NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

NOVEMBER 2019

PHYSICAL SCIENCES (PHYSICS) P1/ *FISIESE WETENSKAPPE (FISIKA) V1* MARKING GUIDELINE/*NASIENRIGLYN* EXEMPLAR/*EKSEMPLAAR*

MARKS/*PUNTE*: **150**

This marking guideline consists of 12 pages./
Hierdie nasienriglyn bestaan uit 12 bladsye.

QUESTION 1/*VRAAG* 1

1.1 B ✓✓ (2)

1.2 D ✓✓ (2)

1.3 B ✓✓ (2)

1.4 B ✓✓ (2)

1.5 B ✓✓ (2)

1.6 D ✓✓ (2)

1.7 A ✓✓ (2)

1.8 A ✓✓ (2)

1.9 C ✓✓ (2)

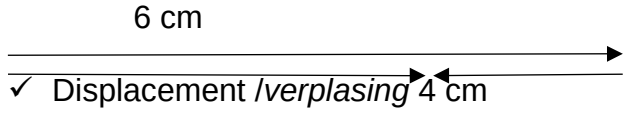
1.10 B ✓✓ (2)

[20]

QUESTION 2/*VRAAG* 2

2.1 A single vector having the same effect as two or more vectors acting together. ✓✓
'n Enkele vektor wat dieselfde effek het as twee of meer vektore wat saamwerk. (2)

2.2



Displacement/*Verplasing* = 4× 20/1 =80 m ✓east ✓ (5)

2.3 2.3.1 Total distance/*Totale afstand* = 160 m ✓✓ (2)

2.3.2 **Positive marking from 2.2/*Positiewe nasien vanaf 2.2.***

Average speed/*gemiddelde spoed* $= \frac{total\ \ distance\,/\,totale\ \ afstand}{total\ \ time\,/\,total\ \ tyd}$ ✓

$= \frac{160}{300}$ ✓

$v = 0{,}53\ m{\cdot}s^{-1}$ ✓ (3)

[12]

QUESTION 3/*VRAAG* 3

3.1 Acceleration is the rate of change of velocity. ✓✓
Versnelling is die tempo van verandering in snelheid. (2)

3.2 3.2.1 $v = 0\ m \cdot s^{-1}$ ✓ (1)

3.2.2 SOUTH/*Suid* ✓ (1)

3.2.3 $a = 0$ ✓ (1)

3.3 3.3.1 Acceleration/*versnelling* = gradient/*gradiënt* = $\frac{\Delta v}{\Delta t}$ ✓

$\frac{v(f) - v(i)}{t(f) - t(i)}$

$\frac{30 - 0}{3 - 0}$ ✓✓

$a = 10\ m \cdot s^{-2}$ ✓ (4)

3.3.2 Total displacement = total area under the graph
Totale verplasing = totale area onder die grafiek

$\Delta X = A_1 + A_2 + A_3 + A_4$

$\Delta X = (1/2\ b \times h) + (l \times b) + (1/2\ b \times h) + (1/2\ b \times h)$ ✓

$\Delta X = \underline{(1/2 \times 3 \times 30)}$ ✓ + $\underline{(4 \times 30)}$ ✓ + $\underline{(1/2 \times 2 \times 30)}$ ✓ + $\underline{(1/2 \times 1 \times -20)}$ ✓

$\Delta X = 45 + 120 + 30 - 10$

$\Delta X = \underline{185m}$ ✓ (in the direction of motion/*in die rigting van beweging*) (6)
[15]

QUESTION 4/*VRAAG* 4

4.1.1 $V_f = v_i + a\Delta t$ ✓

$V_f = 0 + (2)(10)$ ✓

$V_f = 20 m \cdot s^{-1}$ ✓

(3)

4.1.2

Option 1/*Opsie 1*	**Option 2/*Opsie 2*** **Positive marking from 4.1/*Positiewe nasien vanaf 4.1***	**Option 3/*Opsie 3*** **Positive marking from 4.1/*Positiewe nasien vanaf 4.1***
$\Delta x = v_i\Delta t + \frac{1}{2} a\Delta t^2$ ✓	$v_f^2 = v_i^2 + 2a\Delta x$ ✓	$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$ ✓
$\Delta x = \frac{(0)(10) + \frac{1}{2}(2)(10)^2}{}$ ✓	$20^2 = 0^2 + 2(2)\Delta x$ ✓	$\Delta x = \left(\frac{20+0}{2}\right)10$ ✓
$\Delta x = 0 + 100$	$\Delta x = 100$ m ✓	$\Delta x = 100$ m ✓
$\Delta x = 100$m ✓		

(3)

