education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCE P2

NOVEMBER 2006

This memorandum consists of 11 pages.

Learning Outcomes and Assessment Standards Leeruitkomste en Assesseringstandaarde		
LO 1	**LO 2**	**LO 3**
AS 10.1.1: Plan and conduct a scientific investigation to collect data systematically with regard to accuracy, reliability and the need to control one variable. *Beplan en voer 'n wetenskaplike ondersoek uit om data sistematies met akkuraatheid, betroubaarheid en die kontrole van een veranderlike, te versamel.* **AS 10.1.2:** Seek patterns and trends in the information collected and link it to existing scientific knowledge to help draw conclusions. *Soek patrone en tendense in die versamelde inligting en verbind dit met bestaande wetenskaplike kennis om gevolgtrekkings te maak.* **AS 10.1.3:** Apply given steps in a problem-solving strategy to solve standard exercises. *Pas gegewe stappe in 'n probleemoplossingstrategie toe om standaard oefeninge op te los.*	**AS 10.2.1:** Recall and state basic prescribed scientific knowledge. *Onthou en noem basiese voorgeskrewe wetenskaplike kennis.* **AS 10.2.2** Express and explain prescribed scientific theories and models by indicating some of the relationships of different facts and concepts with each other. *Verduidelik en druk voorgeskrewe wetenskaplike teorieë en modelle uit deur van die verwantskappe tussen verskillende feite en konsepte aan te dui.* **AS 10.2.3:** Apply scientific knowledge in familiar, simple contexts. *Pas wetenskaplike kennis in bekende eenvoudige kontekste toe.*	**AS 10.3.2:** Describe the interrelationship and impact of science and technology on socio-economic and human development. *Beskryf die interverwantskap en impak van wetenskap en tegnologie op sosio-ekonomiese en menslike ontwikkeling.* **AS 10.3.3:** Discuss the impact of scientific and technological knowledge on sustainable local development of resources and on the immediate environment. *Bespreek die impak van wetenskaplike en tegnologiese kennis op volhoubare plaaslike ontwikkeling van bronne en op die onmiddellikke omgewing.*

SECTION A / *AFDELING A*

QUESTION 1 / *VRAAG 1*

1.1	hydro(sphere) / *hidro(sfeer)* ✓	[10.2.1]	(1)
1.2	physical / *fisiese* ✓	[10.2.1]	(1)
1.3	covalent / *kovalent* ✓	[10.2.1]	(1)
1.4	physical / *fisiese* ✓	[10.2.1]	(1)
1.5	temperature / *temperatuur* ✓	[10.2.1]	(1) **[5]**

QUESTION 2 / *VRAAG 2*

2.1	D ✓	[10.2.3]	(1)
2.2	E ✓	[10.2.1]	(1)
2.3	F ✓	[10.2.1]	(1)
2.4	C ✓	[10.2.1]	(1)
2.5	J ✓	[10.2.1]	(1)
			[5]

QUESTION 3 / *VRAAG 3*

3.1	False. It increases with increase in temperature. ✓✓ *Onwaar. Dit neem toe met toename in temperatuur.*	[10.2.1]	(2)
3.2	False. ✓✓ It's the amount of energy absorbed. *Onwaar Dit is die hoeveelheid energie opgeneem.*	[10.2.1]	(2)
3.3	True ✓✓ *Waar*	[10.2.1]	(2)
3.4	True ✓✓ *Waar*	[10.3.3]	(2)
3.5	False. The reaction is exothermic ✓✓ *Onwaar. Die reaksie is eksotermies*	[10.3.2]	(2)
			[10]

QUESTION 4 / *VRAAG 4*

4.1	B ✓✓✓	[10.2.3]	(3)
4.2	A ✓✓✓	[10.2.1]	(3)
4.3	B ✓✓✓	[10.3.2]	(3)
4.4	B ✓✓✓	[10.2.3]	(3)
4.5	A ✓✓✓	[10.2.3]	(3)
			[15]

Total Section A / *Totaal Afdeling A* = [35]

SECTION B / *AFDELING B*

QUESTION 5 / *VRAAG 5*

5.1
5.1.1 NaCℓ ✓ [10.2.3] (1)

5.1.2 $CuSO_4$ ✓ [10.2.3] (1)

5.2 Table salt / *Tafelsout* ✓ [10.2.1] (1)

5.3 Transition / *Oorgangs* ✓ [10.2.1] (1)

5.4 Volume of water / *Volume van water* ✓✓ [10.1.1] (2)

5.5 Sodium chloride / *Natriumchloried* ✓✓ [10.1.2] (2)

5.6 54 ℃ ✓✓ [10.1.2] (2)

