

**ATTENTION GRADE 12 STUDENTS WHO ARE SITTING
COMBINED SCIENCE IN THE MAY/JUNE B.G.C.S.E.
EXAMINATIONS.**

The following practicals have been selected from Biology , Chemistry and Physics as the coursework requirements for Combined Science in 2007.

Skill A: Using and Organizing Techniques, Apparatus and Materials

1. Filtration (Chemistry)
2. The Simple Reflex Arc (Biology)

Skill B: Observing, Measuring and Recording

3. The Effect of Exercise on the Pulse Rate – 1 (Biology)
4. Rate of Reaction (Chemistry)

Skill C: Handling Experimental Observations and Data

5. The Effect of Exercise on the Pulse Rate – 2 (Biology)
6. Investigating Osmosis (Biology)

Skill D: Planning, Carrying out and Evaluating Investigations

7. Heat Transfer (Physics)

Problem Statement: A man wants to sell cups to Subway. The cups are made of two types of materials, Styrofoam and cardboard. These cups are to serve hot chocolate in. Carry out a set of experiments and from your results advise Subway as to which set of cups to buy.

8. Work and Energy (Physics)

Problem Statement: One of the ways to recognise that you are healthy is the ability to do work. Your energy level determines how much work you can do. Choose a suitable distance and demonstrate how you can find out the amount of energy and power expended on the task.

COURSEWORK FOLDER

Each student is required to provide a folder for his/her coursework.

Please note the following:

1. The front cover of the folder should have the following information:
 - Name:
 - Candidate Number:
 - School Number/Name: 1902 / Bahamas Academy
 - Subject Number/Name: 3009 / Biology
 - (use the one which is appropriate) 3051 / Chemistry
 - 3117 / Physics
 - 3102 / Combined Science
2. The **name** and **number** of the student should be written on the inside of the front cover.
3. A **table of contents** should be included.
4. The inside of the folder should be partitioned into **four** sections, each section being identified by each of the skills A, B, C and D.
5. The practicals are to be placed in their appropriate sections in the same order as outlined on the previous page.

- NOTE:**
1. **No written report is required for the two Skill A practicals.**
 2. **It is not necessary to redo those practicals that you have already done. Just simply rewrite a copy and submit to Mr. Jones.**
 3. **Deadline for receipt of all coursework is April 4, 2007**

Name: _____

Date: _____

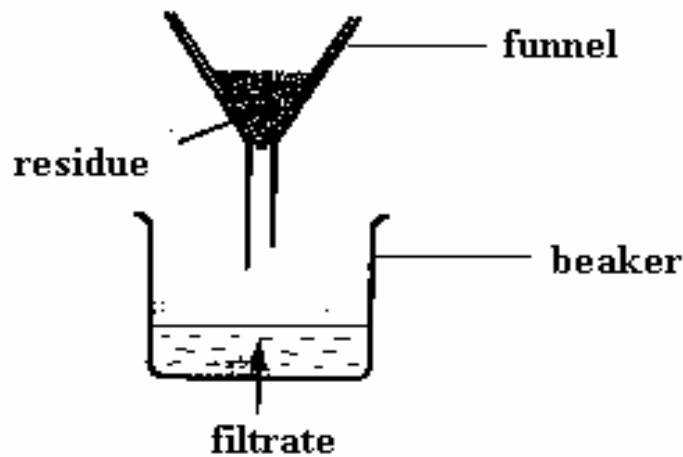
Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill A: Using and organizing techniques, apparatus and materials.

Title: Filtration

Aim: To demonstrate filtration.

Materials/apparatus: filter paper, filter funnel, filter flask or beaker, sand and saltwater mixture, evaporating dish, petri dish.



Procedure /method:

1. Prepare a mixture of saltwater and sand
2. Fold filter paper into a cone shape. (Teacher will demonstrate).
3. Sprinkle a bit of water on the inside of the filter funnel then place filter paper into the funnel.
4. Place funnel into filter flask or beaker.
5. Stir then pour in the mixture of saltwater and sand in small amounts. Do not overflow the filter paper.
6. Collect the residue and place in a separate dish. Show this to your teacher.
7. Remove the flask with the filtrate and show to your teacher.
8. Pour some of the filtrate into an evaporating dish and heat until most of the water has been driven off.
9. Allow the remaining solution to cool to form crystals.
10. Show the crystals to your teacher.
11. Clean up all apparatus used as well as your work area and safely return all apparatus to their correct location.

