



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

TECHNICAL SCIENCES *TEGNIIESE WETENSKAPPE*

MARKING GUIDELINES FOR PRACTICAL ASSESSMENT TASKS/ *NASIENRIGLYNE VIR PRAKTIIESE ASSESSERINGSTAKE*

**GRADE 12
*GRAAD 12***

2019

**This marking guidelines consist of 12 pages.
*Hierdie nasienriglyne bestaan uit 12 bladsye.***

EXPERIMENT 1: OPTION 1/EKSPERIMENT 1: OPSIE 1

**WORKSHEET FOR CONSERVATION OF LINEAR MOMENTUM
WERKSKAART VIR BEHOUD VAN LINIÊRE MOMENTUM**

40

1. PRACTICAL SKILLS/PRAKTIËSE VAARDIGHED

	MARKS/ PUNTE
<p>Precaution.</p> <ul style="list-style-type: none"> • Cleaning the runway and the wheels of the trolleys.✓ • Ensure that the mass balance (digital/manual) is at zero before measuring the mass of the trolleys.✓ <p>Voorsorg.</p> <ul style="list-style-type: none"> • Skoonmaak van die trolliebaan en trolliewiele. • Maak seker dat die massabalans (digitaal/gewone) by die nulpunt is voordat die trollies se massas gemeet word 	2
<p>Set up:</p> <ul style="list-style-type: none"> • Locating a suitable starting position for the two trolleys so that they hit the barriers simultaneously.✓ • Marking the initial position.✓ <p>Opstelling:</p> <ul style="list-style-type: none"> • Bepaal 'n geskikte beginpunt vir die twee trollies sodat hulle die kante gelyktydig tref. • Merk die beginposisie. 	2
<p>Measuring skills:</p> <ul style="list-style-type: none"> • Measurements of the masses of the trolleys.✓✓ • Measuring the distance between the starting position and barrier for each trolley accurately.✓✓ • Use of the timer or stop-watch (start, stop) accurately.✓✓ <p>Meetvaardighede:</p> <ul style="list-style-type: none"> • Bepaal die massas van die trollies. • Meet die afstand tussen die beginpunt en die kante vir elke trollie akkuraat. • Gebruik die stophorlosie akkuraat (begin, stop). 	6
TOTAL/TOTAAL	[10]

- Mass of trolleys./Massa van trollies ✓
Length of the runaway./Lengte van die trolliebaan ✓ (2)
- Runway not clean./Trolliebaan nie skoon nie ✓
Stopwatch reading inaccurate./Onakkurate stophorlosielesings ✓
Inaccurate measurements of trolley displacement./Onakkurate trollieverplasinglesing (ANY 2/ENIGE 2) (2)
- Clean the trolley and the runway./Maak trolliebaan en trollies skoon ✓✓
Improve stopwatch reading skills./Verbeter stophorlosielesingvaardighede ✓✓
Ensure accurate displacement measurements./Maak seker meting van verplasing is akkuraat (ANY 2/ENIGE 2) (4)

5. Data representation and interpretation of results [NB: exemplar results]***Datavoorstelling en interpretasie van resultate [LET WEL: modelresultate]***

TRIAL EKSPERIMENT		MASS (kg) Massa	TIME (s) TYD	DISTANCE (m) (between initial position and barrier) AFSTAND (m) (tussen beginpunt en kant)
1	Trolley A Trollie A	0,546	1,4	0,63
	Trolley B Trollie B	0,757	1,4	0,57
2	Trolley A Trollie A	0,546	1,3	0,64
	Trolley B Trollie B	0,757	1,3	0,56
3	Trolley A Trollie A	0,546	1,26	0,64
	Trolley B Trollie B	0,757	1,26	0,56
Average Gemiddelde	Trolley A Trollie A	0,546	1,32 ✓	0,6367 ✓
	Trolley B Trollie B	0,757	1,32 ✓	0,563 ✓

6. $V_{i(\text{system})} = 0 \text{ m}\cdot\text{s}^{-1} \checkmark\checkmark$

OR/OF

$$V_{iA} = 0 \text{ m}\cdot\text{s}^{-1}$$

$$V_{iB} = 0 \text{ m}\cdot\text{s}^{-1}$$

(2)

