



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE
NASIONALE SENIOR
SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2018

**TECHNICAL SCIENCES P1
TEGNIESE WETENSKAPPE V1
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 10 pages.
Hierdie nasienriglyn bestaan uit 10 bladsye.

**QUESTION/VRAAG 1: (MULTIPLE-CHOICE QUESTIONS/
MEERVOUDIGEKEUSE-VRAE)**

1.1	C	✓✓	(2)
1.2	B	✓✓	(2)
1.3	B	✓✓	(2)
1.4	C	✓✓	(2)
1.5	B	✓✓	(2)
1.6	C	✓✓	(2)
1.7	D	✓✓	(2)
1.8	B	✓✓	(2)
1.9	A	✓✓	(2)
1.10	D	✓✓	(2)
			[20]

QUESTION/VRAAG 2

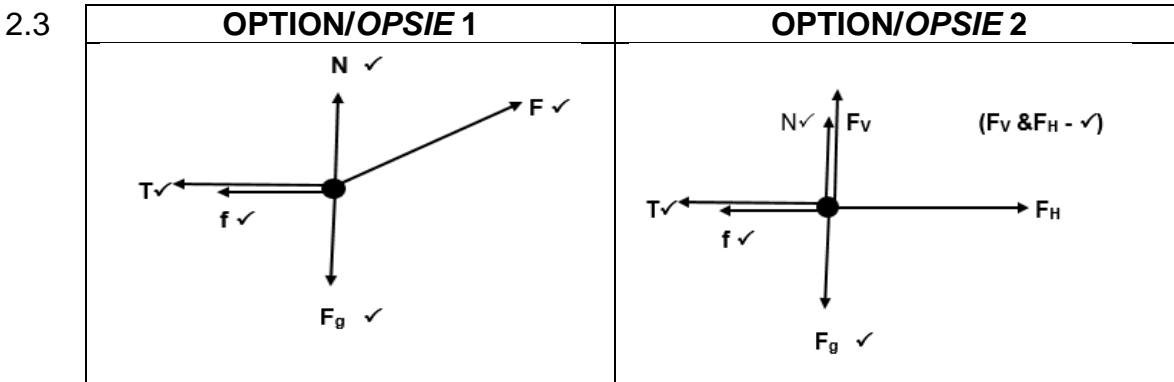
2.1 When a non-zero resultant force acts on an object, the object will accelerate in the direction of the resultant force. This acceleration is directly proportional to the force and inversely proportional to the mass of the object. ✓✓

Indien 'n nie-nul resulterende krag op 'n voorwerp toegepas word, versnel die voorwerp in die rigting van die resulterende krag. Hierdie versnelling is direk eweredig aan die krag en omgekeerd eweredig aan die massa van die voorwerp. ✓✓

(2)

2.2 Tension/Spansing (T) ✓
Applied force/Toegepaste krag (F) ✓
Force of friction/Wrywingskrag ✓
(Any TWO/Enige TWEE)

(2)



(5)

2.4 **On block A/Op blok A**

$$F_{net} = ma \quad \checkmark$$

$$F \cos \theta - T - f_{kA} = ma$$

$$(500)(\cos 30^\circ) - T - 8.8 \quad \checkmark = (30)(a) \quad \checkmark$$

$$424.21 - T = 30a \quad \dots\dots\dots(1)$$

On block B/Op blok B

$$F_{net} = ma$$

$$T - f_{kB} = 20a \quad \checkmark$$

$$T - 39.4 = 20a$$

$$T = 39.4 + 20a \quad \dots\dots\dots(2)$$

Subs/Stel (2) in (1)

$$424.21 - (39.4 + 20a) = 30a \quad \checkmark$$

$$a = 7.70 \text{ m}\cdot\text{s}^{-2} \quad \checkmark$$

(6)

2.5

OPTION/OPSIE 1	OPTION/OPSIE 2
N.B. Positive marking from 2.4 N.B. Positiewe nasien vanaf 2.4.	
$T = 39,4 + 20a \checkmark$ $T = 39,4 + (20)(7,7) \checkmark$ $T = 193,4 \text{ N} \checkmark$	$424,21 - T = 30a \checkmark$ $424,21 - T = 30(7,7) \checkmark$ $T = 424,21 - 231,0$ $T = 193,21 \text{ N} \checkmark$

