HILLCREST HIGH SCHOOL

NATURAL SCIENCE EXAMINATION

Grade 9 November 2013

Time: 2 hours Marks: 150

Instructions:

1. READ ALL INFORMATION CAREFULLY!
2. Answer ALL the questions.
3. Work neatly and clearly.
4. Number all questions according to the question paper.
5. Rule off after each question.

FORMULAE $R_T = R_1 + R_2 + R_3$ $Q = I.t$

$V = I.R$ $D = \frac{M}{V}$

SECTION A

Question 1 – Multiple Choice Questions

Answer the following questions by choosing the most correct answer. Only write down the number and the correct answer in your answer booklets. E.g. 1.1 A

1.1 An object can only obtain an electrostatic charge by:
A. attraction and repulsion
B. electrification
C. friction
D. an electroscope

1.2 A neutral atom contains:
A. more protons than electrons
B. more protons than neutrons
C. as many protons as electrons
D. as many protons and neutrons as electrons

1.3 When adding water to an acid, it is very important to remember to add the two substances in the correct order. This order is:
A. add water slowly to an acid
B. add acid slowly to the water
C. add water quickly to an acid
D. none of the above

1.4 To neutralise a strong acid it is best to:
A. add water
B. add another acid
C. add a weak base
D. add a strong base

1.5 The Van der Graaf generator is used to create:
A. static electricity
B. a dynamo
C. conventional current
D. current electricity

1.6 Charge can be calculated as follows: charge = current x .....
A. potential difference
B. resistance
C. time
D. energy

1.7 A rheostat is a:
A. a device that can open a circuit
B. a variable resistor
C. a large resistor
D. a device that works as a resistor and voltmeter

1.8 The outermost layer of Earth is called the:
A. outer core
B. crust
C. mantle
D. inner core

1.9 Igneous rock is:
A. molten rock which solidifies
B. rock that originates from substances broken down by wind and water
C. rock which changes due to extreme heat and pressure
D. none of the above

1.10 State which substance has a higher density per gram:
A. cork
B. air
C. aluminium
D. lead

[10 x 2 = 20]

Question 2

Fill in the missing words

Write only the question no. and the answer in your answer booklet e.g. 2.1 salt

2.1 Two examples of fossil fuels are ..... and ..... . (2)

2.2 Fossil fuels are ..... sources of energy (1)

2.3 In a wind-up torch, kinetic energy is changed into ..... energy which causes the light bulb to shine. (1)

2.4 Charges of the same kind ..... each other while unlike charges ..... each other. (2)

2.5 Conventional current is the flow of charge from the ..... pole to the ..... pole of a cell in a circuit. (2)

2.6 ..... are the hardest, natural substances that are mined and are used in industry to cut and polish other substances such as glass and well as being used in jewellery. (1)

2.7 Oil is ..... dense than water. (1)

Match the Columns

Write only the question no. and correct letter in your answer booklet.

2.8.1 Nucleus	A. the amount of mass in a certain volume
2.8.2 Density	B. a mixture of two substances in which both substances have become evenly distributed in the other substance
2.8.3 Conductor	C. a reaction between an acid and a base
2.8.4 Solution	D. the positively charged, central core of the atom
2.8.5 Neutralisation	E. a material that allows electrons to move or transfer heat easily

(5)

[15]

SECTION B – Longer Questions

Question 3 – Acids and Bases

3.1 Draw a PH Scale in your answer booklet. You need to show where the following are situated:
A weak acid
A neutral substance (pure water)
A strong base (5)

3.2 Give two properties of acids. (2)

3.3 Give two properties of bases. (2)

3.4 What is an alkali? (1)

3.5 Name the two different indicators used to test whether something is an acid or a base. (2)

3.6.1 Name one household product that is acidic. (1)
3.6.2 Name one household product that is basic. (1)

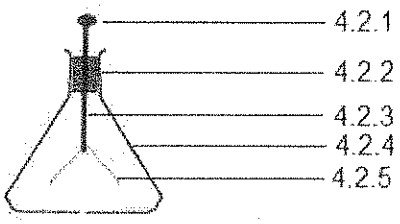
3.7 Which is more dangerous: A strong acid or a strong base? (1)

[15]

Question 4 – Electrostatics

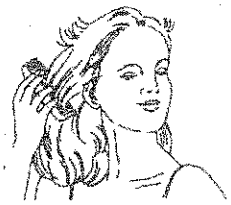
4.1 Name the three sub-atomic particles found in an atom and state what charge they hold. (6)

4.2 Label the following diagram of a simple electroscope. Write the question number with the answer next to it in your answer booklet.



