



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

TECHNICAL SCIENCES *TEGNIESE WETENSKAPPE*

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

**GRADE 12
*GRAAD 12***

EXPERIMENT 1/*EKSPERIMENT 1*

2021

**These marking guidelines consist of 5 pages./
*Hierdie nasienriglyne bestaan uit 5 bladsye.***

EXPERIMENT 1/EKSPERIMENT 1:

**WORKSHEET FOR CONSERVATION OF LINEAR MOMENTUM/
 WERKSKAART VIR BEHOUD VAN LINEÊRE MOMENTUM**

1. PRACTICAL SKILLS/PRAKTIESE VAARDIGHEDE

CRITERIA/KRITERIA	MARKS/ PUNTE
Precaution: <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. ✓ Voorsorg: <ul style="list-style-type: none"> • <i>Skoonmaak van die trolliebaan en die trolliewiele ✓</i> • <i>Maak seker dat die massabalans (digitaal/met die hand) op nul is voordat die massa van die trollies gemeet word ✓</i> 	2
Set-up: <ul style="list-style-type: none"> • Ensuring that the track/rail is level longitudinally. ✓ • Ensuring that the track/rail is level sideways. ✓ • Locating a suitable starting position for the two trolleys so that they hit the barriers simultaneously. ✓ • Marking the initial position. ✓ Opstelling: <ul style="list-style-type: none"> • <i>Maak seker dat die trolliebaan in die lengte (longitudinaal) gelyk is. ✓</i> • <i>Maak seker dat die trolliebaan sywaarts gelyk is. ✓</i> • <i>Vind 'n geskikte beginposisie vir die twee trollies sodat dit die versperrings gelyktydig tref. ✓</i> • <i>Merk die beginposisie. ✓</i> 	4
Measuring skills: <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 stopwatch (start, stop) accurately. ✓ Meetvaardighede: <ul style="list-style-type: none"> • <i>Metings van trollies se massas ✓</i> • <i>Akkurate meting van die afstand tussen die beginposisie en die versperring vir elke trollie ✓</i> • <i>Akkurate gebruik van die tydreëlaar of stophorlosie (begin, stop) ✓</i> 	3
TOTAL/TOTAAL	9

2. Runway not clean/*Trolliebaan nie skoon nie ✓*
 Stopwatch reading inaccurate/*Onakkurate stophorlosielesings*
 Inaccurate measurements of trolley displacement/*Onakkurate trollieverplasinglesing*
(ANY ONE/ENIGE EEN) (1)

3. Clean the trolley and the runway./*Maak trolliebaan en trollie skoon.* ✓
 Improve stopwatch handling skills./*Verbeter stophorlosielesing-vaardighede.*
 Ensure accurate displacement measurements./*Maak seker meting van verplasing is akkuraat.* (ANY ONE/ENIGE EEN) (1)

4. DATA REPRESENTATION AND INTERPRETATION OF RESULTS
(NOTE: exemplar results)

DATAVOORSTELLING EN INTERPRETASIE VAN RESULTATE
(LET WEL: modelresultate)

Without mass piece on the trolley/*Sonder massastuk op die trollie:*

TRIAL/ PROEF	TROLLEY/ TROLLIE	MASS (kg)/ MASSA (kg)	TIME (s)/ TYD (s)	DISTANCE (m) (between initial position and barrier) AFSTAND (m) (tussen beginposisie en versperring)
1	A	0,546	1,4	0,60
	B	0,550	1,4	0,58
2	A	0,546	1,34	0,61
	B	0,550	1,34	0,59
3	A	0,546	1,36	0,62
	B	0,550	1,36	0,60
Average/ Gemiddeld	A	0,546	1,37✓	0,61✓
	B	0,550	1,37✓	0,59✓

