Education and Sport Development

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NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE
NATIONALE SENIOR SERTIFIKAAT

GRADE/*GRAAD* 12

TECHNICAL SCIENCES P2/
TEGNIESE WETENSKAPPE V2

JUNE/ JUNIE 2019

MEMORANDUM

MARKS/*PUNTE*: 150

This memorandum consists of 7 pages./
Hierdie memorandum bestaan uit 7 bladsye.

QUESTION 1/*VRAAG 1*

1.1 D ✓ ✓ (2)

1.2 C ✓ ✓ (2)

1.3 A ✓ ✓ (2)

1.4 D ✓ ✓ (2)

1.5 D ✓ ✓ (2)

1.6 A ✓ ✓ (2)

1.7 C ✓ ✓ (2)

1.8 B ✓ ✓ (2)

1.9 C ✓ ✓ (2)

1.10 B ✓ ✓ (2)
[20]

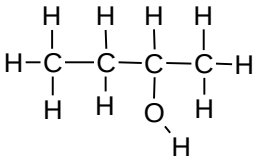
QUESTION 2/*VRAAG 2*

2.1 A series of organic compounds that can be described by the same general formula and where each member differs from the next by a CH2 group./
'n Reeks van verbindings wat dieselfde algemene formule het en waar elke lid verskil van die volgende een met –CH2. ✓ ✓ (2)

2.2.1 Ester/*Ester* ✓ (1)
2.2.2 Ketone/*Ketoon* ✓ (1)
2.2.3 Alkane/*Alkaan* ✓ (1)
2.2.4 Carboxylic acid/*Karboksielsuur* ✓ (1)
2.2.5 Alcohol/*Alkohol* ✓ (1)
2.2.6 Haloalkane/*Haloalkaan* ✓ (1)
2.2.7 Alkene/*Alkeen* ✓ (1)

2.3.1 H ✓ (1)
2.3.2 F ✓ (1)

2.4.1 C_5H_{12} ✓✓ (2)
2.4.2



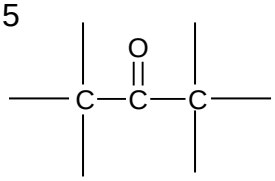
Marking criteria/*Nasienriglyne*	
OH on 2nd carbon/*OH aan die 2de koolstof*	✓
Correct number of carbon/*Korrekte aantal koolstowwe*	✓
The whole structure is correct/*Die hele struktuur is korrek*	✓

(3)

2.4.3 Methyl ethanoate/*Metieletanoaat* ✓✓ (2)

2.4.4 Propanoic acid/*Propanösuur* ✓✓ (2)

2.4.5



NB: 2 marks or nothing/*NB: 2 punte of niks* ✓✓ (2)

2.4.6 A + D ✓✓ (2)

2.4.7 B + E ✓✓ (2)

2.5 Secondary/*Sekondêre* ✓ (1)

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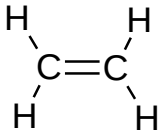
QUESTION 3/*VRAAG 3*

3.1.1 Small organic molecules that can be covalently bonded to each other in a repeating pattern /*Klein organiese molekules wat kovalent aan mekaar kan bind in 'n herhalende patroon* ✓✓ (2)

3.1.2



✓✓ (2)

3.1.3 Strong and light/Durable/Cheaper/Easily accessible

Sterk en lig/Duursaam/Goedkoper/Maklik bekombaar ✓✓ (2)

3.1.4 Manufacturing of plastic bags/squeeze bottles/cling wrap/bullet-proof vests.

Vervaardiging van plastieksakke/druk bottels/kleefpapier/koëlvaste baadjies✓✓(2)

3.2.1 Dipole-dipole (Accept: Van der Waals forces)/

Dipool-Dipool (Aanvaar: Van der Waalskragte) ✓ (1)

3.2.2 <u>The higher the atomic mass/atomic number/amount of protons of the halogen atom, the stronger the dipole-dipole force</u> ✓ and therefore <u>the higher the boiling point of the alkyl-halide</u> ✓ (or opposite). <u>More energy is needed to break the bond</u>. ✓ / <u>*Hoe hoër die atoommassa/atoomgetal/hoeveelheid protone van die halogeenatoom, hoe sterker die dipool-dipoolkrag* en hoe *hoër is die kookpunt van die alkielhalied* (of omgekeerd). *Meer energie is nodig om die krag te breek*</u>. (3)

3.2.3 CH_3F / CH_3Cl / CH_3Br ✓✓ (2)

3.2.4 It is a gas at room temerature and is also flamable./

Dit is 'n gas by kamertemperatuur en is ook vlambaar ✓✓

OR/*OF*

It is a gas at room temperature and is colourless, it may be inhaled accidentaly./

Dit is 'n gas by kamertemperatuur en is kleurloos, dit mag perongeluk ingeasem word. ✓✓ (2)

