GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

GAUTENGSE DEPARTEMENT VAN ONDERWYS

PROVINCIAL EXAMINATION

PROVINSIALE EKSAMEN

JUNE / *JUNIE* 2016

GRADE/*GRAAD* 10

PHYSICAL SCIENCES / *FISIESE WETENSKAPPE*

PAPER 1 / *VRAESTEL* 1

MEMORANDUM

7 pages / *7 bladsye*

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PROVINCIAL EXAMINATION /
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PHYSICAL SCIENCES / *FISIESE WETENSKAPPE*
(Paper 1 / *Vraestel 1*)

MEMORANDUM

ANSWER SHEET / *ANTWOORDBLAD*

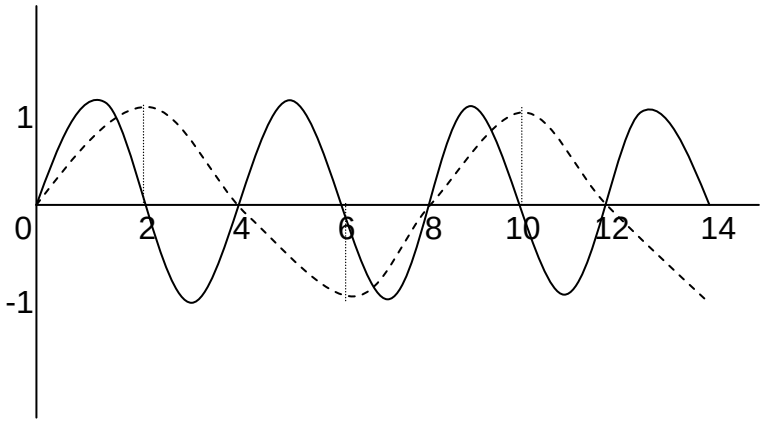
SECTION A /*AFDELING A*

QUESTION 1 / *VRAAG 1*

1.1	D	✓✓	1.6	A	✓✓
1.2	B	✓✓	1.7	C	✓✓
1.3	C	✓✓	1.8	A / B / C	✓✓
1.4	A	✓✓	1.9	C	✓✓
1.5	C	✓✓	1.10	B	✓✓

[20]

3.1



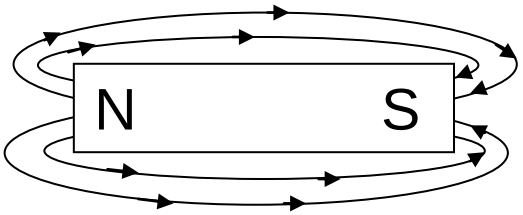
✓✓ amplitude
✓✓ double wavelength / *dubbele golflengte*

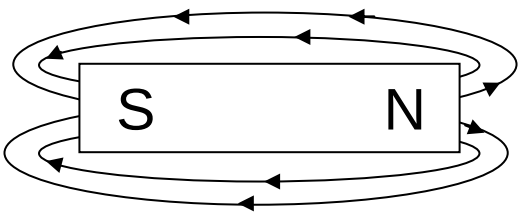
(4)

5.3.1

Marking guideline	***Merk riglyne***
Field lines Do not cross✓	*Veldlyne Oorkruis mekaar nie*✓
Arrows from *N → S*✓	*Pyltjies N → S*✓
Shape of field lines around bar magnets✓	*Vorm van veldlyne om die staafmagnete*✓

(3)





QUESTION 2 / *VRAAG 2*

2.1
A Wavelength / *Golflengte* ✓
B Crest / *Kruin* ✓
C Amplitude / *Amplitude* ✓
D Trough / *Trog* ✓ (4)

2.2 2.2.1 Transverse wave / *Transversale golf* ✓ (1)

2.2.2 It starts at 2 and ends at 4 ✓ (2 and 4 must be present for 1 mark // *2 en 4 moet teenwoordig wees vir 1 punt*) (1)

2.2.3 (a) $f = \frac{1}{T}$

$= \frac{1}{1}$

= 1 Hz ✓✓ (2)

Frequency is 1 cycle per second
Frekwensie is 1 siklus per sekonde

Answer + Unit
Antwoord + Eenheid

OPTION 2

$f = \frac{\text{number of waves}}{\text{time}}$

$f = \frac{2,5}{2,5}$

= 1 Hz

(b) $T = \frac{1}{f}$

= 1 second / *sekonde* ✓✓ (2)