With a mass piece on the trolley/*Met massastuk op trollie:*

TRIAL/ PROEF	TROLLEY/ TROLLIE	MASS (kg)/ MASSA (kg)	TIME (s)/ TYD (s)	DISTANCE (m) (between initial position and barrier) AFSTAND (m) (tussen beginposisie en versperring)
1	A	0,546	1,4	0,62
	B	0,757	1,4	0,58
2	A	0,546	1,3	0,63
	B	0,757	1,3	0,57
3	A	0,546	1,26	0,63
	B	0,757	1,26	0,57
Average/ <i>Gemiddeld</i>	A	0,546	1,32 ✓	0,6267 ✓
	B	0,757	1,32 ✓	0,5733 ✓

Using trolleys without mass piece/*Gebruik van trollies sonder massastukke:*

5. $V_{i(\text{system/sisteen})} = 0 \text{ m}\cdot\text{s}^{-1}$ ✓

OR/OF

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

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

(1)

6.1

$$V_A = \frac{\Delta x}{\Delta t} \checkmark$$

$$= \frac{0,61}{1,37} \checkmark$$

$$= 0,445 \text{ m}\cdot\text{s}^{-1} \checkmark$$

(3)

6.2

$$V_B = \frac{\Delta x}{t}$$

$$= \frac{0,59}{1,37} \checkmark$$

$$= -0,431 \text{ m}\cdot\text{s}^{-1} / 0,43 \text{ m}\cdot\text{s}^{-1} \text{ in the opposite direction/in die teenoorgestelde rigting} \checkmark$$

(2)

7.1 $p = mv$ ✓
 $= (0,546 + 0,550) (0)$ ✓
 $= 0 \text{ kg m}\cdot\text{s}^{-1}$ ✓ (3)

7.2 $\sum p = m_A v_A + m_B v_B$ ✓
 $= (0,546)(0,445)$ ✓ + $(0,550)(-0,431)$ ✓
 $= (0,243) + (-0,237)$
 $= -0,006 \text{ kg m}\cdot\text{s}^{-1}$ ✓ / $0,006 \text{ kg m}\cdot\text{s}^{-1}$ in the original direction of trolley A / *in die oorspronklike rigting van trollie A* (4)

The use of ONE trolley with a (250 g) mass piece. / *Die gebruik van EEN trollie met 'n (250 g) massastuk:*

8.1 $v_A = \frac{\Delta x}{\Delta t}$
 $= \frac{0,6267}{1,320}$ ✓
 $= 0,47 \text{ m}\cdot\text{s}^{-1}$ ✓ (2)

8.2 $v_B = \frac{\Delta x}{t}$
 $= -\frac{0,573}{1,320}$ ✓
 $= -0,43 \text{ m}\cdot\text{s}^{-1}$ ✓ / $0,43 \text{ m}\cdot\text{s}^{-1}$ in the opposite direction / *in die teenoorgestelde rigting* (2)

9.1 $p = mv$ ✓
 $= (0,546 + 0,757) (0)$ ✓
 $= 0 \text{ kg m}\cdot\text{s}^{-1}$ ✓ (3)

9.2 $\sum p = m_A v_A + m_B v_B$ ✓
 $= (0,546)(0,47)$ ✓ + $(0,757)(-0,43)$ ✓
 $= (0,257) + (-0,326)$
 $= -0,069 \text{ kg m}\cdot\text{s}^{-1}$ ✓ / $0,069 \text{ kg m}\cdot\text{s}^{-1}$ in the original direction of trolley A / *in die oorspronklike rigting van trollie A* (4)

10. No/Nee ✓ (1)

11. The system was not perfectly frictionless. ✓
 Faulty release buttons.
 Time that the trolley hit the barriers were slightly different
 Stopwatch handling skills were not accurate. /
Die stelsel was nie heeltemal wrywingloos nie. ✓
Foutiewe vrylatingsknoppies.
Die tyd wat die trollie die versperrings getref het, was effens anders.
Die hantering van stophorlosies was nie akkuraat nie.
 (ANY ONE/ENIGE EEN) (1)

[45]