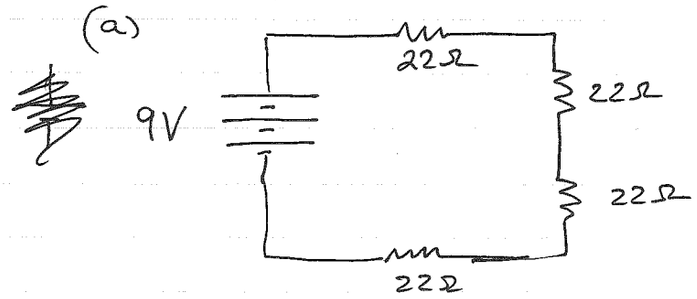
(10.5): Check Your Understanding pg 325

1. (explain in your own words)

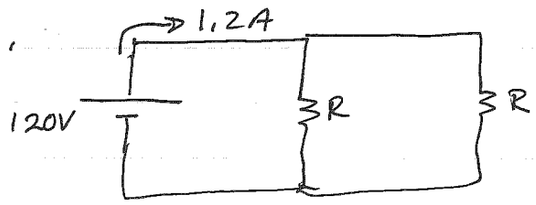
2. (a)



(b) $I = \frac{V}{R_T} = \frac{9V}{(22\Omega)\times 4} = \boxed{0.102\,A} = \boxed{102\,mA}$

(c) $\boxed{R_T = 88\Omega}$

3.



(a) $V_R = 120V$

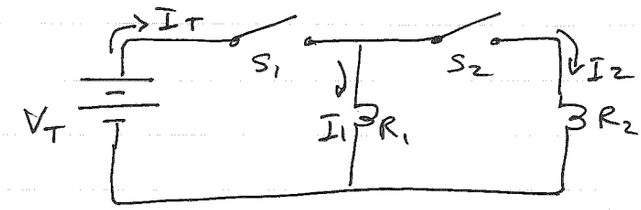
(b) $I = \frac{V}{R}$ / since resistors are equal, they will have equal current.

$\boxed{I = 0.6A}$

(c) $R = \frac{V}{I} = \frac{120V}{0.6A} = \boxed{200\Omega}$

(d) $R_T = \frac{V_T}{I_T} = \frac{120V}{1.2A} = \boxed{100\Omega}$

4.



$I_1 = 160mA$

$V_T = 3V$

$I_T = 440mA = 0.440A$

(a) $I_T = I_1 + I_2$

$\therefore I_2 = I_T - I_1$

$= 440mA - 160mA$

$\boxed{I_2 = 280mA}$

(b) No, the bulbs are not identical. We know this because they draw different currents.

(c) $R_1 = \frac{V_1}{I_1} = \frac{3V}{0.160A} = \boxed{19\Omega}$ (18.75Ω)

$R_2 = \frac{V_2}{I_2} = \frac{3V}{0.280A} = \boxed{11\Omega}$

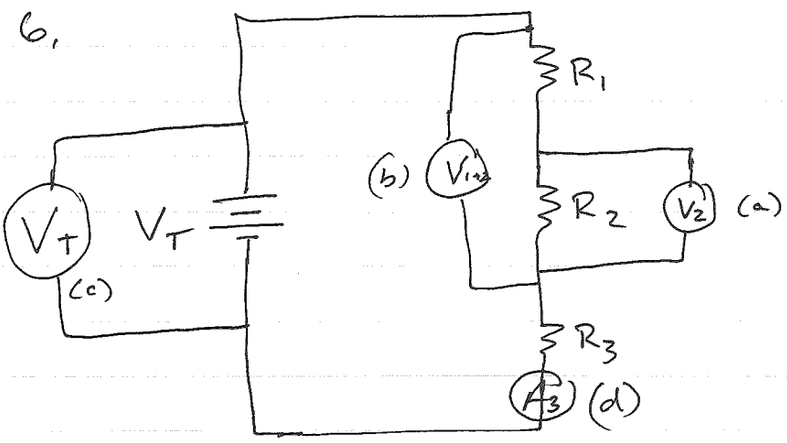
(d) $\underline{V_2 = 0V}$ because no current is flowing ($V = IR$ ... if $I = 0A$, then $V = 0V$)

(e) $\boxed{V_1 = 3V}$ because it is connected in parallel with the energy source.