4.2 $V_f^2 = v_f^2 + 2a\Delta x$ ✓

$\underline{(2v_i)^2}$ ✓ = $\underline{v_i^2 + 2(5)(3500)}$ ✓

$4v_i^2 = v_i^2 + 35\,000$

$3v_i^2 = 35\,000$

$V_i^2 = 11\,666.67$

$V_i = 108{,}01 \ m \cdot s^{-1}$

$V_f = v_i + a\Delta t$

216,02 ✓ = $\underline{108{,}01 + (5)\Delta t}$ ✓

$5\Delta t = 108{,}01$

$\Delta t = 21{,}60$ s ✓

(6)

[12]

QUESTION 5/*VRAAG* 5

5.1 Mechanical energy/*Meganiese energie* ✓ (1)

5.2 E_m (A) = E_k(A) + E_p(A)
= ½ mv^2 + mgh ✓
= ½ (2)$(10)^2$ ✓ + (2(9,8)(30) ✓
= 149,6 J ✓ (4)

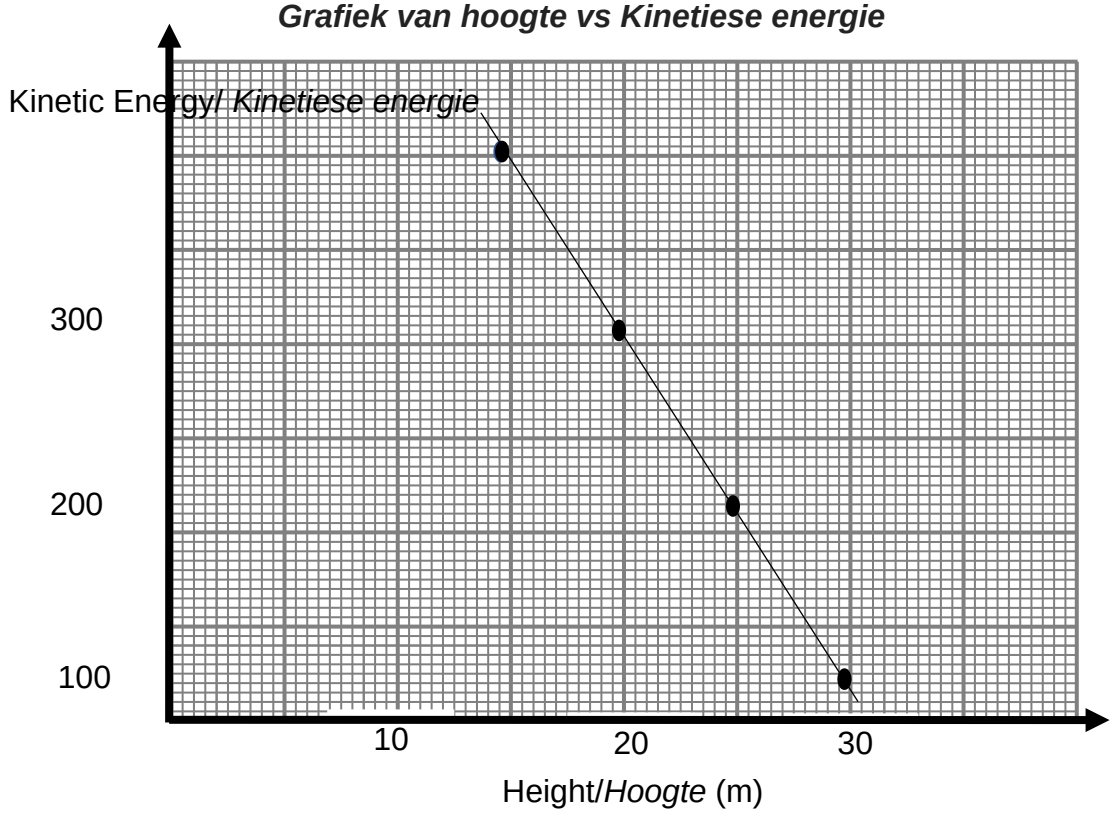
5.3 E_m (A) = E_m (B)
$(½ mv^2 + mgh)_A = (½ mv^2 + mgh)_B$ ✓
149,6 ✓ = ½ (2)v^2 + (2)(9,8)(0) ✓
v = 12,23 $m \cdot s^{-1}$ ✓ (4)

5.4 The principle of conservation of mechanical energy ✓ states that the total mechanical energy in an isolated system remains constant. ✓✓
Die beginsel van die behoud van meganiese energie stel dat die totale meganiese energie in 'n geïsoleerde stelsel konstant bly (3)