Check Points	Level	Assessment
Fold filter paper appropriately into cone shape and place into funnel.		
Place funnel into filter flask or beaker.	1	
Stir and pour at intervals small amounts of mixture into the funnel without overflowing the filter paper.	2	
Collection of residue and of filtrate.	3	
Heating of filtrate to evaporate most of the water.	4	
Cooling of filtrate and formation of crystals.	5	
Cleaning of work area and apparatus and safety precautions.	6	

Name: _____ Date: _____

Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill A: Using and organizing techniques, apparatus and materials.

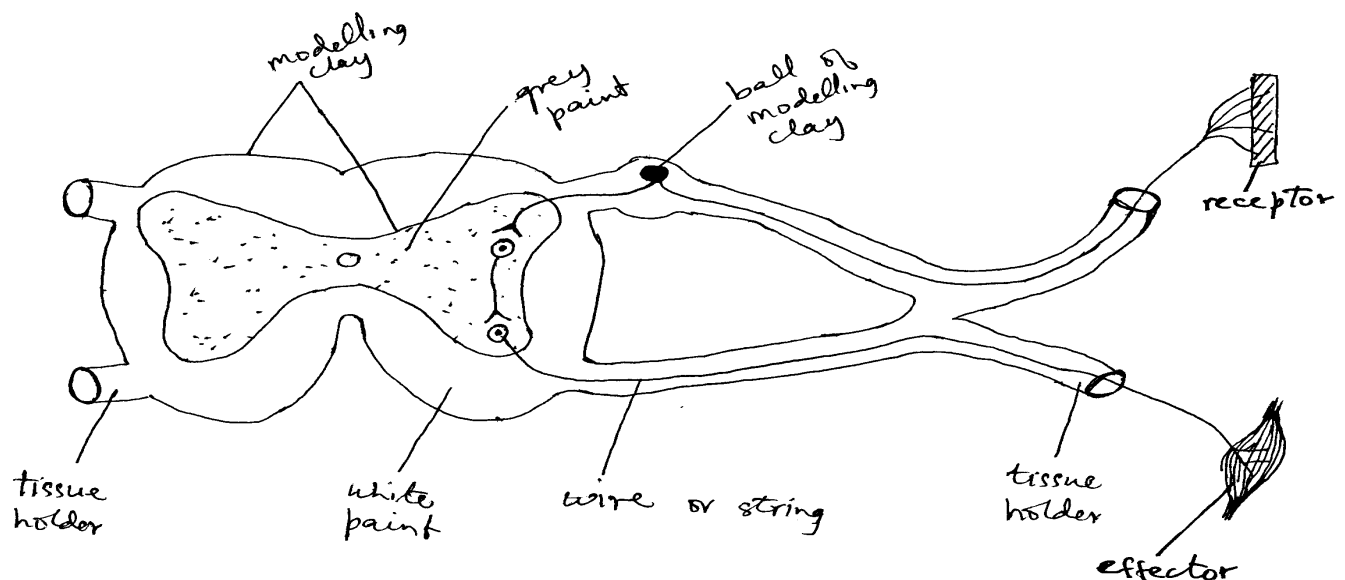
Title: The Simple Reflex Arc

Aim: To design a model of a simple reflex arc

Materials/apparatus: large piece of cardboard (60cm x 45 cm), modeling clay, tissue holder, wires, grey paint, white paint, paint brush

Procedure/method:

1. Make an outline drawing of the simple reflex arc on the sheet of cardboard similar to the one below.



2. Use the modeling clay to properly design the simple reflex arc in cross-section along the outline.
3. Complete the ends with the tissue holders to give a three-dimensional look at those points.
4. Use wires to run along inside the arc as the nerves, spreading out at the ends to illustrate the dendrites.
5. Use any suitable material to represent the receptor and the effector.
6. Make sure there is a clear distinction between the three types of neurons.
7. Use grey and white paint to distinguish between the white and grey matter.
8. All components of the reflex arc are to be properly labeled on the model.
9. Point out to the teacher the pathway of the simple reflex arc when you present your work.

Check Points	Level	Assessment
Obtaining all required materials	1	
Making outline drawing of reflex arc	2	
Design of model consistent with outline drawing	3	
Using materials safely, correctly and methodically	4	
Demonstration of creativity		
Correct and neat labelling of components	5	
Pointing out the pathway of a simple reflex arc	6	

Name: _____ Date: _____

Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill B: Observing, measuring and recording

Title: The effect of exercise on the pulse rate – 1

Aim: To investigate the effect of exercise on the pulse rate.