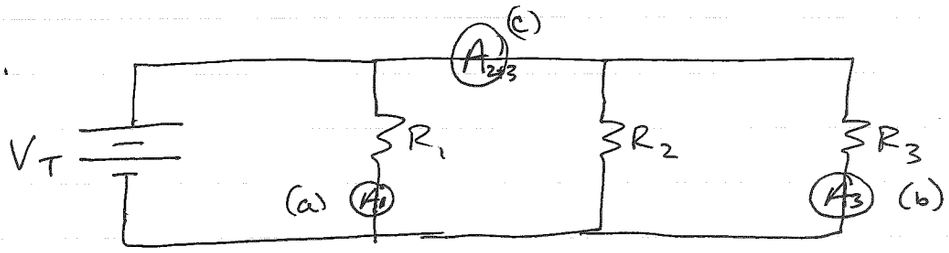
(f) $I = \frac{V_T}{R_T} = \frac{3V}{18.75\Omega} = \boxed{0.16A} = \boxed{160mA}$

5. $R_T = 30\Omega + 60\Omega + 90\Omega = \boxed{180\Omega}$

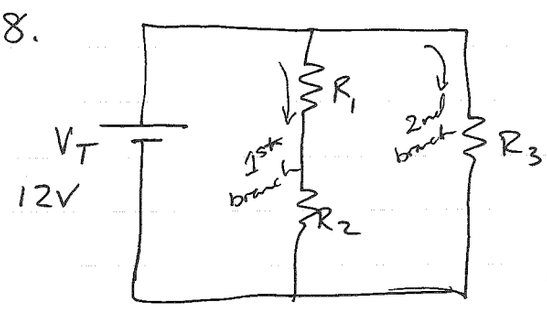
6.



7.



8.



$R_1 = R_2 = R_3$

(a) $V_1 = 6V$, $V_2 = 6V$, $V_3 = 12V$

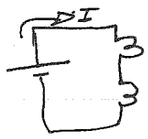
(b) R of 1st branch is 2x R of 2nd branch
$\therefore I_1 = \frac{1}{2} I_3 = 250mA$
$\boxed{I_1 = 250mA}$

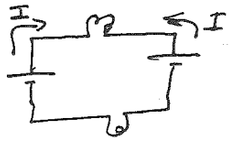
(c) $R_T = \frac{V_T}{I_T} = \frac{12V}{0.750A} = \boxed{16\Omega}$

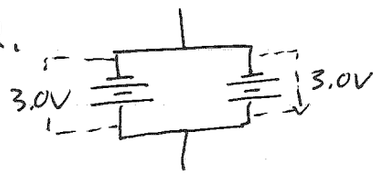
Chapter 10 Review Questions

pg 332

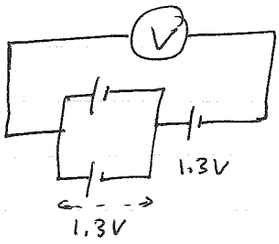
1. Circuit (a) will go on. (b) will not, because the positive terminals of the cells are in directing current in opposite directions, and will cancel each other out.

(a) 

(b) 

2. 

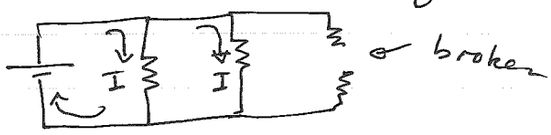
(b) 3.0V (because the batteries of 2 cells are connected in parallel)

3. 

(c) 2.6V

4. No, the current would not continue to flow, The burned out resistor is like an open switch.

5. Yes, the current would flow through the unbroken branches of the circuit.



6. (c)

7. R ⇒ unit = Ohm Ω
V ⇒ unit = Volt V
I ⇒ unit = Ampere A

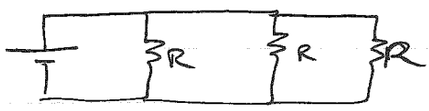
8. Volt (unit)

9. series (ammeter) / parallel (voltmeter)

10. increases / decreases.

11. 

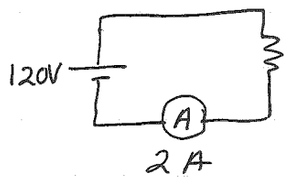
$R_T = \frac{R}{2}$ (assuming both R's are the same value)



$R_T = \frac{R}{3}$

12. 2.0 V

13. 4.0 V

14. 

