Group Work for 18ABDE

Name __________________________

A. Ohm's Law: $R = \dfrac{V}{I}$

1. How much current flows when you hook a 45.0 Ω heater up to a 117 V source?

2. A resistor is connected to 5.00 V and there is a current of 125 mA flowing. What is the resistance?

3. What is the voltage across a 220. Ω resistor with a current of 12.0 mA flowing through it?

4. If you want to limit the current to 0.450 A, what resistance would you use with 12.0 V

B. Power: $P = VI = I^2R = \dfrac{V^2}{R}$

5. What must be the current flowing through a 945 Watt heater connected to a 12.0 V source?

6. A 1400. W heater plugs into a 120. V source. What must be its resistance?

7. A 165 W heater has a resistance of 1.85 Ω. At what voltage must it operate?

8. A 385 Ω resistor is rated at 0.250 Watts. What is the maximum current that can flow through it?

C. Current: $I = \dfrac{\Delta q}{\Delta t}$

9. What time must a 215 mA current flow to deliver 2.30 C of charge?

10. A capacitor bank is charged at an average rate of 0.312 A. What charge is moved in 2.00 minutes?

D. Crazy Mixed Up Power And Energy: (Students struggle with these)

$$P = VI = I^2R = \frac{V^2}{R} \qquad \text{power} = \frac{\text{energy}}{\text{time}} \qquad Q = mc\Delta T \qquad \Delta E_p = mg\Delta h \qquad E_K = \frac{1}{2}mv^2$$

11. An elevator motor must draw 15.1 A of current, and lift an 875 kg elevator from the ground to a height of 22.5 m in 58.0 s. What must be the input voltage for the elevator?

12. A 1.95 Ω heater core operating at 32.0 V is used to heat 1.40 liters of water initially at 21.0 ^{o}C. What time will it take to reach boiling if it loses no heat to the surroundings? (Cwater = 4186 J kg^{-1} ^{o}C^{-1})

13. A 78.0 kg go cart is sped up from rest by a motor with an effective resistance of the 0.961 Ω, and that draws an average of 12.5 A of current. What is the final speed of the go cart after 10.0 seconds assuming there is no friction or other losses?

E. RMS Problems:

$$V_{rms} = \frac{V_0}{\sqrt{2}} \qquad I_{rms} = \frac{I_0}{\sqrt{2}} \qquad R = \frac{V_0}{I_0} = \frac{V_{rms}}{I_{rms}} \qquad P_{max} = I_0V_0 \qquad \bar{P} = \frac{1}{2}I_0V_0 \qquad P = VI = I^2R = \frac{V^2}{R}$$

14. A 12.2 Ω heater is connected to an alternating current with a peak voltage of 172 V. What is the power dissipated?

15. A heater runs on alternating current. The peak voltage across the heater is 35.0 V, and the peak current through the heater is 3.80 A. What is the power consumption of the heater?

16. A 1400. Watt heater runs on alternating current at 120. V (RMS). What is the peak current flowing?

17. What is the power of a heater that operates with a peak current of 12.9 A and has a resistance of 2.50 Ω?

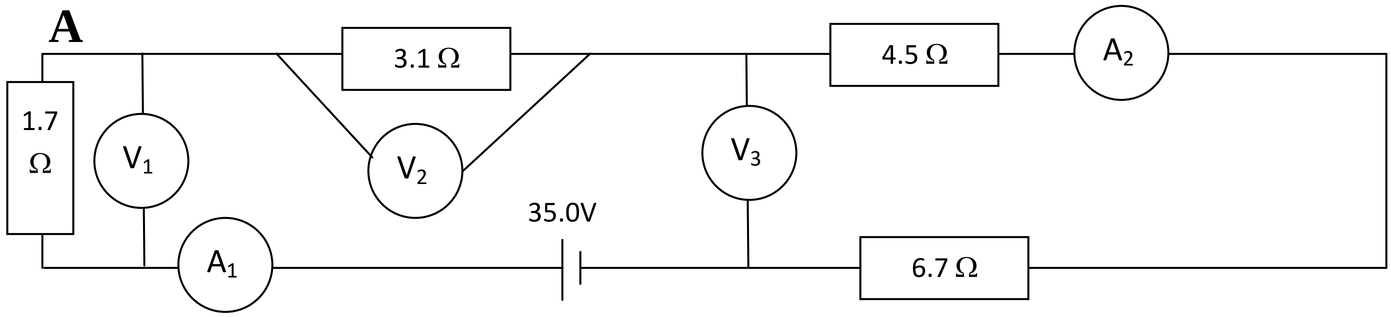
18. A 113 Ω heater is dissipating 825 W of power. What must be the peak voltage if it operates on an alternating current source?

Group Work for 18FGH

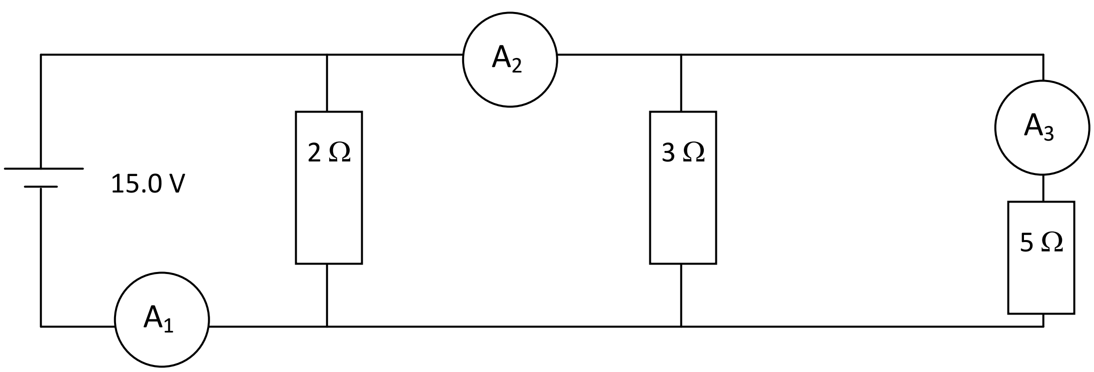
Name ______________________________

Round your answers to three sig figs (retain five), and show your work.

