

Demo

NW/JUNE/PHYSC/ EMIS/6*****



Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sportontwikkeling
Lefapha la Thuto le Tlhabololo ya Metshameko

NORTH WEST PROVINCE

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

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

JUNE 2019

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/ PUNTE: 150

Demo

NW/JUNE/PHYSC/ EMIS/6*****

**This memorandum consists of 11 pages.
Hierdie vraestel bestaan uit 11 bladsye**

GENERAL GUIDELINES

1. CALCULATIONS

- 1.1 **Marks will be awarded for:** correct formula, correct substitution, correct answer with unit.
Punte sal toegeken word vir: korrekte formule, korrekte substitusie, korrekte antwoord met eenheid.
- 1.2 **No marks** will be awarded if an **incorrect or inappropriate formula is used**, even though there may be relevant symbols and applicable substitutions.
Geen punte sal toegeken word waar 'n **verkeerde of ontoepaslike formule gebruik** word nie, selfs al is daar relevante simbole en relevante substitusies.
- 1.3 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 substitusies toegeken word, maar **geen verdere punte** sal toegeken word nie.
- 1.4 If **no formula** is given, but **all substitutions are correct**, a candidate will **forfeit one mark**.
Indien **geen formule** gegee is nie, maar **al die substitusies is korrek**, **verloor** die kandidaat **een punt**.
- 1.5 **No penalisation if zero substitutions are omitted** in calculations where **formula/principle** is given correctly.
Geen penalisering indien **nulwaardes nie getoon** word nie in berekeninge waar die **formule/beginsel korrek gegee is nie**.
- 1.6 Mathematical manipulations and change of subject of appropriate formulae carry no marks, but if a candidate starts off 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 manipulasies en verandering van die onderwerp van toepaslike formules tel geen punte nie, maar indien 'n kandidaat met die korrekte formule begin en dan die onderwerp van die formule verkeerd verander, sal punte vir die formule en korrekte substitusies toegeken word. Die punt vir die verkeerde numeriese antwoord word verbeur.
- 1.7 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 word slegs vir 'n formule toegeken indien 'n **poging tot 'n berekening aangewend is**, d.w.s. substitusies is gedoen of 'n numeriese antwoord is gegee.
- 1.8 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 formule ingestel is en nie vir waardes wat voor 'n berekening genoem is nie.
- 1.9 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.

- 1.10 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.
- 1.11 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 berekenings gedoen moet word (bv. 'n stroomdiagramvraag) hoef nie noodwendig dieselfde volgorde te hê nie. VOLPUNTE sal toegeken word op voorwaarde dat dit 'n geldige oplossing vir die probleem is. Enige berekening wat egter nie die kandidaat nader aan die antwoord as die oorspronklike data bring nie, sal geen punte tel nie.

2. UNITS/EENHEDE

- 2.1 Candidates will only be penalised once for the repeated use of an incorrect unit **within a question or subquestion**.
'n Kandidaat sal slegs een keer gepenaliseer word vir die herhaaldelike gebruik van 'n verkeerde eenheid **in 'n vraag of subvraag**.
- 2.2 Units are only required in the final answer to a calculation.
Eenhede word slegs in die finale antwoord tot 'n vraag verlang.
- 2.3 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 nie vir 'n eenheid per se toegeken nie. Kandidaat sal derhalwe die punt vir die antwoord in die volgende gevalle verbeur:
- Korrekte antwoord + verkeerde eenheid
- Verkeerde antwoord + korrekte eenheid
- Korrekte antwoord + geen eenheid
- 2.4 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.
SI-eenhede moet gebruik word, behalwe in sekere gevalle, bv. $V \cdot m^{-1}$ in plaas van $N \cdot C^{-1}$, en $cm \cdot s^{-1}$ of $km \cdot h^{-1}$ in plaas van $m \cdot s^{-1}$ waar die vraag dit regverdig.

