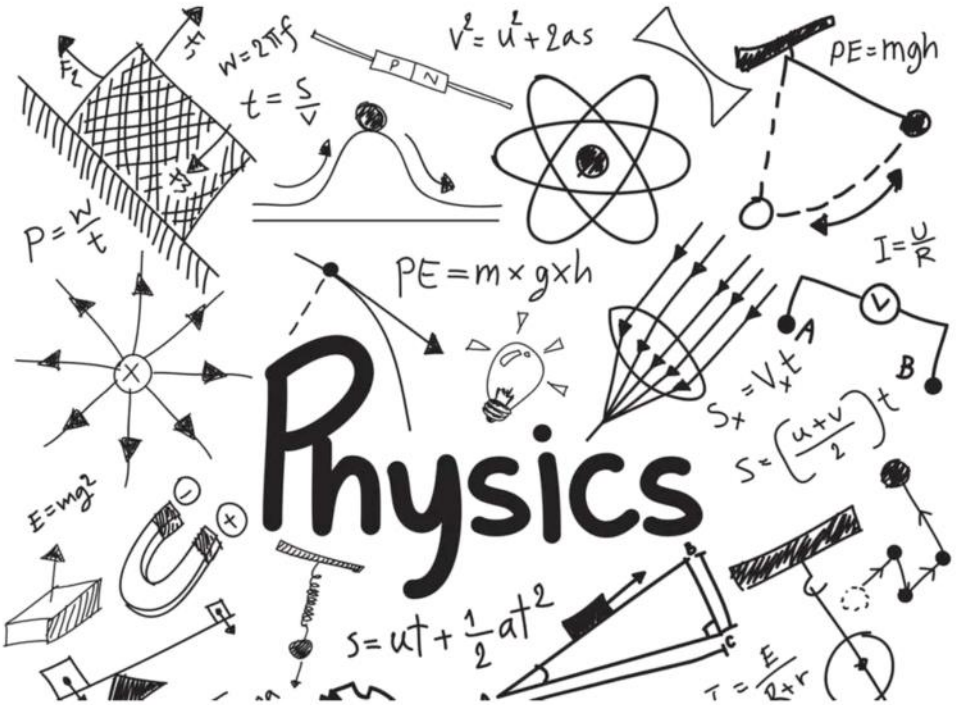
BOOK 3 KEY

June 13, 2019 4:33 PM

SCIENCE 9

FINAL EXAM REVIEW BOOK 3



ELECTRIC CURRENT IS THE FLOW OF ELECTRIC CHARGE

NAME: _____ BLOCK: _____

1

Study Checklist

This review booklet is by no means a "practice final". It is a collection of practice questions on each unit, meant to guide your final exam studying and prepare you for the types of questions you are likely to see. DO NOT treat this booklet as a practice test. If you're stuck on a question, look it up and ask for help! DO NOT go straight to the answer key when you come across a question you cannot remember how to do. Difficult questions SHOULD guide your study! Always look up a concept in your class notes if you are stuck, then attempt the question again.

***BEFORE* beginning this booklet you should:**

- read through your class notes booklet on *each topic*
- make your own "quick summary page" of important formulas & key concepts for the unit
- review quizzes & tests from the unit to recall strengths & weaknesses *(a great study method would be to re-do old quizzes & tests on a separate piece of paper)*

***WHILE* working through this booklet you should:**

- look up concepts & example problems in your class notes when you come across a problem you are stuck on
- make a list of "questions to ask my teacher" so you can come to class and use your time efficiently.

Questions I'm having difficulty with:

Page	Question Number #	Topic

UNIT 3: PHYSICS

use this page to make your own KEY summary notes

PHYSICS STUDY GUIDE

Key Ideas:

- How is electrical energy a part of your world?
- How can electrical energy be generated and used sustainably?
- How do electrical charges behave?
- How do charges flow through the components of a circuit?
- How are circuits used in practical applications?

Key Terms:

- potential energy
- kinetic energy
- energy transformation
- electrical energy
- generator system
- protons
- electrons
- electric charge
- Coulomb
- positive
- negative
- neutral
- static electricity
- insulator
- conductor
- attract
- repel
- force
- action-at-a-distance force
- Laws of Electric Charge
- like charges
- unlike charges
- conduction
- induction
- electroscope
- acetate
- vinyl
- Van de Graaff generator
- current electricity
- circuit
- conductor
- positive terminal
- negative terminal
- electrical potential difference
- electron flow
- current
- circuit diagrams
- source
- electrochemical cell
- battery
- load
- resistor
- open switch
- closed switch
- voltage
- potential energy
- potential difference
- volt
- voltmeter
- electrolytes
- electrodes
- ampere
- milliamp
- ammeter
- resistance
- Ohm
- Ohmmeter
- Ohm's Law
- series circuit
- parallel circuit
- junction point

Key Concepts

Electrical Energy

- Describe how energy transformations are used to generate electrical energy.
- Describe how we use electrical energy in our daily lives.
- Describe sustainable ways that electrical energy can be generated.