7.1

$$V_A = \frac{d}{t} \checkmark$$

$$= \frac{0,6367}{1,320} \checkmark$$

$$= 0,48 \text{ m}\cdot\text{s}^{-1} \checkmark$$

(4)

7.2

$$V_B = \frac{d}{t}$$

$$= -\frac{0,563}{1,320} \checkmark$$

$$= -0,49 \text{ m}\cdot\text{s}^{-1} \checkmark$$

(2)

8.1

$$p = mv \checkmark$$

$$= (0,546 + 0,757) \checkmark (0) \checkmark$$

$$= 0 \text{ kg m}\cdot\text{s}^{-1} \checkmark$$

(4)

8.2

$$p = mv$$

$$= (0,546)(0,48) \checkmark + (0,757)(-0,49) \checkmark$$

$$= (0,26) + (-0,37)$$

$$= -0,11 \text{ kg m}\cdot\text{s}^{-1} \checkmark$$

(3)

9. No/Nee ✓ (1)
10. Stopwatch skills were not accurate./*Onakkurate stophorlosielesings* ✓
Faulty release buttons./*Foutiewe veer of knop wat veer laat ontspring* ✓
Time that the trolley hits the barriers were slightly different./*Tyd wat trollies die kante tref was verskillend.*
The system was not perfectly frictionless./*Stelsel was nie heeltemal wrywingloos nie.*
(ANY 2/ENIGE 2) (2)
[40]

EXPERIMENT 1: OPTION 2/EKSPERIMENT 1: OPSIE 2

**WORK SHEET: PRINCIPLE OF CONSERVATION OF LINEAR MOMENTUM
WERKSKAART: BEGINSEL VAN DIE BEHOUD VAN LINIËRE MOMENTUM**

40

1. PRACTICAL SKILLS/PRAKTIESE VAARDIGHED

	MARKS PUNTE
Precautions. <ul style="list-style-type: none"> Cleaning the runway and the wheels of the trolleys. ✓ Ensuring that trolley-object system move together after the collision. ✓ Voorsorg. <ul style="list-style-type: none"> <i>Skoonmaak van die trolliebaan en trolliewiele.</i> <i>Verseker dat trollie-voorwerpstelsel gesamentlik beweeg na die botsing.</i> 	2
Measurements of the masses of the trolley and object. ✓✓ <i>Bepaal die massa van die trollie en voorwerp.</i>	2
Set up: <ul style="list-style-type: none"> Elevation of the runway at a correct inclination. ✓ Placing trolley on the runway (initially stationary, move at constant velocity when given a slight push). ✓ Dropping the mass piece/object on the trolley midway the runway. ✓ Ensuring that the ticker tape is attached to the trolley that it runs smoothly. ✓ Opstelling: <ul style="list-style-type: none"> <i>Oplig van trolliebaan teen geskikte helling</i> <i>Plasing van trollie op die trolliebaan (aanvanklik stilstaande, beweeg teen konstante snelheid wanneer liggies gestoot word).</i> <i>Laat massastuk/voorwerp op die trollie val, halfpad die trolliebaan.</i> <i>Maak seker dat die tydtikkerlint aan die trollie geheg is en gladde toevoer het tydens die eksperiment.</i> 	4
Analysis of the ticker tape: <ul style="list-style-type: none"> Mark 20 space intervals on the tape before and after the collision. ✓ Measuring the length of the 20 space intervals. ✓ Analise van die tydtikkerlint: <ul style="list-style-type: none"> <i>Merk 20 spasie-intervalle op die lint af, voor en na die botsing</i> <i>Meting van die lengte van die 20 spasie-interval.</i> 	2
TOTAL/TOTAAL	[10]

- Mass of trolleys./Massa van trollies ✓
Length of the runaway./Lengte van die trolliebaan ✓ (2)
- Ticker tape not running smoothly./Tydtikkerlint beweeg nie gladweg deur die tydtikker nie ✓
The system is not frictionless./Die stelsel is nie wrywingloos nie. (ANY 1/ENIGE 1) (1)
- Ensure that the ticker tape runs smoothly./Maak seker dat die lint gladweg deur die tydtikker gevoer word ✓
Ensure that the trolleys run smoothly (clean the runway)./Maak seker dat die trollies wrywingloos beweeg (maak trolliebaan skoon) ✓ (2)