3.2.5 Iodomethane/*Jodometaan* ✓ (1)

3.2.6 Increase/*Toeneem* ✓ (1)

3.2.7 Increasing temperature will cause the gas molecules to collide more often./ *Toename in temperatuur sal lei na meer botsings tussen gas molekules.* ✓ ✓ (2)

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QUESTION 4/*VRAAG 4*

4.1 $2\underline{C_8H_{18}} + 25\underline{O_2}$ ✓ → $16\underline{CO_2}$ ✓ + $18\underline{H_2O}$ ✓ Ballancing/*Ballansering* ✓ (4)

4.2.1 Addition (Hydration)/*Addisie (Hidrasie)* ✓✓ (2)

4.2.2 Substitution (Hydrogenation)/*Substitusie (Hidrogenasie)* ✓ ✓ (2)

4.2.3 Substitution (Halogenation/Chlorination)

Substitusie (Halogenasie/Chlorasie) ✓✓ (2)

4.2.4 HBr ✓ (1)

4.2.5 No water present/*Geen water teenwoordig* ✓

and <u>non-polar solvent</u>/*en <u>nie-polêre oplosmiddel</u>* ✓ (2)

4.3 H_2 ✓✓ (2)

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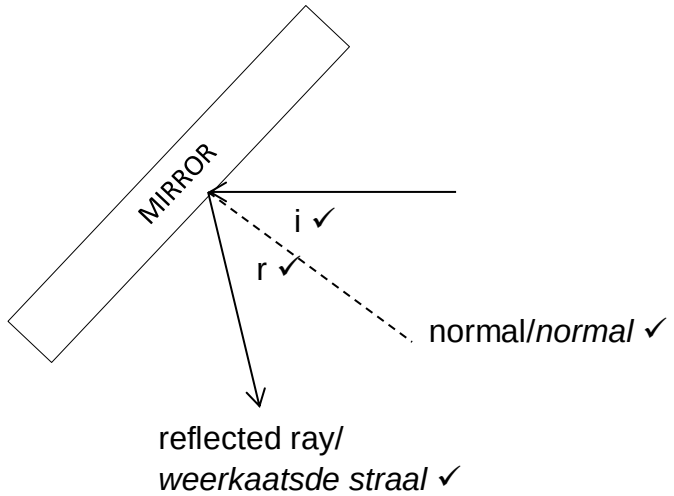
QUESTION 5/*VRAAG 5*

5.1.1



(4)

5.1.2 The incident ray, reflected ray and the normal are all in the same plane./*Die*

invalstraal, weerkaatsde straal en normal is in dieselfde plat vlak. ✓
The angle of incidence is equal to the angle of reflection./*Die invalshoek en weerkaatsingshoek is gelyk*. ✓ (2)

5.2.1 The phenomenon whereby light spreadsout into its component colours./

Die verskynsel waar wit lig opbreek in sy samestellende kleure ✓✓ (2)

5.2.2 Violet/*Violet* ✓✓ (2)

5.2.3 It has the shortest wavelength/*Dit het die korste golflengte* ✓; The shorter the wavelength, the greater the degree of refraction/*Hoe korter die golflengte, hoe groter die mate van refraksie* ✓ (2)

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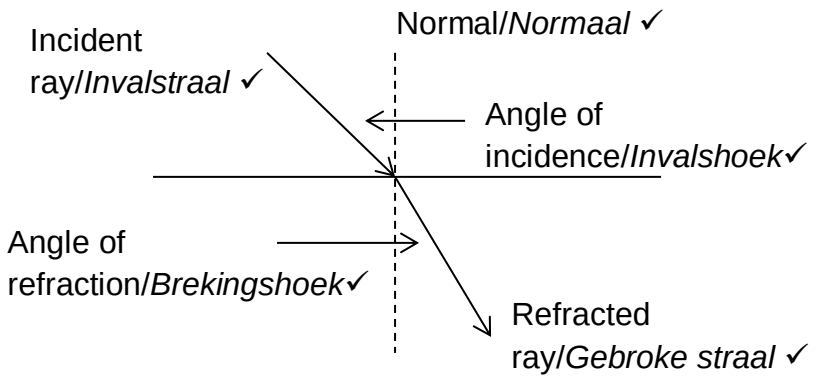
QUESTION 6/*VRAAG 6*

6.1



(5)

6.2 The bending of light when it moves from one medium to another ✓✓

(of different optical density)

Die buiging van lig wanneer dit van een medium na 'n ander beweeg.