5.7 36 g ✓ ✓ [10.1.2] (2)

5.8 Solubility increases with temperature. ✓✓
Oplosbaarheid neem toe met temperatuur. [10.1.2] (2)
[14]

QUESTION 6 / *VRAAG 6*

6.1 Atoms of the same element ✓ with different <u>mass number / number of neutrons / number of nucleons</u>. ✓

Atome van dieselfde element met verskillende <u>massagetalle / aantal neutrone / aantal nukleone</u>. [10.2.1] (2)

6.2 Less reactive / More stable ✓✓
Minder reaktief / Meer stabiel [10.1.2] (2)

6.3 Relative atomic mass / *Relatiewe atoommassa* $= \dfrac{99{,}3(238) + 0{,}7(235)}{100}$ (✓ ✓ ✓) $= 237{,}98$ ✓ [10.1.3] (4)

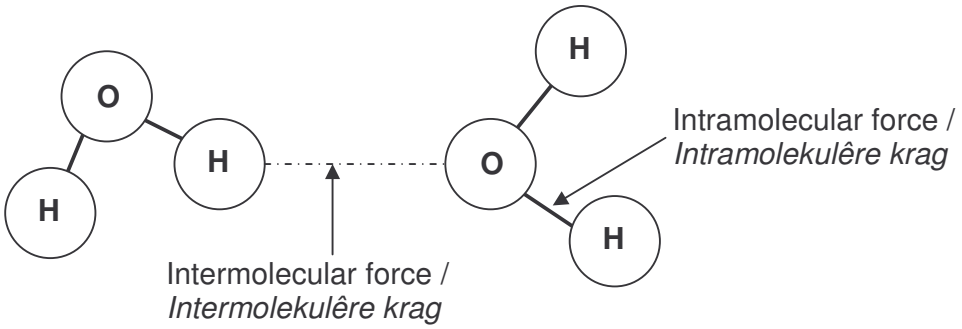
6.4

Benefit of $^{235}_{92}U$ to humankind ***Voordeel vir die mens***	**Disadvantage of $^{235}_{92}U$ to humankind** ***Nadeel vir die mens***
Generation of electricity/energy ✓✓ *Opwekking van elektrisiteit/energie*	Radiation can cause illness or death ✓✓ *Straling kan siektes of dood veroorsaak.*

[10.3.2] (4)
[12]

QUESTION 7 / *VRAAG 7*

7.1



	Checklist / *Kontrolelys*	1	0
1	Structure of water molecules correctly drawn. *Struktuur van watermolekule reg geteken.*		
2	Forces between atoms and between molecules indicated. *Kragte tussen atome en tussen molekule aangedui.*		
3	Intermolecular forces correctly labelled. *Intermolekulêre kragte korrek benoem.*		
4	Intramolecular forces correctly labelled. *Intramolekulêre kragte korrek benoem.*		
	Total out of 4 / ***Totaal uit 4***		

[10.2.2] (4)

7.2 SiH_4 ✓✓ [10.1.2] (2)

7.3 Boiling points increase with molecular size. ✓✓
Kookpunte neem toe met molekulêre grootte / massa. [10.1.2] (2)

7.4 No / *Nee* ✓
Water deviates from the pattern in having the highest boiling point in the group. ✓✓
Water wyk af vanaf die patroon deurdat dit die hoogste kookpunt het. [10.1.2] (3)

7.5 H_2O – liquid / *vloeistof*✓
H_2S – gas
H_2Se – gas } ✓
H_2Te – gas
[10.1.2] (2)

7.6 Water is a liquid at any temperature between these two temperatures – available as liquid to life on earth. OR Wide range in temperature for water to be in a liquid state in order to sustain life.✓✓
Water is 'n vloeistof by enige temperatuur tussen hierdie twee Temperature – beskikbaar as vloeistof vir lewe op aarde. OF Wye temperatuur gebied vir water om in 'n vloeistoffase te wees om lewe te volhou. [10.3.3] (2)
[15]

QUESTION 8 / *VRAAG 8*

PHYSICAL CHANGE ***FISIESE VERANDERING***	**CHEMICAL CHANGE** ***CHEMIESE VERANDERING***
Boiling of water ✓ *Kook van water*	Fermentation of mealie meal ✓ Fermentasie van mieliemeel
Sublimation of dry ice ✓ *Sublimasie van droë ys*	Frying an egg ✓ *Bak van 'n eier*
	Burning of petrol ✓ *Verbranding van petrol*

[10.2.3] (5)
[5]

