# PHYSICS COURSE – YEAR 11

**MODULE 4: ELECTRICITY AND MAGNETISM**

# WORKSHEET NO.2

**NOTE: While thinking and talking about the following questions practise using the language of Physics correctly. Current is a flow of charge, so it is correct to talk about the “current flowing through a resistor”. Potential difference or voltage exists between two points in a circuit, so we speak of “the potential difference across a resistor” or “the voltage drop across a resistor”. DO NOT say things like, “the voltage flowing through the resistor” etc. Voltage does not flow anywhere, so please don’t say it. You can speak about the voltage or potential “at a particular point in a circuit”. For instance, you might say, “the voltage at the positive terminal of a 12 V battery is 12 V”. Good communication is essential in all sciences. So, use the language correctly.**

1. **A circuit consists of a 12 V battery connected across a single resistor. If the current in the circuit is 3 A, calculate the size of the resistor. (4)**
2. **Two 5resistors are connected in series with a 12 V battery. Determine: (a) the potential difference across each resistor; and (b) the current flowing in the circuit. (6 V, 1.2 A)**
3. **Two resistors of size 10 and 5are connected in parallel as shown below.** 
   1. **If 3.6 A of current flows into the parallel branch, determine the current flowing in each of the resistors. (2.4 A in the top resistor & 1.2 A in the bottom resistor)**
   2. **What is the potential difference across each of the resistors? (12V)**
   3. **How much current will flow out of the parallel branch? (3.6 A)**
4. **Consider the following circuit and then answer the questions below.**   
     
   1. **State the potential difference between X and Z.**
   2. **State the potential difference between X and Y.**
   3. **How much potential is left at Y?  
        
      (Answers: (a) 12V, (b) 8V, (c) 4V)**
5. **The circuit below shows a resistor, R, connected in series to a 12 V battery across an open switch, S.**   
     
   1. **If R = 6 how much current flows in the circuit with the switch open?**
   2. **While the switch remains open, determine the potential difference between:**
      1. **A and B**
      2. **A and C**
      3. **B and C**
   3. **When the switch is closed and R = 6, determine:**
      1. **the current in the circuit;**
      2. **the potential difference between A and B; and**
      3. **the potential difference between B and C.  
           
           
          Answers: (a) 0A  
           
          (b)(i) 12V, (ii) 12V, (iii) 0V  
           
          (c)(i) 2A, (ii) 0V, (iii) 12V**

# PHYSICS COURSE – YEAR 11

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# WORKSHEET NO.3

1. **Find the current in the 20and 5 resistors in the following circuit.  
     
      
     
   (Answers: I20 = 0.045 A and I5 = 0.18 A)**
2. **In the circuit below, the reading on the ammeter is 3.2 A.** 

**Determine:**

* 1. **the reading on the voltmeter;**
  2. **the potential difference across the 40 resistor; and**
  3. **the current in the 40 resistor.  
       
     (Answers: (a) 32V, (b) 18V, (c) 0.45A)**

1.   
     
     
   **For the circuit above:**
   1. **Determine the total resistance.**
   2. **Find the reading on the ammeter.**
   3. **Draw a voltmeter in the correct place to measure the potential difference across the 0.3 resistor.**
   4. **Draw an ammeter in the correct place to measure the current in the 0.3 resistor.**
   5. **Determine the readings on the meters mentioned in parts (c) and (d) above.  
        
      (Answers: (a) 100.19b) 0.2A, (c) voltmeter in parallel across the resistor, (d) ammeter in series with the resistor, (e) ammeter reading = 0.125A and voltmeter reading = 0.0375V)**

# PHYSICS COURSE – YEAR 11

**MODULE 4: ELECTRICITY AND MAGNETISM**

# WORKSHEET NO.4

1. **Consider the circuit below, which shows four identical lamps A, B, C and D in a circuit, controlled by switches S1, S2 and S3.** 
   1. **Which globes would light when the following occurs:**
      1. **S1 only is closed;**
      2. **S1 and S2 are closed;**
      3. **S1 and S3 are closed;**
      4. **all three switches are closed?**
   2. **When all switches are closed, globes A and B do not glow as brightly as globe D. Explain why this is so.**
   3. **Comment on the brightness of globe C compared with globe D, when all switches are closed.**
2. **An electric radiator uses a voltage of 240 V and draws a current of 2 A for a total time of 3 hours. Calculate the total energy dissipated by the radiator.**
3. **The electrical energy used in one hour by a tungsten filament light globe is 1.44 x 105 J. If the current flowing through the tungsten filament is 0.17 A, calculate the resistance of the tungsten filament.**
4. **Consider the circuit shown below.**   
     
   **The reading on the ammeter is 0.9 A and that on the voltmeter is 3.36 V. Determine the power dissipated by the:**
   1. **whole circuit;**
   2. **5resistor;**
   3. **10resistor.**

1. **Consider the circuit shown below. The G in the circle represents a galvanometer, which is a very sensitive current measuring device. The galvanometer is connected between points X and Y in the circuit.**    
     
   **For this circuit:**
   1. **determine the total resistance;**
   2. **calculate the current in each parallel arm;**
   3. **find the potential difference across the 1resistor;**
   4. **find the potential difference across the 2resistor;**
   5. **determine the potential difference between X and Y;**
   6. **state the reading on the galvanometer;**
   7. **calculate the power dissipated by this circuit.**

# ANSWERS TO WORKSHEET NO.4

1. **(a) (i) None – no closed circuit; (ii) A, B, D glow; (iii) D, C glow; (iv) all globes  
     
   (b) Current in D is higher than in A & B, since A & B are in one of the two parallel arms of the circuit. Power is proportional to the square of the current. So, power in D > power in A & B and therefore globe D glows more brightly.  
     
   (c) Globe C will be less bright. Lower current and therefore lower power and brightness.**
2. **5.2 x 106 J**
3. **1384 **
4. **(a) 13.5W; (b) 4.05 W; (c) 1.13 W**
5. **(a) 3.33; (b) current in top arm = 2A, current in bottom arm = 1A; (c) 2V;  
     
   (d) 2V; (e) 0V; (f) 0A; (g) 30W**