(met verkillende optiese digthede) (2)

6.3 Transmitted ✓, Reflected ✓, Absorbed ✓

Voortgeplant, weerkaats, geabsorbeer (3)

6.4 Total internal reflection./*Totale interne weerkaatsing*✓ (1)

6.5.1 Medium 2✓ (1)

6.5.2 When light moves from a less dense optical medium to a more dense optical medium, it is refracted towards the normal ✓✓
Wanneer lig beweeg van 'n minder optiese digte medium na 'n meer digte optiese medium, beweeg die straal nader aan die normaal (2)

6.5.3 Medium 3 ✓ (1)

6.5.4 It is the medium where total internal reflection takes place/*Dit is die medium waar totale interne weerkaatsing plaasvind* ✓✓ (2)

6.6 Medium 3 is more dense than medium 4/ *Medium 2 is meer dig as medium 3*✓(1)

6.7.1
- Light must travel from a more dense optical medium to a less dense optical medium./*Lig moet beweeg van 'n meer optiese digte medium na 'n minder optiese digte medium* ✓
- Angle of incidence must be greater than critical angle./*Invalshoek moet groter wees as die grenshoek* ✓ (2)

6.7.2 Telecommunication/*Telekomunikasie* ✓

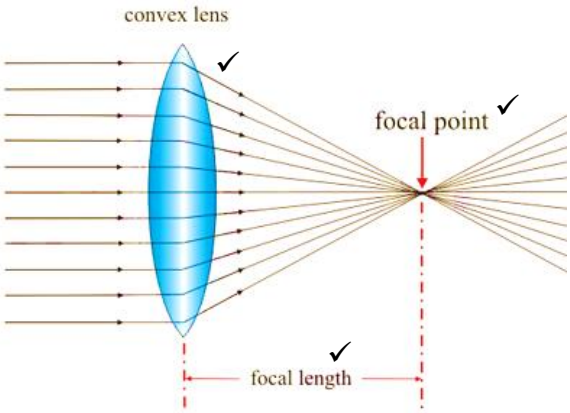
Medicine/*Medisie* ✓ (2)

QUESTION 7/*VRAAG 7*

7.1 Concave/*Konkaaf* ✓ (1)

7.2.1 They cannot see far/*Hul kan nie vêr sien nie.* ✓✓ (2)

7.2.2



(3)

7.2.3 Camera, Telescope, Binocular

Kamera, Telleskoop, Verkyker ✓✓✓ (3)

QUESTION 8/*VRAAG 8*

8.1 Changing magnetic and electric field mutually perpendicular to each other and the direction of propagation of the wave./*Verandering van magnetiese en elektriese veld loodreg tot mekaar in die rigting van die voortplanting van die golf.* ✓✓ (2)

8.2.1 Gamma rays/*Gammastrale* ✓
x-rays/*x-strale* ✓
Ultraviolet light/*Ultraviolet lig* ✓

Infrared/*Infrarooi* ✓
Microwaves/*Mikrogolwe* ✓ (5)

8.2.2 Gamma rays/*Gammastrale* ✓ (1)

8.2.3 It has the highest frequency / *Dit het die hoogste frekwensie* ✓;
according to the formula E = hf, the higher the frequency, the higher the energy of a photon / *volgens die formule E = hf, hoe hoër die frekwensie, hoe hoër die energie van die foton* ✓ (2)

8.3 Accelerating charges induce a magnetic field ✓ at right angles to the direction of their movement. This magnetic field is continuously changing ✓, since the movement of the charges is continuously changing. A changing magnetic field in turn induces a changing electric field ✓ that is perpendicular to the magnetic field./ *Vernsnellende ladings induseer 'n magneetveld teen loodregte hoeke met die rigting van hul beweging. Hierdie magneetveld verander deurlopend, aangesien die lading se beweging ook deurlopend vernander. 'n Veranderende magneetveld induseer om die beurt 'n elektriese veld loodreg met die magneetveld.* (3)

8.4 CT scans, security scanners, medical images ✓✓
CT skandering, sekeruteitskandeerders, mediese beelde (2)

8.5 Skin damage, cancer ✓✓
Beskadig vel, kanker (2)

8.6

OPTION 1/ *OPSIE 1*

$C = f.\lambda$

3×10^{8} ✓ $= 800 \times 10^{-12} . \lambda$ ✓ ✓

$f = 1.82 \times 10^{6}$ Hz

$E = h.f$

$= 6.63 \times 10^{-34} . 1.82 \times 10^{6}$ ✓

$= 2.08 \times 10^{-7}$ J ✓

OPTION 2/ *OPSIE 2*

$E = \frac{hc}{\lambda}$ ✓

$= \frac{6.63 \times 10^{-34} \ (3 \times 10^{8})}{800 \times 10^{-12}}$ ✓ ✓ ✓

$= 2.08 \times 10^{-7}$ J ✓

8.7 Smaller than / *Kleiner as* ✓ (1)

8.8.1 Infrared / *Infrarooi* ✓ (1)

8.8.2 Ultraviolet / *Ultraviolet lig* ✓ (1)

[25]
[150]