basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE
*NASIONALE
SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 11

TECHNICAL SCIENCES: P2
TEGNIESE WETENSKAPPE: V2

EXEMPLAR/*MODEL* 2017

MEMORANDUM

MARKS/*PUNTE*: 150

This memorandum consists of 9 pages.
Hierdie memorandum bestaan uit 9 bladsye.
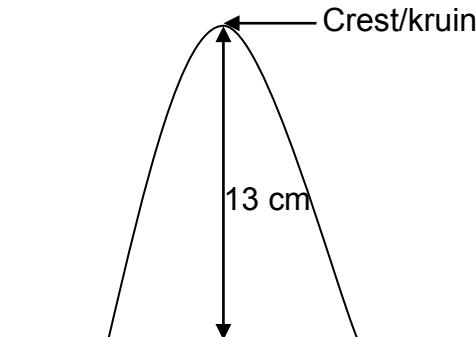
QUESTION 1/*VRAAG* 1

1.1   C ✓✓ (2)

1.2   D ✓✓ (2)

1.3   C ✓✓ (2)

1.4   A ✓✓ (2)

1.5   A ✓✓ (2)

1.6   D ✓✓ (2)

1.7   B ✓✓ (2)

1.8   D ✓✓ (2)

1.9   D ✓✓ (2)

1.10   C ✓✓ (2)

[20]

QUESTION 2/*VRAAG* 2

2.1.1   A single disturbance in a medium. ✓✓
'n Enkele versteuring in 'n medium (2)

2.1.2

Criteria for marking	
Crest labelled/*kruin*	✓
Correct magnitude for amplitude/*regte Amplitude hoogte*	✓

(2)

2.1.3   Superposition. ✓The algebraic sum of the amplitudes of the waves that meet at the same point simultaneously. ✓✓
Superposisie. ✓Die algebraïese som van die amplitudes van die golwe wanneer hulle by dieselfde punt ontmoet✓✓

OR/*OF*

Constructive interference. ✓ The superposition of the two waves which are in phase. ✓✓*Konstruktiewe interferensie✓. Die superposisie van twee golwe wat in fase is✓✓*

NOTE: Do not award a mark if only 'interference' is written.
Geen punte indien slegs 'interfernsie' geskryf is nie.

(3)

2.1.4   In phase, ✓ the crest of one pulse meet the crest of another pulse. ✓✓
In fase ✓die kruin van een puls ontmoet die kruin van 'n ander puls✓✓   (3)

2.2.1   Maximum displacement of a particle from its rest (equilibrium) position. ✓✓
Maksimum verplasing van 'n deeltjie vanf die rus of ewewig posisie. ✓✓   (2)

2.2.2   3 cm ✓✓   (2)

2.2.3   To the left. ✓✓
Na links ✓✓   (2)

2.2.4   The amplitude of pulse A will remain 5 cm (same amplitude as before interference)✓✓ and the direction will be to the right. ✓✓   (4)

[20]

QUESTION 3/*VRAAG 3*

3.1   2/two (complete waves) ✓
2/twee (voltooide golwe).   (1)

3.2   B & F✓✓
D & H
A & E
C & G

NOTE: Allocate 2 marks for any correct pair of points.
2 punte vir elke korrekte paar punte   (2)

3.3   B & D✓✓
A & C
F & H
D & E

NOTE: Allocate 2 marks for any correct combination of points out of phase.
2 punte vir elke kombinasie van punte wat uit fase is.   (2)

3.4   6 x 0,2 ✓ = 1,2 s ✓   (2)

3.5.1   B – Crest ✓ *B- Kruin*
D – Trough ✓ *D- Trog*   (2)

3.5.2   Rest position/Equilibrium ✓
Rusposisie/Ewewig   (1)

3.6.1 $\frac{4}{2}$ ✓ = 2 cm ✓   (2)

3.6.2 $\frac{8}{2}$ ✓ = 4 cm ✓   (2)

