Education and Sport Development

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NORTH WEST PROVINCE

NATIONAL
SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES/FISIESE WETENSKAPPE

JUNE/JUNIE 2017
MEMORANDUM

TIME/TYD   : 2 HOURS/URE

MARKS/PUNTE: 150

QUESTION/VRAAG 1

1.1   C ✓✓ (2)

1.2   D ✓✓ (2)

1.3   B ✓✓ (2)

1.4   D ✓✓ (2)

1.5   B ✓✓ (2)

1.6   C ✓✓ (2)

1.7   C ✓✓ (2)

1.8   D ✓✓ (2)

1.9   C ✓✓ (2)

1.10 B ✓✓ (2)

[20]

QUESTION /VRAAG 2

2.1   Pure substance: A substance that cannot be separated into simpler
        components by physical methods. ✓ ✓
        Suiwer stof. 'n Stof wat nie in kleiner komponente d.m.v. fisiese metodes verdeel
        kan word nie✓✓ (2)

2.2.1 Homogeneous✓ : Composition is uniform and all components a in
        the same phase. ✓
        Homogeen: ✓ Die komposisie is uniform en alle komponente is in
        dieselfde fase ✓ (2)

2.2.2 Heterogeneous✓: Composition is non-uniform and components are easily
        identified. ✓
        Heterogeen. ✓Die komposisie is nie uniform nie en kan maklik idetifiseer word✓
        (2)

2.3.1 Chlorine ✓Chloor (1)
2.3.2 17 ✓ (1)
2.3.3 19✓ (1)
2.3.4 17✓ (1)
2.3.5 K✓ (1)
2.3.6 19✓ (1)
2.3.7 20✓ (1)
2.3.8 19✓ (1)
2.4.1 Thermal Conductors: Material that allows heat to pass through easily. ✓✓
        Termiese geleiers: Materiaal wat hitte maklik deurlaat ✓✓ (2)

Insulators: Material that does not allow heat to pass through. ✓✓

Isoleerders: Materiaal wat nie hitte deurlaat nie. ✓✓   (2)

2.4.2 The base/bottom of the pot✓Die bodem van die pot ✓   (1)

2.4.3 The handle of the pot✓Die handvatsel van die pot ✓   (1)

[20]

QUESTION 3 / *VRAAG 3*

3.1.1 Amonia✓Amoniak✓   (1)
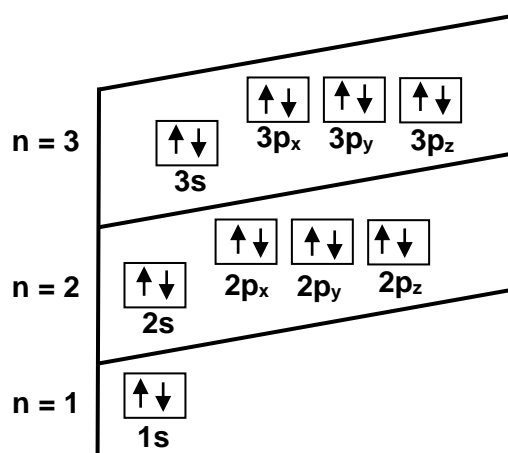
3.1.2 NH_3 ✓✓   (2)

3.2   Ionic Bonding: The transfer on electrons to form cations and anions that
       attract each other to form a formula unit. ✓✓
       Ioniese Binding: Die oordrag van elektrone om katione en anione te vorm
       wat mekaar aantrek om 'n formule eenheid te vorm✓ ✓   (2)

3.3.1 Ionic bond ✓✓Ioniese bindng ✓✓   (2)

3.3.2

Criteria for Aufbau diagram:	Mark
1s with 2 e$^-$ with opposite spins *1s met 2 e wat teenoorgesteld spin*	✓
2s with 2 e$^-$ with opposite spins *2s met 2 d wat teenoorgesteld spin*	✓
2p$_x$,2p$_y$ and 2p$_z$ each with 2 e$^-$ with opposite spins *2p$_x$,2p$_y$ en 2p$_z$ elk met 2 e wat teenoorgesteld spin*	✓
3s with 2 e$^-$ with opposite spins *3s met 2 e wat teenoorgesteld spin*	✓
3p$_x$,3p$_y$ and 3p$_z$ each with 2 e$^-$ with opposite spins *3p$_x$,3p$_y$ en 3p$_z$ elk met 2 e wat teenoorgesteld spin*	✓