Materials /Apparatus: stopwatch or clock (or watch with seconds hand), running shoes, ruler

Procedure/method

1. Select a partner with whom to work and decide on one to be the **experimenter** and the other to be the **experimental subject**.
2. Locate the pulse of the subject and practice counting the pulse until you think you can do it well. (The subject should do the timing while the experimenter counts the beats).
3. Determine the resting pulse rate by counting the number of beats felt in 15 seconds and then multiply by 4 to get the number of beats in 1 minute. Repeat at 30-seconds interval to obtain **three readings** of the resting pulse rate. Record these values as the **resting pulse rate**.
4. The subject will then exercise vigorously for about three to five minutes e.g. fast laps around the playing field, jumping jacks, push ups etc. Upon completion of the exercise, the experimenter will quickly locate the pulse and determine the pulse rate at that time. Record this value as the **pulse rate immediately after exercising**.
Note: The method used in (3) for determining the pulse rate should be used.
5. After 30 seconds have elapsed, determine the pulse rate again and record in the table. (This will be the **fifth entry** in the table so far.)
Thereafter at 30-seconds intervals, continue taking the pulse rate until it returns to or close to (preferably below) the lowest resting pulse rate.
6. Repeat the experiment by switching places with your partner. Identify the first subject as person A and the second subject as person B.
7. Construct a table and record all the data for both persons A and B.
8. Write a suitable conclusion for the experiment.

CHECK POINTS	Level	Assessment
Ability to locate a pulse	1	
Determination of resting pulse rates at 30-seconds intervals	2	
Determination of pulse rate immediately after exercising	3	
Taking pulse rate at 30-seconds intervals until it returns to the lowest resting rate	4	
Recording of all data from the experiment in a suitable format	5	
Writing a suitable conclusion	6	
TOTAL SCORE		

Name: _____ Date: _____

Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill B: Observing, measuring and recording

Title: Rate of reaction

Aim: To measure the time taken for the same quantity of sulphur to be precipitated with different concentrations of sulphuric acid/sodium thiosulphate(VI) mixtures

Materials/apparatus: 250 cm³ conical flasks, stop clock, white paper or tile with a cross drawn on it, measuring cylinder, dilute sulphuric acid solution (0.5M), sodium thiosulphate solution (16 g/dm³).

Procedure/method

1. Using a measuring cylinder, place 50 cm³ of sodium thiosulphate solution into a conical flask.
2. Add 50 cm³ of sulphuric acid to this solution, noting the time that you do so.
3. Place the conical flask over the cross and record the time it takes for the cross to be no longer visible when viewed from above.
4. Repeat the procedure described in 3 above using the sodium thiosulphate/water mixtures as set out in the table below, noting in each case the time taken for the cross to be completely obscured.

Experiment number	Volume of sulphuric acid solution/cm ³	Volume of sodium thiosulphate solution/cm ³	Volume of water/cm ³
1	50	50	0
2	50	45	5
3	50	40	10
4	50	35	15
5	50	30	20
6	50	25	25
7	50	20	30

5. Record all observations in a suitable manner.
6. Write the equation for the reaction and draw a suitable conclusion for your experiment.

Check Points	Level	Assessment
Measuring required materials correctly	1	
Measure and record time accurately	2	
Tabulate results appropriately	3	
Recording of all observations	4	
Writing equation for the reaction	5	
Writing a suitable conclusion	6	

Name: _____ Date: _____

Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill C: Handling experimental observations and data

Title: The effect of exercise on the pulse rate – 2

Aim: To process the results obtained from:
“The effect of exercise on the pulse rate – 1”

Materials/apparatus: calculator, graph sheet, pencil and ruler.

