Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

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TECHNICAL SCIENCES P2/*TEGNIESE WETENSKAPPE V2* MARKING GUIDELINE/*NASIENRIGLYN (EXEMPLAR/EKSEMPLAAR)*

MARKS/*PUNTE*: 150

This marking guideline consists of 9 pages./
Hierdie nasienriglyn bestaan uit 9 bladsye.

QUESTION/_VRAAG_ **1**

1.1   B ✓✓   (2)

1.2   C ✓✓   (2)

1.3   D ✓✓   (2)

1.4   D ✓✓   (2)

1.5   C ✓✓   (2)

1.6   C ✓✓   (2)

1.7   B ✓✓   (2)

1.8   D ✓✓   (2)

1.9   D ✓✓   (2)

1.10   C ✓✓   (2)

                                                                                              [20]

QUESTION/*VRAAG* 2

2.1 A pulse is a single disturbance in a medium. ✓✓
'n Puls is 'n enkele verseuring in 'n medium. ✓✓
A wave is a succession of pulses. ✓✓
'n Golf is 'n opeenvolging van pulse. ✓✓   (4)

2.2 Choose ANY from below/*Kies ENIGE van die kombinasies hieronder.*

BF / CG / AE / EH / DI ✓✓   (2)

2.3 AH✓✓   (2)

2.4 Choose any from below/*Kies enige van die kombinasies hieronder.*

BN / OD / FP ✓✓   (2)

2.5 $f = \frac{1}{T}$ ✓✓   (2)

2.6 2.6.1 Period (T) is the time taken to complete one wave. ✓✓
(Accept: one cycle/vibration.)
Periode (T) is die tyd wat dit neem om een golf te voltooi. ✓✓
(Aanvaar: een siklus/vibrasie.)   (2)

2.6.2 Frequency (f) is the number of waves per second. ✓✓
Frekwensie (f) is die aantal golwe per sekonde. ✓✓   (2)

2.6.3 A Transverse wave is a wave in which the particles of a medium
vibrate at right angles, to the direction of propagation of a wave. ✓✓
*'n Transversale golf is 'n golf waar die partikels van die medium loodreg
op die voortplantingsrigting van die golf vibreer.* ✓✓   (2)

2.7 v = f λ ✓
= 0,25 x 10 ✓
= 2,5 m•s⁻¹ ✓   (3)

2.8 2.8.1 Destructive (interference)/*Destruktiewe (interferensie)* ✓   (1)

2.8.2 A = X + Y
= 7 + (− 3) ✓
= 4 cm ✓   (2)

2.8.3 Destructive interference is the superposition of two waves which are
out of phase. ✓✓
*Destruktiewe interferensie is die superposisie van twee golwe wat uit
fase is.* ✓✓   (2)

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QUESTION/*VRAAG* **3**

3.1 $f = \frac{\text{number of waves}}{\text{time}}$ ✓ $f = \frac{aantal\ golwe}{tyd}$ ✓

$= \frac{30}{60}$

$= 0{,}5$ Hz ✓

$\therefore T = \frac{1}{f} = \frac{1}{0{,}5}$ ✓ $= 2$ s ✓   (4)

3.2   Speed $= \frac{\text{distance}}{\text{time}}$ ✓   *Spoed* $= \frac{afstand}{tyd}$

$= \frac{20}{2}$ ✓

$= 10$ m•s^{-1} ✓   (3)

3.3 $v = f\lambda$ ✓   **OR/***OF* $v = \frac{\lambda}{T}$ ✓

$\lambda = \frac{10\ ✓}{0{,}5\ ✓}$ $\lambda = 10$ ✓ x 2 ✓

$= 20$ m ✓ $= 20$ m ✓   (4)

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QUESTION/*VRAAG* 4

4.1 A longitudinal wave is a wave in which the particles of the medium vibrate parallel to the direction of propagation of the wave. ✓✓
'n Longitudinale golf is 'n golf waar die partikels van die medium parallel aan die rigting van voortplanting van die golf vibreer. ✓✓ (2)

4.2 $v = \frac{\lambda}{T}$ ✓   **OR/*OF*** $f = \frac{1}{T} = \frac{1}{0,002} = 500$ Hz ✓

    340 ✓ $= \frac{\lambda}{0,002}$ ✓ $v = f\lambda$ ✓

    $\therefore \lambda = 0,68$ m ✓ 340 ✓ $= 500 \times \lambda$

                        $\therefore \lambda = 0,68$ m ✓ (4)

