

General Science & Technology

Sec IV

Wednesday, December 19th, 2014
8 am to 11am

Study Aide

Topics

Ch 9 – Populations & Communities

Ch 10 – Ecosystems

Ch 5 – Electricity (Static & Dynamic)

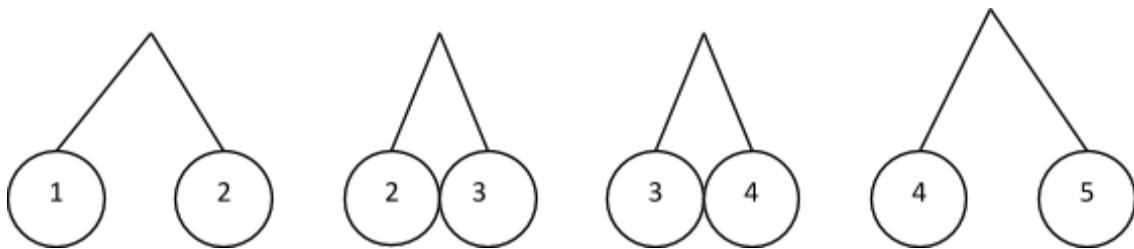
Ch 3 – Energy

Chapter 6 and 7- Renewable and non-renewable energy sources

Bring to the exam: Pencil, eraser, calculator and ruler

Topic 1- Static electricity

1. You have five spheres which are each electrically charged. Determine what will occur when sphere 1 and sphere 4 come into contact and when sphere 2 and 5 come into contact.



2. If two substances like cotton and acetate are rubbed together, what will be their reaction and explain why this occurs?
3. In the laboratory, a student was given the following substances :

1. ebonite
2. cotton
3. silk
4. glass

The student was told that when two substances from the above list are rubbed together, the one higher up in the list becomes negatively charged and the other becomes positively charged.

The student did the following :

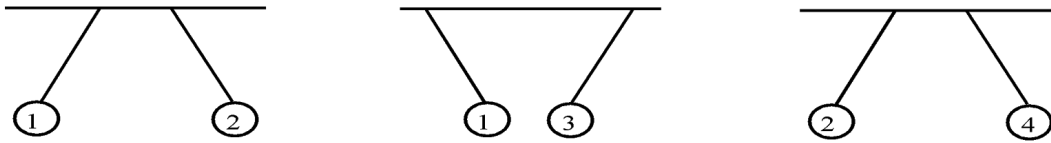
- Rubbed the ebonite and the silk together.
- Rubbed the glass and the cotton together.
- Brought the cotton close to the ebonite.
- Brought the cotton close to the silk.

Which one of the following statements is TRUE?

- A) Ebonite and cotton repel each other; silk and cotton repel each other.
- B) Ebonite and cotton repel each other; silk and cotton attract each other.
- C) Ebonite and cotton attract each other; silk and cotton repel each other.
- D) Ebonite and cotton attract each other; silk and cotton attract each other.

4. A student was given four electrically charged spheres.

The following diagrams show what happened when these spheres were suspended in pairs close to each other.



Which of the following statements is true?

- A) Spheres 1, 2, 3 and 4 have the same charge. C) Spheres 1, 2 and 4 have the same charge.
 B) Spheres 2, 3 and 4 have the same charge. D) Spheres 1 and 3 have the same charge.

Topic 2- Electricity formulas and circuits

- Define current intensity, resistance and potential difference. What are their symbols and units?
- In the table below fill in the formula in the top box, then give the appropriate triangle used for each unknown. Include units for each.

Resistance	Power	Energy

3. How would you convert the following time units:

- Minutes to seconds _____ Seconds to minutes _____
 Hours to seconds _____ Seconds to hours _____
 Minutes to hours _____ Hours to minutes _____
 W to kW _____ J to kWh _____

- How much power did an electric lawn mower use if it used 45 000 J of energy in the 50 minutes it took to mow the lawn?
- How much time was a fish tank on when it needed 0.5 A, 100 V and 45 000 J of energy?
- A man used the computer for 7 hours and used 500 W of power. How much energy (in Wh) did it take to use the computer for seven hours?