3.7

$$f = \frac{1}{T} \checkmark$$

$$f = \frac{1}{0,2} \checkmark$$

f = 5 Hz or 5 s^{-1}

v = f λ $\checkmark$
v = 5 x 0,04 $\checkmark$
v = 0,2 m.s^{-1} $\checkmark$

(5)

[19]
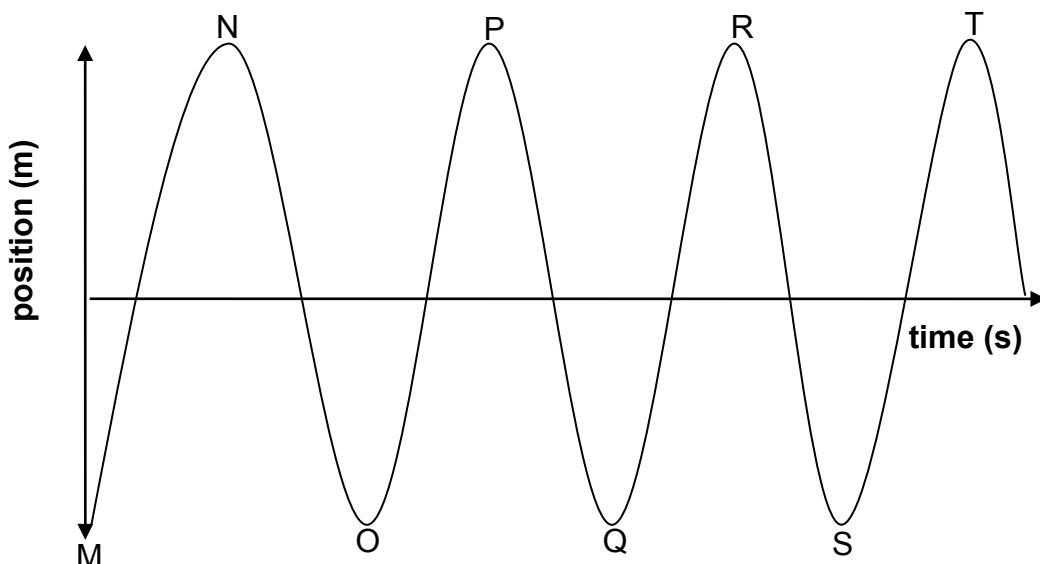
QUESTION 4/*VRAAG* 4

4.1.1   Longitudinal wave $\checkmark$
Longitidunale golf   (1)

4.1.2

Marking criteria	
Correct labelling of position on the y-axis and time on the x-axis	$\checkmark$
Shape of the graph	$\checkmark$
Correct positions of compressions N ,P , R, T	$\checkmark$
Correct positions of rarefactions M, O, Q, S	$\checkmark$

(4)

4.2.1   The reflection of a sound wave. ✓✓
Die weerkaatsing van 'n klank golf ✓✓   (2)

4.2.2

Option 1	Option 2
$v = \dfrac{\Delta x}{\Delta t}$ ✓	$v = \dfrac{\Delta x}{\Delta t}$ ✓
$340 = \dfrac{\Delta x}{0,019}$ ✓	$340 = \dfrac{\Delta x}{0,0095}$ ✓✓
Δx = 6,46 m ✓	Δx = 3,23 m ✓
Distance of bat from object *Afstand van vlermuis vanaf voorwerp* $= \dfrac{6,46}{2}$ = 3,23 m ✓	

(4)

4.3.1   It is a measure of how high or low a note is. ✓✓
Dit is hoe hoog of laag 'n noot (se waarde) is   (2)

4.3.2   Sound C ✓
It has the largest amplitude. ✓✓
Klank C ✓
dit het die grootste amplitude ✓✓   (3)

4.3.3   Sound A ✓
It has the highest frequency. ✓✓
Klank A ✓
dit het die hoogste frekwensie ✓✓   (3)

4.4.1   To monitor/examine the heartbeat of a foetus. ✓
To detect invisible defects on materials e.g leaks, cracks, etc. ✓
To measure the rate of blood flow. ✓
Used in automatic door openers.
Pet scarer (ANY THREE)