A

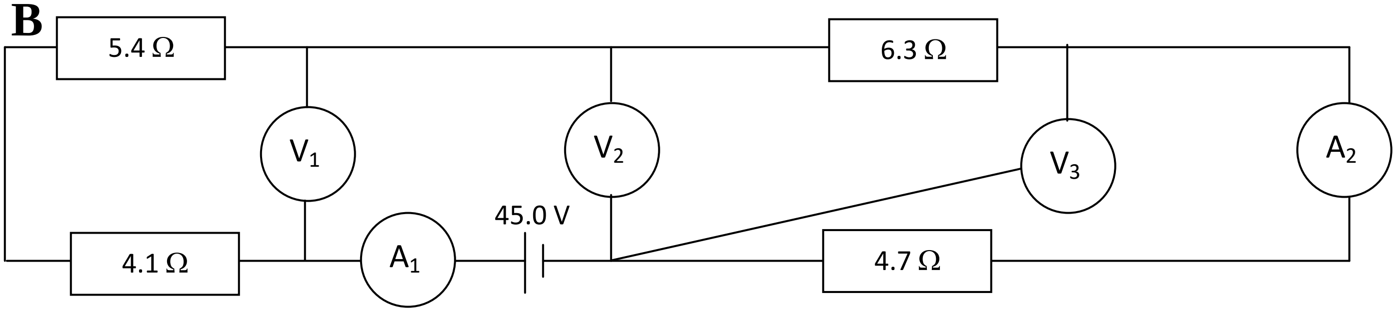


A_1 (2.19 A)	A_2 (2.19 A)	V_1 (3.72 V)
V_2 (6.78 V)	V_3 (24.5 V)	Least power dissipated by a resistor: (the 1.7 ohm: 8.13 W)

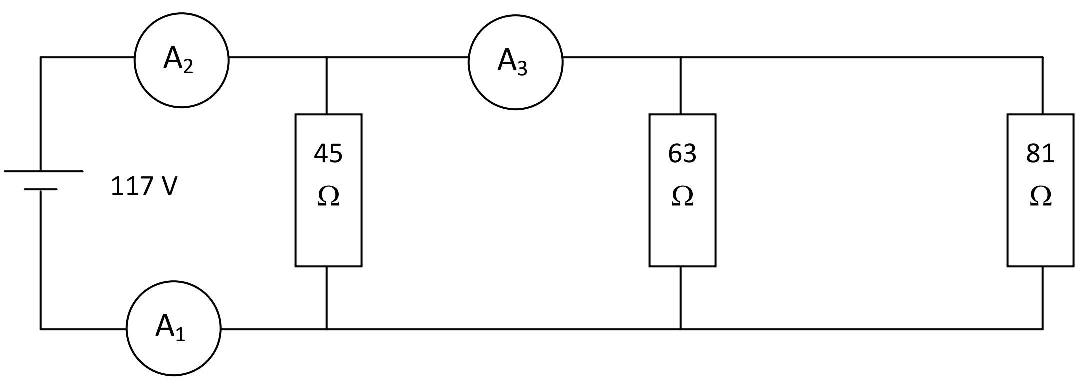


A_1 (15.5 A)	A_2 (8.00 A)	A_3 (3.00 A)	Greatest power dissipated by a resistor (the 2 ohm: 112.5 W)

B

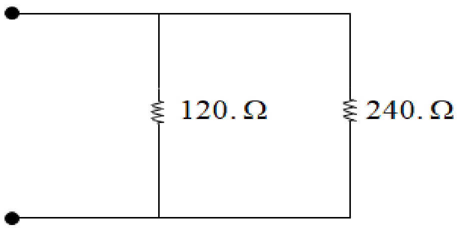


A_1 (2.20 A)	A_2 (2.20 A)	V_1 (20.9 V)
V_2 (24.1 V)	V_3 (10.3 V)	Greatest power dissipated by a resistor: (the 6.3 ohm: 30.4 W)

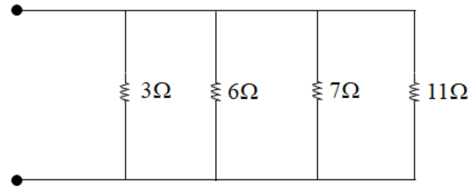


A_1 (5.90 A)	A_2 (5.90 A)	A_3 (3.30 A)	Least power dissipated by a resistor (the 81 ohm: 169. W)

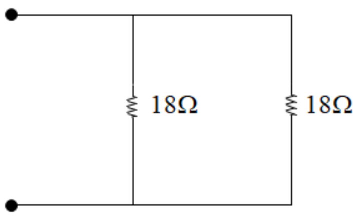
C Find these resistances from the black dot to the black dot:



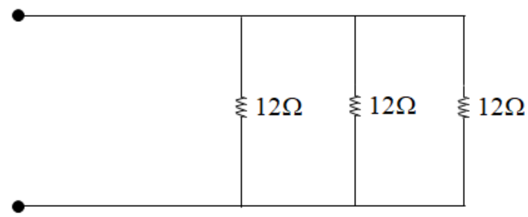
(80 Ω)



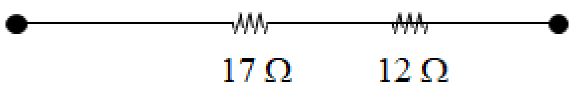
(1.36 Ω)



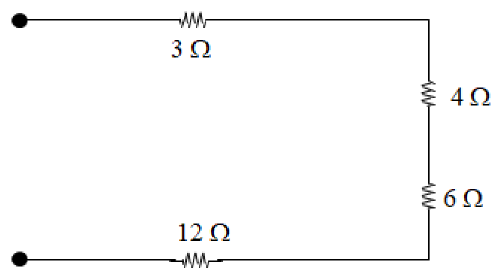
(9 Ω)