7. What is the potential difference of a light bulb when it uses a $200\ \Omega$ resistor and $0.4\ \text{A}$?
8. A radio is on for 150 minutes and has $450\ \text{W}$ of power. What is the energy in kWh?
9. A toaster takes 300 seconds to toast a piece of bread. If it uses $400\ \text{W}$ of power how much energy will be used in J?
10. What is the current intensity of a clock radio when it uses a $150\ \Omega$ resistor and $200\ \text{V}$?
11. An oven is used for 35 minutes to bake cookies. Its voltage is $150\ \text{V}$ and its intensity is $4\ \text{A}$. How much energy was used in J to bake the cake?
12. How much time passed in minutes when a computer did $50\ 000\ \text{J}$ of work and had $550\ \text{W}$ of power?
13. How much energy was used when a radio was on for 90 minutes and had $220\ \text{V}$ and a current intensity of $2\ \text{A}$?
14. What is the resistance of a resistor if a circuit is on for 2 hours, used $50\ 000\ \text{J}$ of energy and $220\ \text{V}$?
15. What is the power of an appliance if it works on $5\ \text{A}$ and has a $3.5\ \Omega$ resistor?
16. What was the current intensity of a clock radio that used $20\ 000\ \text{J}$ of energy when it was on for 2 hours and had $110\ \text{V}$?

17. Draw the symbols for the following:

Resistor	Voltmeter	Total voltage	Current	Total current	Light	Wire	Switch	Power supply

18. Fill in the table

	Series circuit	Parallel circuit
Give the definition		

19. Draw a series and parallel circuit, each with two resistors. Include a switch and a fuse for the controlling the whole circuit.

Series	Parallel

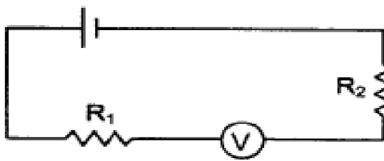
20. Draw a circuit where current intensity has 4 possible pathways. Use the specifics below when drawing the circuit

- Place a voltmeter that measures the potential difference coming from the power source, use V_T as your symbol.
- Place a voltmeter that measures the potential difference across resistor R_2 , use V_2 as your symbol.
- Place an ammeter that measures the current intensity from the power source, use A_T as your symbol.
- Place an ammeter that measures the current intensity through resistor R_3 , use A_3 as your symbol.
- Place an ammeter that measures the current intensity through resistor R_3 and resistor R_4 , use A_4 as your symbol.
- Place a switch that will cause the whole circuit to stop working when it is open.
- Place a switch that will cause resistor R_1 to stop working when it is opened.
- Place a switch that will cause resistors R_2 , R_3 , and R_4 to stop working when it is opened.
- Place a fuse to control the whole circuit
- Place a switch to control resistor 3

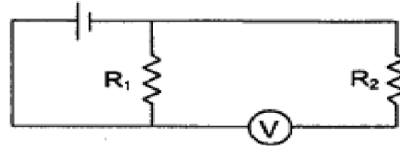
21. Four electric circuit diagrams are given below.

You wish to measure the potential difference across the terminals of resistor R_2 . Which diagrams show a correctly connected voltmeter?

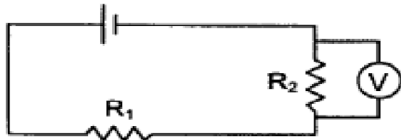
1)



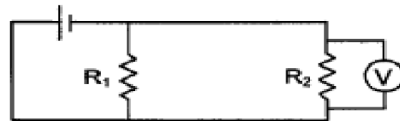
3)



2)



4)



A) 1 and 3

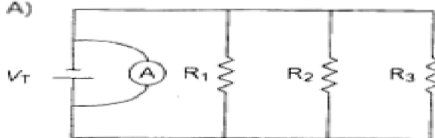
B) 2 and 4

C) 1 and 2

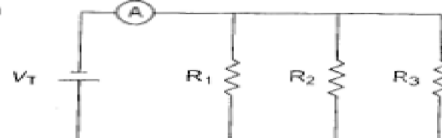
D) 2 and 3

22. The following electric circuit consists of a power supply, V_T , connected to three resistors (R_1 , R_2 and R_3). Which of the following circuit diagrams shows the correct connection for an ammeter A that measures the current flowing through resistor R_1 ?

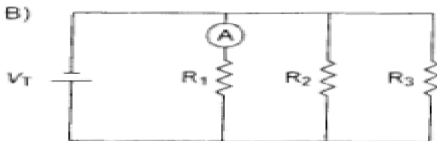
A)



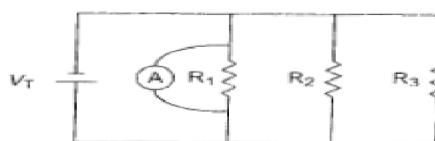
C)



B)