Static electricity

- Know what electric charges are found in an object before and after electrons have been transferred between objects as a result of charging by friction.
- Apply the Laws of Electric Charge.
- Understand how positive and negative charges move when an object is charged by induction or conduction.

Electric circuits

- Understand how repelling and attracting forces can initiate the flow of electrons.
- Describe how an electrochemical cell works.
- Know how to set up a circuit using given parts/materials.
- Know how to draw a circuit diagram using circuit symbols.

Voltage, Current, and Resistance

- Understand what part the voltage, current, and resistance plays in the circuit.
- Understand the relationship between voltage and other parts of the circuit.
- Know how to use a voltmeter and ammeter to measure voltage and current.

Ohm's law

- Understand how voltage can influence current, and vice versa.
- Understand how resistance can influence current.
- Know the equation for Ohm's law (even though it is given in the formula sheet) and how to solve problems involving voltage, current and resistance.

Series and Parallel Circuits

- Understand the difference between a series and a parallel circuit in terms of electron flow.
- Understand how total voltage is related to a series and parallel circuit.
- Understand how total current is related to the current of individual pathways in a parallel circuit.
- Understand how adding resistor can change the total resistance in a series versus parallel circuit.

Physics Review

Modified True/False
Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

1. ANS: T
2. ANS: F, anemometer
3. ANS: F, electrically charged
4. ANS: F, Electrodes
5. ANS: F, source
6. ANS: T
7. ANS: T
8. ANS: T
9. ANS: T
10. ANS: F, parallel
11. ANS: T
12. ANS: T
13. ANS: T
14. ANS: T
15. ANS: T
16. ANS: T
17. ANS: F, series

1. ***Electrical energy*** is used by the human body's nervous system.
2. A ***turbine*** is used to measure wind speeds.
3. Objects with different numbers of protons and electrons are said to be ***electrically neutral***.
4. ***Terminals*** are two different metals that are in a solution.
5. An electrical circuit must include a ***battery***, a load, and wires in a closed loop.
6. When the flow of electrical charges is hindered, heat is generated that causes the filaments of a light bulb to glow. This friction is caused by ***resistance***.
7. The formula for ***Ohm's Law*** is $V = IR$.
8. Many separate ***parallel circuits*** are set up in buildings to reduce the chances of a fire starting.
9. An electron moving through a circuit passes through a source, a load, a second load, and a switch. Upon completing its journey, it reenters the source and passes through the exact same items in the exact same order. This circuit is likely a ***series circuit***.
10. Evan rides his bike from his own house, down Main Street, and then to Dante's house. When he returns home, he bikes back down Winnipeg Street. The following day, Evan bikes to Dante's house, again, but takes Broadway, instead. He returns home, just as before, along Winnipeg Street. This analogy is similar to a ***series circuit.***
11. ***Hydroelectric energy*** requires gravitational energy in order to generate electricity.
12. ***Protons*** cannot be rubbed off a material because they are a part of the nucleus and are held firmly in place.
13. ***Positive charges*** come from protons.
14. The ***Law of Electric Charge*** explains why paint sprayed through an electric paint sprayer sticks to walls.
15. The unit of charge that gains electrical potential energy when it passes through a source is called a ***coulomb***.

____ 16. The ability to hinder the flow of electrical charges is called its ***resistance***.

18. ANS: F, parallel

19. ANS: T

20. ANS: F, series circuits

17. Electrons flow in a single path if the circuit is in ***parallel***.

18. Households are wired in ***series*** to allow all loads to work independently of the others.

19. If a circuit contains 12 V, 6 A and 2 Ω, the ***electric potential difference*** is 12 V.

20. The current remains the same everywhere within a ***parallel circuit.***

Multiple Choice

Identify the choice that best completes the statement or answers the question.

D 21. Bicycle lights can be powered by a person pedaling their bike. This is an example of
a. an energy transformation.
b. a generator.
c. kinetic energy changing into light energy.
d. All of the above.

A 22. The most common method used to generate electricity in British Columbia is through
a. hydroelectric dams.
b. burning fossil fuels.
c. wind power.
d. solar power.

B 23. The most common method used to generate electricity around the world currently is through
a. hydroelectric dams.
b. burning fossil fuels.
c. wind power.
d. solar power.