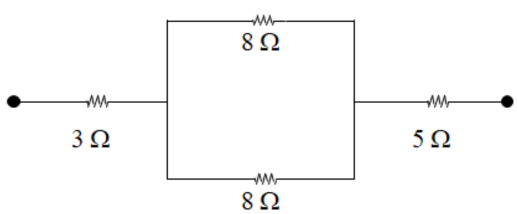
(4 Ω)



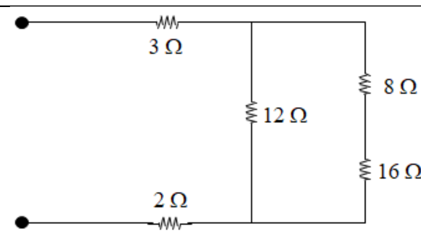
(29 Ω)



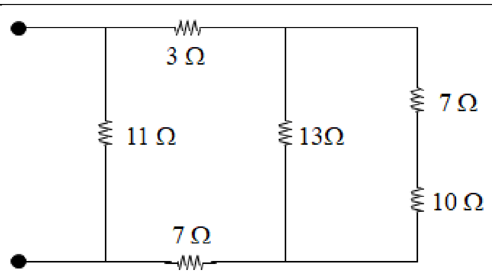
(25 Ω)



$3 + (8^{-1} + 8^{-1})^{-1} + 5$ = 12 Ω (Challenge)



$3+(12^{-1}+(16+8)^{-1})^{-1}+2$ = 13 Ω (Challenge)



(6.73 Ω)

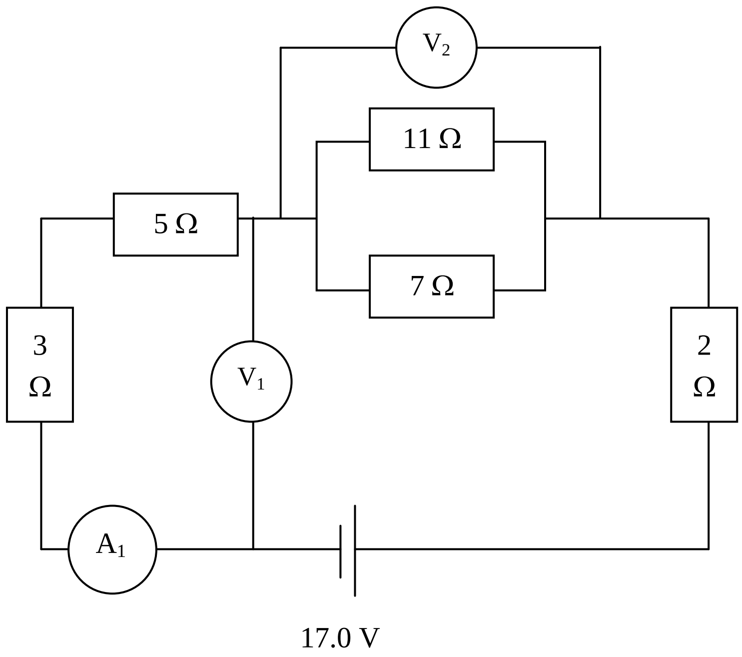
Draw a picture of a pretty pony here:

Group Work for 18IJ-Single Poppers

Name ___________________________

Find the readings on the meters:

1



4.277778		
14.27778		
A1	1.191	A
V1	9.525	V
V2	5.093	V
I 7	0.728	A

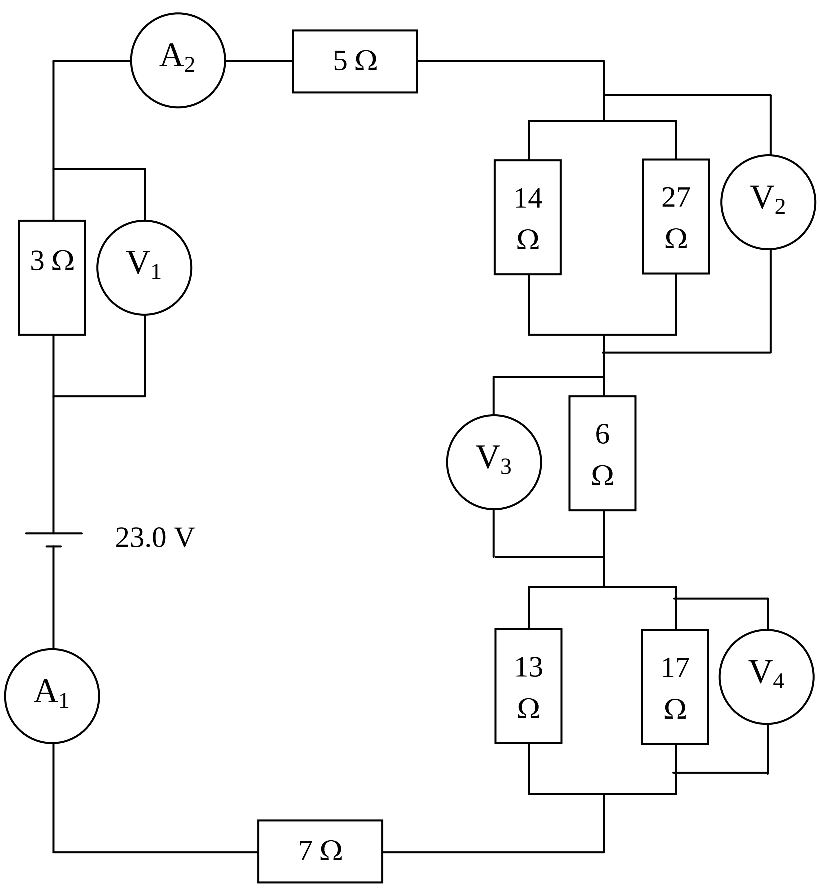
A_1 = __________

V_1 = __________

V_2 = __________

Current through 7 Ω =________

2



9.219512		
7.366667		
37.58618		
A1	0.6119	A
A2	0.6119	A
V1	1.8358	V
V2	5.6417	V
V3	3.6716	V
V4	4.5079	V
I 14	0.4030	A
I 17	0.2652	A

