

**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

**GAUTENG DEPARTMENT OF EDUCATION /
GAUTENGSE DEPARTEMENT VAN ONDERWYS**

**PROVINCIAL EXAMINATION /
PROVINSIALE EKSAMEN**

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

MEMORANDUM

ANSWER SHEET / ANTWOORDBLAD

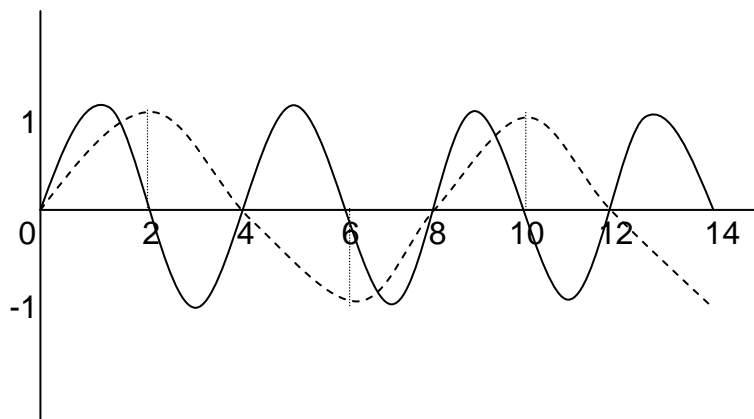
SECTION A / AFDELING A

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



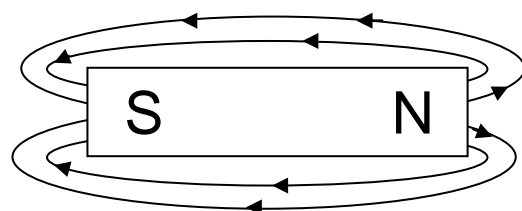
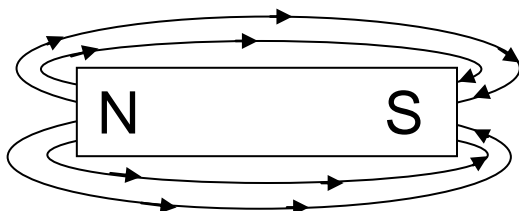
✓✓ amplitude
✓✓ double wavelength / dubbele golflengte

(4)

5.3.1

<u>Marking guideline</u>	<u>Merk riglyne</u>
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) $f = \frac{1}{T}$
 $= \frac{1}{1}$
 $= 1 \text{ Hz}$ ✓✓

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

(2)

Answer + Unit
Antwoord + Eenheid

OPTION 2

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

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

$$= 1 \text{ Hz}$$

(b) $T = \frac{1}{f}$
 $= 1 \text{ second / sekonde}$ ✓✓

Answer + Unit
Antwoord + Eenheid

(2)