3. GENERAL/ALGEMEEN

- 3.1 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.
- 3.2 For marking purposes, alternative symbols (s,u,t, etc.) will also be accepted.
Vir nasiendoeleindes sal alternatiewe simbole (s, u, t, ens.) ook aanvaar word.
- 3.3 Separate compound units with a multiplication dot, not a full stop, for



example, $\text{m}\cdot\text{s}^{-1}$. For marking purposes $\text{m}\cdot\text{s}^{-1}$ and m/s will also be accepted. Skei saamgestelde eenhede met 'n vermenigvuldigpunt en nie met 'n punt nie, byvoorbeeld, $\text{m}\cdot\text{s}^{-1}$. Vir nasiendoeleindes sal $\text{m}\cdot\text{s}^{-1}$ en m/s ook aanvaar word.

4. POSITIVE MARKING/POSITIEWE NASIEN

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

- 4.1 **Subquestion to subquestion:** When a certain variable is calculated in one subquestion (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 subquestions.
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 korrek in 3.2 of 3.3 vervang word, word **volpunte** aan die daaropvolgende subvraag toegeken.
- 4.2 **A multistep question in a subquestion:** 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 stroom verkeerd bereken in 'n eerste stap as gevolg van 'n substitusiefout, verbeur die kandidaat die punt vir die substitusie sowel as die finale antwoord.
5. **NEGATIVE MARKING/NEGATIEWE NASIEN**

Normally an incorrect answer cannot be correctly motivated if based on a conceptual mistake. 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 in 3.2 could be considered.

'n Verkeerde antwoord, indien dit op 'n konsepsuele fout gebaseer is, kan normaalweg nie korrek gemotiveer word nie. Indien 'n kandidaat gevra word om in vraag 3.2 die antwoord op vraag 3.1 te motiveer en 3.1 is verkeerd, kan geen punte vir vraag 3.2 toegeken word nie. Indien die antwoord op bv. 3.1 egter op 'n berekening gebaseer is, kan die motivering vir die verkeerde antwoord in 3.2 oorweeg word.

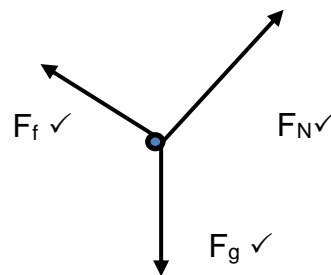
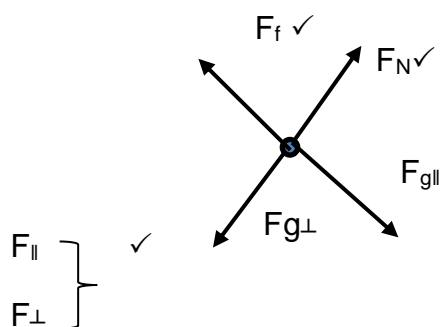
QUESTION 1: MULTIPLE-CHOICE QUESTIONS

VRAAG 1: VEELVULDIGE KEUSEVRAE

- | | | | |
|------|---|----|-----|
| 1.1 | C | ✓✓ | (2) |
| 1.2 | A | ✓✓ | (2) |
| 1.3 | B | ✓✓ | (2) |
| 1.4 | C | ✓✓ | (2) |
| 1.5 | B | ✓✓ | (2) |
| 1.6 | A | ✓✓ | (2) |
| 1.7 | B | ✓✓ | (2) |
| 1.8 | A | ✓✓ | (2) |
| 1.9 | C | ✓✓ | (2) |
| 1.10 | D | ✓✓ | (2) |

[20]



QUESTION 2 / VRAAG 2 2.1**Accepted labels / Aanvaarbare byskrifte**

F_g	F_w /force of earth on pot/weight / gravitational force Krag van aarde op blompot / gravitasiekrak	(3)
F_f	F_k /friction / Wrywing	
N	Normal force / F_N / Force of surface on pot / Normaalkrag / Krag van oppervlakte op blompot	

2.2.1 The force or the component of a force which a surface exerts on an object with which it is in contact, and which is perpendicular to the surface. / Die krag of die komponent van die krag wat die oppervlakte op die voorwerp uitoefen waarmee dit in kontak is en wat loodreg op die oppervlakte is. ✓✓ (2)

2.2.2 $\cos \theta = \frac{F_{\perp}}{F_g}$
 $F_N = F_{\perp} = mg \cos 30^\circ$
 $F_N = 8 (9,8) (0,866) \checkmark$
 $F_N = 67,896 \text{ N} \checkmark$ (2)