(3)

2.6

Newton's Third Law/*Newton se Derde Wet.* ✓

When object A exerts a force on object B, object B simultaneously exerts an oppositely directed force of equal magnitude on object A. ✓✓

Indien voorwerp A 'n krag uitoefen op voorwerp B, oefen voorwerp B gelyktydig 'n gelyke krag op voorwerp A uit maar in die teenoorgestelde rigting. ✓✓

(3)

[21]**QUESTION/VRAAG 3**

3.1

It is the product of mass and velocity. ✓✓

Dit is die produk van massa en snelheid ✓✓

(2)

3.2

The total linear momentum in an isolated system remains constant. ✓✓

Die totale lineêre momentum in 'n geslote sisteem bly konstant. ✓✓

(2)

3.3

OPTION/OPSIE 1East is taken as positive/*Neem oos as positief.*

$$\Sigma p_i = \Sigma p_f \checkmark$$

$$m_C V_{Ci} + m_T V_{Ti} = m_C V_{Cf} + m_T V_{Tf}$$

$$(800)(33,33) \checkmark + (2500)(-19,44) \checkmark = (800+2500) (v_f) \checkmark$$

$$v_f = -6,65 \text{ m}\cdot\text{s}^{-1}$$

$$v_f = 6,65 \text{ m}\cdot\text{s}^{-1} \text{ due west/reg wes.} \checkmark$$

(5)

OPTION/OPSIE 2East is taken as positive/*Neem oos as positief.*

$$\Sigma p_i = \Sigma p_f \checkmark$$

$$m_C V_{Ci} + m_T V_{Ti} = m_C V_{Cf} + m_T V_{Tf}$$

$$(800)(120) \checkmark + (2500)(-70) \checkmark = (800+2500) (v_f) \checkmark$$

$$v_f = -23,94 \text{ km}\cdot\text{h}^{-1}$$

$$v_f = 23,94 \text{ km}\cdot\text{h}^{-1} \text{ due west/reg wes.} \checkmark$$

$$(6,65 \text{ m}\cdot\text{s}^{-1})$$

3.4 Consider the formula: $F_{\text{net}} = \frac{\Delta p}{\Delta t}$

The change in momentum (Δp) remains constant during a collision. ✓

If the contact time (Δt) is increased, the net force decreases. ✓

The airbag increases the contact time, thereby decreasing the force acting on the driver ✓ and thereby reducing the extent of injuries.

Beskou die formule: $F_{\text{net}} = \frac{\Delta p}{\Delta t}$

Die verandering in momentum (Δp) bly konstant tydens 'n botsing. ✓

Indien die kontaktyd (Δt) vermeerder word, neem die netto krag af. ✓

Die lugsak veroorsaak dat die kontaktyd toeneem en dus verminder die krag wat op die bestuurder uitgeoefen word, ✓ en dus neem die aard van die beserings af.

(3)
[12]

QUESTION/VRAAG 4

- 4.1 Work is the product of the force applied on an object and the displacement in the direction of force. ✓✓
Arbeid is die produk van die toegepaste krag op 'n voorwerp en die verplasing in die rigting van die krag. ✓✓ (2)
- 4.2 $W = F\Delta x \cos\theta$ ✓
 $W = (70)(5)(\cos 20^\circ)$ ✓
 $W = 328.89 \text{ J}$ ✓ (3)
- 4.3 Greater than/*Groter as* ✓ (1)
[6]

QUESTION/VRAAG 5

- 5.1 Rate at which energy is transferred/Rate at which work is done. ✓✓
Tempo waarteen energie omgesit word /Tempo waarteen arbeid verrig word. ✓✓ (2)
- 5.2 $P = Fv$ ✓
 $P = (100)(5)$ ✓
 $P = 500 \text{ W}$ ✓ (3)
- 5.3 At point A/*By punt A* ✓✓ (2)
- 5.4 $(E_p + E_k)_A = (E_p + E_k)_B$ ✓
 $(mgh + \frac{1}{2}mv^2)_A = (mgh + \frac{1}{2}mv^2)_B$
 $(10)(9,8)(10) + 0 = 0 + \frac{1}{2}(10)(v^2)$ ✓
 $v = 14 \text{ m}\cdot\text{s}^{-1}$. ✓ (4)
- 5.5 Law of conservation of mechanical energy. ✓
Wet van behoud van meganiese energie
 The total mechanical energy of an isolated system remains constant. ✓✓
Die totale meganiese energie van 'n geslote sisteem bly konstant. (3)
[14]