5.5

Marking guide/*Nasienriglyn*
Correct shape (STRAIGHT LINE)/*Korrekte vorm (REGUIT LYN)* ✓
All points plotted correctly/*Al die punte korrek aangedui* ✓✓
If at least 2 points plotted correctly/*As ten minste 2 punte korrek aangedui is* 1/2

Graph of height vs Kinetic energy/
Grafiek van hoogte vs Kinetiese energie



(3)
[15]

QUESTION 6/*VRAAG* 6

6.1 Pulse is a single disturbance in a medium ✓✓ /
Pols is 'n enkele steuring in 'n medium. (2)

6.2 Up/*Af* ✓ (1)

6.3 6.3.1 T = 1/f ✓
= 1/30 ✓
= 0,033

Δt = 0,033 x 3 ✓
Δt = 0,10 s ✓ (4)

6.3.2 Wavelength/*Golflengte*(m) = 12/3 ✓
= 4 m ✓ (2)

6.3.3

Option 1/*Opsie 1* **Positive marking from 6.3.2/*Positiewe nasien vanaf 6.3.2***	**Option 2/*Opsie 2***	**Option 3/*Opsie 3*** **Positive marking from 6.3.1 and 6.3.2/ *Positiewe nasien vanaf 6.3.1 en 6.3.2***
v = fλ ✓ = (30)(4) ✓ V = 120 m·s^{-1} ✓	Δx = vΔt ✓ 12 = v(0.10) ✓ V = 120 m·s-1 ✓	V= $\frac{\lambda}{T}$ ✓ V= $\frac{4}{0,033}$ ✓ V=121, 21 m·s^{-1} ✓

(3)
[12]

QUESTION 7/*VRAAG* 7

7.1 7.1.1

$\Delta x = v\Delta t$ ✓

$85 = v(0,25)$ ✓

$v = 340\ m \cdot s^{-1}$ ✓

OR / *OF*

$\Delta x = v\Delta t$ ✓

$170 = v(0,5)$ ✓

$V = 340\ m \cdot s^{-1}$ ✓ (3)

7.1.2 **Positive marking from 7.1.1/ *Positiewe nasien vanaf 7.1.1.***

$v = f\lambda$ ✓

$340 = (100)\lambda$ ✓

$\lambda = 3,40\ m$ ✓ (3)

7.2 7.2.1 Ultrasound refers to sound with a frequency of 20 kHz to 100 kHz ✓✓/
Ultraklank verwys na klank met 'n frekwensie van 20 kHz tot 100 kHz (2)

7.2.2
- Detecting invisible cracks in the wings of aircraft ✓
- *Opsporing van onsigbare krake in die vlerke van vliegtuie.*

OR / *OF*

- Determining the thickness of metals/plastic ✓
- *Bepaal die dikte van metale/plastiek*

OR / *OF*

- Cleaning delicate mechanisms of old-fashioned clocks ✓
- *Om delikate meganismes van outydse horlosies skoon te maak* (1)

7.2.3 Ultrasound does not damage the soft tissue of human organs. ✓✓/
Ultraklank beskadig nie die sagte weefsel van menslike organe nie. (2)

[11]

QUESTION 8/*VRAAG* 8

8.1 8.1.1 Infra-red/*infrarooi* ✓ (1)

8.1.2 Sun/*Son* ✓

OR/*OF*

Gas discharge tube/*Gasafvoerbuis* ✓ (1)

8.2 $E = h\frac{c}{\lambda}$ ✓

$E = (6.63 \times 10^{-34})\frac{3 \times 10^{8}}{4 \times 10^{-5}}$ ✓✓

$E = 4.97 \times 10^{-28}\ J$ ✓ (5)

8.3 8.3.1 **B**, ✓
- **B** has a highest energy/frequency than ultraviolet ✓✓/
- ***B*** *het die hoogste energie/frekwensie as ultraviolet* (3)

8.3.2 Type of (electromagnetic) radiation ✓
Tipe (elektromagnetiese) straling

OR/*OF*

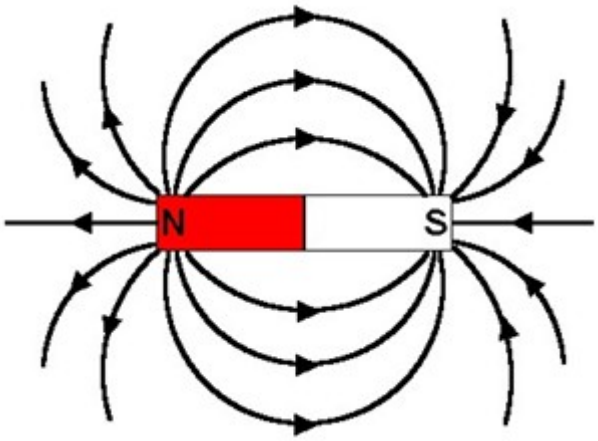
Frequency (of electromagnetic radiation) ✓
Frekwensie (van elektromagnetiese straling (1)