2.3 $F_{g \parallel} = mg \sin \theta$
 $F_{g \parallel} = 8(9,8)(0,5) \checkmark$
 $F_{g \parallel} = 39,2 \text{ N} \checkmark$ (2)

2.4 POSITIVE MARKING FROM 2.2.2

$f_k = \mu_k \cdot F_N \checkmark$
 $\mu_k = 0,4$
 $F_N = 67,89 \text{ N}$
 $f_k = 0,4 (67,896) \checkmark$
 $f_k = 27,16 \text{ N} \checkmark$ (3)

2.5 POSITIVE MARKING FROM 2.3 & 2.4

$F_{\text{net}} = F_{g \parallel} + f_k \checkmark$
 $F_{\text{net}} = 39,2 + (-27,16) \checkmark$
 $F_{\text{net}} = 12,04 \text{ N}$
 $a = F_{\text{net}}/m \checkmark$
 $a = 12,04/8 \checkmark$
 $a = 1,505 \text{ m.s}^{-2} \checkmark$ (4)

2.6 $v_f^2 = v_i^2 + 2a\Delta x$ or/of $v_f^2 = v_i^2 + 2a\Delta y$
 $v_f^2 = 0 + 2(1,505)(2) \checkmark$
 $v_f = 2,45 \text{ m.s}^{-1} \checkmark$

OPTION 1

$\Delta E_k = \frac{1}{2}mv_f^2 + \frac{1}{2}mv_i^2 \checkmark$
 $\Delta E_k = \frac{1}{2}(8)(2,45^2) - (0) \checkmark$
 $\Delta E_k = 24,01 \text{ J} \checkmark$

OPTION 2

$\Delta E_k = F_{\text{net}} \Delta X \cos \theta \checkmark$
 $\Delta E_k = (12,04)(2) \cos 0 \checkmark$
 $\Delta E_k = 24,08 \text{ J} \checkmark$

(5)



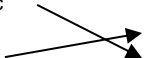
[21]

QUESTION 3 / VRAAG 3

- 3.1 9,8 m.s⁻² downwards / afwaarts✓ (1)
- 3.2 Choose up as positive / Kies op as positief
 $\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓
 $2 = 7 t + \frac{1}{2} (-9,8) t^2$ ✓
 $t = 0,39$ s
 $t = 1,03$ s
 period of time / Tydsinterval = 0,39 s → 1,03 s✓ (3)
- 3.3.1 Gravitational force and air resistance are acting downwards. ✓ The resultant force is greater than F_g ✓ / Gravitasiëkrag en lugweerstand is afwaarts. Die resultante krag is groter as F_g ✓ (2)
- 3.3.2 Gravitational force and air resistance are acting in opposite direction. ✓ The resultant force is smaller than F_g ✓ / Gravitasiëkrag en lugweerstand is in die teenoorgestelde rigting. Die resultante krag is kleiner as F_g (2)
- 3.4 Choose up as positive / Kies opwaarts as positief
 Maximum height the which the ball reaches / Maksimum hoogte wat die bal bereik
 $v_f^2 = v_i^2 + 2a\Delta x$ or/of $v_f^2 = v_i^2 + 2a\Delta y$ ✓
 $0 = 7^2 + 2(-9,8)\Delta x$
 $\Delta x = 2,5$ m upwards✓ / opwaarts
 Total displacement / Totale verplasing = 2,5 + 1,5 = 4 m ✓
 $v_f^2 = v_i^2 + 2a\Delta x$
 $v_f^2 = 0 + 2(-9,8)(4)$ ✓ (5)
 $v_f = 8,85$ m.s⁻¹ downwards✓ / afwaarts

[13]

