Province of the
EASTERN
CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE/GRAAD 12

SEPTEMBER 2012

PHYSICAL SCIENCES P2
FISIESE WETENSKAPPE V2
MEMORANDUM

MARKS/PUNTE: 150

This memorandum consists of 16 pages.
Hierdie memorandum bestaan uit 16 bladsye.

LEARNING OUTCOMES AND ASSESSMENT STANDARDS *LEERUITKOMSTE EN ASSESSERINGSTANDAARDE*		
LO/*LU*1	**LO/*LU*2**	**LO/*LU*3**
AS 12.1.1 Plan and conduct a scientific investigation to collect data systematically with regard to accuracy, reliability and the need to control variables.

Beplan en voer 'n wetenskaplike ondersoek uit om data sistematies te versamel ten opsigte van akkuraatheid, betroubaarheid en die kontroleer van veranderlikes. | **AS 12.2.1** Define and discuss basic prescribed and scientific knowledge.

Definieer en bespreek basiese voorgeskrewe wetenskaplike kennis. | **AS 12.3.1** Recognise, discuss and compare scientific and indigenous knowledge systems and knowledge claims by indicating the correlation among them, and explain the acceptance of different claims. *Herken, bespreek en vergelyk wetenskaplike en inheemse kennissisteme en kennisaansprake deur die ooreenkoms aan te dui en verduidelik die aanvaarding van verskillende aansprake.* |
| **AS 12.1.2** Seek pattern and trends, represent them in different forms to draw conclusions, and formulate simple generalisations.

Soek patrone en tendense, stel dit in verskillende vorms voor om gevolgtrekkings te maak en om eenvoudige veralgemenings te formuleer. | **AS 12.2.2** Express and explain prescribed scientific theories, models and laws by indicating the relationship between different facts and concepts in own words. *Verduidelik en druk voorgeskrewe wetenskaplike beginsels, teorieë, modelle en wette uit deur die verwantskap tussen verskillende feite konsepte in eie woorde aan te dui.* | **AS 12.3.2** Identify ethical and moral issues related to the development of science and technology and evaluate the impact (pros and cons) of the relationship from a personal viewpoint. *Identifiseer etiese en morele uitkomste in verband met die ontwikkeling van die wetenskap en tegnologie en evalueer die impak (voordele en nadele) van die verhouding van 'n persoonlike oogpunt.* |

AS 12.1.3 Apply known problem-solving strategies to solve multi-step problems.	AS 12.2.3 Apply scientific knowledge in everyday life contexts.	AS 12.3.3 Evaluate the impact of scientific and technological knowledge on sustainable development of resources and suggest long-term and short-term strategies to improve the management of resources in the environment.
Pas bekende probleemoplossingstrategieë toe om veelvuldigestapprobleme op te los.	*Pas wetenskaplike kennis in kontekste van die alledaagse lewe toe.*	*Evalueer die impak van wetenskaplike en tegnologiese kennis op volhoubare ontwikkeling van bronne en om kort-termyn en lang-termyn strategieë voor te stel om die bestuur van bronne in die omgewing te verbeter.*
AS 12.1.4 Communicate and present scientific arguments with clarity and precision. *Kommunikeer en verdedig wetenskaplike argument duidelik en presies.*		

GUIDELINES FOR MARKING/*RIGLYNE VIR NASIEN*

This section provides guidelines for the way in which marks will be allocated. The broad principles must be adhered to in the marking of Physical Sciences tests and examinations.
Hierdie afdeling verskaf riglyne vir die manier waarop punte toegeken sal word. Die breë beginsels moet tydens die nasien van Fisiese Wetenskappe toetse en eksamens gevolg word.

1.1 **MARK ALLOCATION/*PUNTE TOEKENNING***

    1.1.1 **Definitions/*Definisies*:**
        Two marks will be awarded for a correct definition. No marks will be awarded for an incorrect or partially correct definition.
        Twee punte sal vir 'n korrekte definisie toegeken word. Geen punte sal vir 'n verkeerde of gedeeltelik korrekte definisie toegeken word nie.