4.3   4.3.1   Will remain unchanged/*Bly onveranderd* ✓ (1)

      4.3.2   Will increase/*Sal toeneem* ✓ (1)

      4.3.3   Will increase/*Sal toeneem* ✓ (1)

4.4   4.4.1   Pitch is a measure of how high or low a note is. ✓✓
            Toonhoogte is die mate van hoe hoog of laag 'n noot is. ✓✓ (2)

      4.4.2   Sound **C** ✓ It has the largest amplitude. ✓✓
            *Klank **C*** ✓ *Dit het die hoogste amplitude.* ✓✓ (3)

      4.4.3   Sound **A** ✓ It has the highest frequency. ✓✓
            *Klank **A*** ✓ *Dit het die hoogste frekwense.* ✓✓ (3)

4.5   •   To monitor/examine the heartbeat of a foetus.
       Om die hartklop van 'n fetus te monitor/ondersoek.
    •   To measure the rate of blood flow.
       Om die tempo van bloedvloei te meet.   Any TWO
    •   To detect invisible defects on materials.   *Enige TWEE* ✓✓
       Om onsigbare defekte in materiale op te spoor.
    •   Used in automatic door opener.
       Word gebruik om automatiese deure oop te maak. (2)

4.6   •   Used to predict/detect natural disasters.
       Word gebruik om natuurrampe te voorspel/na te speur.
    •   Used to enforce compliance of nuclear test ban.   Any TWO
    •   *Om die nakoming van kerntoetsverbodverdrae te verifieer.*   Enige TWEE ✓✓
    •   Used in anti-poaching strategies.
       Word gebruik in teenstropingsstrategieë. (2)
                                             [21]

QUESTION/*VRAAG* 5

5.1 Echo is the reflection of a sound wave. ✓✓
     'n Eggo is 'n weerkaatsing van 'n klankgolf. ✓✓   (2)

5.2 $v = f\lambda = \frac{\lambda}{T}$ ✓   **OR/*OF*** $f = \frac{1}{T} = \frac{2}{5}$ ✓ = 0,4Hz   **OR/*OF*** $v = \frac{Distance}{Time}$

   $\frac{Afstand}{Tyd}$ ✓

     $= \frac{1700}{5}$ ✓✓ $v = f\lambda$ ✓ $= \frac{850}{2,5}$ ✓✓

     = 340 m•s^{-1} ✓   = 0,4•850 ✓   = 340 m•s^{-1} ✓

                                    = 340 m•s^{-1} ✓   (4)

5.3 $v = f\lambda$

      but $\lambda = \frac{340}{200}$ ✓✓ = 1,7 m ✓   (3)

5.4 Between 20 Hz and 20 000 Hz / *Tussen 20 Hz en 20 000 Hz* ✓✓   (2)

5.5 $\lambda = \frac{v}{f} = \frac{340}{20}$ = 17 m longest/*langste* ✓

     $\lambda = \frac{340}{20000}$ = 0,017 m shortest/*kortste* ✓   (2)

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QUESTION/*VRAAG* **6**

6.1 Law of conservation of heat states that the amount of heat lost equals the amount of heat gained, when no heat is lost. ✓✓
Die wet van behoud van warmte bepaal dat die hoeveelheid warmte wat afgegee word, gelyk is aan die hoeveelheid warmte wat opgeneem word, mits geen energie verlore gaan nie. ✓✓ (2)

6.2 $\Delta Q = \Delta U + \Delta W$ ✓
$\underline{520\ 000 = \Delta U + 310\ 000}$ ✓
$\Delta U = 210\ 000$ J or/*of* 210 kJ ✓ (3)

6.3 A substance that absorbs energy (heat) from the source. ✓✓
'n Stof wat energie (hitte) van 'n bron absorbeer. ✓✓ (2)

6.4 • Heat engine (petrol or diesel)/ *Hitte-enjin (petrol of diesel)*
   • Refrigerator /Coolant / *Yskas/koelmiddel*   Any TWO
   • Hair dryer / *Haardroër*   *Enige TWEE* ✓✓
   • Lawn Mower / *Grassnyer*
   • Electrical drill / *Elektriese boor*   (2)

[9]

QUESTION/*VRAAG* 7

7.1 Specific heat capacity of a substance is the amount of heat required to increase the temperature of 1 kg of the substance by 1℃ (or 1 K). ✓✓
Spesifieke warmtekapasiteit van 'n stof is die hoeveelheid energie wat nodig is om die temperatuur van 1 kg van 'n stof met 1℃ (of 1 K) te laat styg. ✓✓ (2)