A_1 = __________

A_2 = __________

V_1 = __________

V_2 = __________

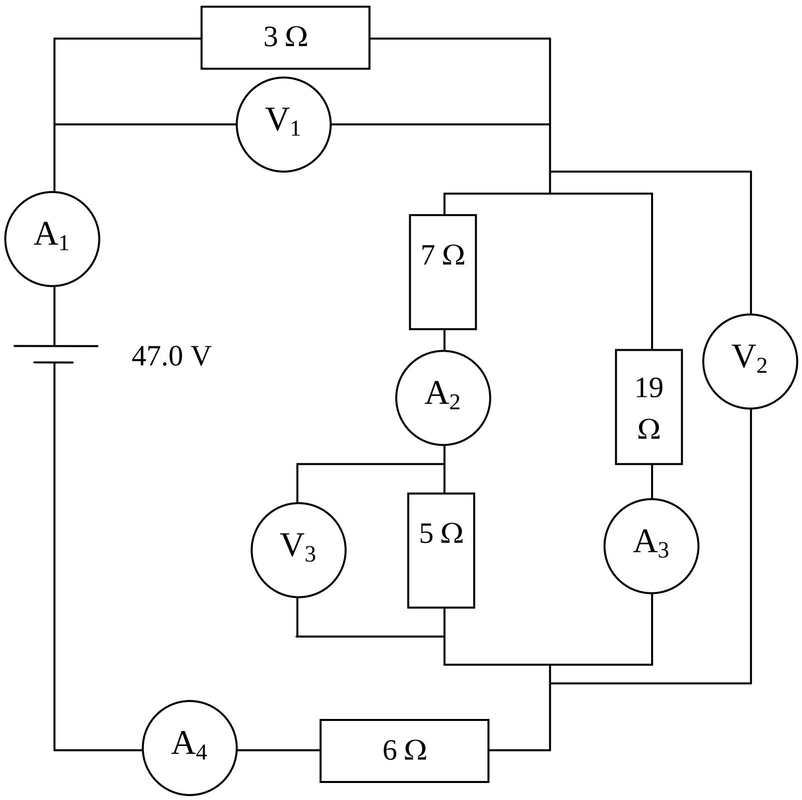
V_3 = __________

V_4 = __________

Current through 14 Ω =________

Current through 17 Ω =________

3



12		
7.354839		
16.35484		
A1	2.8738	A
A2	1.7613	A
A3	1.1124	A
A4	2.8738	A
V1	8.6213	V
V2	21.1361	V
V3	8.8067	V

A_1 = __________

A_2 = __________

A_3 = __________

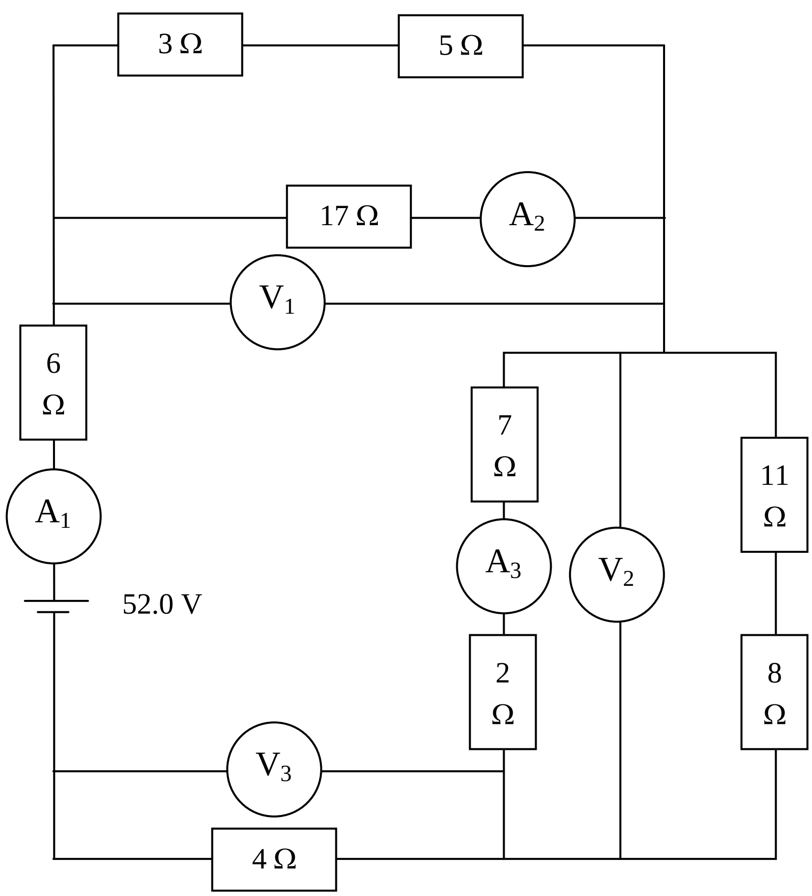
A_4 = __________

V_1 = __________

V_2 = __________

V_3 = __________

4



8		
5.44		
9		
19		
6.107143		
21.54714		
A1	2.4133	A
A2	0.7723	A
A3	1.6376	A
V1	13.1284	V
V2	14.7384	V
V3	9.6533	V
I 3Ω	1.6411	A
V 3Ω	4.9232	V
V 7Ω	11.463	V
I 8Ω	0.7757	A
V 11Ω	8.5328	V