    1.1.2 **Calculations/*Berekeninge*:**
        o   Marks will awarded for: correct formula, correct substitution, correct answer with unit.
            Punte sal toegeken word vir: korrekte formule, korrekte substitusie, korrekte antwoord met eenheid.
        o   No marks will be awarded if an incorrect or inappropriate formula is used, even though there may be relevant symbols and applicable substitutions.
        o   *Geen punte sal toegeken word waar 'n verkeerde of ontoepaslike formule gebruik word nie, selfs al is daar relevante simbole en relevante substitusies.*

1.1.3   **Explanations and interpretations/Verduidelikings en interpretasie:**

Allocation of marks to questions requiring interpretation or explanation e.g. AS 1.4, 2.2, 2.3, 3.1, 3.2 and 3.3, will differ and may include the use of rubrics, checklists, memoranda, etc. In all such answers emphasis must be placed on scientific concepts relating to the question.

Toekenning van punte by vrae wat interpretasie of verduideliking vereis bv. AS 1.4, 2.2, 2.3, 3.1, 3.2 en 3.3, sal verskil en mag die gebruik van rubrieke, kontrolelyste, memoranda, ens. insluit. By al hierdie antwoorde moet die beklemtoning op die wetenskaplike konsepte, met betrekking tot die vraag, val.

1.2   **FORMULAE AND SUBSTITUTIONS/*FORMULES EN SUBSTITUSIE***

1.2.1   Mathematical manipulations and change of subjects of appropriate formulae carry no marks, but if a candidate starts with the correct formula and then changes the subject of the formula incorrectly, marks will be awarded for the formula and the correct substitutions. The mark for the incorrect numerical answer is forfeited.

Wiskundige manipulering en verandering van die voorwerp van toepaslike formules dra geen punte nie, maar as 'n kandidaat begin met die korrekte formule en dan die voorwerp van die formule verkeerd uitwerk, sal punte vir die formule en korrekte substitusie toegeken word.

1.2.2   When an error is made during **substitution into a correct formula**, a mark will be awarded for the correct formula and for the correct substitutions, but **no further marks** will be given.

*Wanneer 'n fout gedurende **substitusie in 'n korrekte formule** begaan word, sal 'n punt vir die korrekte formule en vir korrekte substitusie toegeken word, maar **geen verdere punte** sal toegeken word nie.*

1.2.3   Marks are only awarded for a formula if a calculation had been **attempted,** i.e. substitutions have been made or a numerical answer given.

*Punte sal slegs toegeken word vir 'n formule as 'n **poging aangewend was** om 'n berekening te doen d.w.s. substitusie was gedoen of 'n numerieke antwoord word verskaf.*

1.2.4   Marks can only be allocated for substitutions when values are substituted into formulae and not when listed before a calculation starts.

Punte kan slegs toegeken word vir substitusies wanneer waardes in formules ingestel is en nie vir waardes wat voor 'n berekening gelys is nie.

1.2.5   All calculations, when not specified in the question, must be done to two decimal places.

Alle berekenings, wanneer nie in die vraag gespesifiseer word nie, moet tot twee desimale plekke gedoen word.

1.3   **UNITS/*EENHEDE***

1.3.1   Candidates will only be penalised once for the repeated use of an incorrect unit **within a question or sub-question.**
*'n Kandidaat sal slegs een keer gepenaliseer word vir die herhaaldelike gebruik van 'n verkeerde eenheid **in 'n vraag of subvraag.***

1.3.2   Units are only required in the final answer to a calculation.
Eenhede word slegs in die finale antwoord tot 'n vraag verlang.

1.3.3   Marks are only awarded for an answer, and not for a unit per se. Candidates will therefore forfeit the mark allocated for the answer in each of the following situations:
  - correct answer + wrong unit
  - wrong answer + correct unit
  - correct answer + no unit.
Punte word slegs vir 'n antwoord en vir 'n eenheid per se toegeken nie. Kandidate sal derhalwe die punt vir die antwoord in die volgende gevalle verbeur:
  - *korrekte antwoord + verkeerde eenheid*
  - *verkeerde antwoord + korrekte eenheid*
  - *korrekte antwoord + geen eenheid*

1.3.4   SI units must be used except in certain cases, e.g. $V \cdot m^{-1}$ instead of $N \cdot C^{-1}$, and $cm \cdot s^{-1}$ or $km \cdot h^{-1}$ instead of $m \cdot s^{-1}$ where the question warrants this. (This instruction only applies to Paper 1).
SI-eenhede moet gebruik word behalwe in sekere gevalle, bv. $V \cdot m^{-1}$ in plaas van of $N \cdot C^{-1}$, en $cm \cdot s^{-1}$ of $km \cdot h^{-1}$ in plaas van $m \cdot s^{-1}$ waar die vraag dit verlang. (Hierdie instruksie geld slegs by Vraestel 1).