Procedure/Method

1. Copy the data obtained in the experiment:
“ The effect of exercise on the pulse rate – 1”.
Refer to this data to complete the information required below.
SHOW ALL NECESSARY WORKING.
2. Calculate the **individual average resting pulse rate** for you and your partner i.e. person A and person B.
3. Use each individual average to calculate the **combined average resting pulse rate** for you and your partner.
4. Use the individual averages to calculate the **average resting pulse rate for the entire class.**
5. Calculate the **average pulse rate immediately after the period of exercise** for persons A and B.
6. Calculate the **average pulse rate immediately after the period of exercise** for the entire class.
7. Calculate the **time taken for the pulse rate to return to the lowest resting rate** for each of persons A and B.
8. Calculate the **average time taken for the pulse rate to return to the lowest resting rate** or close to it for persons A and B.
9. Calculate the **average time taken for the pulse rate to return to the lowest resting rate** or close to it for the entire class.
10. Using appropriate axes and scales, plot the data in the table drawn in procedure 1 of persons A and B on the same graph and draw a line graph through each set of points.
11. Describe any differences observed between both sets of data.
12. Account for any anomalous or inconsistent results in any or both tables of data.
13. Identify and comment on any possible sources of experimental error.
14. Write a general conclusion, commenting on the average resting pulse rate, the average pulse rate after exercising and the average time taken for the pulse rate to return to the resting rate after exercising.

Check points	Level	Assessment
Calculation of average resting pulse rates	1	
Calculation of average pulse rates after exercising	2	
Calculation of average time taken for pulse rates to return to lowest resting rate	3	
Plotting of data for persons A and B on a graph with appropriate axes and scales	4	
Differences and anomalies in results		
Sources of experimental error	5	
General conclusion on experiment	6	

Name: _____ Date: _____

Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill C: Handling experimental observations and data

Title: **Investigating Osmosis**

Aim: To investigate the effect of osmosis on potato strips.

Materials/apparatus: potato, cork borer, boiling tubes, distilled water, glucose (G) solutions (5%, 10%, 15%, 20%), ruler.

Procedure/method:

1. Choose 5 test tubes and label them as follows: water, 5%G, 10%G, 15%G and 20%G.
2. Place each solution in its respective tube to about half the volume.
3. Use a cork borer to cut 5 cylinders of potato of equal length. Record the length of the potato tubes (in millimeters).
4. Place one cylinder of potato in each tube and leave there for 24 hours.
5. The **next day**, remove the strips, dry them and record their final lengths. Record your results in a suitable table.
6. Calculate the percentage (%) change of length, if any, for each potato strip.
7. Give an explanation for the changes in length or lack of change in length observed.
8. Show the results graphically.
9. Comment on any anomalous or inconsistent results.
10. Comment on any possible sources of experimental error.
11. Write a suitable conclusion for the experiment.

Check points	Level	Assessment
Results recorded in a suitable format	1	
Calculation of percentage change in length	2	
Explanation of results	3	
Axes of graph correctly labeled	4	
Suitable graph drawn (bar chart)	5	
Differences and anomalies in results		
Sources of experimental error	6	
General conclusion on experiment		

Name: _____

Date: _____

Bahamas Academy of Seventh-day Adventists
B.G.C.S.E. Combined Science Coursework

Skill D: Planning, carrying out and evaluating investigations

Title: Heat Transfer

Problem Statement:

A man wants to sell cups to Subway. The cups are made of two types of materials, Styrofoam and cardboard. These cups are to serve hot chocolate in. Carry out a set of experiments and from your results advise Subway as to which set of cups to buy.

Check Points	Level	Assessment
Logical plan to solve problem	1	
Carrying out of plan to solve problem	2	
Recognition of variables affecting the results	3	
Presentation of table of results		
Graphical analysis of results	4	
Recognition of sources of experimental error and making of modifications	5	
Generalizations relating to heat transfer, evaluations and conclusion	6	

Name: _____ Date: _____

Skill D: Planning Sheet

Problem to be investigated:

Proposed title of experiment:

Hypothesis:

List of materials required:

Outline of plan (use additional paper if necessary)

Name: _____

Date: _____

Bahamas Academy of Seventh-day Adventists
B.G .C.S.E. Combined Science Coursework

Skill D: Planning, carrying out and evaluating investigations

Title: Work and Energy

Problem Statement:

One of the ways to recognise that you are healthy is the ability to do work. Your energy level determines how much work you can do. Choose a suitable distance and demonstrate how you can find out the amount of energy and power expended on the task.

Check Points	Level	Assessment
Logical plan to solve problem	1	
Carrying out of plan to solve problem	2	
Recognition of variables affecting the results	3	
Presentation of table of results		
Graphical analysis of results	4	
Recognition of sources of experimental error and making of modifications	5	
Generalizations relating work to energy, evaluations and conclusion	6	

Name: _____ Date: _____

Skill D: Planning Sheet

Problem to be investigated:

Proposed title of experiment:

Hypothesis:

List of materials required:

Outline of plan (use additional paper if necessary)