B 24. Nuclear reactors use _____ to undergo controlled _____ reactions.
a. plutonium, fusion
b. uranium, fission
c. potassium, fission
d. radium, fusion

D 25. Canada's largest solar farm is located just outside the city of Kimberly, B.C. on the site of an old lead-zinc mine. At an elevation of 1120 m above sea level, this southeastern B.C. city not only has the highest elevation of any BC city, but it also averages 300 days of sunlight each year. The city of Kimberley is a prime location for a solar farm because
a. the mine is a large area.
b. Kimberley has the highest elevation of any city in B.C.
c. there are 300 days of sunlight a year.
d. All of the above.

C 26. The Law of Electric Charge states that
a. opposite charges attract.
b. like charges repel.
c. Both A and B.
d. Neither A nor B.

C 27. Evan finds that his hair is standing up after taking his sweater off over his head. It is likely that
a. the sweater has rubbed protons off Evan's hair causing the negatively charged hair to repel other hairs.
b. the sweater has rubbed electrons off of Evan's hair causing the negatively charged hair to repel other hairs.
c. the sweater has rubbed electrons onto Evan's hair causing the negatively charged hair to repel other hairs.
d. the sweater has had no effect on Evan's hair.

B 28. A charged object is brought near a positively charged piece of acetate and it is attracted to it. It is then brought near a negatively charged object and it repels it. Based on these results, the charged object must be

a. positive.
b. negative.
c. positive or neutral.
d. negative or neutral.

A 29. An uncharged metre stick is placed on a surface that can allow it to rotate freely. A negatively charged piece of ebony is brought towards one end of the metre stick and the metre stick reacts.

a. The metre stick rotates toward the ebony because the electrons in the metre stick move away from the ebony leaving the positively charged protons to be attracted to the ebony.
b. The metre stick rotates towards the ebony because the protons in the metre stick move towards the ebony causing the metre stick to be attracted to the ebony.
c. The metre stick rotates away from the ebony because the electrons in the metre stick are repelled by the negatively charged ebony.
d. There is no reaction when the neutrally charged metre stick is near the negatively charged ebony.

B 30. An electrical outlet is similar to a source that supplies electrical energy like a

a. battery and a load.
b. dry cell and wet cell.
c. battery and a conducting wire.
d. conductor and insulator.

C 31. Metals are classified as conductors because they

a. allow electrons to move through them easily.
b. allow current to move through them easily.
c. All of the above.
d. None of the above.

C 32. A conductor

a. describes how easily charges can travel through it.
b. does not allow charges to flow through it.
c. does allow charges to flow through it.
d. hinders the progress of charges through it.

B 33. The symbol and unit for current are

a. *V* and V
b. *I* and A
c. *R* and Ω
d. *C* and c

A 34. A circuit contains a source, a load, and a switch. The circuit must

a. have a resistance at the load and a current flowing through it if the switch is closed.
b. have a resistance at the load and a current flowing through it if the switch is open.
c. not have a resistance at the load and a current flowing through it if the switch is closed.
d. not have a resistance at the load and a current flowing through it if the switch is open.

B 35. Current requires a
   a. source to create an electrical potential difference, a load to convert the electrical energy, and conducting wires in order for electrons to flow from the positive terminal of a cell to the negative terminal of a cell.
   b. source to create an electrical potential difference, a load to convert the electrical energy, and conducting wires in order for electrons to flow from the negative terminal of a cell to the positive terminal of a cell.
   c. source to create a resistance, a load to convert the electrical energy, and conducting wires in order for electrons to flow from the positive terminal of a cell to the negative terminal of a cell.
   d. source to create a resistance, a load to convert the electrical energy, and conducting wires in order for electrons to flow from the negative terminal of a cell to the positive terminal of a cell.

C 36. A stove top element is a load that converts electrical energy into heat energy. Which of the following statements is true?
   a. The element is a conductor of electron flow.
   b. The element is an insulator to electron flow.
   c. The element is a resistor to electron flow.
   d. The element is a switch for electron flow.

D 37. Four cells are placed into a circuit such that their combined voltage is 10 volts. The voltage of each of the identical cells must be
   a. 1 volt
   b. 1.5 volts
   c. 2 volts
   d. 2.5 volts

A 38. The electrical charges within an electrical circuit are
   a. equal between positive and negative charges.
   b. unbalanced because electrons outnumber protons in the circuit.
   c. unbalanced because protons outnumber the electrons in the circuit.
   d. unbalanced because protons outnumber electrons in the cell.

