Friday, January 11/13
Physics 122/121

Exam Review

1. Ohm's Law: Textbook: Page 714, #21-24

2. Series Circuit

3. Textbook: Page 719, #27-31

4. Parallel Circuit

5. Textbook: Page 724, #32-35

P1 / P6

6. Combination/Complex Circuits

7. Textbook: Page 728, #36-37
   Textbook: Page 749, #33-34

Physics 122/121 Exam

<u>Tentative</u>

Part 1 – MC 40 ⇒ List the #'s.

Part 2 - Prob. 12

* Formula Sheet

Circular Motion

Handout: Problems - Circular Motion

LEVEL 1 -> Packet (Banked and Unbanked Curves, Vertical Circular Motion)

Universal Gravitation

Experiment 8.1 - Kepler's Laws - Page 49

Chapter 12 - Page 580, PP#1-7

Investigation 12-A, Page 581

Handouts (3) - Kepler's Laws, Value of "g", Speed and Period of a Satellite

Simple Harmonic Motion

Text: Page 608, #1-4
Page 623, #23-27, 30 } Mass on Spring

Text: Page 614, #5-8
Page 623, #28, 29 } Pendulum

Answer to #5 is listed as #7's. Scan answers for others.

SHM - Pendulum Lab

Handout: SHM Problems

Projectiles

Text: Page 536, PP #1-8

Text: Page 549, PP #13
Page 570, Prob. #17, 19, 20 (omit graph)

Coulomb's Law

Textbook: Page 638, #4-5
Handout: Charge and Coulomb's Law

Electric Field Strength

Textbook: Page 646, #11-14
Textbook: Page 655, #20-24

Electric Potential Difference (Voltage)/Electric Current

Textbook: Page 696, #4-10

Ohm's Law

Textbook: Page 714, #21-24

Series Circuit

Textbook: Page 719, #27-31

Parallel Circuit

Textbook: Page 724, #32-35

Series Circuits (Page 716)

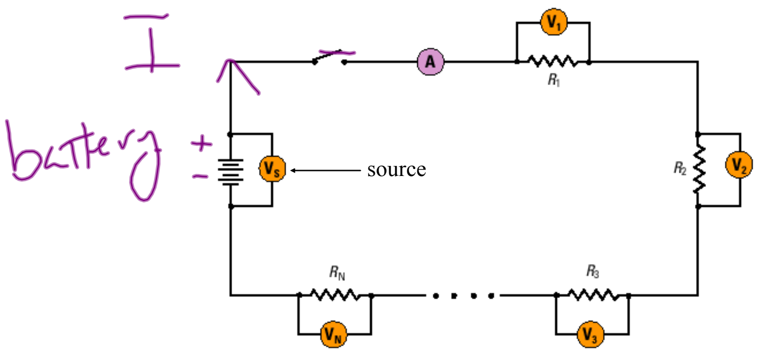


Figure 15.19 A circuit might consist of any number of loads. If this circuit had eight loads, R_N would represent R_8, and eight loads would be connected in series.

Chapter 15 Electric Energy and Circuits • MHR 717

A series circuit consists of loads (resistances) connected in series.

The current that leaves the battery has only one path to follow. All of the current that leaves the battery must pass through each of the loads.

An ammeter could be connected at any point in the circuit and each reading would be the same.

$$I = I_1 = I_2 = I_3 = I_N$$

The potential difference of the battery must be shared over all the loads. A portion of the electric potential of the battery must be used to push the current through each load. If each load had a voltmeter connected across it, the total of the potential differences across the individual loads must equal the potential difference across the battery.

$$V = V_1 + V_2 + V_3 + \ldots + V_N$$

The equivalent resistance, R_{eq}, of the circuit is the calculated total resistance of the resistors in the circuit. For resistors connected in series:

$$R_{eq} = R_1 + R_2 + R_3 + \ldots + R_N$$

The V-I-R Chart

V=IR

This chart may be useful in organizing the information you are given and the information you must find.

	V	I	R
R_1			
R_2			
R_3			
R_N			
Total			

Ohm's Law is valid whenever two of the three values in a row are known.

Example - Model Problem Page 718 (MHR) ✓

MODEL PROBLEM

Resistances in Series

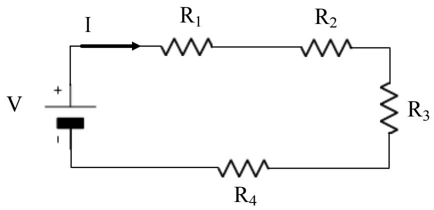
Four loads (3.0 Ω, 5.0 Ω, 7.0 Ω, and 9.0 Ω) are connected in series to a 12 V battery. Find

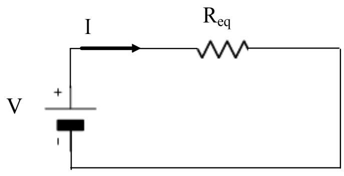
(a) the equivalent resistance of the circuit