Answer + Unit
Antwoord + Eenheid

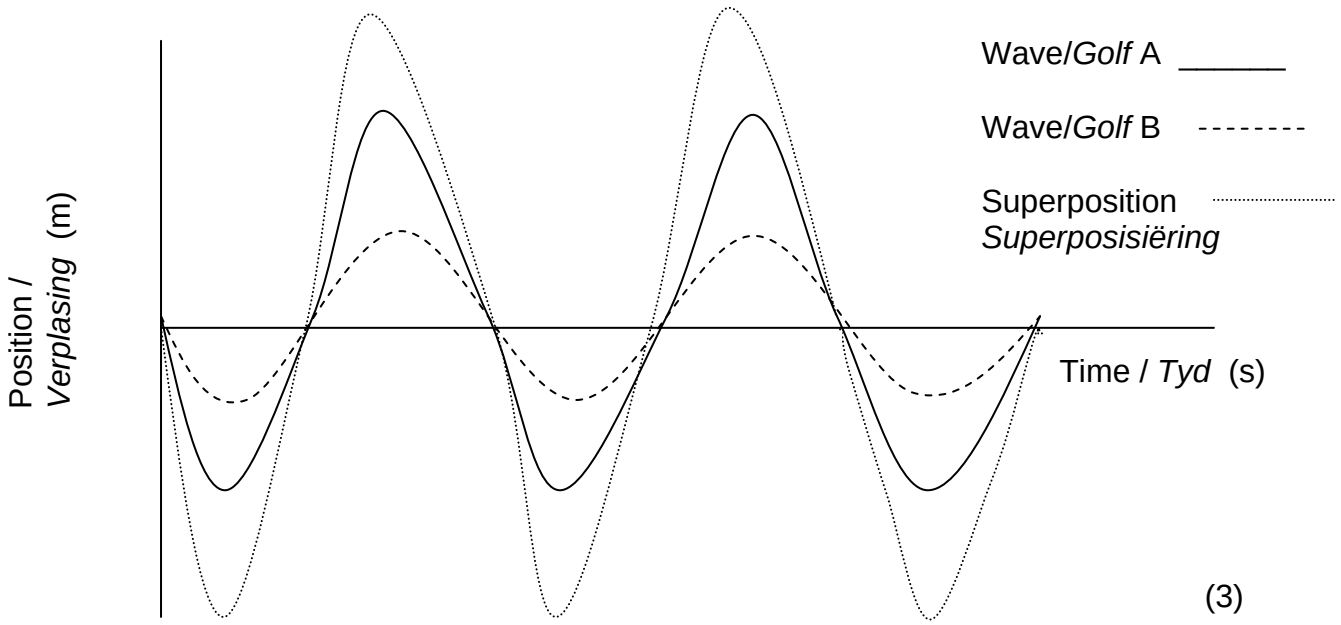
(c) Amplitude = $\frac{20\times10^{-2}}{2}$

= 0,1m ✓✓✓ (3)

Accept: 10cm
Aanvaar: 10cm

Answer + Unit
Antwoord + Eenheid

2.2.4



(3)

✓ Complete 2½ waves must be drawn / *2½ Voltooide golwe moet geteken wees*
✓✓ Amplitude must be greater than **wave A and B** / *Amplitude moet groter as **golf A en B** wees*

2.2.5 Constructive Interference ✓ / *Konstruktiewe interferensie* ✓ (1)

2.2.6 Superposition of pulses ✓ / *Superposisïering van pulse* ✓

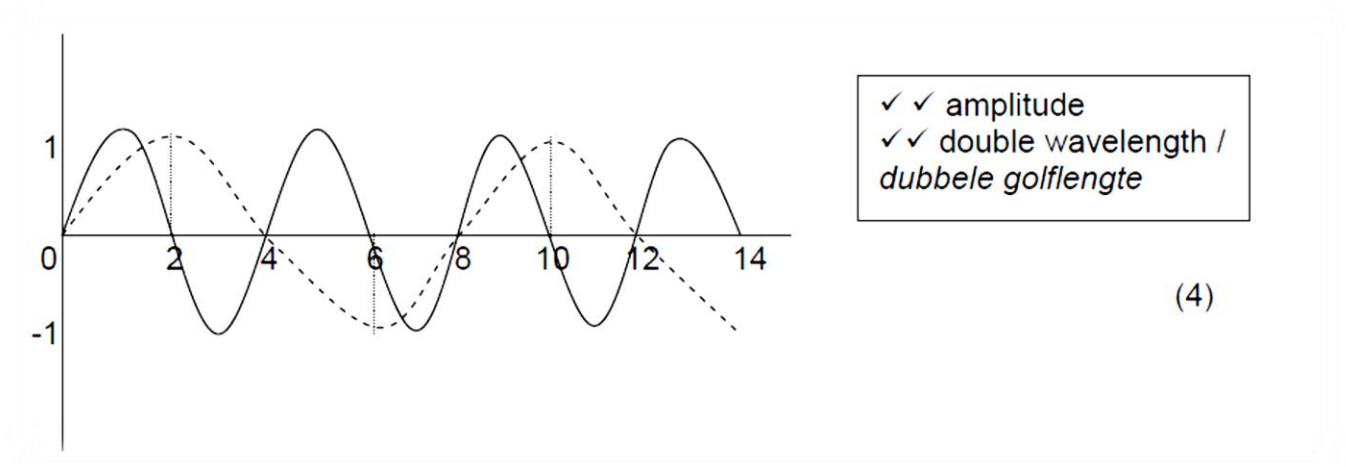
The addition of the disturbances of the two pulses that occupy the same space at the same time ✓✓

