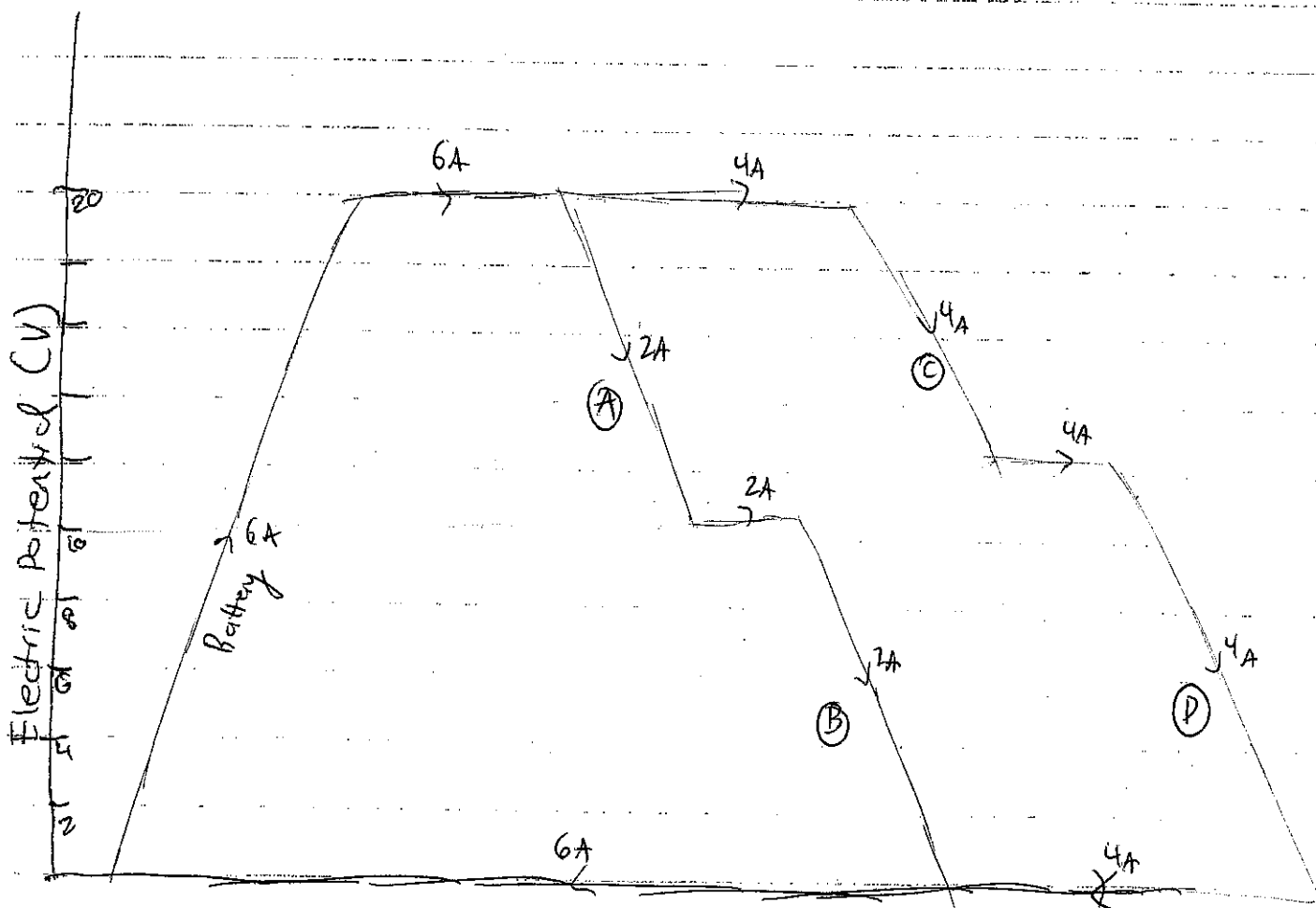
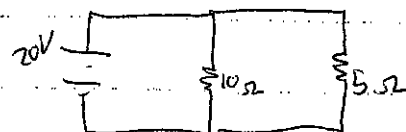
65