                                    (5)

3.3.3 Hund's Rule✓: No pairing of electron in P orbital until each orbital has at
       least one electron. ✓✓

       Hund se wet: ✓ Geen paring van die elktrone in die P orbitale todat elke orbital
       ten minste een elkektron bevat✓ ✓   (3)
       Pauli's Exclusion Principle✓: An orbital can accommodate a maximum
       of two electrons with opposite spins. ✓✓
       Pauli se uitsluitings beginsel. ✓ Elke orbital kan n maksimum van 2 elektrone
   bevat wat teenoorgesteld spin✓✓   (3)

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QUESTION 4 / *VRAAG 4*

4.1 Transverse Pulse: A pulse in which the particles of the medium moves at right angles to the direction of motion of the pulse. ✓✓
Tranversale puls: 'n Pulse waar die deeltjies van die medium loodreg tot die rigting van beweging voortbeweeg✓ (2)

4.2 T (1 wave) = 2s
T (8 waves) = <u>8 × 2s</u> ✓
T (8 waves) =<u>16 s</u> ✓ (2)

4.3 T = 2 s✓ (1)

4.4 $\lambda = \dfrac{4}{2}$ ✓ = <u>2m</u> ✓ (2)

4.5 $f = \dfrac{1}{T}$ ✓

$f = \dfrac{1}{2}$ ✓

f = 0,5sec ✓ (3)

4.6 v = $f\lambda$ ✓
v = <u>0,5Hz×2m</u> ✓
v = <u>1 m.s^{-1}</u> ✓ (3)

[13]

QUESTION/VRAAG 5

5.1 Principle of the superposition of waves: The algebraic sum of the amplitudes of two pulses that occupy the same space at the same time

OR The addition of the disturbances of the two pulses that occupy the same space at the same time. ✓✓

Beginself van die superposisie van golwe: Die algebriese som van die amplitudes van twee pulse wat dieselfde ruimte gedurende dieslefde tyd bevat. ✓✓
OF Die som van die versteuring van twee pulse wat dieselfde ruimte in dieslfde tyd bevat. (2)

5.2.1 Constructive interference ✓ Konstruktiewe interferensie (1)
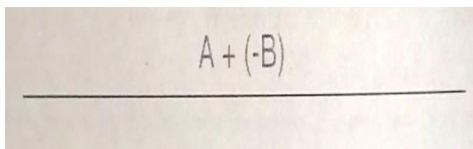5.2.2 Destructive interference ✓ Destruktiewe interferensie (1)

5.3.1
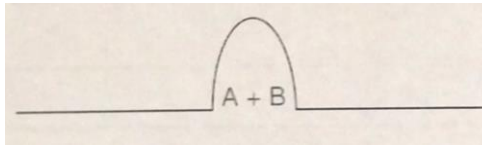
	Criteria for sketch	Mark
	Shape of the resulting wave. Vorm van die golf	✓✓
	Resulting Amplitude indicated as A+B. Resultante amp aangedui as A + B	✓

(3)

5.3.2

	Criteria for sketch	Mark
	Shape of the resulting wave. Vorm van die res golf	✓✓
	Resulting Amplitude indicated as A+ (-B). Resultante amp aangedui as A + B	✓

(3)