QUESTION 4 / VRAAG 4

- 4.1.1 Both of their momenta are equal in magnitude ✓ but different in direction. ✓ Hulle momentum is gelyk in grootte, maar verskil in rigting (2)
- 4.1.2 $\sum P_{\text{before}} = \sum P_{\text{after}}$ ✓
 $(90)(0) + (50)(0) = (90)(v) + (50)(1,5)$ ✓
 $v = -0,833$ m.s⁻¹
 $v = 0,833$ m.s⁻¹ in the opposite direction of the dancer. ✓ / In die teenoorgestelde rigting as die danser (4)
- 4.2.1 The total mechanical energy (sum of gravitational potential energy and kinetic energy) in an isolated system remains constant. ✓✓ / Die totale meganiese energie in 'n geslote sisteem bly konstant (2)
- 4.2.2 $(E_p + E_k)_B = (E_p + E_k)_C$
 $E_{\text{mech}}(B) = E_{\text{mech}}(C)$  any one / enige een✓
 $0,05 \times 9,8 \times 0,3 + \frac{1}{2} \times 0,05 \times 3^2 = 0 + \frac{1}{2} \times 0,08 \times v_f^2$ ✓
 $v_f = 3,05$ m.s⁻¹ to the right / na regs✓ (4)

[12]



QUESTION 5 / VRAAG 5

- 5.1 Acceleration = Gradient of graph / Versnelling = gradient van grafiek
 $a = \Delta v / \Delta t$
 $a = (6-8)/(4-0)$
 $a = -0,5 \text{ m} \cdot \text{s}^{-2} \checkmark$
 $F_f = ma$
 $F_f = 4 \times -0,5 \checkmark$
 $F_f = \underline{2 \text{ N opposite to the direction of motion}}$ / in die teenoorgestelde rigting \checkmark (3)
- 5.2 $W = F \Delta x \checkmark$
 $\Delta x = \text{area under the graph} / \text{area onder die grafiek}$
 $\Delta x = (4 \times 6) + (\frac{1}{2} \times 4 \times 2) \checkmark$
 $W = 2 \times 28$ (3)
 $W = 56 \text{ J} \checkmark$
- 5.3 $\sum P_{\text{before}} = \sum P_{\text{after}}$
 $4 \times 6 = (4 + m) \cdot 4 \checkmark$
 $m = 2 \text{ kg} \checkmark$ (2)
- 5.4.1 The net/total work done on an object is equal to the change in the object's kinetic energy / Die netto werk verrig op 'n voorwerp is gelyk aan die verandering in die kinetiese energie $\checkmark \checkmark$
 OR the work done on an object by a resultant/net force is equal to the change in the object's kinetic energy. $\checkmark \checkmark$ (2)
- 5.4.2 $W_{\text{net}} = \Delta K \checkmark$
 $W_{\text{net}} = W_{Ff} + W_{gll}$
 $F_{gll} = mg \sin \theta$
 $F_{gll} = 1,5 \times 9,8 \times \sin 30^\circ$
 $F_{gll} = 7,35 \text{ N}$
 $W = F \Delta x \cos \theta$
 $W_{gll} = 7,35 \times 15 \times \cos 180^\circ$
 $W_{gll} = -110,25 \text{ J} \checkmark$
 $F_f = \mu_k \cdot F_N$
 $F_f = 0,3 \times 1,5 \times 9,8 \cos 30^\circ$
 $F_f = 3,82 \text{ N}$
 $W_{Ff} = 3,82 \times 15 \cos 180^\circ$
 $W_{Ff} = -57,3 \text{ J} \checkmark$
 $W_{\text{net}} = K_f - K_i$
 $(-110,25) + (-57,3) = 0 - \frac{1}{2} 1,5 v_i^2 \checkmark$
 $v_i = 14,95 \text{ m} \cdot \text{s}^{-1} \checkmark$ (5)

[15]

QUESTION 6 / VRAAG 6

- 6.1 The change in frequency (or pitch) of the sound detected by a listener because the sound source and the listener have different velocities relative to the medium of sound propagation. / Die verandering in die waarneembare frekwensie wat die luisteraar hoor agv die relatiewe beweging van die bron en die luisteraar ten opsigte van mekaar. ✓✓ (2)
- 6.2 $f = v/\lambda$
 $f = 1482/0,045$ ✓
 $f = 32933,33 \text{ Hz}$
 $f = 32,93 \text{ kHz}$ ✓ (2)
- 6.3 No. / Nee ✓ Human ear can only hear frequencies up to 20000 Hz and 32933,33 Hz > 20 Hz / Die menslike oor kan net frekwensies tot 20 000 Hz hoor ✓ (2)
- 6.4
$$f_L = \left(\frac{v \pm v_L}{v \pm v_s} \right) f_s$$
 ✓

$$f_L = \frac{(1482-0)(32933,33)}{(1482-9,2)}$$
 ✓
 $f_L = 33139,05 \text{ Hz}$ ✓ (4)
- 6.5.1 R ✓. The further a galaxy is away, the faster its moving / Hoe verder die hemelligaam weg is van die aarde hoe vinniger beweeg dit ✓ (2)
- 6.5.2 R ✓. The faster a galaxy is moving away from Earth, the greater the red shift. / Hoe vinniger die hemelligaam weg van die aarde af beweeg hoe groter is die rooi verskuiwing. ✓ (2)