$R = \frac{V}{I} = \frac{120V}{2A} = \boxed{60\Omega}$

15. Voltmeter - in parallel
ammeter - in series

16. $R = \frac{V}{I} = \frac{2.6V}{0.041A} = \boxed{63\Omega}$

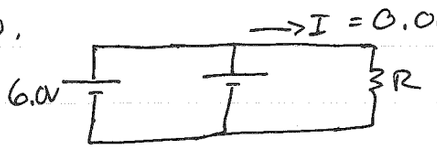
17. $V = IR$
$= (0.500A)(60\Omega)$
$= 30V$

$\#\text{cells} = \frac{30V}{1.5V/\text{cell}}$

$\boxed{= 20 \text{ cells}}$

18. $R = \frac{V}{I} = \frac{4.6V}{0.180A} = \boxed{26\Omega}$

19. ★ your ideas?

20. 

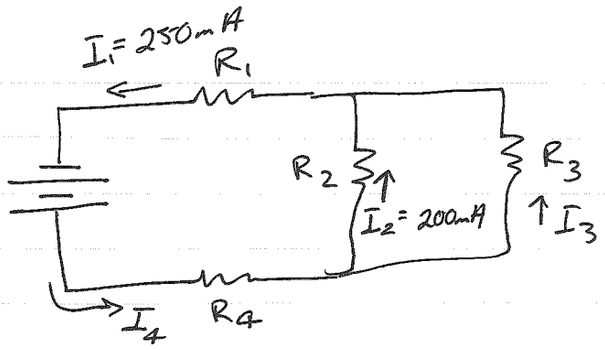
$I = (0.001A) \times (1000 mA/A)$

$\boxed{I = 1 mA}$

$R = \frac{V}{I} = \frac{6.0V}{0.001A} = \boxed{6000\Omega}$

21. Household circuits are wired in parallel. We know this because when we turn one device off, the others stay on.

22.

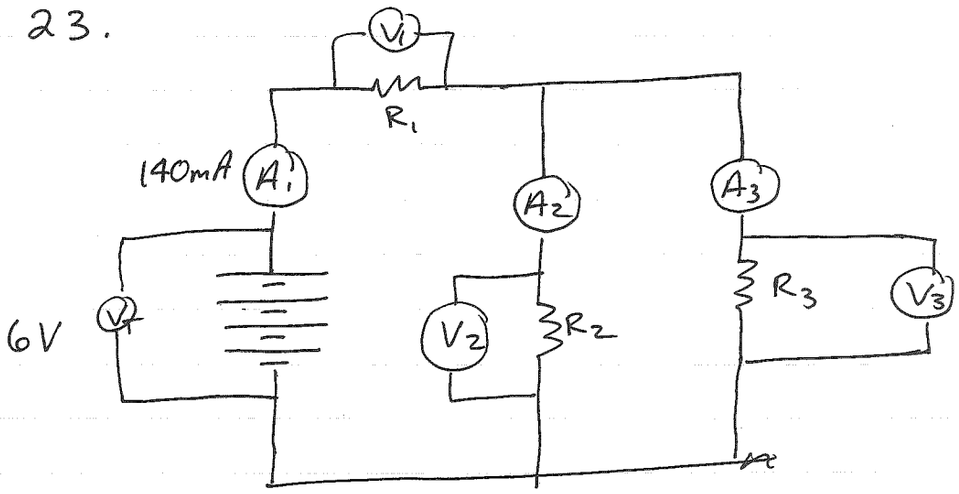


$\boxed{I_4 = 250mA}$

$I_3 = 250mA - 200mA$

$\boxed{I_3 = 50mA}$

23.



$V_T = 6V$ $\quad V_2 = 2V$ $\quad I_3 = 90mA$

$I_1 = 140mA$ $\quad I_2 = ?$ $\quad V_3 = ?$

$I_1 = I_2 + I_3$

$\therefore I_2 = I_1 - I_3$

$= 140mA - 90mA$

$\therefore \boxed{I_2 = 50mA}$

$V_T = V_1 + V_2$

$\therefore V_1 = V_T - V_2$

$= 6V - 2V$

$\boxed{V_1 = 4V}$

$V_2 = \boxed{V_3 = 2V}$

Current at A_2 is $\boxed{I_2 = 50mA}$

Voltage at $\boxed{V_3 = 2V}$ (parallel to V_2)