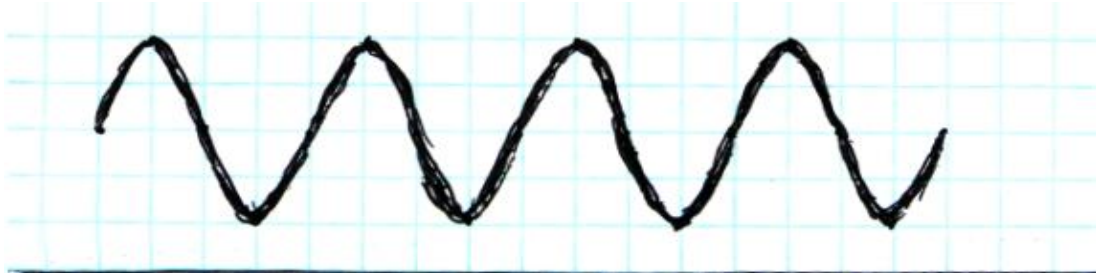5.4.1 Wave B ✓   Golf B ✓   (1)

5.4.2 Wave B has a <u>high frequency / short wavelength</u>✓ resulting in high
<u>Note / pitch</u>✓
Golf B het 'n <u>hoë frekwensie/kort golflengte</u> wat verantwoordelik is vir n <u>hoë noot</u>
(2)

5.5.1 Amplitude. ✓   (1)

5.5.2

Criteria for sketch	Mark
Same number of waves (i.e 4 waves) Dieselfde hoeveelheid golwe	✓
Same wavelength (4 units) Dieslefde golflengte	✓
Amplitude is doubled (2 units) Die amplitude verdubbel	✓

(3)

5.6   Sonar (Pregnancy) ✓ / Treatment (of Kidney stones) / ✓Diagnosis (Blood flow
in arteries) ✓   (Any 2)
Sonar/ Nierstene/Bloedvloei (enige 2) ✓ ✓   (2)

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QUESTION/VRAAG 6

6.1.1 Over exposure can damage eyes and skin OR Can cause skin cancer. (Any ONE) ✓

   Blootstelling kan die oë of vel beskadig of velkanker veroorsaak (enige 1) ✓ (1)

6.1.2 Over exposure can lead to cancer or skin damage. ✓

   Oormatige blootstelling kan tot kanker of velskade lei. ✓   (1)

6.2 Photon: A packet of energy found in light. ✓✓

  ' n Foton: 'n Pakkie energie ✓✓   (2)

6.3 Light **A: Lig A**

$E = h\,f$ ✓

$E = 6.63 \times 10^{-34}$ J.s $\times$ 5, 56 $\times 10^{14}$ Hz ✓

$E = 3, 69 \times 10^{-19}$ J ✓

                   (3)

Light **B: Lig B**

$$E = \frac{hc}{\lambda} \checkmark$$

$$E = \frac{(6,63 \times 10^{-34})(3 \times 10^{8})}{390 \times 10^{-9}} \checkmark$$

$E = 5, 1 \times 10^{-19}$ J ✓   (3)

$3, 69 \times 10^{-19}$ J $< 5, 1 \times 10^{-19}$ J ✓   (1)

Therefore, light **B** has the highest energy ✓
Dus het lig B die hoogste energie ✓   (1)

                   [12]

QUESTION/VRAAG 7

7.1 $(NH_4)_2CO_3$ ✓ $\rightarrow CO_2$ ✓ $+ H_2O$ ✓ $+ 2$ ✓ NH_3 ✓ (5)

7.2 Oxygen ✓ + Sulphur dioxide ✓ $\rightarrow$ Sulphur trioxide ✓ (3)

  Suurstof + swaeldioksied $\rightarrow$ Swaeltrioksied

                   [8]

QUESTION 8

8.1 $17\,^{\circ}C$ ✓   (1)

8.2 $117\,^{0}C$ ✓   (1)

8.3 Stays constant ✓ Bly konstand   (1)

8.4 Its boiling point is greater than $100\,^{0}C$ ✓✓ Die kookpunt is hoër as $100\,^{0}C$ (2)

8.5   Gaseous phase ✓✓ Gasfase
(2)

QUESTION/VRAAG 9

9.1.1   Magnetic Field: A region in space where a magnet or ferromagnetic
        material will experience a force (non-contact). ✓✓
        Magnetiese veld: 'n Omgewing in die ruimte waar 'n magneet of ferromagnteiese
        material 'n krag sal ervaar ✓✓   (2)