$$\Delta V = I \cdot R$$

Answer



Equivalent circuit

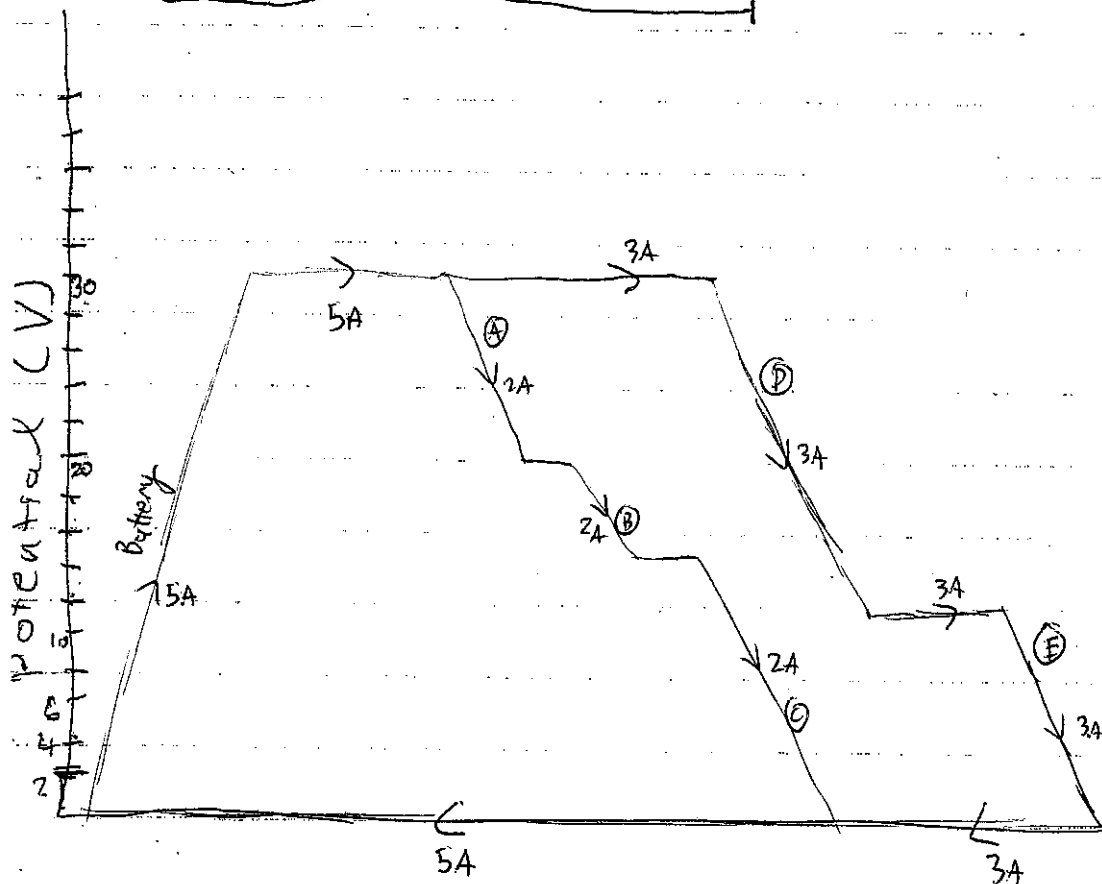
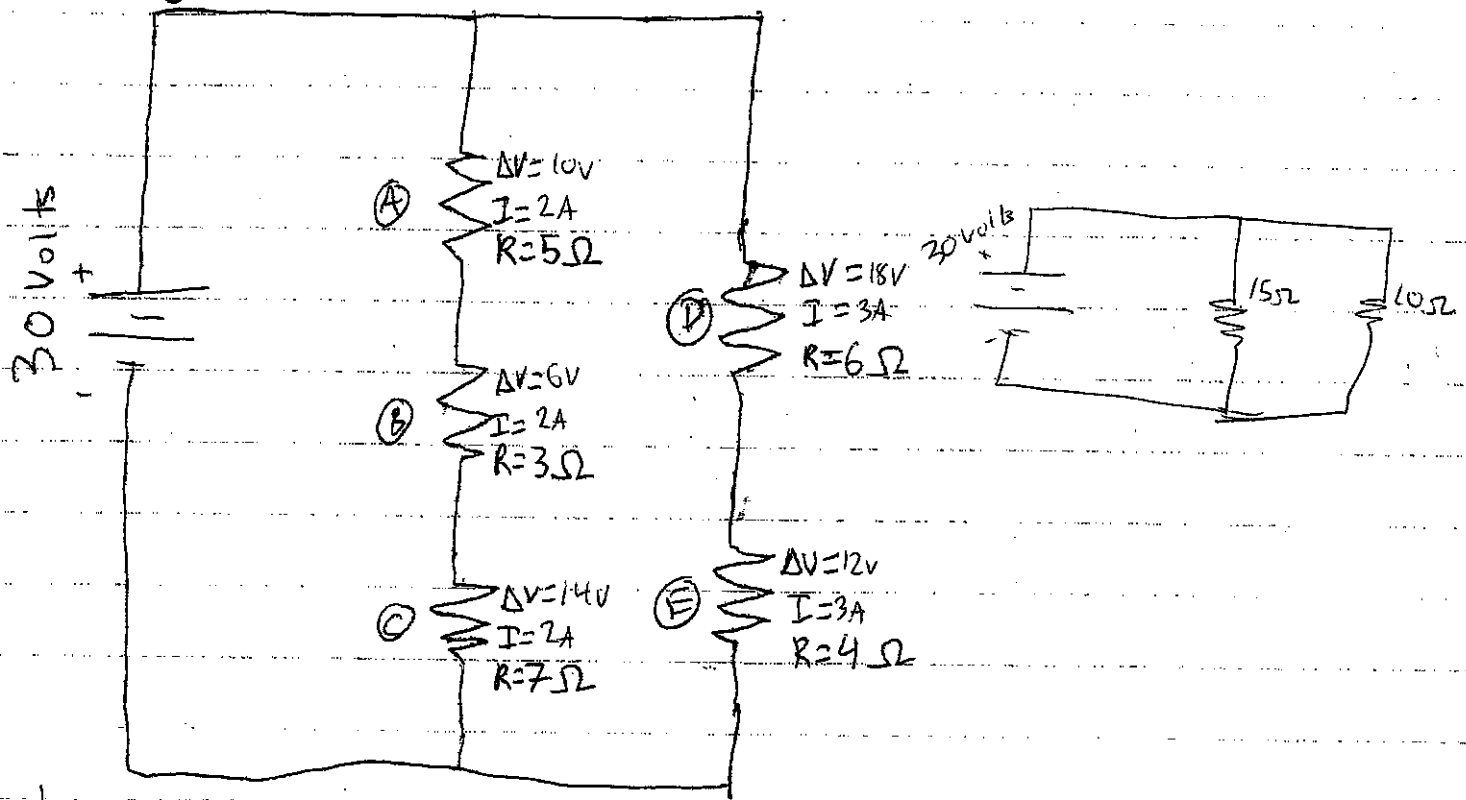