[14]**QUESTION 7 / VRAAG 7**

7.1
$$F = \frac{kQ_1Q_2}{r^2}$$
 ✓

Force by P₂ / Krag by P₂

$$F = \frac{(9 \times 10^9 \times 6 \times 10^{-12} \times 9 \times 10^{-12})}{(10 \times 10^{-3})^2}$$

$$F = 4,86 \times 10^{-9} \text{ N repulsive / afstotend}$$
 ✓

Force by P₃ / Krag by P₃

$$F = \frac{(9 \times 10^9 \times 6 \times 10^{-12} \times 2,6 \times 10^{-12})}{(55 \times 10^{-3})^2}$$

$$F_{P_3} = 4,64 \times 10^{-11} \text{ N attractive / aantrekkend}$$
 (5)



7.2.1

$$\text{New charge} = \frac{(-9 \times 10^{-12} + (+2,6 \times 10^{-12}))}{2} \quad \checkmark$$

$$\text{New charge / Nuwe lading} = -3,2 \times 10^{-12} \text{ C} \quad \checkmark \quad (2)$$

7.2.2

$$\text{Excess electrons} = \frac{(-3,2 \times 10^{-12})}{(-1,6 \times 10^{-19})} \quad \checkmark \quad (2)$$

$$\text{Excess electrons / Oormaat elektrone} = 2 \times 10^7 \text{ electrons} \quad \checkmark$$

7.3

The magnitude of the electrostatic force exerted by one point charge (Q_1) on another point charge (Q_2) is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance (r) between them. $\checkmark\checkmark$ Die grootte van die elektrostatische krag wat twee voorwerpe op mekaar uitoefen is direk eweredig aan die produk van hulle ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle middelpunte. (2)

7.4.1

$$E = F/Q \quad \checkmark$$

$$E = (3,23 \times 10^{-5}) / (4,8 \times 10^{-9}) \quad \checkmark$$

$$E = 6729,17 \text{ N.C}^{-1} \quad \checkmark \quad (3)$$

7.4.2

OPTION 1

$$E = \frac{kQ}{r^2} \quad \checkmark$$

$$6729,17 = \frac{9 \times 10^9 \times 4,8 \times 10^{-9}}{r^2} \quad \checkmark$$

$$r = 0,08 \text{ m} \quad \checkmark$$

OPTION 2

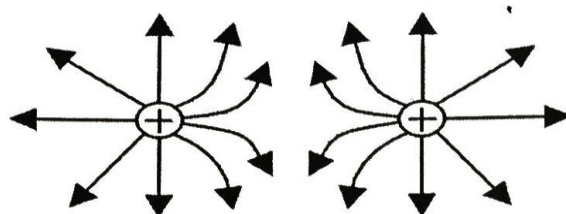
$$F = \frac{kQ_1Q_2}{r^2} \quad \checkmark$$

$$3,23 \times 10^{-5} = \frac{(9 \times 10^9 \times 4,8 \times 10^{-9} \times 4,8 \times 10^{-9})}{r^2} \quad \checkmark$$

$$r = 0,08 \text{ m} \quad \checkmark \quad (3)$$

7.4.3

Shape \checkmark / Vorm
Correct direction / Rigting van pyle \checkmark



(2)

[19]

QUESTION 8 / VRAAG 8

$$8.1 \quad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$\frac{1}{R_p} = \frac{1}{3} + \frac{1}{2+8} + \frac{1}{15} \quad \checkmark$$

$$R_p = 2 \, \Omega$$

$$R_T = 2 + 5$$

$$= 7 \, \Omega \quad \checkmark$$

(2)

$$8.2 \quad V = IR$$

$$V = 1,5 \times 2 \quad \checkmark$$

$$V = 3 \, V \quad \checkmark$$

(2)

$$8.3 \quad \varepsilon = I(R + r) \quad \checkmark$$

$$3 \times 4,5 = (1,5 \times 7) + (1,5 \times r) \quad \checkmark$$

$$r = 2 \, \Omega \quad \checkmark$$

internal resistance of each cell / interne weerstand van elke sel = $2/3 = 0,67 \, \Omega \quad \checkmark$