QUESTION/VRAAG 6

6.1 6.1.1 1,2 cm ✓ (1)

6.1.2 Force applied for the length of 1,7 cm = 4,2 N ✓
Krag toegepas vir die lengte van 1,7 cm = 4,2 N
 $F = mg$ ✓
 $4,2 = m(9,8)$ ✓
 $m = 0,43 \text{ kg}$ ✓ (4)

6.1.3 Strain is defined as the ratio of change in dimension to the original dimension. ✓✓
Rekking is die verhouding tussen verandering in dimensie en die oorspronklike dimensie van die voorwerp. ✓✓ (2)

6.1.4 $\epsilon = \frac{\Delta l}{L}$ ✓
 $\epsilon = \frac{0,02}{0,15}$ ✓✓
 $= 0,13$ ✓ (4)

6.2 6.2.1 Hooke's law states that within the limit of elasticity, stress is directly proportional to the strain. ✓✓
Hooke se wet: Binne die grense van elasticiteit is druk eweredig aan die rekking. ✓✓ (2)

6.2.2 $K = \frac{\sigma}{\epsilon}$ ✓
 $2 \times 10^{11} = \frac{\sigma}{3,6 \times 10^{-4}}$ ✓
 $\sigma = 7,2 \times 10^7 \text{ Pa}$ ✓ (3)

[16]

QUESTION/VRAAG 7

- 7.1 7.1.1 Pressure at a particular point is the thrust acting on the unit area around that point. ✓✓
Druk by 'n spesifieke punt is die stukrag op die eenheidsoppervlakte rondom daardie punt. ✓✓ (2)
- 7.1.2 Less than/*Kleiner as.* ✓
 Pressure increases with depth/ *Druk neem toe met diepte.* ✓
 Point 2 is deeper than Point 1/*Punt 2 is dieper as Punt 1.* ✓ (3)
- 7.1.3 Pressure of water at point 2 is higher than pressure of water at point 1. ✓✓
Die druk van die water by Punt 2 is hoër as die druk van die water by Punt 1. ✓✓ (2)
- 7.2 7.2.1 Pascal's law states that in a continuous liquid at equilibrium, the pressure applied at any point is transmitted equally to the other parts of the liquid. ✓✓
Pascal se wet: In 'n kontinue vloeistof in ewewig, word die druk wat by enige punt toegepas word, eweredig na die ander dele van die vloeistof versprei. ✓✓ (2)
- 7.2.2

$$\frac{F_1}{A_1} = \frac{F_2}{A_2} \checkmark$$

$$\frac{F_1}{0,001} \checkmark = \frac{(1\ 200)(9,8)}{0,06} \checkmark$$

$$F = 196\ \text{N} \checkmark$$
 (4)

[13]

QUESTION/VRAAG 8

8.1 A capacitor is a device for storing electrical charge. ✓✓
'n Kapasitor is 'n elektriese komponent wat elektriese energie/lading kan stoor. (2)

8.2 The high voltage across plates can cause electric shock or even death when the capacitor discharges. ✓✓
Die hoë spanning tussen die plate kan elektriese skok of selfs die dood veroorsaak as die kapasitor ontlaai. (2)

8.3 8.3.1 $C = \frac{\epsilon_0 A}{d}$ ✓
 $C = \frac{(8,85 \times 10^{-12})(2 \times 10^{-2})}{0,00003}$ ✓
 $C = 5,9 \times 10^{-11} \text{ F}$ ✓ (3)

8.3.2

N.B. Positive marking from 8.3.1
N.B. Positiewe nasien vanaf 8.3.1.

$$Q = CV \quad \checkmark$$

$$Q = (5,9 \times 10^{-11})(6) \quad \checkmark$$

$$Q = 3,54 \times 10^{-10} \text{ C} \quad \checkmark$$

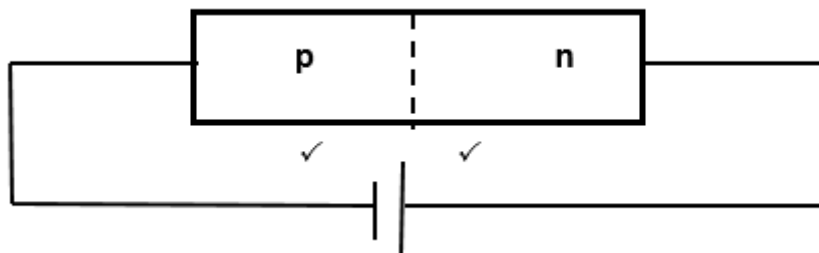
(3)
[10]