1.4　**POSTIVE MARKING/*POSITIEWE NASIEN***

Positive marking regarding calculations will be followed in the following cases:
Positiewe nasien met betrekking tot berekeninge sal in die volgende gevalle geld:

1.4.1　**Sub-question to sub-question**: When a certain variable is calculated in one sub-question (e.g. 3.1) and needs to be substituted in another (3.2 or 3.3), e.g. if the answer for 3.1 is incorrect and is substituted correctly in 3.2 or 3.3, **full marks** are to be awarded for the subsequent sub-questions.
Subvraag na subvraag: Wanneer 'n sekere veranderlike in een subvraag (bv. 3.1) bereken word en dan in 'n ander vervang moet word (3.2 of 3.3), bv. Indien die antwoord vir 3.1 verkeerd is en word korrek in 3.2 of 3.3 vervang, word volpunte aan die daaropvolgende subvraag toegeken.

1.4.2　**A multi-step question in a sub-question**: If the candidate has to calculate, for example, current in the first step and gets it wrong due to a substitution error, the mark for the substitution and the final answer will be forfeited.
'n Vraag met veelvuldige stappe in 'n subvraag: Indien 'n kandidaat byvoorbeeld, die aantal mol verkeerd bereken in 'n eerste stap as gevolg van 'n substitusiefout, verloor die kandidaat die punt vir die substitusie sowel as die finale antwoord.

1.4.3　If a final answer to a calculation is correct, full marks will not automatically be awarded. Markers will always ensure that the correct/appropriate formula is used and that workings, including substitutions, are correct.
Indien 'n finale antwoord tot 'n berekening korrek is, sal volpunte nie outomaties toegeken word nie. Nasieners sal altyd verseker dat die korrekte toepaslike formule gebruik word en dat bewerkings, insluitende substitusies korrek is.

1.4.4　Questions where a series of calculations have to be made (e.g. a circuit diagram question) do not necessarily always have to follow the same order. FULL MARKS will be awarded provided it is a valid solution to the problem. However, any calculation that will not bring the candidate closer to the answer than the original data, will not count any marks.
Vrae waar 'n reeks berekeninge gedoen moet word (bv. 'n stroombaan diagram vraag) hoef nie noodwendig altyd dieselfde orde te volg nie. VOLPUNTE sal toegeken word mits dit 'n geldige oplossing tot die probleem is. Maar, enige berekening wat nie die kandidaat nader aan die antwoord bring as die oorspronklike data, sal geen punte tel nie.

1.4.5 If one answer or calculation is required, but two given by the candidate, only the first one will be marked, irrespective of which one is correct. If two answers are required, only the first two will be marked, etc.
Indien een antwoord of berekening verlang word, maar twee word deur die kandidaat gegee, sal slegs die eerste een nagesien word, ongeag watter een korrek is. Indien twee antwoorde verlang word, sal slegs die eerste twee nagesien word, ens.

1.4.6 Normally, if based on a conceptual mistake, an incorrect answer cannot be correctly motivated. If the candidate is therefore required to motivate in question 3.2 the answer given to question 3.1, and 3.1 is incorrect, no marks can be awarded for question 3.2. However, if the answer for e.g. 3.1 is based on a calculation, the motivation for the incorrect answer for 3.2 could be considered.
Normaalweg, as dit gebaseer is op 'n voorstellingsfout, kan 'n verkeerde antwoord nie korrek gemotiveer word nie. As die kandidaat derhalwe gevra word met 'n vraag in 3.2 om die antwoord in vraag 3.1 te motiveer, en 3.1 is verkeerd, sal geen punte vir vraag 3.2 toegeken word nie. Maar, as die antwoord in bv. 3.1 gebaseer is op 'n berekening, kan die motivering vir die verkeerde antwoord oorweeg word.