A 39. The reason one building will have multiple parallel circuits is because
   a. one parallel circuit would get extremely hot and not work effectively.
   b. multiple parallel circuits would get extremely hot and not work effectively.
   c. one series circuit would get extremely hot and not work effectively.
   d. multiple series circuits would get extremely hot and not work effectively.

A 40. A circuit contains an electric potential difference of 36 V and a resistance of 9Ω. The current must be
   a. 4 A.
   b. 0.25 A.
   c. 27 A.
   d. 324 A.

D 41. A current that is 0.5 A is required at a load with a resistance of 3 Ω. The electric potential difference of the load is
   a. 15 V.
   b. 1500 V.
   c. 166.7 V.
   d. 1.5 V.

D 42. A bulb has a resistance of 30 Ω. If the current running through it is 4 A, what is the electric potential difference?
a. 7.5 A
b. 7.5 V
c. 120 A
d. 120 V

C 43. A series circuit has three loads all attached to a single source with an electric potential difference of 12 V. The first load has a rating of 4 V and the second load has a rating of 2 V. If the resistance of the third load is 2 Ω, what is the total current in the entire circuit?
a. 1 A
b. 2 A
c. 3 A
d. 6 A

B 44. If a circuit has a 3 V battery and a 20 Ω bulb. What will happen to the current if the battery is replaced with a 6 V battery?
a. The current will remain the same.
b. The current will double.
c. The current will be cut in half.
d. The current will triple.

C 45. An electrolyte is the solution containing
a. the terminals.
b. the cells.
c. the electrodes.
d. the source.

Matching

Match each description to one of the following terms.

a. electrical energy
b. mechanical energy
c. chemical energy
d. solar energy
e. nuclear energy
f. thermal energy

D 46. the energy carried by the electromagnetic spectrum
E 47. the energy formed from the breaking apart or bringing together of atoms
C 48. the energy stored in the chemical bonds of fossil fuels and biomass
F 49. the energy created through friction between two objects
A 50. the energy created by moving electrons
B 51. the energy created as an object falls, spins, or bounces

Match each description to one of the following terms.

a. negative charge
b. positive charge
c. electrically neutral
d. electrically charged
e. friction
f. law of electric charge
g. attract
h. repel
i. negative charge and neutral charge
j. positive charge and neutral charge

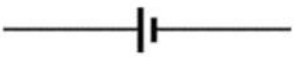
C 52. materials containing equal numbers of protons and electrons
B 53. charge of a proton
A 54. charge of an electron
E 55. charging objects by rubbing
G 56. opposite charges react this way
D 57. materials containing different numbers of protons and electrons
H 58. like charges react this way
F 59. opposite charges attract and like charges repel
J 60. attracted to a negative charge
I 61. attracted to a positive charge

Match each term to one of the following diagrams.

E 62. closed switch
D 63. battery
C 64. cell
A 65. load
B 66. conducting wire
F 67. open switch

a.

b.

c.

d.

e.

f.


Match each description to one of the following terms.

G 68. a single path for electrons to flow through
I 69. the unit for measuring electric potential difference
K 70. the unit for measuring resistance
A 71. relationship between voltage, current, and resistance
F 72. converts electrical energy into another form of energy
J 73. the unit for measuring current
B 74. the electric potential difference

a. Ohm's Law
b. voltage
c. current
d. resistance
e. source
f. load
g. series circuit
h. parallel circuit
i. volts
j. amperes
k. ohms

Completion

Complete each statement.

75. Mechanical energy is the sum of the potential and kinetic energies.
76. When energy from the Sun is captured by plants and plant-like organisms the energy is stored as biomass
77. Hot springs and geysers are signs of geothermal activity.
78. The objects that rubbed off a material, according to Benjamin Franklin were negative charges.
79. The wires within a circuit are called conductors because they allow the flow of electrons through them easily.
80. A battery operated flashlight will often have two cells working together to add their voltages together.
81. The ohm is the unit used to measure resistance. Its symbol is the Greek letter Omega, Ω.
82. Ohm's Law shows the relationship between voltage, current and resistance. $V = I \cdot R$
83. The electrical potential difference is measured in units called volts and symbolized by V.
84. A simple circuit has a current of 5 A and a resistance of 6 Ω. The voltage must be 30V.

Short Answer

85. How is a battery different from an electrochemical cell?

A battery is a combination of two or more electrochemical cells.

86. When electrons flow within a circuit, they move from the negative terminal of the cell to the positive terminal of the cell. Explain why this is the path of electron flow.

Electrons are repelled from the negative end of a cell and attracted to the positive end of a cell. In order for this movement to occur, they must move through the entire circuit before coming back to the cell.