QUESTION/VRAAG 9

9.1 9.1.1 5 ✓ (1)

9.1.2 Electrons or negative charges/*Elektrone of negatiewe ladings* ✓ (1)

9.2



(2)

9.3 9.3.1 0,5 V ✓✓ (2)

9.3.2 Decreases/*Verminder* ✓✓ (2)

[8]

QUESTION/VRAAG 10

- 10.1 Energy transferred to the kettle per second is 1500 J when operating at 240 V. ✓✓
Die energie wat aan die ketel per sekonde oorgedra word is 1500 J indien die potensiaalverskil 240 V is. ✓✓ (2)

10.2
$$P = \frac{V^2}{R} \checkmark$$

$$1500 \checkmark = \frac{(240)^2}{R} \checkmark$$

$$R = 38,4 \Omega \checkmark$$
 (4)

10.3
$$W = Pt \checkmark$$

$$= (1500)(3)(60) \checkmark \checkmark$$

$$= 270 \times 10^3 \text{ J} \checkmark$$
 (4)
[10]

QUESTION/VRAAG 11

- 11.1 11.1.1 If transformer defined as a device used to step up or step down the voltage. ✓✓
'n Transformator is 'n toestel wat die potensiaalverskil kan verhoog of verlaag. ✓✓ (2)

11.1.2
$$\frac{V_s}{V_p} = \frac{N_s}{N_p} \checkmark$$

$$\frac{12}{240} = \frac{300}{N_p} \checkmark$$

$$N_p = 6\ 000 \checkmark$$
 (3)

- 11.1.3 Step down/*Verlagings* ✓ (1)

- 11.2 11.2.1 If the magnetic field linked with the coil changes, the emf induced is directly proportional to the rate of change of magnetic flux. ✓✓
Indien die magneetveld wat met die spoel verbind word verander, is die emk wat geïnduseer word direk eweredig aan die tempo waarteen die magneetvloed verander. ✓✓ (2)

11.2.2
$$\varepsilon = -N \frac{\Delta\Phi}{\Delta t} \checkmark$$

$$\varepsilon = -11 \frac{2,7 - 5,34}{12} \checkmark$$

$$\varepsilon = 2,42 \text{ V} \checkmark$$
 (3)
[11]

QUESTION/VRAAG 12

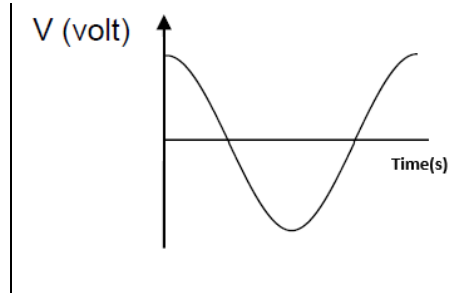
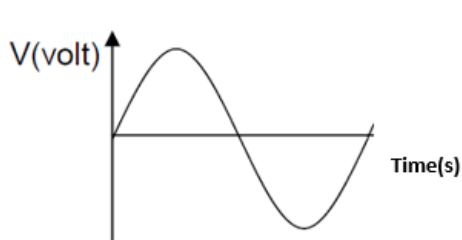
12.1 AC generator/*WS generator* ✓ (1)

12.2 Mechanical energy to electrical energy. ✓
Meganiese energie na elektriese energie. ✓ (1)

12.3 12.3.1 Slip rings/*Sleepringe* ✓ (1)

12.3.2 Brushes/*Borsels* ✓ (1)

12.4



(3)

Axes/*Asse* ✓
One complete cycle/*Een volledige siklus* ✓
Shape/*Vorm* ✓

12.5 Electroplating plants/*Elektroplatering.* ✓
Locomotives/*Lokomotiewe.* ✓
Ships/*Skepe* ✓

(Any TWO/*Enige TWEE*) [9]

TOTAL/TOTAAL: 150