8.3.3 Fair test ✓✓ **OR** fair investigation **OR** to have one independent variable/
*Billike toets **OF** billike ondersoek **OF** om een onafhanklike veranderlike te hê.* (2)

[13]

QUESTION 9/*VRAAG* 9

9.1



Poles are correctly labelled/*Pole is korrect*	✓
Field lines with arrows/*Veldlyne met pyle*	✓
Correct pattern/*Korrekte patroon*	✓

(3)

9.2 ATTRACTION/*AANTREKKINGKRAG* ✓ (1)

9.3.1 YES/*JA* ✓ (1)

9.3.2 NO, ✓ They repel each other or same poles of magnet ✓/
NEE, *hulle stoot mekaar of dieselfde magneetpole.* (2)

9.4 Earth's magnetic field deflects charged particles ✓ which would harm the ozone layer./
Die Aarde se magnetiese veld reflekteer gelaaide deeltjies af wat die osoonlaag kan benadeel.
Ozone layer protects Earth from ultraviolet strays. ✓/
Osoonlaag beskerm die Aarde teen ultravioletstrale. (2)
[9]

QUESTION 10/*VRAAG* 10

10.1 **A** ✓ (1)

10.2 ELECTRIC/*ELEKTRIES* ✓ (1)

10.3 To prevent charge leakage/*Om ladinglek te voorkom* ✓✓ (2)

10.4 10.4.1 States that the net charge of an isolated system remains constant during any physical process. ✓✓/
Stel dat die netto lading van 'n geïsoleerde stelsel gedurende enige fisiese proses konstant bly. (2)

10.4.2 **B** ✓ (1)

10.4.3 $Q = \frac{Q_1 + Q_2}{2}$

$\frac{(4.4 \times 10^{-9}) + (-2 \times 10^{-9}}{2}$ ✓

$Q = +1.2 \times 10^{-9}$ C

$n = \frac{\Delta Q}{q}$ ✓

$n = \frac{(1.2 \times 10^{-9}) - (4.4 \times 10^{-9})}{-1.6 \times 10^{-19}}$ ✓✓ OR = $\frac{(1.2 \times 10^{-9}) - (-2 \times 10^{-9})}{1.6 \times 10^{-19}}$ ✓✓

$n = 2 \times 10^{10}$ electrons/*elektrone* ✓ (5)

[12]

QUESTION 11/*VRAAG* 11

11.1 Electric current is the rate of flow of charges ✓✓/
Eletriesestroom is die tempo waarteen lading vloei
***Accept*/Aanvaar**
Electric current is the amount of charge passing a point per unit time. ✓✓/
Elektriesestroom is die hoeveelheid lading wat deur 'n punt gaan per eenheidstyd (2)

11.2 11.2.1 Potential difference/*Potensiaalverskil* ✓ (1)

11.2.2 Electric current/*Elektriesestroom* ✓ (1)

11.3 11.3.1 $R_{\parallel} = \frac{R_1 \times R_2}{R_1 + R_2}$ ✓

$= \frac{6 \times 12}{6 + 12}$ ✓

= 4 Ω ✓

OR/OF 1/Rp = $1/R_1 + 1/R_2$
= 1/6 +1/12

Rp = 4 Ω (3)

11.3.2 **Positive marking from 11.3.1/*Positiewe nasien vanaf 11.3.1.***
$R_{\parallel} = R_s + R_{\parallel}$

= 18 + 4

= 22 Ω ✓✓ (2)

11.3.3

Option 1/*Opsie 1*	**Option 2/*Opsie 2***
V = IR V = (1)(6) ✓ V = 6 V $I = \frac{V}{R}$ $I = \frac{6}{4}$ ✓ I =1,5 A I = Q /Δt ✓ 1,5 = Q/5 ✓ Q = 7,5 C ✓	$I_{12\,\Omega}$ = 0,5 A✓ I_{A2} = 1 + 0,5 = 1,5 A✓ I = Q /Δt✓ 1,5 = Q/5 ✓ Q = 7,5 C ✓

(5)

11.4 EQUAL TO ✓ /*GELYK AAN*
Resistors in parallel work under the same potential difference ✓✓/
Weerstande in parallel werk onder dieselfde potensiële verskil. (3)

11.5 INCREASE/*TOENEEM* ✓✓ (2)
[19]

TOTAL/*TOTAAL*: 150