1.4.7 If instructions regarding method of answering are not followed, e.g. the candidate does a calculation when the instruction was to **solve by construction and measurement**, a candidate may forfeit all the marks for the specific question.
*Indien instruksies aangaande metode van beantwoording nie gevolg word nie, bv. die kandidaat doen 'n berekening wanneer die instruksie **los op deur konstruksie en meting** was, mag die kandidaat al die punte vir die spesifieke vraag verbeur.*

1.4.8 For an **error of principle, no marks** are awarded (Rule 1) e.g. If the potential difference is 200 V and resistance is 25 Ω, calculate the current.
*Vir 'n **voutdraendebeginsel,** sal **geen punte** toegeken word nie (Reël 1) bv. As die potensiaalverskil 200 V en die weerstand 25 Ω is, bereken die stroom.*
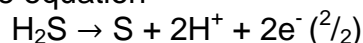
CORRECT/ *KORREK*	ANSWER (1) ANTW (1)	POSSIBLE *MOONTLIK*	ANSWER (2) ANTW (2)	POSSIBLE *MOONTLIK*
$I = \dfrac{V}{R}$ ✓ $= \dfrac{200}{25}$ ✓ $= 8\,\text{A}$ ✓	$R = \dfrac{V}{I}$ ✓ $= \dfrac{200}{25}$ ✗ $= 8\,\text{A}$ ✗	$R = \dfrac{V}{I}$ ✗ $= \dfrac{200}{25}$ $= 8\,\text{A}$	$R = \dfrac{V}{I}$ ✓ $I = \dfrac{R}{V}$ ✗ $= \dfrac{25}{200}$ $= 0{,}125\,\text{A}$ ✗	$I = \dfrac{V}{R}$ ✓ $= 8\,\text{A}$ ✓

1.5 GENERAL PRINCIPLES OF MARKING IN CHEMISTRY/ *ALGEMENE BEGINSELS VAN NASIEN BY CHEMIE*

The following are a number of guidelines that specifically apply to Paper 2.
Die volgende is 'n aantal riglyne wat spesifiek met Vraestel 2 van toepassing is.
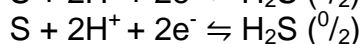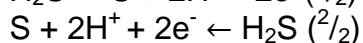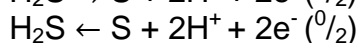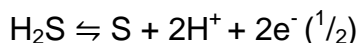
1.5.1 When a chemical **FORMULA** is asked, and the **NAME** is given as answer, only one of the two marks will be awarded. The same rule applies when the **NAME** is asked and the **FORMULA** is given.
*Wanneer 'n chemiese **FORMULE** gevra word en die **NAAM** word as antwoord gegee, sal slegs een van die twee punte toegeken word. Dieselfde reël geld wanneer die **NAAM** gevra word en die **FORMULE** gegee word.*

1.5.2 When redox half-reactions are to be written, the correct arrow should be used. If the equation
$$H_2S \rightarrow S + 2H^+ + 2e^- \ (^2/_2)$$
is the correct answer, the following marks will be given:
Wanneer redokshalfreaksies geskryf moet word, moet die korrekte pyltjie gebruik word. Indien die bostaande vergelyking die korrekte antwoord is, sal die volgende punte toegeken word:

$H_2S \leftrightharpoons S + 2H^+ + 2e^- \ (^1/_2)$
$H_2S \leftarrow S + 2H^+ + 2e^- \ (^0/_2)$
$S + 2H^+ + 2e^- \leftarrow H_2S \ (^2/_2)$
$S + 2H^+ + 2e^- \leftrightharpoons H_2S \ (^0/_2)$

1.5.3 When candidates are required to give an explanation involving the relative strength of oxidising and reducing agents, the following is unacceptable:
- Stating the position of a substance on Table 4 only (e.g. Cu is above Mg).
- Using relative reactivity only (e.g. Mg is more reactive than Cu).
- The correct answer would for instance be: Mg is a stronger reducing agent than Cu, and therefore Mg will be able to reduce Cu^{2+} ions to Cu. The answer can also be given in terms of the relative strength as electron acceptors and donors.

Wanneer kandidate 'n verduideliking moet gee oor die relatiewe sterkte van oksideer- en reduseermiddels, is die volgende onaanvaarbaar.
- *Meld slegs die posisie van 'n stof op tabel 4 (bv. Cu is bo Mg).*
- *Gebruik slegs relatiewe reaktiwiteit (bv. Mg is meer reaktief as Cu).*
- *Die korrekte antwoord sal byvoorbeeld wees: Mg is 'n sterker reduseermiddel as Cu en derhalwe sal Mg in staat wees om Cu^{2+}-ione na Cu te reduseer. Die antwoord kan ook in terme van die relatiewe sterkte van elektronakseptors of donors gegee word.*

1.5.4 One mark will be forfeited when the charge of an ion is omitted per equation.
Een punt sal verbeur word wanneer die lading van 'n ioon per vergelyking weggelaat is.