A_1 = __________

A_2 = __________

A_3 = __________

V_1 = __________

V_2 = __________

V_3 = __________

Current through the 3 Ω________

Voltage across the 3 Ω_________

Voltage across the 7 Ω_________

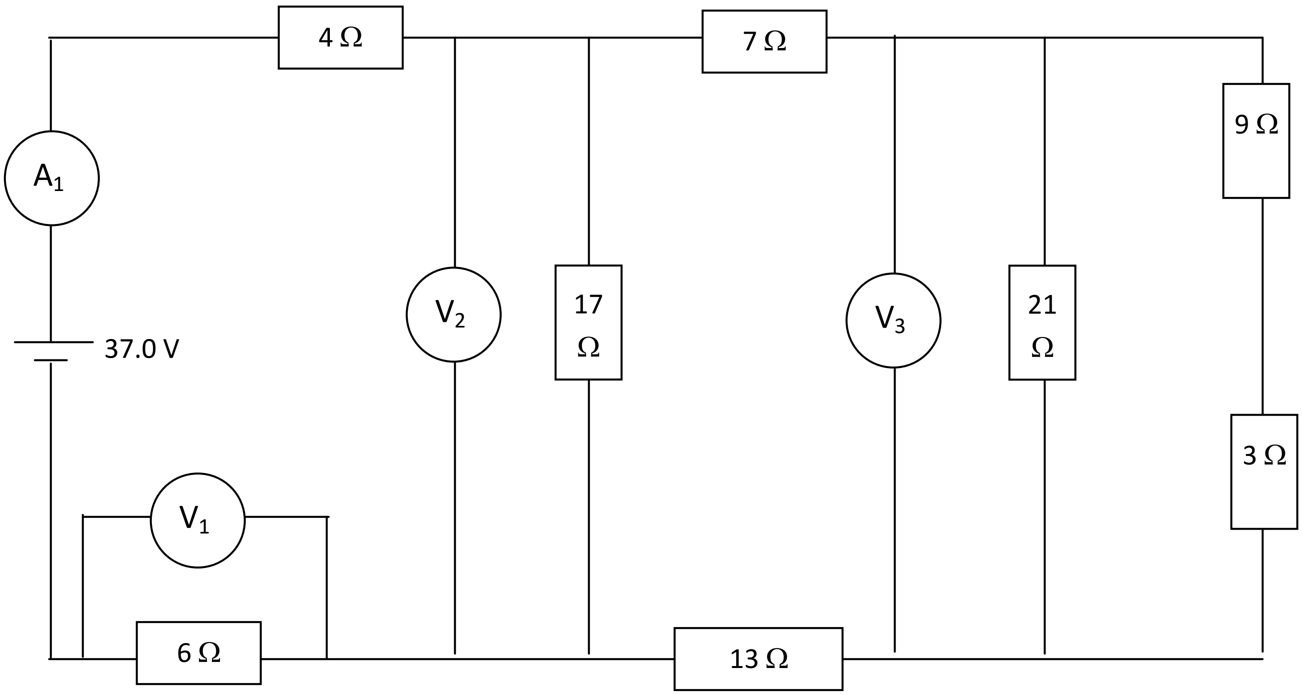
Current through the 8 Ω ________

Voltage across the 11 Ω________

Group Work for 18IJ2-Double Popper's Penguins Name ___________________________

Round your answers to three sig figs (retain five), and show your work.

1



Find:

A_1 =________________

V_1 =________________

V_2 =________________

V_3 =________________

Find the current through:

17 Ω________________

7 Ω________________

21 Ω________________

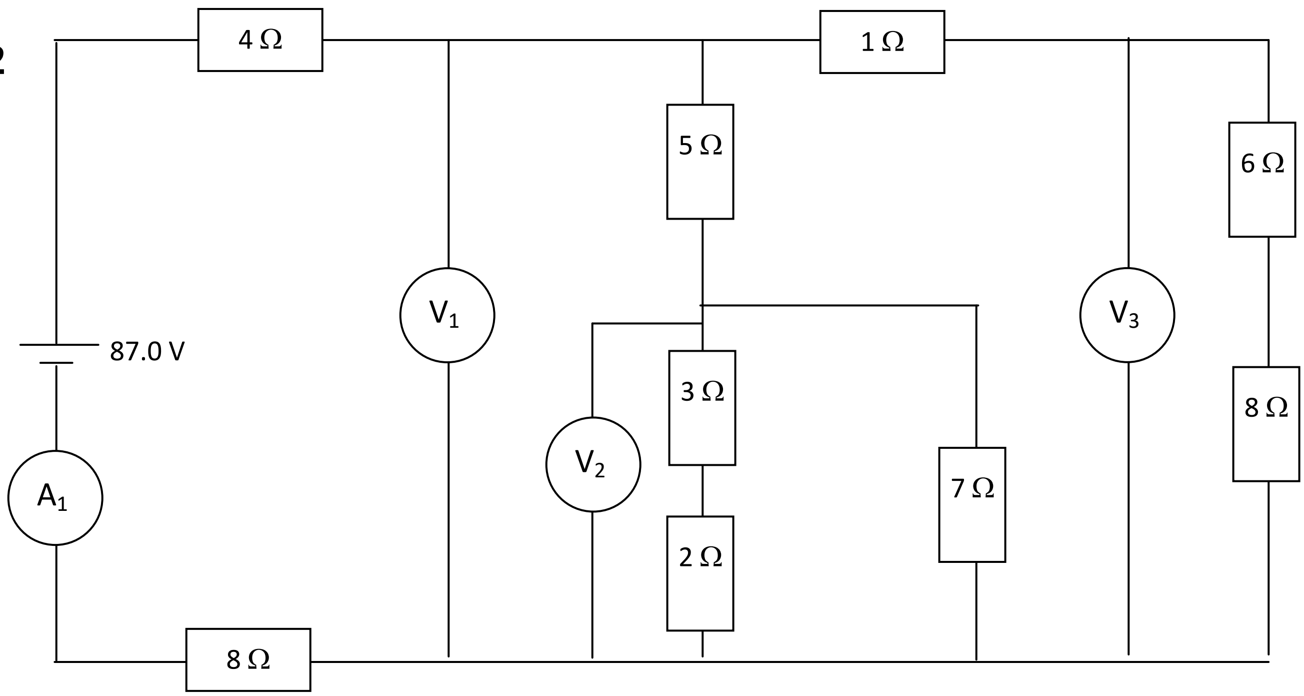
9 Ω________________

Find the Voltage across:

3 Ω________________

12		
7.636364		
27.63636		
10.52546		
20.52546		
A1	1.8026	A
V1	10.8158	V
V2	18.9736	V
V3	5.2427	V
I 17Ω	1.1161	A
I 7Ω	0.6865	A
I 21Ω	0.2497	A
I 9Ω	0.4369	A
V 3Ω	1.3107	V

2



Find:

A_1 =________________

V_1 =________________

V_2 =________________

V_3 =________________

Find the current through:

5 Ω________________

3 Ω________________

6 Ω________________

7 Ω________________

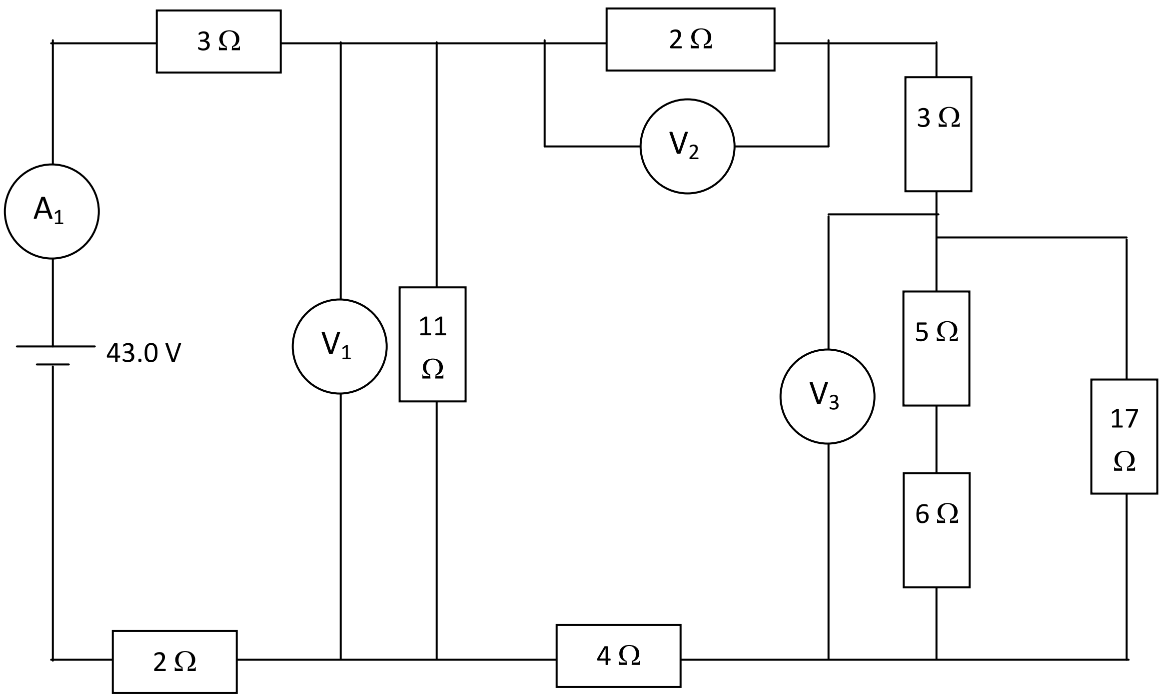
Find the voltage across:

2 Ω________________

5 Ω________________

15		
5		
2.916667		
7.916667		
5.181818		
17.18182		
A1	5.0635	A
V1	26.2381	V
V2	9.6667	V
V3	24.4889	V
I 5Ω	3.3143	A
I 3Ω	1.9333	A
I 6Ω	1.7492	A
I 7Ω	1.381	A
V 2Ω	3.8667	V
V 5Ω	16.571	V

3



Find:

A_1 =________________

V_1 =________________

V_2 =________________

V_3 =________________

Find the current through:

11 Ω________________

4 Ω________________

5 Ω________________

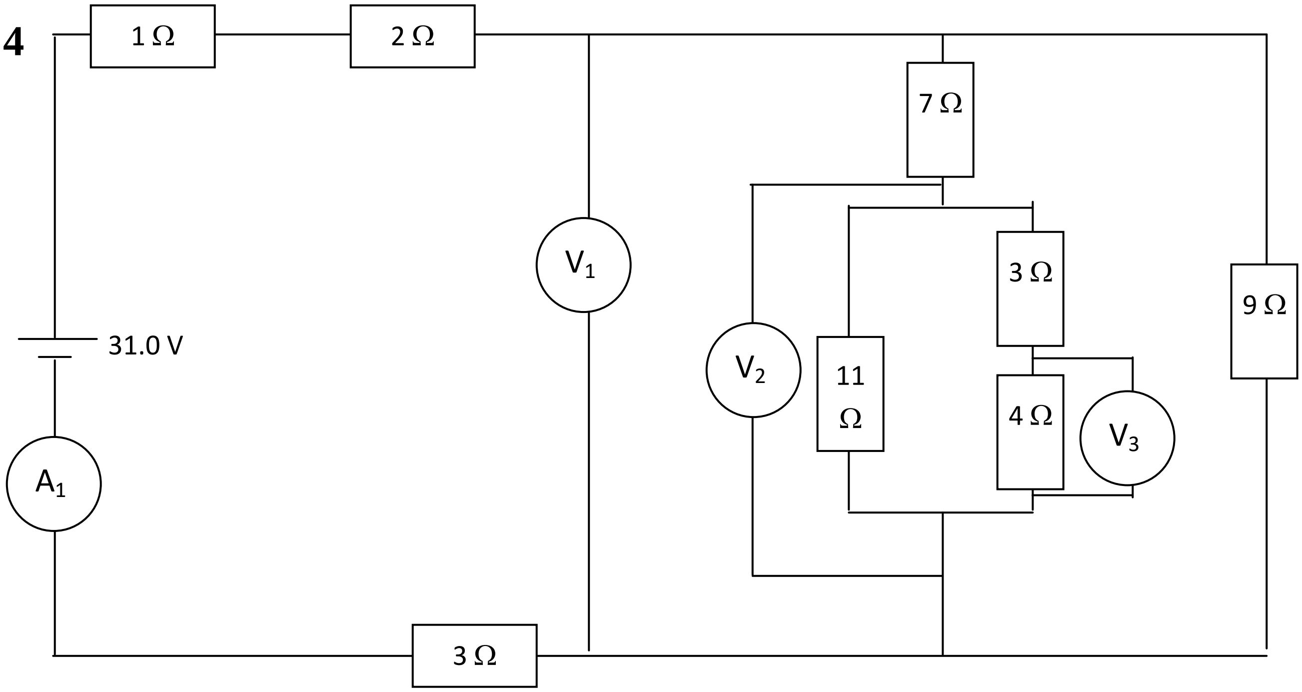
17 Ω________________

Find the Voltage across the:

6 Ω________________

11		
6.678571		
15.67857		
6.464525		
11.46452		
A1	3.7507	A
V1	24.2465	V
V2	3.0929	V
V3	10.3282	V
I 11Ω	2.2042	A
I 4Ω	1.5465	A
I 5Ω	0.9389	A
I 17Ω	0.6075	A
V 6Ω	5.6336	V

4



Find:

A_1 =________________

V_1 =________________

V_2 =________________

V_3 =________________

Find the current through:

7 Ω________________

9 Ω________________

4 Ω________________

11 Ω________________

Find the Voltage across the:

7 Ω________________

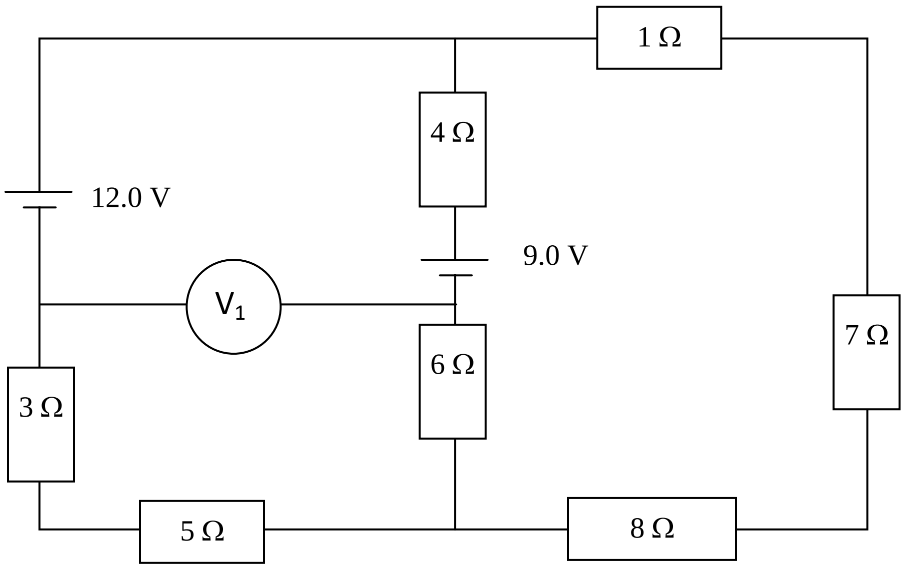
2 Ω________________

7		
4.277778		
11.27778		
5.005479		
11.00548		
A1	2.8168	A
V1	14.0993	V
V2	5.3480	V
V3	3.0560	V
I 7Ω	1.2502	A
I 9Ω	1.5666	A
I 4Ω	0.764	A
I 11Ω	0.4862	A
V 7Ω	8.7513	V
V 2Ω	5.6336	V

Group Work for 18L

Name ______________________________

1



Find the current and direction (up or down) through:

3 Ω__________________

6 Ω__________________

7 Ω__________________

Find the voltage across:

6 Ω__________________

8 Ω__________________

Find power dissipated by:

1 Ω__________________

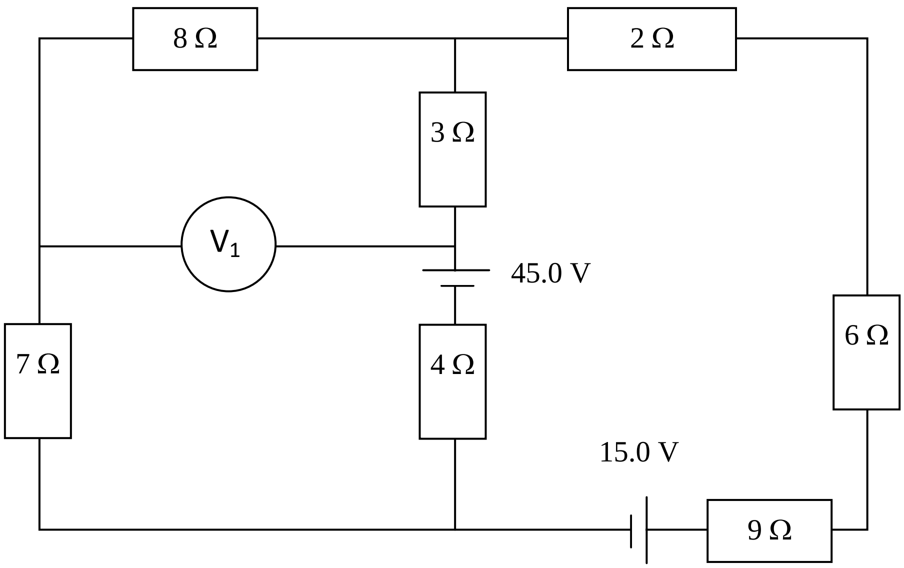
4 Ω__________________

Find:

$|V_1|$ =_________________

I	3	**0.457**	**A**	**Up**
I	6	**0.0652**	**A**	**Up**
I	7	**0.522**	**A**	**Down**
V	6	**0.391**	**V**	
V	8	**4.174**	**V**	
P	1	**0.272**	**W**	
P	4	**0.0170**	**W**	
	|V1|	3.2609	**V**	

2



Find the current and direction (up, down) through:

7 Ω________________

4 Ω________________

6 Ω________________

Find the voltage across:

8 Ω________________

2 Ω________________

Find power dissipated by:

3 Ω________________

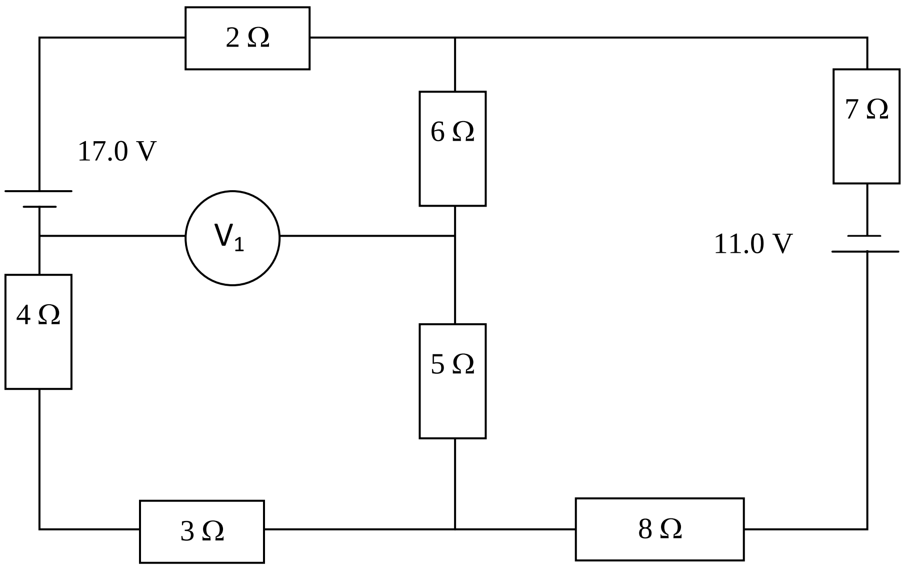
9 Ω________________

Find:

$|V_1|$ =_______________

I	7	1.82	A	Down
I	4	2.54	A	Up
I	6	0.720	A	Down
V	8	14.5	V	
V	2	1.44	V	
P	3	19.3	W	
P	9	4.67	W	
	|V1|	22.1	V	

3



Find the current and direction (up or down) through:

4 Ω__________________

5 Ω__________________

7 Ω__________________

Find the voltage across:

6 Ω__________________

8 Ω__________________

Find power dissipated by:

2 Ω__________________

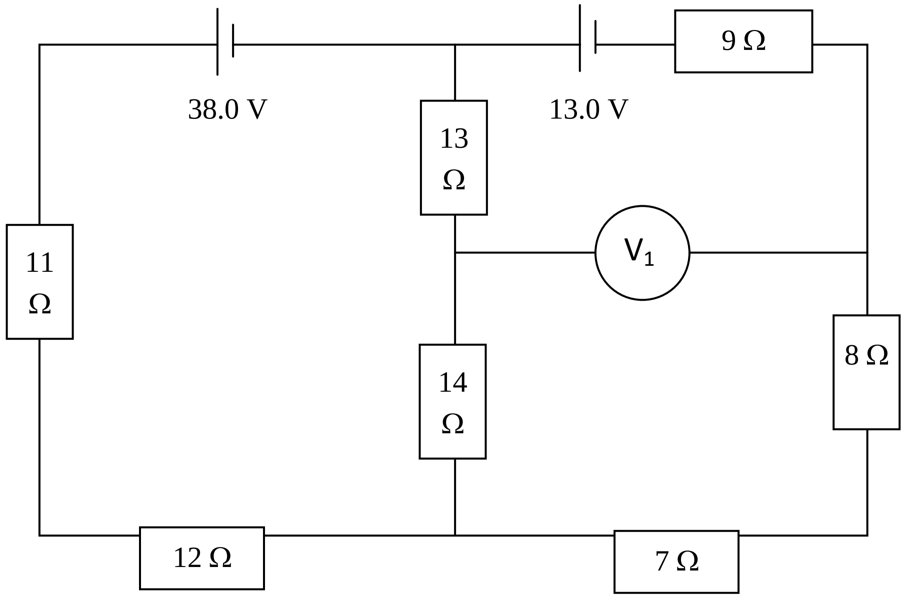
7 Ω__________________

Find:

$|V_1|$ =_________________

I	4	**1.41**	**A**	**Up**
I	5	**0.391**	**A**	**Down**
I	7	**1.02**	**A**	**Down**
V	6	**2.35**	**V**	
V	8	**8.16**	**V**	
P	2	**3.98**	**W**	
P	7	**7.28**	**W**	
	|V1|	11.832	**V**	

4



Find the current and direction (up, down, left, right) through:

11 Ω________________

14 Ω________________

8 Ω_________________

Find the voltage across:

13 Ω________________

9 Ω_________________

Find power dissipated by:

12 Ω________________

7 Ω_________________

Find:

$|V_1|$ =________________

I	11	1.26	A	Down
I	14	0.337	A	Up
I	8	0.920	A	Up
V	13	4.38	V	
V	9	8.28	V	
P	12	18.96	W	
P	7	5.93	W	
	|V1|	9.09	V	