# Electricity & Magnetism – Unit Review

5. What is meant by the electric potential difference?
6. What is meant by current?
7. What is Kirchhoff's current law?
8. What is Kirchhoff's voltage law?
9. How much charge is transferred by a current of 0.80A in 19 minutes?
10. What is the energy of a proton accelerated through a potential difference of 500kV? The charge on one proton is $1.6 \times 10^{-19}$ C.
11. How much energy is transferred to a radio if a current of 0.40A runs through it for 1.5 minutes, with a potential difference of 115V?
12. A microwave at a potential difference of 120V uses 50 000 J of energy during the 60s it is on. What is the current through the microwave?
13. A TV remote control has a resistance of 9.2 Ω and is connected to two AA batteries with a potential difference of 3.0 V. What is the current through the remote control?
14. How many 60 Ω resistors must be connected in parallel to draw a current of 10.0A from a 120V source?
15.
    a. What maximum power can be used on a 10 V circuit with a 15 A fuse?
    b. How much more current can be drawn from a 10 V outlet fused at 15 A if a 600 W curling iron and a 1200 W hair dryer are already operating in the circuit?
16. Four sets of Christmas lights (each holding 25 bulbs), are set up for a Christmas display. These 7 W bulbs were lit for four hours a night for 25 nights. If the average cost of electricity is $0.10/kWh, how much will the display cost?

20) Solve the following circuits.

a) 9V, 30Ω, 30Ω, 30Ω

(b) 6V, 2Ω, 2Ω, 1Ω

(c) 1Ω, 12V, 6Ω, 6Ω, 3Ω, 2Ω

(d) 2V, 6V, 0.2A, 20Ω, 0.3A, 0.5A

21) Solve the following diagrams:

(a) (b) (c) (d) (e) (f) Motor N S (g) Motor (h) Generator (i) Generator S N

5) Also known a Voltage - One volt is the electric potential difference between two points if one Joule of work is required to move one coulomb (C) of charge between the points.

6) The amount of charge moving past a point divided by the time taken.

7) The total amount of current into a junction point of a circuit equals the total current that flows out of that same junction.

| In a series circuit | In a parallel circuit |
| --- | --- |
| $I_T = I_1 = I_2 = \ldots$ | $I_T = I_1 + I_2 + \ldots$ |

8) The total ~~of~~ all electric potential decreases in any complete circuit loop is equal to any potential increase in that circuit loop.

| Series circuit | Parallel |
| --- | --- |
| $V_T = V_1 + V_2 + \ldots$ | $V_T = V_1 = V_2 = \ldots$ |

9) $I = 0.80A$ $\quad I = \frac{Q}{t}$

$t = 19 min \times \frac{60s}{1 min} = 1140 sec$ $\quad 0.80 = \frac{Q}{1140}$

$912 = Q$

$Q = ??$

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10) $V = 500kV = 5.0 \times 10^5 V$ $\quad V = \frac{E}{Q}$

$Q = 1.6 \times 10^{-19} C$ $\quad 5.0 \times 10^5 = \frac{E}{1.6 \times 10^{-19}}$

$E = ??$

$8.0 \times 10^{-14} J = E$

11) $I = 0.40A$

$t = 1.5 min = 90s$

$V = 115V$

$\Delta E = ?$

$I = \frac{Q}{t}$ $\quad Q = It = (0.40)(90)$

$Q = 36 C$

$V = \frac{\Delta E}{Q}$ $\quad \Delta E = VQ = (115)(36) = 4140 J$

12) $V = 120V$

$\Delta E = 50,000 J$

$t = 60s$

$V = \frac{\Delta E}{Q}$

$Q = \frac{\Delta E}{V} = \frac{50,000}{120} = 416.66 C$

$I = \frac{Q}{t} = \frac{416.66 C}{60s} = 6.94A$

13) $R = 9.2\Omega$
$V = 3.0\,V$
$I = ??$

$R = \frac{V}{I}$

$9.2 = \frac{3}{I}$

$I = 0.326\,A$

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14) $V = 120V$
$R = 60\Omega$
$I = ??$

$R = \frac{V}{I}$

$60 = \frac{120}{I}$

$I = 2A$

$\frac{1\ resistor}{2A} = \frac{x\ resistors}{10A}$

$5 = \#\ of\ resistors$

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15) $V = 10V$
a) $I = 15A$
$P = ??$

$P = VI$

$P = (10)(15)$

$P = 150W$

b) None -> all of these pieces of equipment are too much for the fuse.

