



education

Department of
Education
FREE STATE PROVINCE

CONTROL TEST / *KONTROLETOETS*

GRADE 10 / *GRAAD 10*

**TECHNICAL SCIENCES
*TEGNIJSE WETENSKAPPE***

MEMORANDUM

NOVEMBER 2021

MARKS: 100 / *PUNTE: 100*

TIME: 2 HOURS / *TYD: 2 UUR*

**This memorandum consists of SIX pages.
*Hierdie memorandum bestaan uit SES bladsye.***

QUESTION 1 / VRAAG 1

1.1 C ✓✓

1.2 B ✓✓

1.3 B ✓✓

1.4 D ✓✓

1.5 B ✓✓

1.6 C ✓✓

1.7 D ✓✓

1.8 A ✓✓

1.9 C ✓✓

1.10 A ✓✓

[20]

QUESTION 2 / VRAAG 2

2.1.1 $5778 - 273 = 5\,505\text{ (}^{\circ}\text{C)}$ ✓ (1)

2.1.2 $5 \times 10^{11}\text{ (kg)} / 500\,000\,000\,000\text{ (kg)}$ ✓ (1)

2.2 $E = hf + \frac{1}{2}mv^2$

$$\frac{1}{2}mv^2 = E - hf \quad \checkmark$$

$$v^2 = \frac{2(E - hf)}{m} \quad \checkmark$$

$$v = \sqrt{\frac{2(E - hf)}{m}} \quad \checkmark$$

| | |
|---|---|
| Subtract hf from E. <i>Trek hf van E af.</i> | ✓ |
| Divide by m/2. <i>Deel met m/2.</i> | ✓ |
| Square root of above-mentioned <i>Vierkantswortel van bogenoemde</i> | ✓ |

(3)
[5]

QUESTION 3 / VRAAG 3

3.1 $2 + 7 \checkmark = 9 \text{ km} \checkmark$ Answer only; full marks / *Antwoord alleen; volpunte* (2)

3.2 $5 \text{ km} \checkmark$ west/wes \checkmark (2)

3.3 $Speed = \frac{distance}{time} \checkmark$ $Spoeed = \frac{afstand}{tyd}$
 $= \frac{9\,000}{18 \times 60} \checkmark$
 $= 8,33 \text{ m} \cdot \text{s}^{-1} \checkmark$ (3)

3.4 **Positive marking from 3.2. / Positiewe nasien vanaf 3.2.**

$$Velocity = \frac{displacement}{time} \checkmark \quad Snelheid = \frac{verplasing}{tyd}$$

$$= \frac{5\,000}{18 \times 60} \checkmark$$

$$= 4,63 \text{ m} \cdot \text{s}^{-1} \checkmark$$

Average velocity is $4,63 \text{ m} \cdot \text{s}^{-1}$; west \checkmark

Gemiddelde snelheid is $4,63 \text{ m} \cdot \text{s}^{-1}$; wes

(4)
[11]

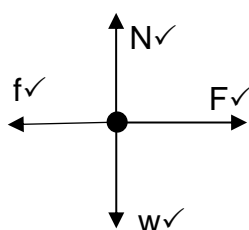
QUESTION 4 / VRAAG 4

4.1.1 Vector \checkmark **NEGATIVE MARKING** *Vektor* **NEGATIEWE NASIEN**
 It has magnitude and direction. \checkmark *Dit het grootte en rigting.* (2)

4.1.2 $0 \text{ (N)} / \text{Zero} \checkmark$ (1)

4.1.3 Yes/Ja \checkmark (1)

4.2.1



| | Acceptable labels <i>Aanvaarbare byskrifte</i> |
|---|---|
| w | $F_g / mg / F_{\text{weight}} / \text{Weight} / \text{Gravitational force} / \text{Force of gravity}$ $F_g / mg / F_{\text{gewig}} / \text{Gewig} / \text{Gravitasiekrag}$ |
| N | $F_N / F_{\text{normal}} / \text{Normal force} / \text{Normal}$ $F_N / F_{\text{normaal}} / \text{Normaalkrag} / \text{Normaal}$ |
| F | $T / F_{\text{tension}} / \text{Tension} / F_{\text{applied}}$ $T / F_{\text{spanning}} / \text{Spanning} / F_{\text{toegepas}}$ |
| f | $F_{\text{friction}} / F_f / \text{Friction} / \text{Frictional force} / \text{Force of friction}$ $F_{\text{wrywing}} / F_f / \text{Wrywing} / \text{Wrywingskrag}$ |