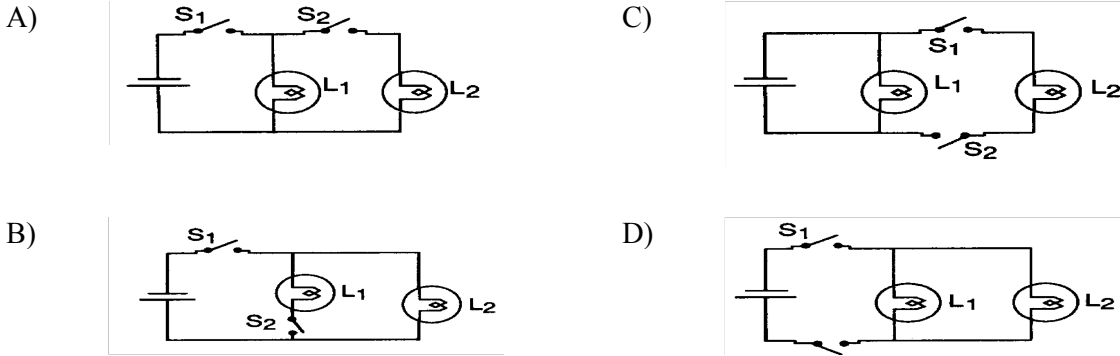
D)



23. An electrical circuit consists of a power source, two switches (S_1 and S_2) and two light bulbs (L_1 and L_2). The following table shows what happens to both light bulbs:

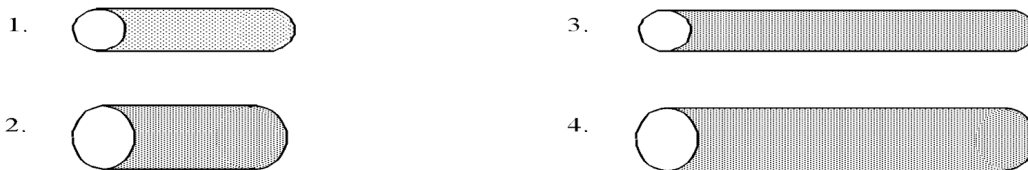
Switch		Light Bulb	
S_1	S_2	L_1	L_2
open	open	out	out
closed	open	bright	out

Which of the following circuit diagrams illustrates the results shown in the table above?



24. A circuit consists of a power supply, a light bulb and two terminals that can be connected to a rod.

The copper rods illustrated below are inserted into the circuit one at a time. The rods are the same temperature, but they have different dimensions.



Which rod will offer the least resistance to the flow of electric current?

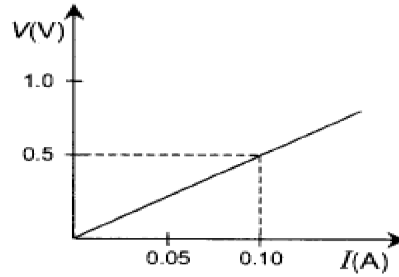
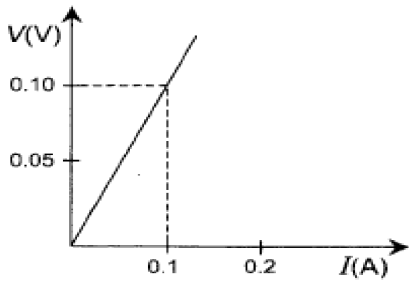
- A) rod 1 B) rod 2 C) rod 3 D) rod 4

25. The following table shows measurements related to four different resistors.

Which of the resistors below has the most conductance (i.e. lowest resistance)?

Resistor	Potential Difference (V)	Current Intensity (A)
1	10	10
2	10	1
3	1	10
4	4	2

26. Which of the following graphs represents the conductor with the highest resistance?

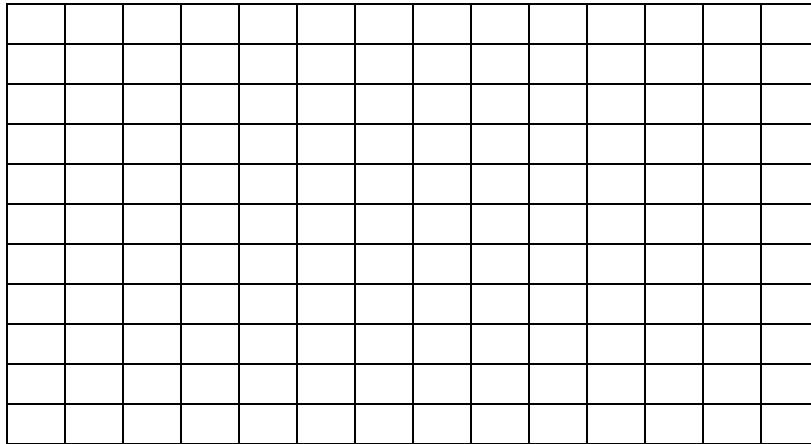


27. Use the results to answer the questions.

Voltage (V)	0	1.5	3.0	4.5	6	7.5	9
Current (A)	0	0.35	0.70	1.0	1.4	1.7	2.0

Draw a resistance graph

Find the resistance



Topic 3 Energy efficiency and heat

1. What is the energy efficiency formula?
2. An elevator has an energy efficiency of 64%. What amount of energy must the elevator consume in order to provide 95 kWh of useful energy?
3. A microwave consumes 27 000 J of energy in order to provide 21 500 J of useful energy. What is its energy efficiency?