5. **Data representation and interpretation of results [NB: Exemplar results]**
Datavoorstelling en interpretasie van resultate [NB: voorbeeld resultate]

TRIAL EKSPERIMENT		MASS (kg) MASSA	TIME (s) TYD	DISTANCE (m) length of tape between 20 space intervals AFSTAND (m) (<i>lengte van 20 spasie-intervalle</i>)
1	Trolley <i>Trollie</i>	0,374	0,4	0,216
	Trolley + object <i>Trollie + voorwerp</i>	0,355	0,4	0,140
2	Trolley <i>Trollie</i>	0,374	0,4	0,216
	Trolley + object <i>Trollie + voorwerp</i>	0,355	0,4	0,140
3	Trolley <i>Trollie</i>	0,374	0,4	0,216
	Trolley + object <i>Trollie + voorwerp</i>	0,355	0,4	0,140
Average/ Gemiddeld	Trolley <i>Trollie</i>	0,374	0,4✓	0,216✓
	Trolley + object <i>Trollie + voorwerp</i>	0,355	0,4✓	0,140✓

6.
$$T = \frac{1}{f} \checkmark$$

$$T = \frac{1}{50} \checkmark$$

$$= 0,02 \text{ s} \checkmark \quad (3)$$

7. 7.1
$$t = 20 \checkmark \times 0,02 \checkmark$$

$$= 0,4 \text{ s} \checkmark \quad (3)$$

7.2
$$V_A = \frac{d}{t} \checkmark$$

$$= \frac{0,216}{0,40} \checkmark$$

$$= 0,54 \text{ m} \cdot \text{s}^{-1} \checkmark \quad (3)$$

7.3
$$V_{A+B} = \frac{d}{t}$$

$$= \frac{0,14}{0,40} \checkmark$$

$$= 0,35 \text{ m} \cdot \text{s}^{-1} \checkmark \quad (2)$$

8. 8.1 $p_i = m_A v_A$ ✓
 $= (0,374) \checkmark (0,54) \checkmark$
 $= 0,20 \text{ kg m} \cdot \text{s}^{-1}$ ✓ (4)
- 8.2 $P_f = (m_A + m_B) V_{A+B}$
 $= (0,374 + 0,355) \checkmark (0,35) \checkmark$
 $= -0,26 \text{ kg m} \cdot \text{s}^{-1}$ ✓ (3)
9. No/*Nee* ✓ (1)
10. Not smooth running of tape/*Tydtikkerlint beweeg nie gladweg nie* ✓
The system was not perfectly frictionless/*Die stelsel was nie heeltemal wrywingloos nie* ✓ (2)
- [40]**

EXPERIMENT 2/EKSPERIMENT 2

WORKSHEET FOR DETERMINING THE CHARACTERISTIC OF A P-N DIODE/ WERKSKAART OM DIE EIENSKAPPE VAN 'N P-N-DIODE TE BEPAAL

30

1. PRACTICAL SKILLS/PRAKTIESE VAARDIGHED

	MARKS/ PUNTE
Precaution: <ul style="list-style-type: none"> Power source initially switched off. ✓✓ Voorsorg: <ul style="list-style-type: none"> Kragbron aanvanklik afgeskakel. 	2
Set up: <ul style="list-style-type: none"> Correctly connected components in the circuit <ul style="list-style-type: none"> Diode, ammeter, switch, resistors and power source in series ✓✓ Voltmeter in parallel with the diode ✓✓ Voltmeter and ammeter (multimeters) set to correct scale ✓✓ Positive terminal of the power source connected to the P- region and the negative terminal to the N- region of the diode ✓✓ Being able to vary the supply voltages ✓✓ OPSTELLING: <ul style="list-style-type: none"> Komponente in stroombaan korrek gekoppel <ul style="list-style-type: none"> Diode, ammeter, skakelaar, weerstande en kragbron in series Voltmeter in parallel met die diode Voltmeter en ammeter (multimeters) op korrekte skaAL Positiewe terminaal van die kragbron verbind aan die P-tipe kant en die negatiewe terminaal aan die N-tipe kant van die diode Kan die toevoerspanning varieer 	10
TOTAL/TOTAAL	[12]