1.5.5 The error carrying principle does not apply to chemical equations or half-reactions. For example, if a learner writes the wrong oxidation/reduction half-reaction in the sub-question and carries the answer to another sub-question (balancing of equations or calculations of E^{θ}_{cell}) then the learner is not credited for this substitution.
Die foutdraendebeginsel geld nie vir chemiese vergelykings of halfreaksies nie. Byvoorbeeld, indien 'n leerder die verkeerde oksidasie/reduksie-halfreaksie vir die subvraag skryf en die antwoord na 'n ander subvraag dra (balansering van vergelyking of E^{θ}_{sel}) dan word die leerder nie vir die substitusie gekrediteer nie.

1.5.6 When a calculation of the cell potential of a galvanic cell is expected, marks will only be awarded for the formula if one of the formulae indicated on the data sheet (Table 2) is used. The use of any other formula using abbreviations etc. will carry no marks.
Wanneer 'n berekening van die selpotensiaal van 'n galvaniesesel verlang word, sal punte slegs vir die formule toegeken word as een van die formules op die gegewensblad (Tabel 2) gebruik word. Die gebruik van enige ander formule, die gebruik van afkortings, ens. Sal geen punte dra nie.

1.5.7 In the structural formula of an organic molecule all hydrogen atoms must be shown. Marks will be deducted if hydrogen atoms are omitted.
In die struktuurformules van 'n organiese molekuul moet alle waterstofatome getoon word. Punte sal afgetrek word vir die weglating van waterstofatome.

1.5.8 When a structural formula is asked, marks will be deducted if the candidate writes the condensed formula.
Wanneer 'n struktuurformule gevra word, sal punte afgetrek word indien die leerder die gekondenseerde formule skryf.

1.5.9 When an IUPAC name is asked, and the candidate omits the hyphen (e.g. instead of 1-pentene the candidate writes 1 pentene), marks will be forfeited.
Wanneer die IUPAC naam gevra word en die koppelteken(s) in die naam word uitgelaat (bv. In plaas van pent-1-een of 1-penteen skryf 'n kandidaat pent 1 een of 1 penteen), sal punte verbeur word.

SECTION/*AFDELING* A

QUESTION/*VRAAG* 1

1.1 Stereo-isomers/*stereoïsomere* ✓ [12.2.1] (1)

1.2 Effective collisions/*effektiewe botsings* ✓ [12.2.1] (1)

1.3 Oxidising agent/reduced
substance/*Oksideermiddel/gereduseerde stof* ✓ [12.2.1] (1)

1.4 Sodium hydroxide/*natriumhidroksied* ✓ [12.2.1] (1)

1.5 Haber process/*Haberproses* ✓ [12.2.1] (1)
[5]

QUESTION/*VRAAG* 2

2.1 A ✓✓ [12.2.1] (2)

2.2 B ✓✓ [12.2.1] (2)

2.3 D ✓✓ [12.2.3] (2)

2.4 B ✓✓ [12.2.3] (2)

2.5 C ✓✓ [12.2.3] (2)

2.6 B ✓✓ [12.2.3] (2)

2.7 C ✓✓ [12.2.3] (2)

2.8 A ✓✓ [12.2.1] (2)

2.9 A ✓✓ [12.2.3] (2)

2.10 C ✓✓ [12.2.3] (2)
[20]

TOTAL SECTION/*TOTAAL AFDELING* A: 25

SECTION/*AFDELING* B

QUESTION/*VRAAG* 3

3.1

$$H-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-\overset{\overset{O}{||}}{C}-O-H \quad \checkmark\checkmark$$

[12.2.3] (2)

3.2   carboxylic acids/*karboksielsure* ✓   [12.2.1] (1)

3.3 $CH_3CH_2OH + O_2 \rightarrow CH_3COOH + H_2O$ (✓ Bal)   [12.2.3] (3)

3.4   Fermentation/*gistingsproses/fermentasie* ✓✓   [12.2.3] (2)

[8]

QUESTION/VRAAG 4

4.1   4.1.1

$$\underset{H}{\overset{H}{\diagdown}}C=\overset{}{C}-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-H \quad \checkmark\checkmark$$

1-butene/but-1-ene
1-buteen/but-1-een ✓

[12.2.3] (3)

