LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
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NATIONAL SENIOR CERTIFICATE

GRADE 11

PHYSICAL SCIENCES: PHYSICS (P1)/*FISIESE WETENSKAPPE: FISIKA (V1)*

MARKING GUIDELINE/*NASIENRIGLYNE*

JUNE 2026/*JUNIE 2026*

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MARKS/*PUNTE*: 100

This marking guideline consists of 9 pages/*Hierdie nasienriglyne bestaan uit 9 bladsye*

QUESTION/*VRAAG* 1

1.1 C✓✓ (2)

1.2 B✓✓ (2)

1.3 A✓✓ (2)

1.4 B✓✓ (2)

1.5 D✓✓ (2)

[10]

QUESTION/*VRAAG* 2

2.1 The vector diagram for the forces acting on the object must be closed.✓✓/ *Die vektordiagram vir die kragte wat op die voorwerp inwerk, moet geslote wees.*

OR/*OF*

The vector sum of all the forces acting on the object must be zero/ *Die vektorsom van al die kragte wat op die voorwerp inwerk, moet nul wees.*

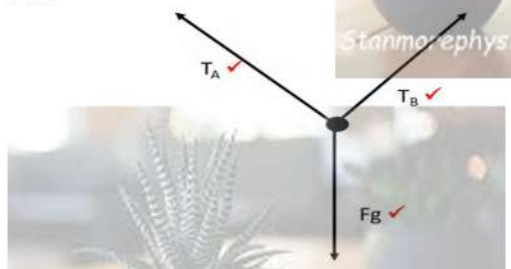
OR/*OF*

The object must either be at rest or move at a constant velocity./ *Die voorwerp moet óf in rus wees óf teen 'n konstante snelheid beweeg*

OR/*OF*

The object must experience no acceleration./ *Die voorwerp moet geen versnelling ervaar nie* (2)

2.2



Accept/*Aanvaar*:	
Fg	W/Weight/Force of gravity/*gewig/gravitasiekrag*

(3)

2.3

OPTION 1/*OPSIE 1*

Horizontal/*horisontaal*:

$T_A\cos(70^o) = T_B\sin(10^o)$ ✓

$T_A = \frac{T_B\sin(10^o)}{\cos(70^o)}$

Vertical/*vertikaal:*

$T_A\sin(70^o) + T_B\cos(10^o) = F_g$ ✓

But, $F_g = 130 \times 9{,}8 = 1274$ N

$T_A\sin(70^o) + T_B\cos(10^o) = 1274$ ✓

$\frac{T_B\sin(10^o)}{\cos(70^o)}\sin(70^o) + T_B\cos(10^o) = 1274$

$T_B = 871{,}467$ N✓

$T_A = 442{,}456$ N ✓

OPTION 3/*OPSIE 3*

$\frac{\sin A}{A} = \frac{\sin B}{B} = \frac{\sin C}{C}$

$\frac{\sin(150^o)}{130\times9{,}8} = \frac{\sin(20^o)}{T_B}$ ✓

$\frac{\sin(150^o)}{130\times9{,}8} = \frac{\sin(20^o)}{T_B}$ ✓

$T_B = 871{,}47\ N$ ✓

$\frac{\sin(150^o)}{130\times9{,}8} = \frac{\sin(10^o)}{T_A}$ ✓

$T_A = 442{,}46\ N$ ✓

OPTION 2/*OPSIE 2*

Horizontal/*horisontaal*: $T_A\cos(70^o) = T_B\sin(10^o)$ ✓

$$T_B = \frac{T_A\cos(70^o)}{\sin(10^o)}$$

Vertical/*vertikaal*: $T_A\sin(70^o) + T_B\cos(10^o) = F_g$ ✓

But/*maar*, $F_g = 130 \times 9{,}8 = 1274$ N

$T_A\sin(70^o) + T_B\cos(10^o) = 1274$ ✓

$T_A\sin(70^o) + \frac{T_A\cos(70^o)}{\sin(10^o)}\cos(10^o) = 1274$

$T_A = 442{,}456$ N ✓

$T_B = 871{,}467$ N ✓ (5)

2.4 The object will fall ✓ as there will be a resultant force ✓./ *Die voorwerp sal val omdat daar 'n resulterende krag sal wees*

OR/*OF*

The object will accelerate downwards. ✓✓/ *Die voorwerp sal afwaarts versnel*

OR/*OF*

The vector diagram of the forces will be open. ✓✓/ *Die vektordiagram van die kragte sal oop wees* (2)