2. 2.1 To prevent heating of the conducting wires ✓ which might increase the resistance in the conducting wires/circuit and affect the readings on the meters. ✓
Om te verhinder dat die geleidingsdrade warm word wat die weerstand in die stroombaan/geleiers verhoog en die lesing op die ammeter en voltmeters kan beïnvloed (2)

- 2.2 To minimise the amount of current flowing in the circuit./Om die stroom wat in die stroombaan vloei minimaal te maak ✓✓ (2)

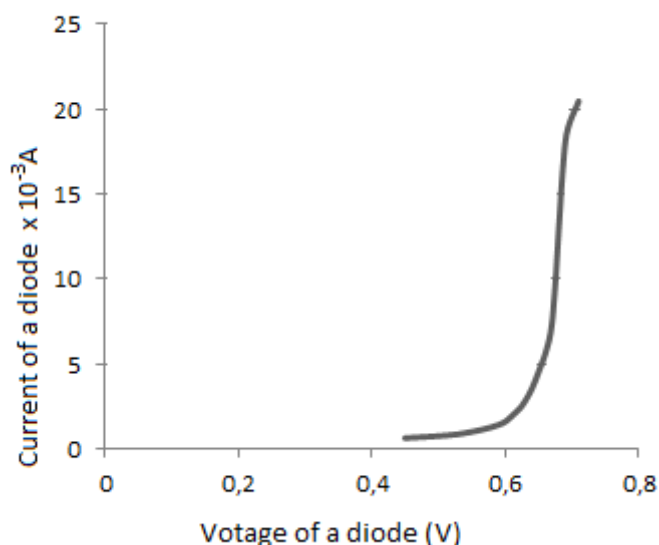
3 NOTE/LET WEL: Exemplar results/Modelresultate

V Supply/toevoer potensiaal (V)	V Diode (V)	I Diode (mA)
1,2	0,45	0,62
1,2	0,53	0,85
1,2	0,59	1,39
1,2	0,61	1,92
1,2 ✓	0,63 ✓	2,8 ✓
1,2	0,65	4,52
1,2	0,67	7,35
1,2	0,69	18,06
	0,71	20,45

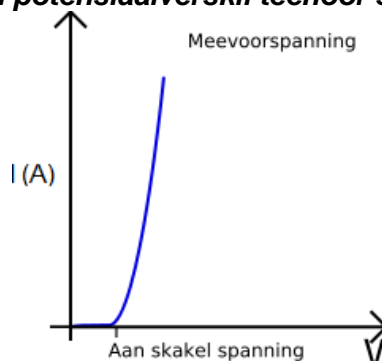
(3)

4.

A graph of voltage versus current of a diode



Grafiek van potensiaalverskil teenoor stroom in 'n diode



Marking criteria for the graph/Nasienkriteria vir die grafiek	
Heading of the graph/Opskrif van die grafiek ✓	1
X-axis :voltage in (V) and y-axis current in (A) ✓ x- as : potensiaalverskil (V) en y-as: stroom in (A)	1
5 or more points correctly plotted✓✓✓ 5 of meer punte korrek op grafiek getoon	3
Correct shape/Korrekte vorm ✓	1

(6)

5. When the positive terminal of battery is connected to the P-type material and the negative terminal of the battery is connected to the N-type material of a diode. ✓✓
Wanneer die positiewe terminaal van die battery aan die p-tipe kant en die negatiewe terminaal aan die n-tipe kant van die diode gekoppel word. (2)

6. 0 A ✓

(1)

7. • The current through the diode increases as the voltage across it increases. ✓✓
• As V_f approaches 0,7 V there is a rapid rise in current as the barrier potential is around that values. ✓
• Die stroom deur die diode verhoog soos die potensiaalverskil oor die diode verhoog.
• As V_f 0,7 V bereik, is daar 'n verhoogde toename in die ingeboude spannings-potensiaal oor die diode