4.1.2   Elimination/dehydrohalogenation/
Eliminasie/dehidrohalogenasie ✓✓   [12.2.3] (2)

4.1.3

$$H-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{Cl}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-H \quad \checkmark\checkmark$$

[12.2.3] (2)

4.2   4.2.1

$$R-\overset{\overset{O}{||}}{C}-O-R^{I} \quad \checkmark\checkmark$$

[12.2.3] (2)

4.2.2   alcohols and carboxylic acids/
alkohole en karboksielsure ✓✓   [12.2.3] (2)

4.2.3   pineapple/*pynappel* ✓   [12.2.1] (1)

[12]

QUESTION/*VRAAG* 5

5.1 Compounds which contain only H- and C- atoms./
Verbindings wat slegs uit H- en C-atome bestaan.✓✓ [12.2.1] (2)

5.2 Saturated hydrocarbons/*versadigde koolwaterstowwe* ✓
No further atoms can be added to the molecule/Has only single
bonds ✓✓/
*Geen verdere atome kan by die molekuul gevoeg word nie/Het
slegs enkelbindings.* ✓✓ [12.1.4] (3)

5.3 Gas ✓ [12.2.1] (1)

5.4 C_nH_{2n+2} ✓ [12.2.1] (1)

5.5 C_nH_{2n+2} ✓✓ [12.1.2] (2)

5.6 The longer the alkane chain/the greater the number of C-atoms,
the greater the intermolecular forces and the higher the boiling
point. ✓✓/
*Hoe langer die alkaanketting/hoe groter die aantal C-atome,hoe
groter die intermolekulêre kragte en hoe hoër die kookpunt.* ✓✓ [12.1.4] (2)

5.7 The size of the molecule/surface area/molecular mass increases
with more C-atoms. ✓ The larger the molecule, the more van der
Waal's forces are formed. ✓ More van der Waal's forces require
more energy to overcome these forces, ✓ therefore the higher the
boiling points. ✓/
*Die grootte/oppervlakte/molekulêre massa van die molekule
vergroot met 'n groter aantal C-atome.* ✓ *Hoe groter die molekuul,
hoe meer van der Waalskragte wat kan vorm.* ✓ *Meer van der
Waalskragte het meer energie nodig om die kragte te oorkom* ✓
dus styg die kookpunte. ✓ [12.1.4] (4)

5.8

[12.2.3] (2)

5.9 2-methylpropane/*2-metielpropaan* ✓✓ [12.2.3] (2)

5.10 Molecules with branched chains are more spherical than
molecules with straight chains, and consequently have a smaller
surface area with weaker van der Waal's forces which result in
lower boiling points. ✓✓/
*Molekule met vertakte kettings is meer sferies as die met reguit
kettings en het gevolglik 'n kleiner oppervlakte met swakker van
der Waalskragte wat lei na laer kookpunte.* ✓✓ [12.1.4] (2)

[21]

QUESTION/*VRAAG* 6

6.1 What is the effect of surface area on the rate of a reaction? ✓✓
Wat is die effek van oppervlakte op die tempo van 'n reaksie? ✓✓   [12.1.1] (2)

6.2 Measure the increase in volume of H_2 gas/measure the decrease in mass of the reaction mixture as gas is given off. ✓✓
Meet die toename in volume van H_2-gas/meet die afname in massa van die reaksie mengsel namate gas afgegee word. ✓✓   [12.1.2] (2)

6.3 B ✓ larger surface area/*groter oppervlakte* ✓✓   [12.1.4] (3)

6.4 Stays the same/*Bly dieselfde* ✓✓   [12.1.2] (2)

6.5 Increase the temperature/concentration of the HCℓ solution/*Verhoog die temperatuur/konsentrasie van die HCℓ-oplossing.*   **(Any 1/*Enige 1* ✓✓)**   [12.1.2] (2)

6.6 **Temperature:** At higher temperatures, the particles have more kinetic energy and move faster so collisions occur more frequently and more energetically and the number of effective collisions increases. ✓✓
Temperatuur: Teen hoër temperature het die partikels meer kinetiese energie en beweeg vinniger sodat botsings meer gereeld en met meer energie plaasvind en die aantal effektiewe botsings neem toe. ✓✓ **OR/OF**
Concentration: More collisions will occur because there are more particles that can collide in a given volume. The chances of effective collisions are higher. ✓✓/*Konsentrasie: Meer botsings sal plaasvind want daar is meer partikels wat kan bots in 'n gegewe volume. Die kanse vir effektiewe botsings is dus hoër.* ✓✓   [12.1.2] (2)