7.2 **Surrounding** is anything outside the system which has some bearing on the behaviour of the system. ✓✓
*Die **omgewing** is enigiets buite die sisteem wat 'n invloed op daardie sisteem uitoefen.* ✓✓
Thermodynamic system is a portion of matter, e,g gas enclosed inside a cylinder, fitted with a piston. ✓✓
*'n **Termodinamiese sisteem** is 'n gedeelte van materie. bv. 'n ingeslote gas binne-in 'n silinder wat met 'n suier toegerus is.* ✓✓ (4)

7.3 7.3.1 1 ℓ of water/*1 ℓ water* ✓ (1)

7.3.2 It has the highest specific heat capacity/✓✓
Dit het die hoogste spesifieke warmtekapasiteit (hittekapasiteit) ✓✓ (2)

7.4 **Q** lost by 220g of water = **Q** gained by unknown mass of water ✓
***Q** verloor deur 220g water = **Q** gewin deur onbekende massa water*

OR/*OF*

$mc\Delta T$lost by 220g of water = $mc\Delta T$gained by unknown mass of water ✓
$mc\Delta T$ *verloor deur 220g water* = $mc\Delta T$*gewin deur onbekende massa water*

(0,22) (4200) (57) ✓ = **m** (4200) (23) ✓

m = $\frac{(0,22)(57)}{23}$ = 0,545217 kg ✓
(Accept/*Aanvaar*: m = 545,22 g) (4)

7.5 Heat given out = Heat taken in ✓
Hitte afgegee = Hitte opgeneem

OR/*OF*

$c_k m_k \Delta T_k$ = $c_w m_w \Delta T_w$ ✓
$c_k(0,1)$ ✓ (63) ✓ = (4200) ✓ $(0,2)$ ✓ (3) ✓
$c_k = \frac{2520}{6,3}$ = 400 J•kg^{-1}•K^{-1} ✓ (7)

[20]

QUESTION/*VRAAG* **8**

8.1 Oxidation is a loss of electrons/*Oksidasie is 'n verlies van elektrone.* ✓✓
Reduction is a gaining of electrons/*Reduksie is 'n wins van elektrone.* ✓✓ (4)

8.2 8.2.1 Mn + 2(-2) = 0 ✓
∴ Mn = +4 ✓ (2)

8.2.2 2(+1) + 2Cr + 7(-2) = 0 ✓
2Cr = +12
∴ Cr = +6 ✓ (2)

8.2.3 N + 4(+1) = +1 ✓
∴ N = -3 ✓ (2)

8.3 8.3.1 Oxygen ion/O^{2-} is oxidised. ✓✓ (2)
Suurstof-ioon/O^{-2} is geoksideer.

8.3.2 Potassium ion/K^+ is reduced. ✓✓
Kalium-ioon/K+ is gereduseer. (2)

8.4 8.4.1 The decomposition of a substance when an electric current is passed
through it. ✓✓
Die ontbinding van 'n stof indien 'n elektriese stroom daardeur vloei. ✓✓ (2)

8.4.2 Carbon is non-reactive./*Koolstof is onreaktief.* ✓✓ (2)

8.4.3 Electrode/*Elektrode* **P**
Bubbles are formed around the electrode/*Borrels word om hierdie
elektrode gevorm.* ✓✓
Electrode/*Elektrode* **Q**
Copper will be deposited on the electrode/Metallic brown deposits around
the electrode. ✓✓
*Koper slaan op hierdie elektrode neer / Metaalagtige bruin neerslae slaan
op hierdie elektrode neer.* (4)

8.4.4 Anode: Electrode/*Elektrode* **P** ✓
Cathode/*Katode:* Electrode/*Elektrode* **Q** ✓ (2)

8.4.5 $Cu^{2+} + 2e^- \rightarrow Cu$ ✓✓ (2)

8.4.6 $2Cl^- \rightarrow Cl_2 + 2e^-$ ✓✓ (2)

8.4.7 • Electroplating/*Elektroplatering*
• Purification/extraction of metals/*Suiwering/ekstraksie van* ⎤ Any 2
metale ⎟ *Enige 2*✓✓
• Preparation of Chemicals/*Voorbereiding van chemikalieë* ⎦ (2)

[30]

TOTAL/*TOTAAL:* **150**