[12]

QUESTION 3/*VRAAG 3*

3.1 When a net force acts on an object, the object will accelerate in the direction of the force, and the acceleration is directly proportional to the force and inversely proportional to the mass of the object. ✓✓ / *Wanneer 'n netto krag op 'n voorwerp inwerk, sal die voorwerp in die rigting van die krag versnel en die versnelling is direk eweredig aan die krag en omgekeerd eweredig aan die massa van die voorwerp.* (2/0) (2)

3.2 3.2.1. Downwards ✓/*Afwaarts* (1)

3.2.2. Upwards ✓/*Opwaarts* (1)

3.3 REMAINS THE SAME. ✓ /*BLY DIESELFDE*

Since the masses are connected by a light inextensible string, the masses move together ✓/ *Aangesien die massas deur 'n ligte, onrekbare toutjie verbind is, beweeg die massas saam*

OR/OF

their speeds/velocities change at the same rate/ *hul snelhede/spoed verander teen dieselfde tempo* (2)

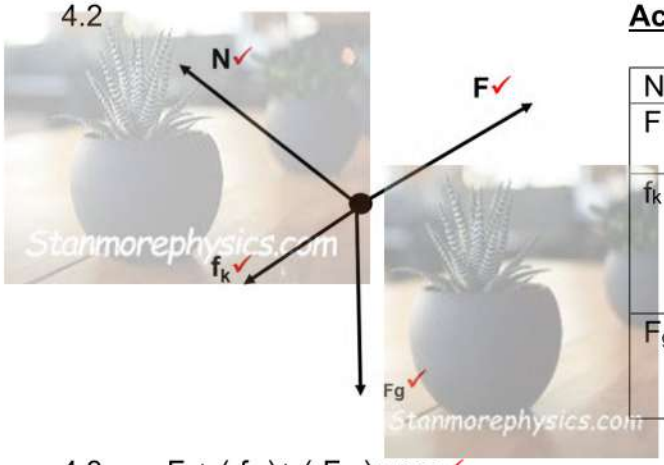
3.4 Greater than. ✓/*Groter as*. m_1 is greater than m_2 ($m_1 > m_2$), and a is the same, therefore $m_1a > m_2a$ or $F_{net1} > F_{net2}$ ✓./ *m_1 is groter as m_2 ($m_1 > m_2$), en a is dieselfde, daarom $m_1a > m_2a$ of $Fnet_1 > Fnet_2$* (2)

3.5 The string must provide constant tension between the masses in the system ✓/ *Die tou moet konstante spanning tussen die massas in die stelsel bied.*
The low friction pulley is there to change the direction of the force without affecting its magnitude through friction. ✓ / *Die laewrywingskatrol is daar om die rigting van die krag te verander sonder om die grootte daarvan deur wrywing te beïnvloed.* (2)
[10]

QUESTION 4/*VRAAG 4*

4.1 A body will remain in its state of rest or motion at constant velocity unless a non-zero resultant/net force acts on it. ✓✓ / *'n Liggaam sal in sy toestand van rus of beweging teen konstante snelheid bly, tensy 'n nie-nul resulterende/netto krag daarop inwerk.* (2/0) (2)

4.2



Accept/*Aanvaar*:

N	F_N; Normal/*normaal*
F	Fa/force applied/*krag toegepas*
f_k	Frictional force/Kinetic frictional force/*wrywingskrag/kinetiese wrywingskrag*
F_g	W/Weight; Force of gravity/*gewig, gravitasiekrag*

(4)

4.3 $F + (-f_k) + (-F_{g//}) = ma$ ✓
$F + (-18) + (-25 \times 9{,}8 \sin 30^o) = 0$ ✓
$F = 140{,}5$ N ✓ (3)

4.4 $F_{net} = F_{g//} + f_k$
$= (25 \times 9{,}8 \times \sin 30^o) + (-18)$ ✓
$= -140{,}5$ N ✓ (2)
[11]

QUESTION 5/*VRAAG 5*

5.1.1 Newton's law of universal gravitation states that each particle in the universe attracts every other particle with a gravitational force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres. ✓✓/ *Newton se wet van universele gravitasie bepaal dat elke deeltjie in die heelal elke ander deeltjie aantrek met 'n gravitasiekrag wat direk eweredig is aan die produk van hul massas en omgekeerd eweredig aan die kwadraat van die afstand tussen hul middelpunte.* (2/0) (2)

5.1.2 **r** is measured from the centre of masses as it allows the complex or extended objects to be treated as simple point masses. ✓✓/ ***r***

word gemeet vanaf die middelpunt van massas, aangesien dit toelaat dat die komplekse of uitgebreide voorwerpe as eenvoudige puntmassas behandel word.