G-6

- ① - Draw an equivalent circuit
- ② - Solve the equivalent circuit
- ③ - Draw the current on the equivalent circuit
- ④ - Go back to the original circuit and draw the current on it
- ⑤ - Solve each element of the original circuit

$$\Delta V = I \cdot R$$

Answer

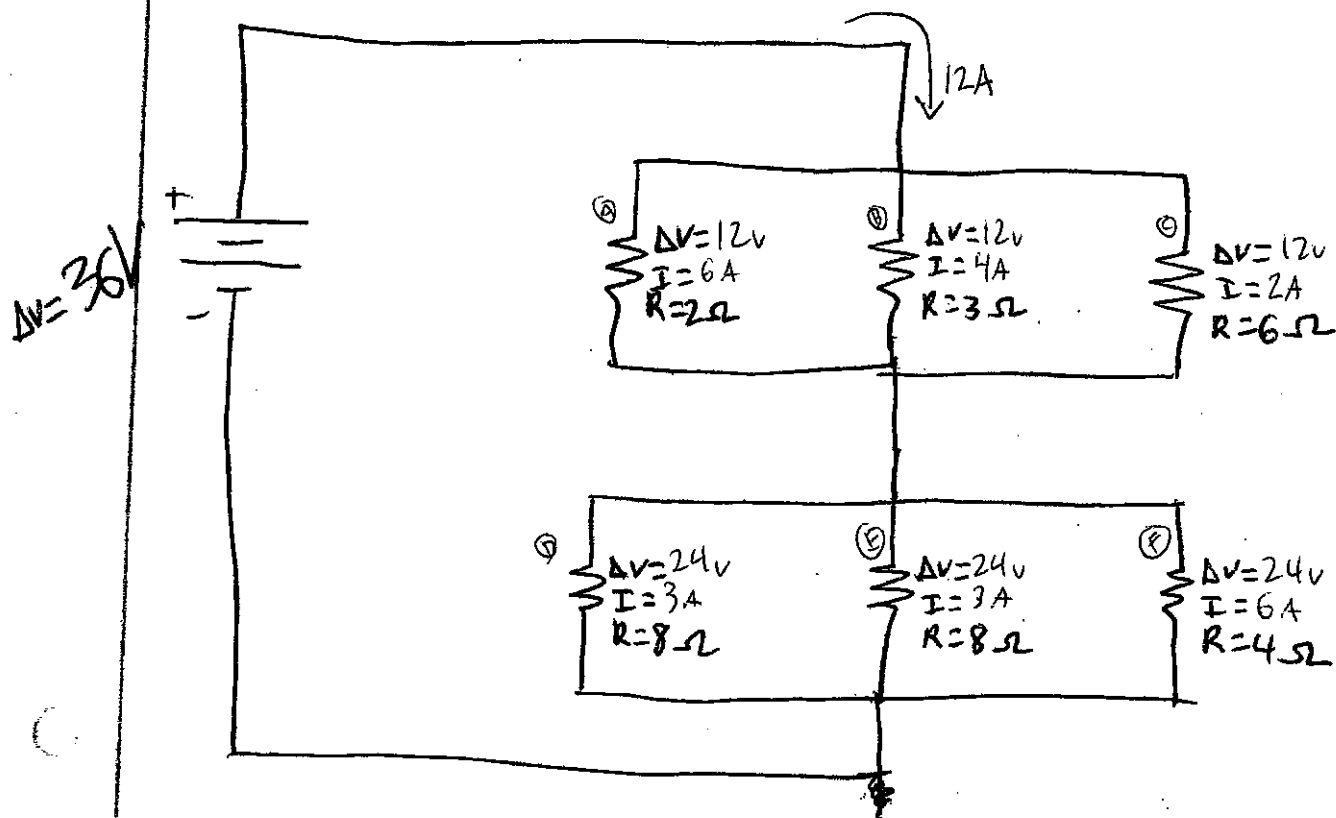


Different steps!

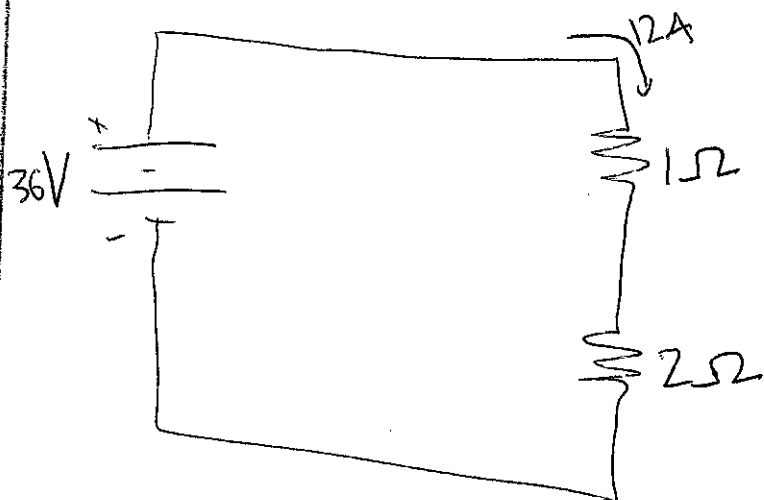
6-2

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

→ formula to Answer  
add resistors in parallel



Draw the equivalent circuit here



Answer 1

G-7 cont.