Die som van die versteuring van die twee pulse wat in dieselfde tyd dieselfde spasie beslaan ✓✓ (3)

[20]

QUESTION 3 / *VRAAG 3*

3.1 Answer sheet / *Antwoordblad*



✓✓ amplitude
✓✓ double wavelength / *dubbele golflengte*

(4)

3.2 $v = \frac{\Delta x}{t}$ ✓

$\Delta x = (345)(\frac{0,15}{2})$ ✓

= 25,875 m
= 25,88 m } ✓

Answer + Unit
Antwoord + Eenheid

(3)

3.3 Rarefaction / *Verdunning*

Compression / *Verdigting*

(4)
[11]

Shape / *Vorm* ✓✓
Rarefaction / *verdunning* ✓
Compression / *verdigting* ✓
IGNORE AMPLITUDE / *IGNOREER AMPLITUDE*

QUESTION 4 / *VRAAG 4*

ANY TWO

4.1 * Wave-particle duality ✓ / *Golf-deeltjie model* ✓
* No need for a medium to propagate ✓/ *Benodig nie 'n medium om voort te plant nie* ✓
***** Speed of EM waves are constant at 3 x 10^8m.s^{-1} in a vacuum ✓/ *Die spoed van EM golwe bly konstant teen 3 x 10^8m.s^{-1} in 'n vakuum* ✓
***** Oscillation between alternating accelerating charges cause magnetic waves ✓ / *Ossilasie tussen afwisselende versnellende ladings wat magnetiese golwe veroorsaak* ✓ (2)

4.2 An accelerating electric charge ✓✓ ✓.

Versnellende elektriese lading ✓✓ ✓ (3)

4.3 OPTION 1 / *OPSIE 1*:

$E = \frac{hc}{\lambda}$ ✓

$= \frac{(6{,}63 \times 10^{-34})(3 \times 10^8)}{(100 \times 10^{-3})}$ ✓

= 1,989 x 10^{-24} J
= 1,99 x 10^{-24} J ✓

Answer + Unit
Antwoord + Eenheid

OPTION 2 / *OPSIE 2*:

$c = f\lambda$
$3 \times 10^8 = f(100 \times 10^{-3})$ ✓
$f = 3 \times 10^9 Hz$

$E = hf$ ✓
$= (6{,}63 \times 10^{-34})(3 \times 10^9)$ ✓
= 1,989 x 10^{-24} J
= 1,99 x 10^{-24} J ✓ (4)

4.4 4.4.1 X-rays ✓ / *X-strale* ✓

It has shortest wavelength ✓ / *Dit het die kortste golflengte* ✓
OR / *OF*
It has the highest frequency in the table ✓ / *Dit het die hoogste frekwensie in die tabel* ✓ (2)

4.4.2

$E = \frac{hc}{\lambda}$ ✓

$6{,}63 \times 10^{-19} = \frac{(6{,}63 \times 10^{-34})(3 \times 10^8)}{\lambda}$ ✓
$\lambda = 3 \times 10^{-7}\ m$ ✓

Answer + Unit
Antwoord + Eenheid

∴ Ultraviolet light✓ / *Ultraviolet lig* ✓ (4)

4.5 4.5.1 * UV has the highest frequency that penetrates into the eyes
* Cause cataracts
} any ✓

**UV het die hoogste frekwensie wat in die oë penetreer*
**Veroorsaak katarakte*
} *enige* ✓ (1)

4.5.2 High frequency kills microbes and sterilises food ✓
Hoë frekwensie maak mikrobe dood en steriliseer voedsel ✓ (1)
[17]

QUESTION 5 / VRAAG 5

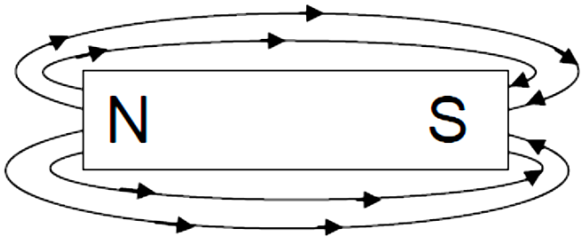
5.1 It is the space where a magnet / ferromagnetic material will experience a force ✓✓.
Dit is die ruimte waar 'n magneet / 'n voorwerp gemaak van 'n magnetiese stof, 'n krag sal ondervind ✓✓. (2)