OR/OF

the uneven objects have their masses concentrated at their centres, therefore r is measured from the centre. ✓✓/ *Die ongelyke voorwerpe het hul massas gekonsentreer by hul middelpunte, daarom word r vanaf die middelpunt gemeet.* (2)

5.1.3 $F = \frac{Gm_1m_2}{r^2}$ ✓

$F = \frac{6,67\times10^{-11}\times5,98\times10^{24}\times600}{(6,38\times10^{6}+2,0\times10^{6})^2}$ ✓✓

$F = 3407,93\ N$ ✓ (4)

5.1.4 $F \propto \frac{1}{r^2}$ ✓

If r is doubled (2r), the force becomes/ *As r verdubbel word (2r), word die krag* $\frac{1}{2^2} = \frac{1}{4}$.

The force will decrease by a factor of 4✓/ *Die krag sal met 'n faktor van 4 afneem*

OR/*OF*

new force is $\frac{1}{4}F$/ *nuwe krag is* $\frac{1}{4}F$ (2)

5.2 Weightlessness ✓/ *Gewigloosheid* (1)

[11]

QUESTION 6/*VRAAG 6*

6.1 The magnitude of the electrostatic force exerted by two point charges (Q_1 and Q_2) on each other is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance (r) between them.✓✓/ *Die grootte van die elektrostatiese krag wat deur twee puntladings (Q_1 en Q_2) op mekaar uitgeoefen word, is direk eweredig aan die produk van die groottes van die ladings en omgekeerd eweredig aan die kwadraat van die afstand (r) tussen hulle.* (2/0) (2)

6.2 $F = k\frac{Q_1Q_2}{r^2}$ ✓

$F = (9\times10^{9})\frac{(5\times10^{-6})(3\times10^{-6})}{(0,1)^2}$ ✓✓

$F = 13,5\ N$ ✓ (4)

6.3



Marking Criteria/*Nasien kriteria*	**Marks/*Punte***
Correct shape/*korrekte vorm*	✓
Field lines are at right angle with the charges and never cross each other/ *Veldlyne is reghoekig met die ladings en kruis mekaar nooit*	✓
Direction: From P to T and vertically drawn/ *Rigting: Van P na T en vertikaal geteken*	✓

(3)

6.4 $\text{charge per sphere}/lading\ per\ sfeer = \frac{Q_1 + Q_2}{2}$ ✓

$= \frac{(5\times 10^{-6}) + (-3\times 10^{-6})}{2}$ ✓

$= 1{,}0 \times 10^{-6}\text{C}$ ✓

(3)

6.5.1 The electrostatic force experienced per unit positive charge placed at that point.✓✓ / *Die elektrostatiese krag wat per eenheid positiewe lading wat op daardie punt geplaas word, ervaar word* 2/0 (2)

6.5.2 $r^2 = PT^2 + QT^2$ OR $r = \sqrt{PT^2 + QT^2}$

$r^2 = (0{,}1)^2 + (0{,}15)^2$

$= 0{,}0325\ \text{m}^2$ ✓

$E = k\frac{Q_1}{r^2}$ due to/*agv* **P** ✓

$= 9{,}0 \times 10^9 \frac{(1{,}0\times 10^{-6})}{0{,}0325}$ ✓

$E = 2{,}7693 \times 10^5\ \text{N.C}^{-1}$ ✓

(4)

6.5.3 $E = k\frac{Q_1}{r^2}$ due to/*agv* **T**

$= 9{,}0 \times 10^9 \frac{(1{,}0\times 10^{-6})}{(0{,}15)^2}$ ✓

$E = 4{,}0 \times 10^5\ \text{N.C}^{-1}$ ✓

(2)

[20]

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QUESTION 7/*VRAAG 7*

7.1 The magnitude of the induced emf across the ends of a conductor is directly proportional to the rate of change in the magnetic flux linkage with the conductor. ✓✓/ *Die grootte van die geïnduseerde emk oor die punte van 'n geleier is direk eweredig aan die tempo van verandering in die magnetiese vloedverbinding met die geleier.* (2/0) (2)