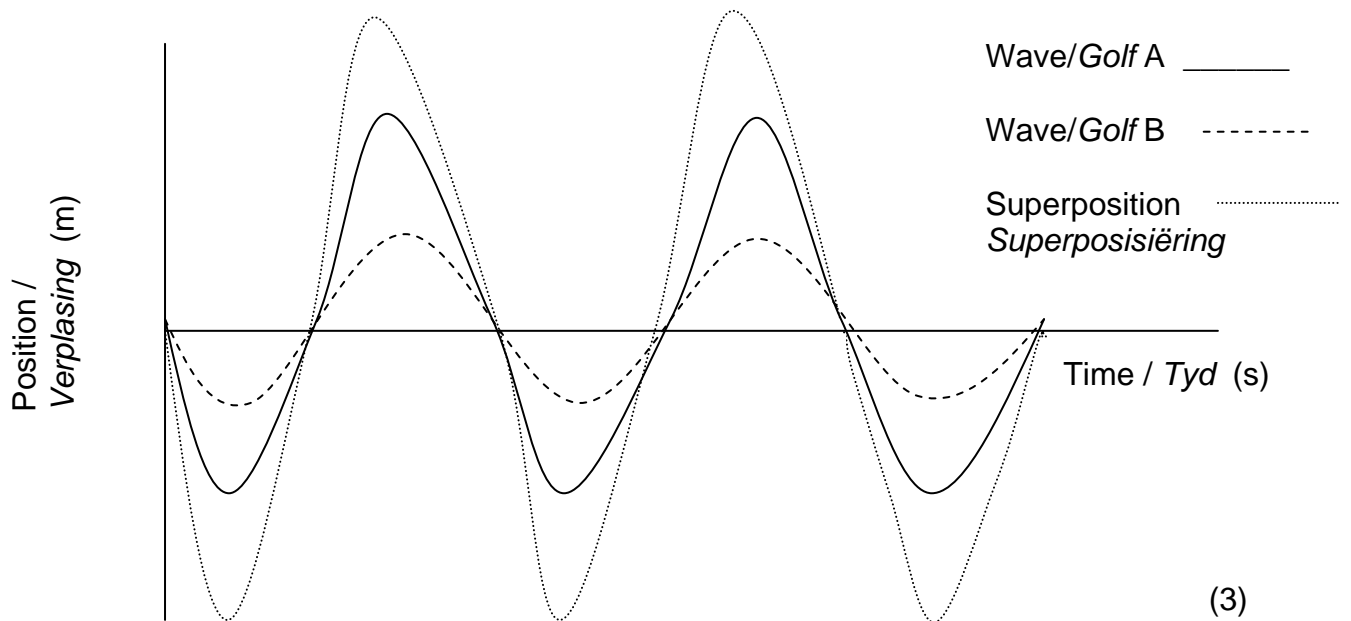
(c) Amplitude = $\frac{20 \times 10^{-2}}{2}$
 $= 0,1 \text{ m}$ ✓✓✓

Accept: 10cm
Aanvaar: 10cm

(3)

Answer + Unit
Antwoord + Eenheid

2.2.4



✓ Complete $2\frac{1}{2}$ waves must be drawn / $2\frac{1}{2}$ 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 ✓ / Superposisiëring van pulse ✓

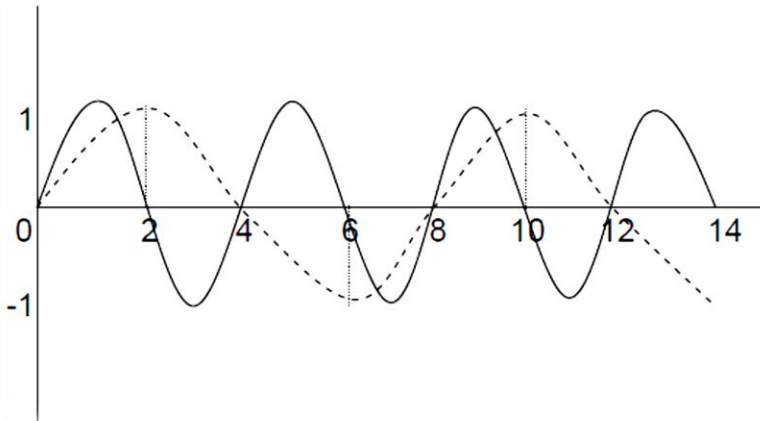
The addition of the disturbances of the two pulses that occupy the same space at the same time ✓✓

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 $v = \frac{\Delta x}{t}$ ✓

$\Delta x = (345) \left(\frac{0,15}{2}\right)$ ✓

= 25,875 m

= 25,88 m } ✓

Answer + Unit
 Antwoord +
 Eenheid

(3)

Rarefaction / Verdunning

3.3



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 $3 \times 10^8 \text{m.s}^{-1}$ in a vacuum ✓ / *Die spoed van EM golwe bly konstant teen $3 \times 10^8 \text{m.s}^{-1}$ 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:

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

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

$$= 1,989 \times 10^{-24} \text{ J} \quad \checkmark$$

$$= 1,99 \times 10^{-24} \text{ J} \quad \checkmark$$

Answer + Unit
 Antwoord +
 Eenheid

OPTION 2 / OPSIE 2:

$$c = f\lambda$$

$$3 \times 10^8 = f(100 \times 10^{-3}) \quad \checkmark$$

$$f = 3 \times 10^9 \text{ Hz}$$

$$E = hf \quad \checkmark$$

$$= (6,63 \times 10^{-34})(3 \times 10^9) \quad \checkmark$$

$$= 1,989 \times 10^{-24} \text{ J}$$

$$= 1,99 \times 10^{-24} \text{ J} \quad \checkmark$$

- 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

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

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

$$\lambda = 3 \times 10^{-7} \text{ m} \quad \checkmark$$

Answer + Unit
 Antwoord +
 Eenheid

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

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

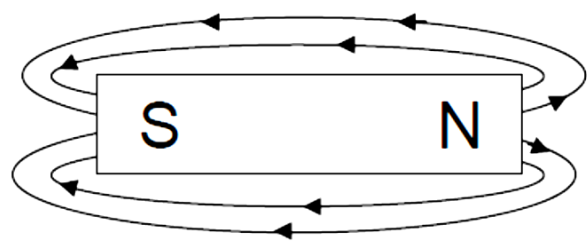
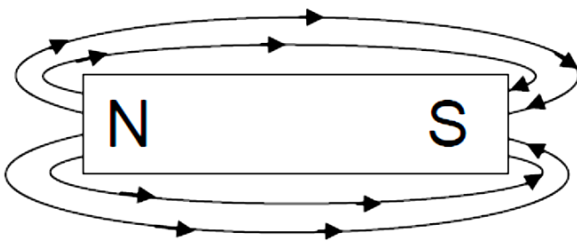
*UV het die hoogste frekwensie wat in die oë penetreer } enige ✓
 *Veroorsaak katarakte (1)

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

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

<u>Marking guideline</u>	<u>Merk riglyne</u>
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 ✓



- 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 OPTION / OPSIE 1:

$$Q = \frac{Q_1 + Q_2}{2} \quad \checkmark$$

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

$$= +1,6 \text{ nC} \quad \checkmark$$

Answer + Unit
Antwoord +
Eenheid

OPTION / OPSIE 2:

$$Q = \frac{Q_1 + Q_2}{2} \quad \checkmark$$

$$= \frac{(-2,4 \times 10^{-9}) + (5,6 \times 10^{-9})}{2}$$

$$= +1,6 \times 10^{-9} \text{ C} \quad \checkmark$$

(2)

6.3 $Q = nq_e$

$$-1,6 \times 10^{-9} = n(-1,6 \times 10^{-19})$$

$$n = 1 \times 10^{10} \text{ electrons / elektrone} \quad \checkmark \checkmark$$

(2)

6.4 P to Q ✓ / P na Q ✓

(1)

6.5

Negative marking
from 6.4

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

(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 effektiwe 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 effektiwe weerstand het. ✓

OF

Om te bepaal of die resistors wat as stroomverdelers ✓ gekonnekteer is, 'n verminderde/verhoogde effektiwe 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
$$\begin{aligned} \frac{1}{R_T} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad \checkmark \\ &= \frac{1}{2} + \frac{1}{5} + \frac{1}{15} \quad \checkmark \\ &= \frac{15+6+2}{30} \\ &= \frac{23}{30} \\ R_T &= 1,30 \Omega \quad \checkmark \end{aligned}$$

Answer + Unit
 Antwoord +
 Eenheid

(3)

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

Answer + Unit
 Antwoord +
 Eenheid

(3)

PHYSICAL SCIENCES FISIESE WETENSAPPE (Paper 1 / Vraestel 1)	GRADE 10 GRAAD 10	10
--	------------------------------------	-----------

$$\begin{aligned} 7.5.2 \quad V &= \frac{W}{Q} \quad \checkmark \\ &= \frac{30}{2,3} \quad \checkmark \\ &= 13,04V \quad \checkmark \end{aligned}$$

Answer + Unit <i>Antwoord + Eenheid</i>
--

(3)
[14]