Om die fetus te monitor of die hartklop te monitor ✓
Om onsigbare defekte in materiale te ondersoek soos lekke, krake, ens ✓
Om die bloedvloei te meet ✓
In outomatiese deuroopmakers ✓
Huisdier verskrikker ✓ *(ENIGE DRIE)*   (3)

4.4.2   It used to enforce compliance of nuclear test ban. ✓
It is used in anti-poaching strategies. ✓
It is used to predict/detect natural disasters like volcanic eruptions, tsunami, etc. (ANY TWO)
Dit word gebruik om handhawing van atoomtoetse te monitor ✓
Dit word in strategieë teen diere-diefstal te gebruik ✓
Dit word gebruik om natuurrampe soos aardbewings, vulkaanuitbarstings, tsunami's te voorspel te bespeur ✓ *(ENIGE TWEE)*   (2)

[24]

QUESTION 5/*VRAAG* 5

5.1 The starter must put on ear muffs.✓
The gun should be pointed upwards with the arm stretched above head. ✓
Die persoon wat die pistool vuur, moet oorbeskerming aanhê.
Die pistool moet met uitgestrekte arm opwaarts gerig wees (2)

5.2 To have a fair test. ✓ *Om 'n regverdige toets te doen*✓ (1)

5.3
$$v = \frac{\Delta x}{\Delta t} ✓$$

$$v = \frac{250}{0,75} ✓$$

$$v = 333,33 \text{ m.s}^{-1}✓$$ (3)

5.4 No,✓ according to $v = \frac{\Delta x}{\Delta t}$ ✓ when the distance doubles, the time taken for

sound to travel to the listener will also double. ✓

Nee, ✓ *volgens* $v = \frac{\Delta x}{\Delta t}$ ✓

wanneer die afstand verdubbel, sal die tyd vir klank na die luisteraar ook verdubbel ✓

OR

No,✓ if the distance increases by a factor of two, then time will also increase by a factor of two✓ so the speed will remain the same. ✓

OF

Nee✓ *, as die afstand met 'n faktor van twee verhoog, sal die tyd ook met 'n faktor van twee verhoog*✓*, terwyl die spoed dieselfde bly*✓ (3)

[9]

QUESTION 6/*VRAAG* 6

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

6.1.2 Heat (petrol or diesel) engine✓ and refrigerator/coolant. ✓
Accept: Electrical drill, hair dryer, lawn mower, etc. (ANY TWO)
Hitte (petrol of diesel) motor✓ *en verkoelingsmiddele*✓
Aanvaar: Elektriese boor, haardroër, grassnyer, ens. (ENIGE TWEE) (2)

6.2 The amount of heat lost equals the amount of heat gained when no heat is lost. ✓✓
Die hoeveelheid hitte wat verlore gaan, is gelyk aan die hitte opgeneem wanneer daar geen hitte verlies is nie ✓✓ (2)

6.3 $\Delta Q = \Delta U + \Delta W$ ✓
$450\,000 = \Delta U + 275\,000$✓
$\Delta U = 175\,000$ J ✓ (**Accept:/***Aanvaar:* 175 kJ) (3)

[9]

QUESTION 7/*VRAAG* 7

7.1   A closed system is a system which can exchange heat (energy) only, not matter, with the surrounding ✓✓ while an isolated system is a system which is not influenced by its surroundings (No exchange of heat or energy with the surroundings). ✓✓
'n Toe of geslote sisteem kan slegs hitte (energie) uitruil, en nie materie, met die omgewing; ✓✓ *terwyl 'n geïsoleerde sisteem nie beïnvloed word deur sy omgewing nie (geen uitruiling met die omgewing nie)* ✓✓   (4)