7.2.1 There will be a reading registered on the galvanometer. ✓/ *Daar sal 'n lesing op die galvanometer geregistreer word*
OR/***OF***
The galvanometer will deflect to a side. ✓/ *Die galvanometer sal na 'n kant afbuig* (1)

7.2.2 No reading on the galvanometer/Zero reading✓/ *Geen lesing op die galvanometer/Nul lesing* (1)

7.3.1 North pole✓/Noordpool (1)

7.3.2 A to/*na* B✓✓ (2)

7.3.3 Use the right hand rule (for solenoids). The thumb of the right hand indicates the North pole ✓and the fingers of the right hand indicate the direction the current flows in the solenoid. ✓/ *Gebruik die regterhandreël (vir solenoïdes). Die duim van die regterhand dui die noordpool aan en die vingers van die regterhand dui die rigting aan waarin die stroom in die solenoïde vloei.* (2)
[9]

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QUESTION 8/*VRAAG 8*

8.1 Power is the rate at which work is done. ✓✓/ *Drywing is die tempo waarteen werk verrig word*

OR/*OF*

Power is the rate at which energy is supplied to the device. ✓✓/ *Drywing is die tempo waarteen energie aan die toestel verskaf word* (2/0) (2)

8.2.1

OPTION 1/*OPSIE 1*

$R_s = R_A + R_B$
$R_s = 4,5 + 4,5$
$R_s = 9,0\ \Omega$✓
$V = IR$✓
$V = 2X9,0$✓
$V = 18,0\ V$✓

OPTION 2/*OPSIE 2*

$R_s = R_A + R_B$
$R_s = 4,5 + 4,5$
$R_s = 9,0\ \Omega$✓
$V = IR$✓
$V = 2X9,0$✓
$V = 18,0\ V$✓ (4)

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8.2.2 **POSTIVE MARKING FROM 8.2.1/*POSITIEWE NASIEN VANAF 8.2.1***

OPTION 1/*OPSIE 1*

$\left.\begin{matrix}\varepsilon = V_{ext} + V_{int} \\ \varepsilon = IR + Ir\end{matrix}\right\}$ ✓any one/*enige 1*
$24 = 18 + 2r$✓
$r = 3,0\ \Omega$ ✓

OPTION 2/*OPSIE 2*

$\left.\begin{matrix}V_{int} = \varepsilon - V_{ext} \\ Ir = \varepsilon - V_{ext}\end{matrix}\right\}$ ✓any one/*enige1*
$2r = 24 - 18,0$ ✓
$r = 3,0\ \Omega$ ✓

OPTION 3/*OPSIE 3*

$I = \frac{\varepsilon}{R+r}$ ✓
$2 = \frac{24,0}{18,0+r}$ ✓
$r = 3,0\ \Omega$ ✓ (3)

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8.3 Bulbs **A** and **B** are connected in series across the battery, therefore they glow equally brightly, ✓ whereas bulb **C** is connected itself across the battery, then the voltage drop across **C** has the same magnitude as the terminal potential difference, ✓ whereas the same terminal potential difference splits between bulbs **A** and **B** ✓, as a result , bulb **C** glows more brightly than either of bulb **A** and **B**. ✓/

*Gloeilampe **A** en **B** is in serie oor die battery gekoppel, daarom gloei hulle ewe helder, terwyl gloeilamp **C** self oor die battery gekoppel is, dan het die spanningsval oor **C** dieselfde grootte as die terminaalpotensiaalverskil, terwyl dieselfde terminaalpotensiaalverskil tussen gloeilampe **A** en **B** verdeel , gevolglik gloei gloeilamp **C** helderder as enige van gloeilampe **A** en **B**.* (4)

8.4 DECREASES✓/*AFNEEM*

- External resistance decreases/total resistance decreases✓
- As emf is constant, total current increases, potential difference in the internal resistance ($V_{internal}$) increases ✓
- According to the equation; $V_{ext} = \varepsilon - V_{int}$, terminal potential difference across the battery decreases. ✓/
- *Eksterne weerstand neem af/totale weerstand neem af*
- *Aangesien emk konstant is, neem die totale stroom toe, die potensiaalverskil in die interne weerstand (V_{intern}) neem toe*
- *Volgens die vergelyking; $V_{eks} = \varepsilon - V_{int}$, neem die terminaalpotensiaalverskil oor die battery af.*

(4)
[17]

TOTAL/*TOTAAL*: 100



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