NOTES / AANTEKENINGE

- Arrow plus label: one mark / *Pyl plus byskrif: een punt*
- Ignore comparative lengths of arrows. / *Ignoreer vergelykende lengtes van pyle.*
- Penalise one mark for extra force(s). / *Penaliseer een punt vir ekstra krag(te).*
- Penalise one mark if vectors do not touch the dot. / *Penaliseer een punt as vektore nie aan die kol raak nie.*

(4)

4.2.2 Gravitational force / weight \checkmark *Gravitasiekrag/gewig*
 Accept correct symbol. *Aanvaar korrekte simbool.* (1)
 [9]

QUESTION 5 / VRAAG 5

5.1.1 The turning effect of a force about a point. ✓✓

Die draai-effek van 'n krag om 'n punt.

(2)

5.1.2 $\tau = Fr_{\perp}$ ✓

$= 20 \times 0,2$ ✓

$= 4 \text{ N} \cdot \text{m}$ ✓

(3)


5.2.1 For a body in equilibrium the sum of the clockwise moments about a point ✓ is equal to the sum of the anticlockwise moments about the same point. ✓

Vir 'n liggaam in ewewig is die som van die kloksgewyse momente om 'n punt gelyk aan die som van die antikloksgewys momente om dieselfde punt.

(2)

5.2.2 $\text{Torque}_{30} = F \times r_{\perp}$
 $= (30)(0,8)$ ✓
 $= 24 \text{ N} \cdot \text{m}$

or/of $\Sigma_{30} = \Sigma_{20}$
 $30 \times 0,8$ ✓ $= 20x$ ✓
 $x = 1,2 \text{ m}$ ✓


 $\text{Torque}_{20} = F \times r_{\perp}$
 $24 = (20)(x)$ ✓
 $x = 1,2 \text{ m}$ ✓

(3)

[10]

QUESTION 6 / VRAAG 6

6.1 The sum of the gravitational potential energy and kinetic energy. ✓✓

Die som van gravitasie-potensiële energie en kinetiese energie.

(2)

6.2.1 $0 \text{ (J)} / \text{Zero}$ ✓

(1)

6.2.2 $0 \text{ (J)} / \text{Zero}$ ✓

(1)

6.3.1 $E_p = mgh$ ✓
 $= (3)(9,8)(400)$ ✓
 $= 11\,760 \text{ J}$ ✓

(3)

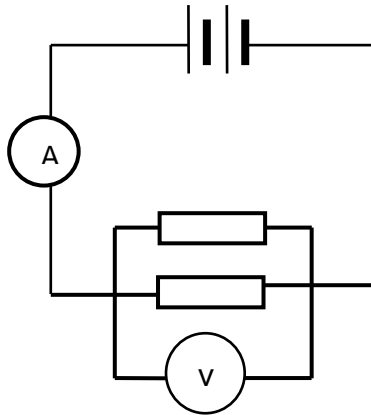
6.3.2 $E_k = \frac{1}{2}mv^2$ ✓
 $= (\frac{1}{2})(3)(53)^2$ ✓
 $= 4\,213,5 \text{ J}$ ✓

(3)

[10]

QUESTION 7 / VRAAG 7

7.1



| Criteria for marking Nasienriglyne | |
|---------------------------------------|---|
| Cells/Selle | ✓ |
| Ammeter | ✓ |
| Voltmeter | ✓ |
| Resistors | ✓ |

(4)

7.2.1 Positive to negative / Positief na negatief ✓

(1)

7.2.2 1,5 J of energy ✓ is transferred per coulomb of charge ✓.
1,5 J energie word oorgedra per coulomb lading .