4. A computer that is 87% efficient consumes 375 kWh of energy. How much useful energy does it provide?
5. A television that is 83% efficient provides 4 600 J of useful energy. How much energy does it consume?
6. An oven consumes 425 kWh of energy in order to provide 386 kWh of useful energy. What is its percent efficiency?
7. What are the 2 variables for heat?

Topic 4- Populations and ecosystems

1. Define the term population.
2. In a forest, 24 new blue jays were born, 17 flew in for the summer, 12 died because of the harsh winter and 7 emigrated because of the lack of resources. Was there a population increase or decrease during the year?
3. Explain what population density is.
4. You counted 150 dandelions in a 6 m² area. What is their population density?
5. Give 2 examples of biotic and abiotic factors.
6. Draw what each type of population distribution would look like.

Clumped	Uniform	Random

7. Explain what a limiting factor is.

8. The X's, O's, W's and T's represent different populations in a community.

X T T T T O O X T T T T T O O X T T T T O O W

A- Explain if this is a diverse community.

B- Calculate the biodiversity of each species

9. Use the graph to answer the questions.

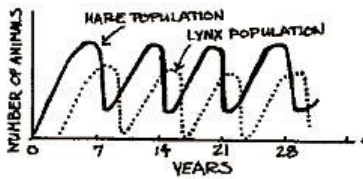
A-What causes the lynx population to increase?

B- What causes the hare population to decrease?

C- What causes the lynx population to decrease?

D- What causes the hare population to increase?

E- How long does this cycle last?

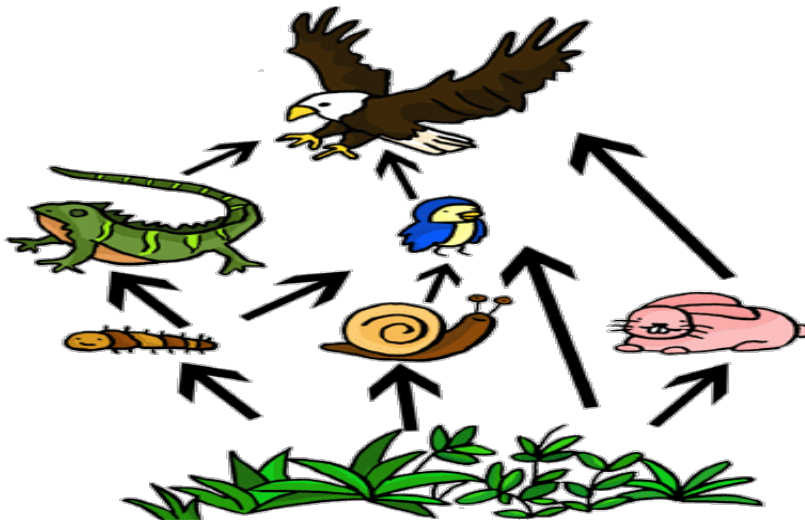


10. Define and give examples of the following words.

	Definition	Example
Mutualism		
Predation		
Parasitism		
Commensalism		
Competition		

11. Define the following terms and give an example of each.

	Ecosystem	Producer	Consumer	Decomposer
Definition				
Example				



12. Using the picture above, answer the following questions:

- a- Name a secondary producer?
- b- Can the bird be a primary and secondary consumer?
- c- Make a food chain with 3 consumers
- d- Give a consequence of the lizard being taken out of the food web.

13. Explain why the sun is necessary for the energy flow between trophic levels.

14. Explain what biomass is.

15. What is primary productivity and what is it influenced by?

Topic 5: Renewable and Non-renewable Energy

1. Create a table listing each of the energy sources from the lithosphere, hydrosphere and atmosphere.
 - a. Your table should include:
 - i. The name of the energy source
 - ii. Whether it is renewable or nonrenewable
 - iii. How it works (What turns the turbines connected to the generator?)
 - iv. Advantages of using this source
 - v. Disadvantages of using this source

Topic 6: Estimating Population Size

1. Scientists want to determine the size of a population of brook trout in a lake. First, they catch 50 trout, tag them and release them. A few days later, they catch 55 trout, including 11 tagged fish.
 - a) Which method for measuring population size did the scientists use?
 - b) What is the estimated population of brook trout in this lake? Show your calculations.
2. There is an average of seven clovers per 0.5 m^2 in Cedar Park; the area of the park is 2500 m^2 .