(5)

4.3 Cindy is busy combing her hair. As the comb rubs against her hair, electrons get transferred from the comb to her hair.



4.3.1 What charge does Cindy's hair now have? (1)

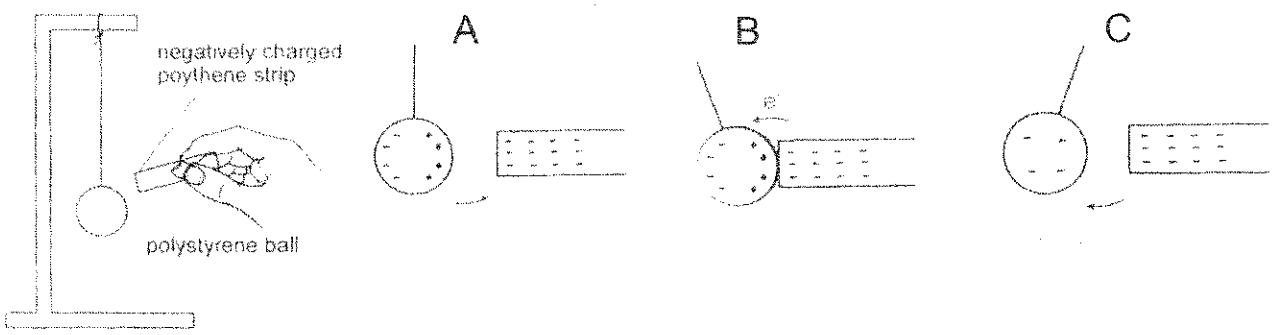
4.3.2 Is Cindy's comb charged positively or negatively? (1)

4.3.3 Did Cindy's comb gain or lose electrons? (1)

4.3.4 Cindy's hair will not lay flat anymore and some hairs move away from each other. Explain why this is happening. (2)

4.3.5 When Cindy holds the comb close to her hair, what do you think would happen? (1)

4.4 Study the diagrams A, B and C below and explain what is happening in each phase.



(3)

[20]

QUESTION 5 – Current Electricity

5.1 Circuit Diagrams – Draw the symbol next to the question no. in your answer booklet.

Component	*Symbolic representation*
Light bulb	**5.1.1**
Switch	**5.1.2**
Battery	**5.1.3**
Resistor	**5.1.4**
Connector	**5.1.5**

(5)

5.2 Complete the following sentences by choosing the correct option.

5.2.1 The instrument used to measure potential difference is a .....(cell, ammeter, resistor, voltmeter).

5.2.2 If the number of resistors in series is increased, the current will ..... (increase, decrease, remain constant).

5.2.3 As the number of cells, connected in series, in a circuit increases, the voltage will ..... (increase, decrease, remain constant).

5.2.4 An ammeter is always connected in .....(series, parallel).

5.2.5 A battery will last longer if the cells are connected in ..... (series, parallel).

(5)

5.3 Complete the following table. Your answers need to be in your answer booklet next to the question no. e.g. 5.3.1 energy

	Symbol	*Unit that it is measured in*
Charge	**Q**	(5.3.1)
Time	(5.3.2)	(5.3.3)
Current Strength	(5.3.4)	**Amperes (A)**
Resistance	(5.3.5)	(5.3.6)
(5.3.7)	**V**	(5.3.8)

(8)

5.4 Name 3 factors that cause a wire to have more resistance. (3)

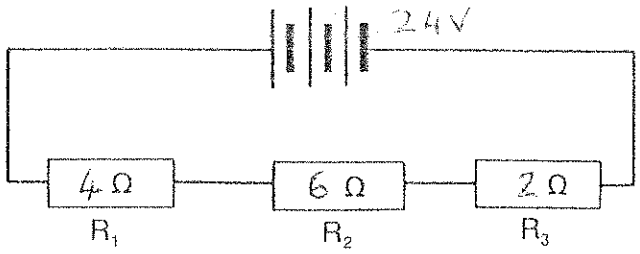
Calculations: use the formulae on the front page of the question paper and show your working out.