(b) the total current in the circuit

(c) the potential difference across the 7.0 Ω load

718 MHR • Unit 6 Electric, Gravitational, and Magnetic Fields





	V	I	R
R_1			3.0 Ω
R_2			5.0 Ω
R_3	3.50 V	0.500 A	7.0 Ω
R_4			9.0 Ω
Total	12 V	0.500 A	24.0 Ω

a) $R_{eq} = R_1 + R_2 + R_3 + R_4$

$R_{eq} = 3.0\Omega + 5.0\Omega + 7.0\Omega + 9.0\Omega$

$R_{eq} = 24.0\Omega$

b) $I = ?$

$R_{eq} = 24.0\Omega$

$V = 12V$

$V = I R_{eq}$

$I = \frac{12V}{24.0\Omega}$

$I = 0.500 A$

c) $V_3 = ?$

$I = I_3 = 0.500 A$

$R_3 = 7.0\Omega$

$V_3 = I R_3$

$V_3 = (0.500A)(7.0)$

$V_3 = 3.50V$

Parallel Circuits (Page 720)

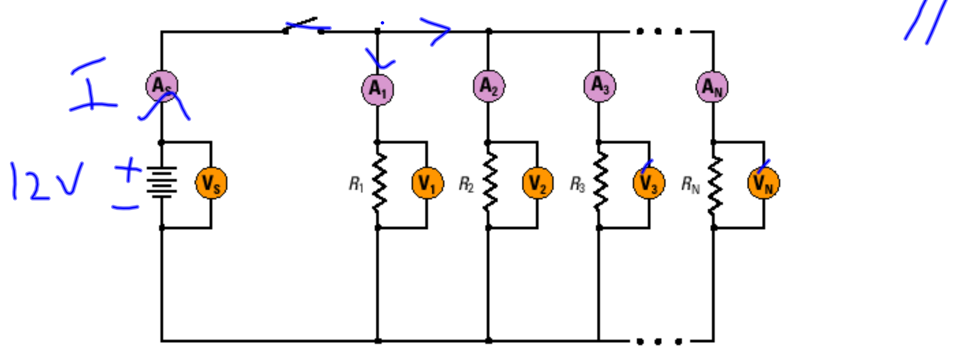


Figure 15.21 The *N* loads in this circuit are all connected in parallel with each other. The dots indicate where any number of additional loads could be connected in parallel with those present.

Chapter 15 Electric Energy and Circuits • MHR 721

A parallel circuit consists of loads connected in parallel.

The current that leaves the battery has more than one path to follow. When the current leaving the battery, I_S, comes to a point in the circuit where the path splits into two or more paths, the current must split so that a portion of it follows each path. After passing through the loads, the currents combine before returning to the battery. The sum of the currents in parallel paths must equal the current entering and leaving the battery.

$$I = I_1 + I_2 + I_3 + ... + I_N$$

The potential difference across each of the individual loads in a parallel circuit must be the same as the total potential difference across the battery, V_S.

$$V = V_1 = V_2 = V_3 = V_N$$

For resistors connected in parallel, the <u>equivalent resistance</u>, R_{eq}, is given by:

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_N} + ...$$

$R_{eq} <$ all the individual resistances

Example - Model Problem Page 722 (MHR)

MODEL PROBLEM

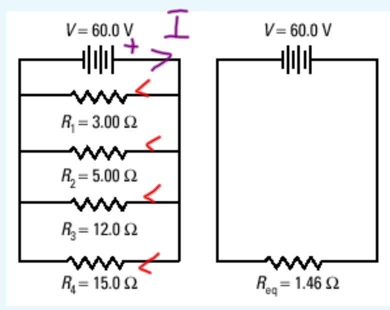
Resistors in Parallel

A 60 V battery is connected to four loads of 3.0 Ω, 5.0 Ω, 12.0 Ω, and 15.0 Ω in parallel.

(a) Find the equivalent resistance of the four combined loads.

(b) Find the total current leaving the battery.

(c) Find the current through the 12.0 Ω load.



	V	I	R
R_1			3.0 Ω
R_2			5.0 Ω
R_3	60V	5.0A	12.0 Ω
R_4			15.0 Ω
Total	60V	41.1A	1.46 Ω

a) $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$

$\frac{1}{R_{eq}} = \frac{1}{3.0} + \frac{1}{5.0} + \frac{1}{12.0} + \frac{1}{15.0}$

$R_{eq} = 1.46\ \Omega$

b) $I = ?$

$R_{eq} = 1.46\ \Omega$

$V = 60\ V$

$I = \frac{V}{R_{eq}}$

$I = \frac{60}{1.46}$

$I = 41.1\ A$

c) $R_3 = 12.0\ \Omega$

$V = 60V$

$I_3 = ?$

$I_3 = \frac{V}{R_3} = \frac{60}{12.0} = 5.0A$