6.7 $ZnCℓ_2$ ✓   [12.1.2] (1)

6.8 2 Zn + 4 HCℓ → 2 ZnCℓ$_2$ + 2 H$_2$ (✓ Bal.)   [12.1.2] (3)

6.9 Exothermic/*Eksotermies.* ✓
ΔH is less than zero/negative/more heat are given off. ✓✓
ΔH is minder as nul/negatief/meer hitte word vrygestel. ✓✓   [12.1.2] (3)
[20]

QUESTION/*VRAAG 7*

7.1   7.1.1   A – forward (reaction)/*voorwaartse (reaksie)* ✓
                B – reverse (reaction)/*terugwaartse (reaksie)* ✓   [12.1.2]   (2)
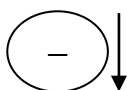
        7.1.2   At the start of the reaction there was only AX present and no A_2 or X_2. ✓ Graph A begins with a value greater than zero and decreases with time, it can therefore only represent the forward reaction. ✓ Graph B can only be the reverse reaction because it begins at zero and increases with time. ✓/

By die begin van die reaksie was daar slegs AX teenwoordig en geen A_2 of X_2 nie. ✓ Grafiek A begin met 'n waarde groter as nul en verminder met tyd, dit kan dus slegs die voorwaartse reaksie verteenwoordig. ✓ Grafiek B kan slegs die terugwaartse reaksie verteenwoordig want dit begin by nul en neem toe met tyd. ✓   [12.1.4]   (3)

        7.1.3   Equilibrium is reached/*Ewewig is bevestig* ✓✓   [12.1.2]   (2)

        7.1.4   Pressure/*Druk* ✓✓   [12.1.2]   (2)
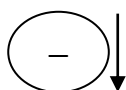
        7.1.5   The change in pressure does not actually change the equilibrium, but causes both the forward and reverse reactions to take place at a faster rate. ✓ Both reactions also increase by the same amount. ✓ The reason for all this is because there are equal volumes on either side of the equation. ✓/

'n Verandering in druk verander nie noodwendig die ewewig nie, maar veroorsaak dat beide die voorwaartse en terugwaartse reaksies teen 'n hoër tempo plaasvind. ✓ Beide reaksies neem ook toe met dieselfde hoeveelheid. ✓ Die rede vir die is dat daar gelyke volumes is aan beide kante van die vergelyking. ✓   [12.1.4]   (3)

        7.1.6   According to Le Chatelier, a decrease in temperature will favour the reaction which releases heat/energy, ✓ that is, the reverse reaction will be favoured. ✓ More AX will thus be formed. ✓/

Volgens Le Chatelier sal 'n afname in temperatuur die reaksie begunstig wat hutte/energie vrystel. ✓ d.w.s. die terugwaartse reaksie word begunstig. ✓ Meer AX sal dus gevorm word. ✓   [12.1.4]   (3)

7.2   7.2.1

$$K_c = \frac{[SO_2]^2 \cdot [O_2]}{[SO_3]^2} \checkmark$$

$$\therefore 31,25 \checkmark = \frac{(0,5)^2 \cdot [O_2]}{(0,04)^2} \begin{matrix}\checkmark \\ \checkmark\end{matrix}$$

$$\therefore [O_2] = 0,2 \text{ mol·dm}^{-3} \checkmark$$

but: m = cMV

$$\therefore V = \frac{m}{cM} \checkmark = \frac{19,2}{0,2 \times 32} \checkmark = 3 \text{ dm}^3 \checkmark$$
                                                  [12.1.3] (8)
[23]

QUESTION/VRAAG 8

8.1   8.1.1   Galvanic/voltaic cell/*Galvaniese/voltaïese sel* $\checkmark$ [12.2.1] (1)

       8.1.2   Zn (s)/$\overset{\checkmark}{Zn^{2+}}$ (aq)//$\overset{\checkmark}{Ag^+}$ (aq)/$\overset{\checkmark}{Ag}$ [12.2.3] (3)