5.5 How much charge flows past a certain point in 1minute if the current in the circuit is 2A? (3)

5.6 Calculate the current if a charge of 120 coulombs flows past a certain point in a circuit in 30 seconds. (3)

5.7 Calculate the time it takes a charge of 360 coulombs to move past a certain point in the circuit if the current in the circuit is 4A. (3)

5.8 Study the series circuit below and then do the following calculations:

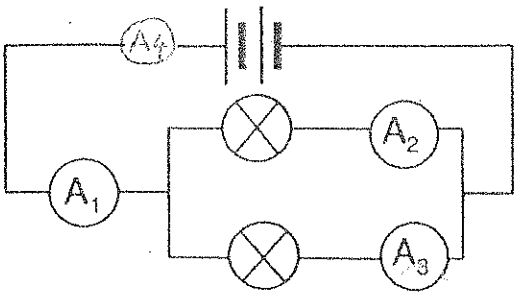


5.8.1 Calculate the total resistance of the circuit. (3)

5.8.2 Work out the current in the circuit. (3)

5.8.3 What is the potential difference across the R_1 resistor? (3)

5.9 Study the following diagram of a parallel circuit and answer the following questions.



5.9.1 If A_1 reads 4A and A_2 reads 3A what will the reading be on A_3 and A_4? (2)

5.9.2 If a voltmeter is placed across the battery and has a reading of 8V, what voltage does each cell have? (3)

5.10.1 Calculate the resistance of a piece of wire if the potential difference across the wire of 18V gives rise to a current of 3A. (3)

5.11 What potential difference is needed to produce a current strength of 2A through a resistor of 25Ω? (3)

[50]

QUESTION 6 – Minerals and Mining in South Africa

The importance of South Africa's minerals

Rocks are found all over the world. However, rocks containing useful minerals are not found everywhere. South Africa is very fortunate as it has large amounts of many of the world's most important minerals. Figure 4 below shows how South Africa's mineral production compares with the rest of the world.

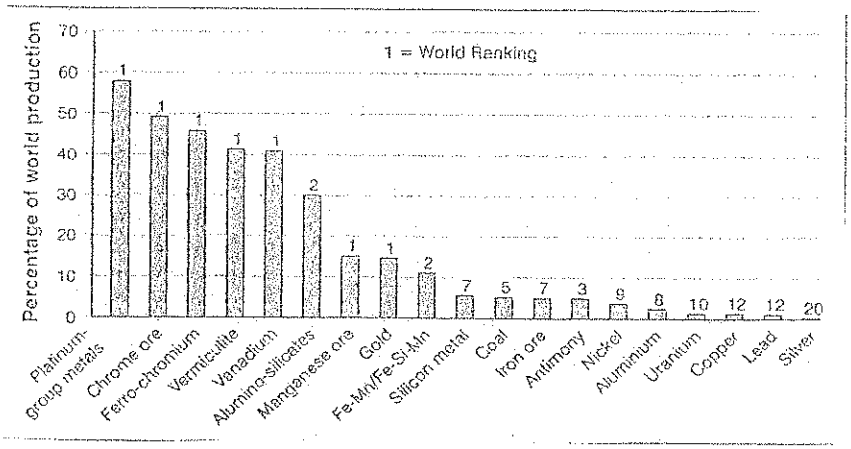


Figure 4: South Africa's share of the world's production of certain minerals in 2003

Use Figure 4 to answer the following questions:

6.1 Which mineral/minerals does South Africa produce more of than any other country? (1)

6.2 Name three minerals that South Africa provides 30% or more of the world's supply. (3)

6.3 Why is it an advantage for South Africa to have so much of the world's supply of certain minerals? (3)

How reliant South Africa still is on Fossil Fuels

The pie charts on Figures 1, 2 and 3 give statistics that show how important fossil fuels still are for different purposes in South Africa.