(4)

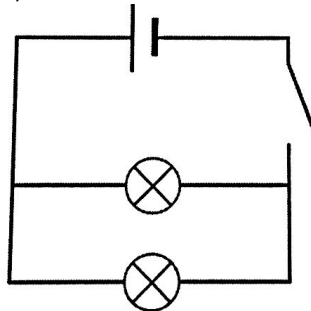
8.4.1 Increase / Toeneem \checkmark There are fewer resistors in parallel / Daar is minder weerstande in parallel \checkmark

(2)

8.4.2 Decrease / Afneem \checkmark External resistance is greater, the current will be lower. / Eksterne weerstand is groter, stroom sal kleiner wees. \checkmark

(2)

8.5.1

 $\checkmark \checkmark$

(2)

8.5.2 Bulbs should be connected in parallel / In parallel gekoppel
Resistance of each bulb / Weerstand van elke gloeilamp

$$R = V/I$$

$$R = 12/3 = 4 \, \Omega \quad \checkmark$$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4}$$

$$R_p = 2 \, \Omega \quad \checkmark$$

$$I = V/R$$

$$I = 12/2 \quad \checkmark$$

$$I = 6 \, A \quad \checkmark$$

(4)

[18]

QUESTION 9 / VRAAG 9

- 9.1 Increase speed of rotation ✓, area of the coil ✓, strength of magnetic field, and number of turns. / Verhoog die rotasiespoed, oppervlakte van die spoel, sterkte van die magneet of die aantal windings

Any two

(2)

- 9.2.1 Heat / Hitte ✓

(1)

- 9.2.2 Kinetic / Kineties ✓

(1)

- 9.2.3 Electrical / Elektries ✓

(1)

- 9.3.1 Sun / Son ✓

(1)

- 9.3.2 Eco-friendly or Renewable / Omgewingsvriendelik en hernubaar

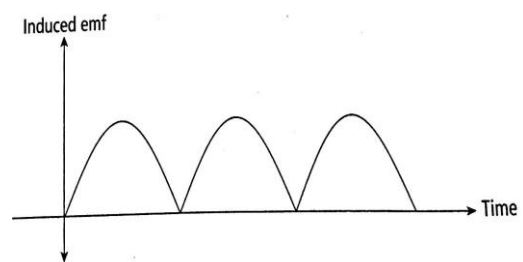
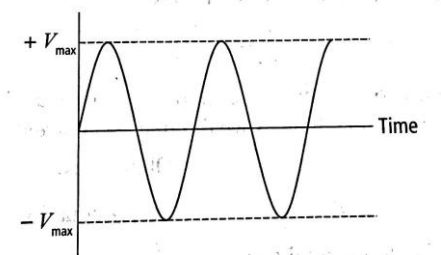
(1)

- 9.4 Alternating current generator

Direct current generator

Wisselstroom

Gelykstroom



Shape / Vorm ✓

Shape ✓ / Vorm

Label axes / Asse benoem ✓

Label axes / Asse benoem ✓

(4)

9.5.1 $V_{\text{rms}} = \frac{V_{\text{max}}}{\sqrt{2}}$ ✓

$V_{\text{rms}} = 17/\sqrt{2}$ ✓

$V_{\text{rms}} = 12,02 \text{ V}$ ✓ ✓

(3)

9.5.2 $I_{\text{rms}} = V_{\text{rms}}/R$

$I_{\text{max}} = I_{\text{rms}} \times \sqrt{2}$ ✓

$I_{\text{rms}} = 12,02/10$ ✓
 $= 1,202 \text{ A}$

$I_{\text{max}} = 1,202 \times \sqrt{2} = 1,7 \text{ A}$ ✓

(3)

- 9.5.3 Alternating current symbol / Wisselstroom se simbool



(1)

[18]**TOTAL: 150**