QUESTION 9 / *VRAAG 9*

9.1 $2CO + O_2$ ✓→ $2CO_2$ ✓ (✓ - balancing / *balansering*) [10.3.3] (3)

9.2 SO_2 ✓+ H_2O✓ → H_2SO_3✓ [10.3.3] (3)

9.3 $CH_4(g)$ ✓ + $2O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell)$ ✓
(✓- balancing / *balansering*) [10.3.3] (3)
[9]

QUESTION 10 / *VRAAG 10*

10.1 Decomposition ✓
Ontbindings [10.2.3] (1)

10.2 Bubbles of carbon dioxide gas form in the stomach. ✓✓
OR
CO_2 gas in the stomach

Borrels koolstofdioksiedgas vorm in die maag.
OF
CO_2-gas in die maag. [10.3.2] (2)

10.3

	Checklist / *Kontrolelys*	1	0
1	**Investigative question / *Ondersoekende vraag***		
	Question that is relevant to investigation; refers to dependent and independent variables and can be solved practically. *Vraag wat relevant tot* ondersoek; v*erwys na afhanklike en onafhanklike veranderlikes en kan prakties opgelos word*		
2	**Method / *Metode***		
	Stepwise method suggested to answer question *Stapsgewyse metode aanbeveel om vraag te beantwoord*		
	Method is suitable and can be performed practically Metode is geskik en kan prakties uitgevoer word		
3	**Results / *Resultate***		
	Suitable table suggested for collection of information or recording of results. *Geskikte tabel voorgestel om inligting te versamel of resultate op te teken.*		
4	**Conclusion / Gevolgtrekking**		
	Suitable graph / other form indicated to seek a pattern in results *Geskikte grafiek / ander vorm aangedui om patroon in resultate te soek*		
	Total out of 5 / *Totaal uit 5*		

Example / *Voorbeeld*

Investigative question / *Ondersoekende vraag:*
What is the relationship between fizzy drinks consumed and tooth decay?
Wat is die verwantskap tussen gebruik van gaskoeldrank en tandbederf?

Method / *Metode*

- Select 20 persons (ask your dentist for assistance) / *Kies 20 persone (vra jou tandarts vir hulp)*
- For each person:/ *Vir elke persoon*:
  - Enquire how much fizzy drinks he/she drinks per month or week.
    Vind uit hoeveel gaskoeldrank hy/sy per maand of week drink.
  - Enquire how many teeth in his/her mouth give problems.
    Vind uit hoeveel van sy/haar tande probleemtande is.

OR

- Get hold of two milk teeth. / *Verkry twee melktande*.
- Soak one milk tooth in fizzy drink. / *Plaas en melktand in gaskoeldrank*.
- Soak the second in distilled water for a certain time to serve as reference./ *Plaas die tweede melktand in water om as verwysing te dien.*
- Close both containers*. / Bedek beide houers.*
- Observe the teeth over a period of time. / *Neem die tande oor 'n tydperk waar.*
- Record any changes to enamel. */ Teken enige veranderinge aan die emalje op.*

Results / *Resultate*

Method 1/*Metode 1:* Collection of information/ *Versameling van inligting*

Name of Persons/ *Name van Persone*	Amount of fizzy drinks (ℓ or cans)/ *Hoeveelheid gaskoeldrank (ℓ of blikkies)*	Number of problematic teeth/ *Aantal problem tande*

Method 2/*Metode 2*: Recording of results /*Opteken van resultate*

Time/*Tyd* (days/*dae*)	Change to enamel in comparison to reference/ *Verandering in emalje in vergelyking met verwysing*

Interpretation of results / *Interpretasie van resultate*

Draw a graph (e.g. fizzy drinks consumed vs decay) or describe the pattern seen in results to answer the investigative question
Teken 'n grafiek (bv. gaskoeldrank verbruik vs verrotting) of beskryf die patroon waargeneem om die ondersoekende vraag te beantwoord.

[10.1.1] (5)
[8]

QUESTION 11 / *VRAAG 11*

11.1 Different samples ✓of a pure compound always contain the same elements in the same composition ✓/proportion.

Verskillende monsters van 'n suiwer verbinding bevat altyd dieselfde elemente in dieselfde samestelling / verhouding. [10.2.1] (2)

11.2 Percentage/*Persentasie* H: $\frac{4}{16}$ x100 ✓ = 25% ✓

Percentage/*Persentasie* C: $\frac{12}{16}$ x100 ✓ = 75% ✓ [10.1.3] (4)