7.2   Water✓, it has a high specific heat capacity. ✓✓
Water✓, dit het 'n hoë spesifieke hittekapasiteit (waarde) ✓✓   (3)

7.3   Q lost by 150 g of water = Q gained unknown mass of water ⎫ ANY ONE
        $(mc\Delta T)_{\text{lost by 150 g of water}} = (mc\Delta T)_{\text{gained unknown mass of water}}$ ⎬ ✓ of these
        $(0,15)(4200)(48)$ ✓ = $(m)(4200)(17)$✓ ⎭
        m = 0, 4235 kg✓   (**Accept:** 423,53 g)   (4)

7.4.1   Avoid body contact with hot water **OR** do not spill hot water. ✓
        Avoid skin contact with a hot copper mass piece. ✓
        Vermy kontak met warm water OF moenie warm water mors nie. ✓
        Vermy kontak met die warm koper stukkie✓

        ┌───┐
        │ **Accept:** Other relevant safety precautions.   │
        │ **Aanvaar:** Enige ander veiligheids-   │
        │ maatreëls   │
        └───┘   (2)

7.4.2   Q = mcΔT✓
        Q = (0,125)(4200)(3,63) ✓
        Q = 1905,75 J ✓ (ACCEPT 1,906 kJ).   (3)

7.4.3   C = cm ✓
        C = (400)(0,065) ✓
        C = 26 J.K^{-1}✓   (3)
                                                                       [19]

QUESTION 8/*VRAAG* 8

8.1   Oxidising agent is a substance that undergoes reduction (gains electrons). ✓✓ *'n Oksideermiddel is 'n stof wat reduksie ondergaan (elektrone wen of optel)*
        Reducing agent is a substance that undergoes oxidation (loses electrons). ✓✓ *'n Reduseermiddel is 'n stof wat oksidasie ondergaan (verloor elektrone)*   (4)

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)

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

8.3.2   Magnesium ion/Mg^{2+} (aq) is reduced ✓✓
          Magnesium ion /Mg^{2+}(aq) word gereduseer ✓✓   (2)

8.4.1   The decomposition of a substance when an electric current is passed through
          it. ✓✓
          *Die dekomposisie van 'n stof wanneer 'n elektriese stroom daardeur gestuur
          word*   (2)

8.4.2   They are inert/non-reactive. ✓✓
          Hulle is onreaktief of edel   (2)

8.4.3   Electrode P/*Elektrode P*
          Bubbles are formed around the electrode.✓✓
          Borrels vorm rondom die elektrode

          Electrode Q/*Elektrode Q*
          Copper will be deposited on the electrode.OR metallic brown deposits ✓✓
          'n Koperneerslag vorm by die elektrode OF 'n metaalbruin neerslag vorm   (4)

8.4.4   P is the anode✓and Q is the cathode. ✓
          P is die anode✓ en Q is die katode ✓   (2)

8.4.5 Cu^{2+} (aq)+ 2e⁻ ✓→   Cu ✓

┌─────────────────────────────────┐
│ **NOTE:** If oxidation half-reaction │
│ is written 0/2   │
│ *As oksidasie-halfreaksie geskryf* │
│ *word 0/2*   │
└─────────────────────────────────┘   (2)

8.4.6 $2Cl^-$ (aq) ✓ → Cl_2 + 2e⁻ ✓

┌─────────────────────────────────┐
│ **NOTE:** If reduction half-reaction │
│ is written 0/2   │
│ *As reduksie-halfreaksie geskryf* │
│ *word 0/2*   │
└─────────────────────────────────┘   (2)

8.4.7   Electroplating ✓*Elektroplatering*
          Purification/Extraction of metals ✓*Suiwering/ekstraksie van metale*
          Preparation of chemicals/*Bereiding van chemikalieë* (ANY TWO/*ENIGE TWEE*) (2)
                                                                                      [30]

                                                        TOTAL/*TOTAAL*:   150