       8.1.3   Zn/zinc/*sink* $\checkmark$ [12.2.3] (1)

       8.1.4   Oxidation/*oksidasie* $\checkmark$ [12.2.3] (1)

       8.1.5   Zn → Zn^{2+} + 2 e^- $\checkmark\checkmark$ [12.2.3] (2)

       8.1.6 Ag^+ + e^- → Ag $\checkmark\checkmark$ [12.2.3] (2)

       8.1.7   Zn → Zn^{2+} + 2 e^-
                 2 Ag^+ + 2 e^- → 2 Ag (x2) $\checkmark$
                 Zn + 2 Ag^+ $\checkmark$ → Zn^{2+} + 2 Ag $\checkmark$ ($\checkmark$ Bal.)   [12.1.3] (4)

       8.1.8 $E^o{}_{cell} = E^o{}_{oxidising\ agent} - E^o{}_{reducing\ agent}$ $\checkmark$
                = (0,80) $\checkmark$ − (−0,76) $\checkmark$
                = 1,56 V $\checkmark$ [12.1.3] (4)

8.2   8.2.1   Electroplating is the process during which one metal is coated with another metal, through electrolysis, to give it more desirable or useful properties $\checkmark\checkmark$
Elektroplatering is die proses waartydens een metaal met 'n ander metaal bedek word, deur elektrolise, om dit meer begeerlike of nuttige eienskappe te gee. $\checkmark\checkmark$ [12.2.1] (2)

       8.2.2   Electrorefining is the process whereby a metal is purified by means of electrolysis/*Elektroraffinering is die proses waardeur 'n metaal versuiwer word deur elektrolise.* $\checkmark\checkmark$ [12.2.1] (2)
[22]

QUESTION/VRAAG 9

9.1　9.1.1　Secondary cell/*sekondêre sel.* ✓
　　　　　　It can be recharged/*Dit kan herlaai word.* ✓　　　　[12.2.1]　(2)

　　　9.1.2　Chemical energy is changed to electrical
　　　　　　energy/*Chemiese energie word in elektriese energie
　　　　　　omgesit.* ✓✓　　　　　　　　　　　　　　　　[12.2.1]　(2)

　　　9.1.3　**-** Plastic casing/*plastiek omhulsel* ✓ **-** broken up into
　　　　　　pieces, washed, melted, extruded and remoulded into
　　　　　　new battery casings/*word opgebreek in stukkies, gewas,
　　　　　　gesmelt, geëkstrueer en hervorm as nuwe battery
　　　　　　omhulsels.* ✓

　　　　　　- Lead (grids)/*lood (roosters)* ✓ **-** are cleaned, melted and
　　　　　　moulded into new grids for new batteries/*word
　　　　　　skoongemaak, gesmelt en in nuwe roosters gegiet vir
　　　　　　nuwe batterye.*✓

　　　　　　- Battery acid/*batterysuur* ✓ **-** is neutralised and
　　　　　　dumped/*word geneutraliseer en weggegooi.* ✓　　[12.3.3]　(6)

9.2　9.2.1　Fertilisers derived from plant and/or animal matter as well
　　　　　　as naturally occurring minerals/*Bemestingstowwe wat
　　　　　　hoofsaaklik uit plant- en/of diermateriaal, sowel as
　　　　　　minerale wat natuurlike voorkom bestaan.* ✓✓　　[12.3.3]　(2)

　　　9.2.2　Nitrates, phosphates and other soluble nutrients are
　　　　　　leached from the soil and enter rivers and streams in run-
　　　　　　off water. ✓ The nutrient content of rivers and streams
　　　　　　increases. ✓ Algae in water go through a growth spurt,
　　　　　　called algal bloom. ✓ When the algae in the water die and
　　　　　　decompose, the oxygen level in the water decreases. ✓
　　　　　　Fish then die from lack of oxygen. ✓
　　　　　　*Nitrate, fosfate en ander oplosbare voedingstowwe word
　　　　　　uit die grond gespoel en vloei in riviere en strome met die
　　　　　　afloopwater.* ✓ *Die voedingsinhoud van die rivier of
　　　　　　stroom word verhoog.* ✓ *Alge in die water groei baie
　　　　　　vinnig (algbloei genoem).* ✓ *Wanneer die alge sterf en
　　　　　　ontbind, neem die suurstofvlak in die water af.* ✓ *Visse
　　　　　　vrek van 'n gebrek aan suurstof.* ✓　　　　　　[12.3.2]　(5)

　　　9.2.3　$(NH_4)_2SO_4$ ✓✓　　　　　　　　　　　　　[12.3.3]　(2)
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[19]

TOTAL SECTION B/*TOTAAL AFDELING B:* 125

GRAND TOTAL/*GROOTTOTAAL:* 150