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(16) Power = 7w × 25 bulbs × 4 strands = 700w

$t = 4 \text{ hours} \times 25 \text{ nights} = 100 \text{ hours}$

$E = ??$ $\quad E = Pt$

$E = (700)(100)$

$= 7.0 \times 10^4 \text{ wh} = 70 \text{ kwh}$

rate = \$0.10/kwh

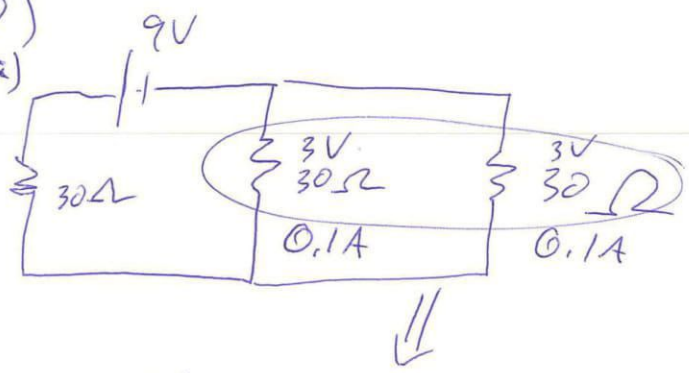
cost = ??

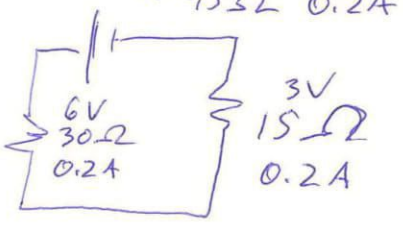
cost = rate × Energy

$= (0.10)(70) =$ \$7.00

20)

a)

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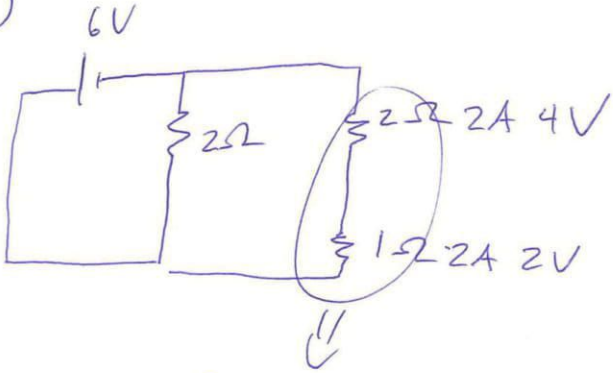


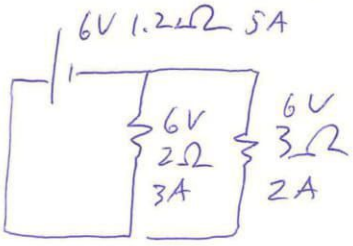

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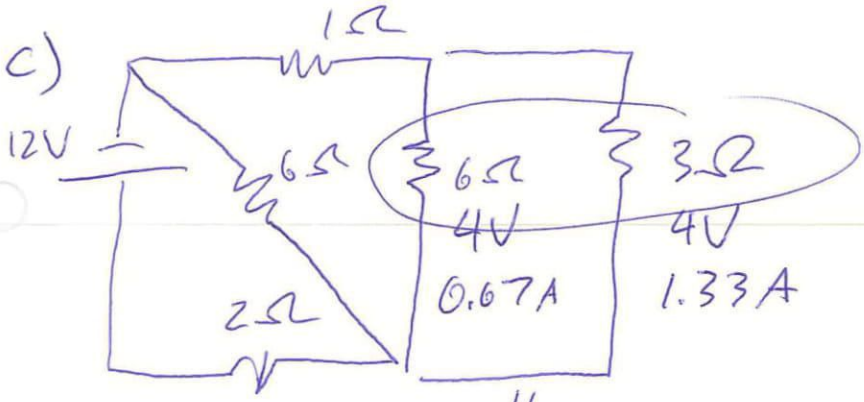
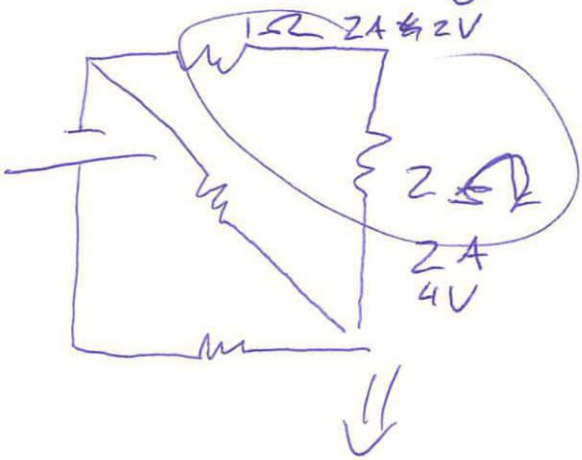
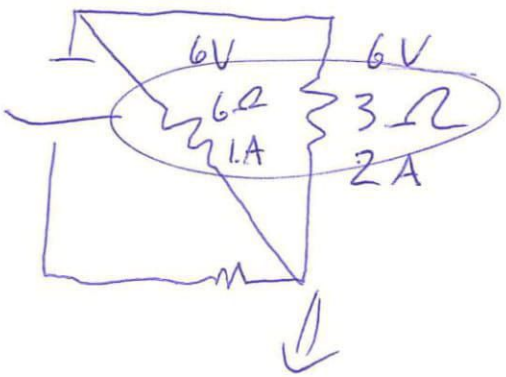
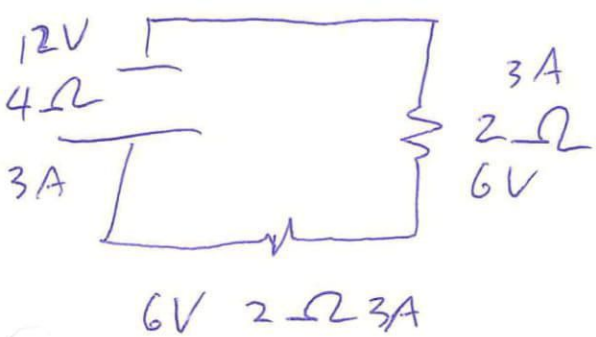