87. What is a series electrical circuit?

A series electrical circuit allows for the movement of electrical charges through it but only along one path. There are no branches.

88. A table lamp uses 120 V of electric potential energy and has a current of 2 A. Calculate the resistance in this lamp. Show your work.

$R = V \div I$

$R = 120\ V \div 2\ A$ = The lamp has a current of 60 Ω.

$R = 60\ \Omega$

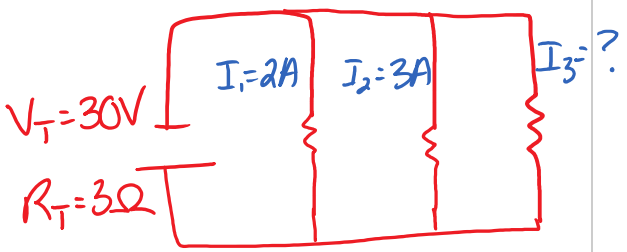
89. A parallel circuit with current moving through it contains three branches. The first branch carries a current of 2 A while the second branch carries a current of 3 A. If the total voltage in the circuit is 30 V and the total resistance in the circuit is 3 Ω, what is the current in the third branch?

$I_{Total} = V \div R$

$I = 30\ V \div 3\ \Omega$

$I = 10\ A$

The total current is 10 A in the circuit.



$I_{Total\ parallel} = I_1 + I_2 + I_3$

$10\ A = 2\ A + 3\ A + I_3$

$10\ A - 5A = I_3$

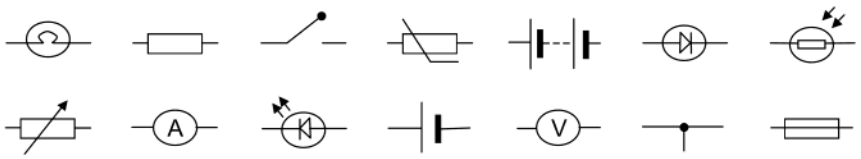
$5A = I_3$

Therefore, the third branch carries a current of 5 A.

Circuit Symbols

Instructions

Copy the correct circuit symbol for each of the **components** listed.



Component	Symbol	Component	Symbol
1. Single cell		8. Fixed resistor	
2. Battery		9. Variable Resistor	
3. Junction of wires		10. Diode	
4. Lamp		11. LED	
5. Switch		12. Thermistor	
6. Ammeter		13. LDR	
7. Voltmeter		14. Fuse	

Further task

Cover over the names, and check that you know which component each symbol is used for.

Ohms Law Practice

Directions: Use Ohms law to solve each problem. You must show your work, and circle your answer.

Ohms law: V=I·R I=V/R R=V/I

1. A resistance of 30Ω is placed in a circuit with a 90 volt battery. What current flows in the circuit?

2. A motor with a resistance of 32Ω is connected to a voltage source. Four amps of current flows in the circuit. What is the voltage of the source?

3. A transistor radio uses 2 amps of current when it is run by a 9 volt battery. What is the resistance in the radio circuit?

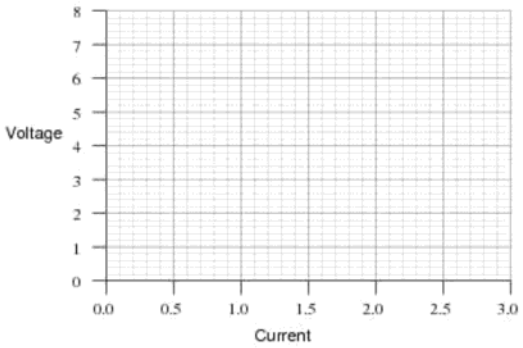
4. An E.M.F. Of 75 volts is placed across a 15 ohm fixed resistor. What current flows through the resistor?

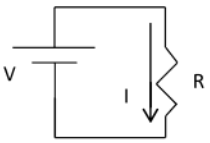
5. A current of 5 amps flows through a lamp when it is connected to a 110 volt power source. What is the resistance of the lamp?

6. A resistance of 60 ohms allows 0.4 amps of current to flow when it is connected across a battery. What is the voltage of the battery?

7. What current flows through a 15 ohm fixed resistor when it operates on a 120 volt outlet?

Suppose you did a lab with this simple circuit and got the following data. Plot the points of the provided graph.





Voltage (V)	Current (A)
0.65	0.12
1.41	0.29
2.55	0.51
3.28	0.67
4.11	0.81
6.15	1.23

What mathematical relationship do you see between voltage and current?

Is the resistance constant?

Solve for the unknown in each of these circuits