11.3 Same/*Dieselfde* (25% of C) ✓✓ [10.2.3] (2)
[8]

QUESTION 12 / *VRAAG 12*

12.1 Reaction in test tube X✓
Heat is produced by the reaction. ✓✓

Reaksie in proefbuis X
Hitte word deur die reaksie vrygestel. ✓✓ [10.1.2] (3)

12.2 $Na_2CO_3 + 2HC\ell \rightarrow 2NaC\ell$ ✓ $+ H_2O + CO_2$
(✓✓ - balancing/*balansering)* [10.2.3] (3)
[6]

QUESTION 13 / *VRAAG 13*

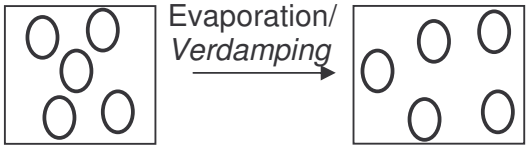
13.1 Heat absorbed or released ✓during a phase change ✓ without a change in temperature. ✓

Hitte opgeneem of afgegee tydens 'n faseverandering sonder 'n verandering in temperatuur. [10.2.1] (3)

13.2 Evaporation ✓of sweat leaves the skin cool as the more energetic particles leave the liquid. ✓

Verdamping van sweet laat die vel koel soos die meer energieke deeltjies die vloeistof verlaat. ✓ [10.3.2] (2)

13.3



Checklist / *Kontrolelys*		1	0
1	Spaces between liquid molecules (first block) smaller than in second block. *Spasies tussen vloeistofmolekule (eerste blok) kleiner as in tweede blok.*		
2	Spaces between vapour molecules (second block) bigger than in first block. *Spasies tussen dampmolekule (tweede blok) groter as in eerste blok.*		
3	Evaporation correctly indicated. *Verdamping korrek aangedui.*		
4	Sketch completely correct and neat. *Skets volledig korrek en netjies.*		
	Total out of 4 / *Totaal uit 4*		

[10.1.2] (4)

13.4 Latent heat of vaporisation ✓✓
Latente verdampingswarmte [10.2.3] (2)
[11]

QUESTION 14 / *VRAAG 14*

14.1 Hydrogen/*Waterstof* ✓✓ [10.2.3] (2)

14.2 Haber process/*Haberproses* ✓✓ [10.2.3] (2)

14.3 Process which converts nitrogen into compounds that can be used by plants. ✓✓

Proses wat stikstof omskakel in verbindings wat deur plante gebruik kan word. [10.2.1] (2)

14.4 Man uses the nutrients faster than it can be replenished, hence it is necessary to produce the nutrients artificially. ✓✓✓

OR

More food can be produced at a faster rate for an increasing consumption.

Die mens gebruik voedingstowwe vinniger as wat dit vervang kan word en gevolglik moet voedingstowwe kunsmatig vervaardig word. ✓✓✓

OF

Meer voedsel kan teen 'n vinniger tempo vir toenemende verbruik produseer word.

[10.3.3] (3)

14.5 Any two/*Enige twee*:

Excess of nitrates in water can cause/*Oormaat nitrate veroorsaak*:

Fast growth of algae/*Vinnige groei van alge*
Depletion of oxygen in water – death of aquatic life ✓✓
Uitputting van suurstof in water – dood van waterlewe

Health hazard to humans/*Gesondheidsgevaar vir mense* ✓✓

Increase in acidity of water - death of aquatic life
Toename in s*uurheid van water – dood van waterlewe* [10.3.3] (4)

[13]

QUESTION 15 / *VRAAG 15*

15.1	Acidic / *Suur* ✓✓	[10.1.2]	(2)
15.2	Pollutants in air decrease as rain keeps falling. ✓✓ Besoedelende stowwe neem af soos reën aanhou val.	[10.1.2]	(2)
15.3	Any two: /Enige twee: ✓✓✓✓ Industries (Factories) releasing CO_2, SO_2 or NO_x *Industrieë (Fabrieke) wat CO_2, SO_2 of NO_x vrystel*. Gases released by cars./*Gasse vrygestel deur motors.* Gases released by coal-fired power stations. *Gasse vrygestel deur steenkoolkragstasies*.	[10.3.3]	(4)
15.4			
15.4.1	Respiratory problems / *Asemhalingsprobleme* ✓✓	[10.3.2]	(2)
15.4.2	Increase in pH of water – death of aquatic life ✓✓ *Toename in pH van water – dood van waterlewe*	[10.3.3]	(2)
15.4.3	Eroding of buildings / *Wegvreet van geboue* ✓✓	[10.3.3]	(2) **[14]**

TOTAL MARKS OF QUESTION PAPER / *TOTALE PUNTE VAN VRAESTEL* = 150