9.1.2   -Some field lines are crossing. ✓
        -Direction of some field lines moves from the South pole. ✓
        -Space between field lines at some point of greater field bigger than where
         at point where field is weak. ✓
        -Party veldlyne kruis   ✓
        -Die rigting van party veldlyne is vanaf die suidpool✓
        -Die spasie tussenj veldlyne by party punte is groter en lyk dus swakker as punte
        waar die eintlik swakker is ✓   (3)

9.1.3   A Compass. ✓'n Kompas   (1)

9.1.4
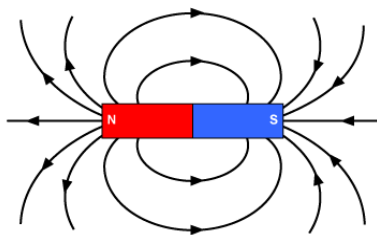
Criteria for sketch	Mark
Direction of lines in at south pole, out at north pole. Uit Suid en in by Noord	✓
Correct shape for field pattern as shown. Korrekte vorm vir veldpatrone	✓

(2)

9.2   Earth's magnetic field offers protection from solar winds (Stream of
        radioactive and charged particles sent into space at high speeds due to
        reaction on the reactions on the sun) ✓✓
        Die aarde se magnetise veld beskerm ons van sonwinde (Stroom van radioaktiewe
        en gelaade deeltjies wat vanaf die son teen 'n hoë spoed na die aarde aankom✓✓
                                                                                 (2)

                                                                        [10]

QUESTION /VRAAG10

10.1.1   Lost electrons. ✓Elektrone verloor   (1)

10.1.2   Object is <u>positively charged</u>✓ showing a <u>deficiency/shortage of
            electrons</u>✓.
            Voorwerp is <u>positief gelaai</u> ✓ en het dus 'n <u>tekort aan elektrone</u>✓   (2)

10.1.3 $Q = nq_e$
            $+3.2 \times 10^{-15}$ ✓ $= n(1,6 \times 10^{-19})$ ✓
              $\therefore n =$ (electrons) ✓   (3)

10.2 $Q_{net} = \dfrac{Q_1 + Q_2}{2}$ ✓

            $Q_{net} = \dfrac{-1.6x10^{-9} + 1.2x10^{-9}}{2}$ ✓

            $Q_{net} = 4.8 \times 10^{-9}$ C ✓   (3)

10.3   Terminal potential difference: The voltage measured across the
          terminals of the battery when charges are flowing in circuit. ✓✓
          Terminale potensiaalverskil; Die volts gemeet oor die terminale van die battery
          wanner lading deur die stroombaan vloei   ✓ ✓   (2)

10.4.1 $Q = I\,t$ ✓
          $Q = 1,5 \times 10$✓
          $Q = 15$ C ✓   (3)

10.4.2 $R_1 = \dfrac{V}{I}$ ✓

             $R_1 = \dfrac{2}{1.5}$ ✓
             $R_1 = 1.33\ \Omega$ ✓   (3)

10.4.3	OPTION 1	OPTION 2
	$V_T = V_1 + V_2$✓ $\therefore V_2 = (3-2)$ ✓ $V_2 = 1V$ ✓ but $R_2 = \dfrac{V}{I}$ ✓ $R_2 = \dfrac{1}{1.5}$ ✓ $R_2 = 0,67\ \Omega$ ✓	$R_T = \dfrac{V_T}{I_T}$ ✓ $R_T = \dfrac{3}{1.5}$ ✓ $R_T = 2\ \Omega$ ✓ but $R_T = R_1 + R_2$✓ $\therefore R_2 = (2-1,33)$ ✓ $R_2 = 0,67V$ ✓

                                                                                                           (6)

                                                                                                          [23]

                                                                                  TOTAL :   150