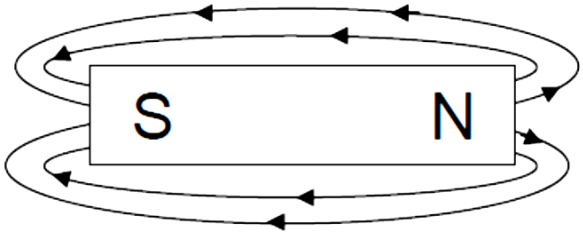
5.2 S (South / *Suid*) ✓ (1)

5.3 Answer sheet / *Antwoordblad*

Marking guideline	***Merk riglyne***
Field lines Do not cross✓ Arrows from *N* → *S*✓ Shape of field lines around bar magnets✓	*Veldlyne Oorkruis mekaar nie*✓ *Pyltjies N* → *S*✓ *Vorm van veldlyne om die staafmagnete*✓

(3)





5.4 Decrease ✓

Negative marking

As the distance between the magnets increases the magnetic field weakens ✓✓.

OR

When the magnetic field lines are far apart, the magnetic field is weak ✓✓

Afneem ✓

Negatiewe merk

Soos die afstand tussen die magnete vermeerder, sal die magnetiese veld verswak ✓ ✓.

OF

Wanneer die magnetiese veldlyne ver van mekaar is, is die magnetiese veld swak ✓✓

(3)
[9]

QUESTION 6 / *VRAAG 6*

6.1 They are opposite / unlike charges ✓✓(attract each other / experience a force of attraction)
Hulle is teenoorgestelde / verskillende ladings ✓✓(trek mekaar aan / ondervind 'n aantrekkingskrag) (2)

6.2

<u>OPTION / OPSIE 1:</u>

$Q = \frac{Q1+Q2}{2}$ ✓

$= \frac{(-2,4\ nC)\ +(+5,6nC)}{2}$

$= +1,6\ nC$ ✓

Answer + Unit
Antwoord + Eenheid

<u>OPTION / OPSIE 2:</u>

$Q = \frac{Q1+Q2}{2}$ ✓

$= \frac{(-2,4\times10^{-9}) +(5,6\times10^{-9})}{2}$

$= +1,6 \times 10^{-9}C$ ✓ (2)

6.3 $Q = nq_e$
$-1,6 \times 10^{-9} = n(-1,6 \times 10^{-19})$
$n = 1 \times 10^{10}$ electrons / *elektrone* ✓✓ (2)

6.4 P to Q ✓ / *P na Q* ✓ (1)

6.5

Negative marking from 6.4

Excess electrons can move from (more) <u>negative</u> to (more) <u>positive</u> ✓✓ / *Oortollige elektrone kan beweeg van (meer) <u>negatief</u> na (meer) <u>positief</u>*✓✓

(2)
[9]

QUESTION 7 / *VRAAG 7*

7.1 To compare the effective resistance✓ of resistors in a parallel and series circuit ✓
OR
To determine whether resistors connected as potential dividers✓ have a lower/higher effective resistance ✓
OR
To determine whether resistors connected as current dividers✓ have a lower/higher effective resistance✓ (2)

Om die effektiewe weerstand van resistors ✓in 'n parallel en serie stroombaan te vergelyk ✓
OF
Om te bepaal of die resistors wat as potensiaal verdelers ✓gekonnekteer is, 'n verminderde/verhoogde effektiewe weerstand het. ✓
OF
Om te bepaal of die resistors wat as stroomverdelers ✓gekonnekteer is, 'n verminderde/verhoogde effektiewe weerstand het ✓

7.2 7.2.1 Magnitude / number of resistors / temperature ✓
Waarde / aantal resistors(weerstande) / temperatuur ✓ (1)

7.2.2 Connection of resistors ✓ / *Skakeling van die resistors ✓* (1)

7.3 Any of the following: ✓
* Measure the total current in the circuit
* Has negligible resistance

Enige van die volgende: ✓
** Meet die totale stroom wat deur die stroombaan vloei*
** Het weglaatbare weerstand* (1)

7.4 $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ ✓
$= \frac{1}{2} + \frac{1}{5} + \frac{1}{15}$ ✓
$= \frac{15+6+2}{30}$
$= \frac{23}{30}$
$R_T = 1{,}30\ \Omega$ ✓

Answer + Unit
Antwoord + Eenheid

(3)

7.5 7.5.1 $Q = It$ ✓
$2{,}3 = I(420)$ ✓
$I = 5{,}47619 \ldots \times 10^{-3}\ A$
$I = 5{,}48 \times 10^{-3}\ A$ ✓

Answer + Unit
Antwoord + Eenheid

(3)

7.5.2 $V = \frac{W}{Q}$ ✓

$= \frac{30}{2,3}$ ✓

$= 13,04\text{V}$ ✓

Answer + Unit
Antwoord + Eenheid

(3)
[14]