(2)

$$\begin{aligned}
 7.2.3 \quad I &= \frac{Q}{\Delta t} \checkmark \\
 &= \frac{42}{60} \checkmark \\
 &= 0,7 \text{ A} \checkmark
 \end{aligned}$$

(3)

7.2.4 Connect bulbs in parallel. / Skakel gloeilampe in parallel. ✓

(1)

[11]

QUESTION 8 / VRAAG 8

8.1 The potential difference across the cell when no current is flowing in the circuit. ✓✓
Die potensiaalverskil oor die sel wanneer geen stroom in die stroombaan vloei nie.

(2)

8.2

OPTION 1/OPSIE 1

$$\begin{aligned}
 \frac{1}{R_p} &= \frac{1}{R_1} + \frac{1}{R_2} \checkmark \\
 \frac{1}{R_p} &= \frac{1}{6} + \frac{1}{3} \checkmark \\
 \therefore R_p &= 2 \Omega
 \end{aligned}$$

$$\begin{aligned}
 R_T &= R_p + R_S \checkmark \\
 &= 2 + 2 \checkmark \\
 &= 4 \Omega \checkmark
 \end{aligned}$$

OPTION 2/OPSIE 2

$$\begin{aligned}
 R_p &= \frac{R_1 \times R_2}{R_1 + R_2} \checkmark \\
 R_p &= \frac{6 \times 3}{6 + 3} \checkmark \\
 &= 2 \Omega
 \end{aligned}$$

$$\begin{aligned}
 R_T &= R_p + R_S \checkmark \\
 &= 2 + 2 \checkmark \\
 &= 4 \Omega \checkmark
 \end{aligned}$$

(5)

8.3.1 Increase (or synonym) / Toeneem (of sinoniem) ✓✓

(2)

8.3.2 Less than x / Minder as x ✓

(1)

[10]

QUESTION 9 / VRAAG 9

| | | |
|-----|---|---|
| 9.1 | Criteria/Kriteria | |
| | Give a statement about the relationship between the dependent and independent variables. <i>Maak 'n stelling omtrent die verwantskap tussen die afhanklike en onafhanklike veranderlike.</i> | ✓ |
| | Refer to the dependent (charge) and independent (kind of material) variables in the hypothesis. <i>Verwys na die afhanklike (lading) en onafhanklike (soort materiaal) veranderlike in die hipotese.</i> | ✓ |

Examples/Voorbeelde

- The charge depends on the kind of material the balloons are rubbed with.
Die lading hang af van die soort materiaal waarmee die ballonne gevryf word.
- The charge is not affected by the kind of material the balloons are rubbed with.
Die lading word nie beïnvloed deur die soort materiaal waarmee die ballonne gevryf word nie. (2)

- 9.2 **Dependent/Afhanklik** ✓ **Independent/Onafhanklik** ✓
force (of repulsion) charge (on balloons)
(afstotings)krag *lading (op ballonne)*
- OR/OF**
- charge (on balloons) material (used to rub balloons)
lading (op ballonne) materiaal (waarmee ballonne gevryf is) (2)

- 9.3 Like charges repel ✓; unlike charges attract. ✓
Soortgelyke ladings stoot af; ongelyksoortige ladings trek aan.
- OR/OF**
- Objects can be charged ✓ by rubbing (friction). ✓
Voorwerpe kan gelaai word deur hulle te vryf/d.m.v. wrywing. (2)
- [6]**

QUESTION 10 / VRAAG 10

- 10.1 A single type of material. OR A substance that cannot be separated into simpler components by physical methods. ✓✓
'n Enkele soort materiaal. OF 'n Stof wat nie deur fisiese metodes in eenvoudiger komponente opgebreek kan word nie. (2)
- 10.2.1 NaCl or/of H₂SO₄ ✓ (1)
- 10.2.2 CO₃²⁻ ✓ (1)
- 10.2.3 Cu ✓ (1)
- 10.4 2CO + O₂ → 2CO₂ R ✓ P ✓ B ✓ (3)
- [8]**

GRAND TOTAL: 100 / GROOTTOTAAL: 100