Figure 1: Energy consumption in South Africa in 2000

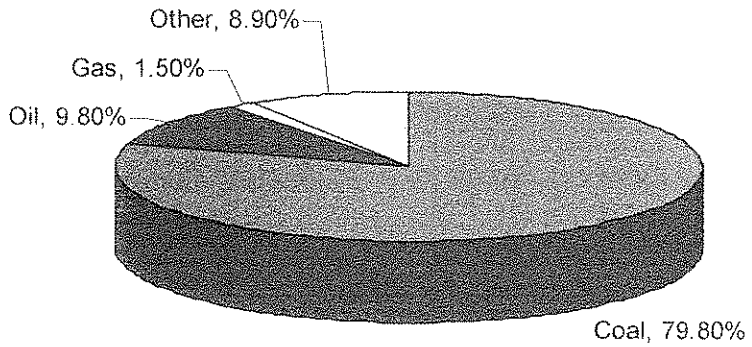


Figure 2: Uses of coal in 2000

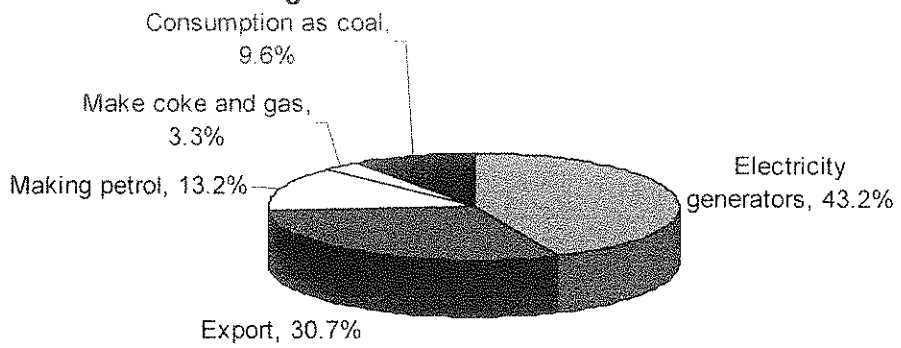
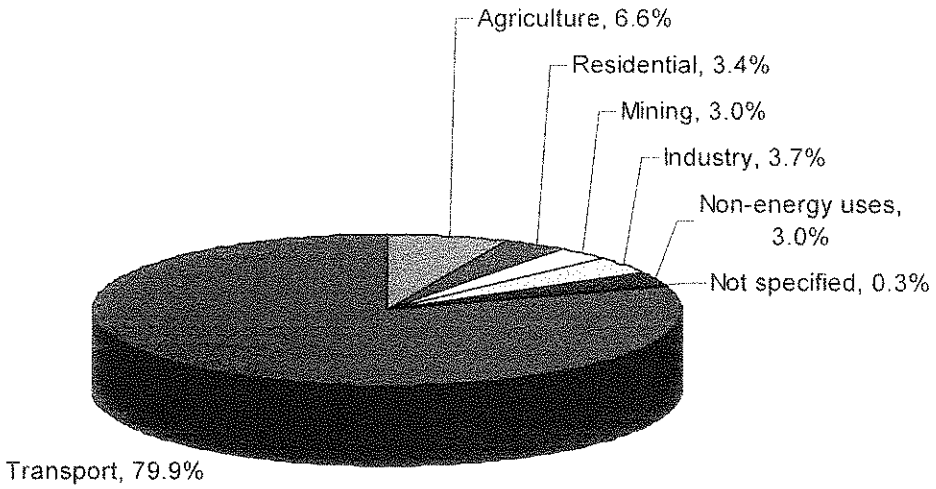


Figure 3: Uses of oil in 2000



6.4 What percentage of all energy consumed in South Africa comes from fossil fuels? (1)

6.5 Which of these fuels are used the most? (1)

6.6 Which of these fuels is the second most popular? (1)

6.7 What is most of South Africa's coal used for? (1)

6.8 How much of South Africa's coal is exported? (1)

6.9 Which sector of the economy uses the most oil? (1)

6.10 Name two negative impacts that mining has on the environment. (2)

6.11 Write a short essay (10 lines) on an alternative source of energy. You will need to include advantages and disadvantages of your energy source as well as other facts. (5)

[20]

QUESTION 7 – Density

7.1 Give the definition for Density. (2)

7.2 Explain how a substance with an irregular shape is measured. (2)

Calculate, showing all working out:

7.3 A piece of metal has a mass of 180g and a volume of 15cm^3. Calculate its density. (3)

7.4 A substance has a density of 6,4 g/cm^3. What volume will 14g occupy? (3)

[10]

Total = 150