OR/OF

(2)

- The current through the diode increases as the voltage across it increases. ✓✓
- The current increases as the increment across the diode starts to destroy its potential barrier developed by electrostatic force between the N and P material. ✓✓
- *Die stroom deur die diode verhoog as die eksterne spanning se polariteit verhoog.*
- *Die stroom verhoog as die inkrement oor die diode begin om sy potensiaalversperring te verwoes wat deur elektrostatiese krag tussen die N- en P-materiaal ontwikkel is*

[30]

EXPERIMENT 3/EKSPERIMENT 3

WORKSHEET FOR ELECTROLYTIC CELL WERKSKAART VIR ELEKTROLITIESE SEL

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1. PRACTICAL SKILLS/PRAKTIËSE VAARDIGHED

	MARKS PUNTE
Wearing of appropriate safety clothing, e.g. laboratory coat, goggles, rubber gloves. ✓ <i>Dra geskikte veiligheidsklere, bv. laboratorium oorjas, handskoene, veiligheidsbril.</i>	1
Correct and safe handling of glassware (no breakage) chemicals (no spillage/swallowing). ✓✓ <i>Korrekte en veilige hantering van glassware (breek niks nie), chemikalië (mors niks nie/sluk niks nie)</i>	2
Correct usage of apparatus: ○ Accurate measurement of copper salt mass. ✓ ○ Correct volume of water measured ✓ <i>Korrekte gebruik van apparaat:</i> ○ Akkurate afweeg van massa van die kopersout ○ Korrekte volume water afgemeet	2
Ensuring that electrodes were cleaned with steel wool (wire brush/and paper) before conducting the experiment. ✓ <i>Maak seker dat die elektrodes met staalwol (ysterborsel/skuurpapier) skoongeskuur is voor die aanvang van die eksperiment.</i>	1
Correct assembling and handling of apparatus. ✓✓ <i>Korrekte opstelling en hantering van die apparaat.</i>	2
Experimental procedure followed in a logic sequence. ✓✓ <i>Eksperimentele prosedure uitgevoer in 'n logiese volgorde</i>	2
TOTAL/TOTAAL	10

2. Prevent skin or eye contact with the solution. ✓
Ensure that the electrodes do not touch each other when conducting the experiment.
Verhoed vel of oogkontak met die oplossing.
Maak seker dat die elektrodes nie aanmekaar raak tydens die uitvoering van die eksperiment nie. (ANY ONE/ENIGE EEN) (1)
3. 3.1 Enable effective electroplating to take place./Laat elektroplatering effektief plaasvind ✓✓ (2)
- 3.2 To avoid having a short circuit and no electroplating occurs./Voorkom dat 'n kortsluiting in stroombaan ontstaan en geen elektroplatering vind dan plaas nie ✓✓ (2)
4. The copper ions from the solution will be reduced to copper. ✓
Copper will be plated on the surface of the iron nail. ✓
Die koperione in die oplossing sal na koper gereduseer word.
Die koper word op die ysterspyker geplateer. (2)
5. Strength of the current through the conductors. ✓
The concentration of the copper salt solution. ✓
Time taken
Sterkte van die stroom deur die geleiers.
Die konsentrasie van die kopersoutoplossing
Tydskuur (ANY TWO/ENIGE TWEE) (2)

6. 6.1 Copper plate/copper rod/*Koperplaat/koperstaaf*. ✓ (1)
- 6.2 Iron nail/*Ysterspyker* ✓ (1)
7. 7.1 $\text{Cu(s)} \checkmark \longrightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \checkmark$ (2)
- 7.2 $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \checkmark \longrightarrow \text{Cu(s)} \checkmark$ (2)
- 7.3 $\text{Cu(s)} + \text{Cu}^{2+}(\text{aq}) \checkmark \longrightarrow \text{Cu}^{2+}(\text{aq}) + \text{Cu(s)} \checkmark$ (2)
8. The reaction is non-spontaneous./*Die reaksie is nie-spontaan* ✓ (1)
9. Electrical energy to chemical energy./*Elektriese energie na chemiese energie* ✓✓ (2)
- [30]**