1Ω
12V
6Ω
6Ω
4V
0.67A
3Ω
4V
1.33A
2Ω

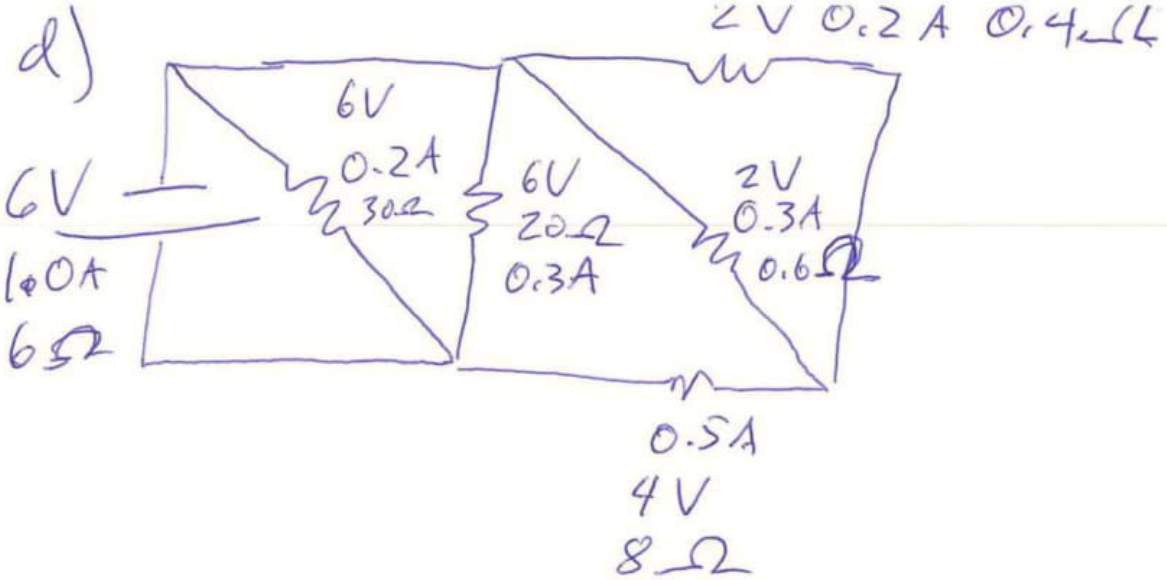

1Ω 2A 2V
2Ω
2A
4V


6V
6V
6Ω
1A
3Ω
2A


12V
4Ω
3A
3A
2Ω
6V

6V 2Ω 3A

d)

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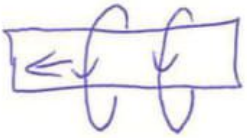
21)

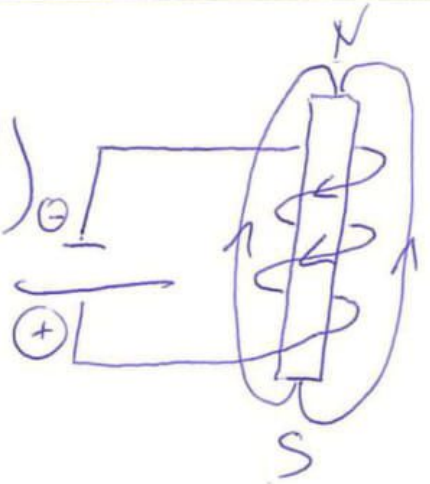
a)

b)

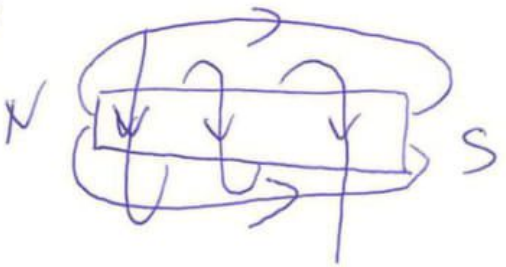


c)

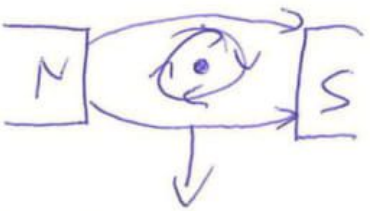
d)




e)

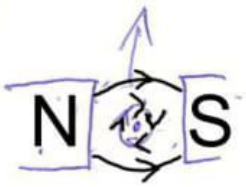



f) Motor




g) Motor


h) Generator




(i) Generator