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**NATIONAL
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GRADE/GRAAD 10

NOVEMBER 2020

**TECHNICAL SCIENCES P1/
TEGNIIESE WETENSKAPPE V1
MARKING GUIDELINE/NASIENRIGLYN
(EXEMPLAR/EKSEMPLAAR)**

MARKS/PUNTE: 150

This marking guideline consists of 11 pages./
Hierdie nasienrglyn bestaan uit 11 bladsye.

QUESTION/VRAAG 1

1.1 D ✓✓

1.2 D ✓✓

1.3 B ✓✓

1.4 D ✓✓

1.5 B ✓✓

1.6 B ✓✓

1.7 A ✓✓

1.8 A ✓✓

1.9 A ✓✓

1.10 B ✓✓

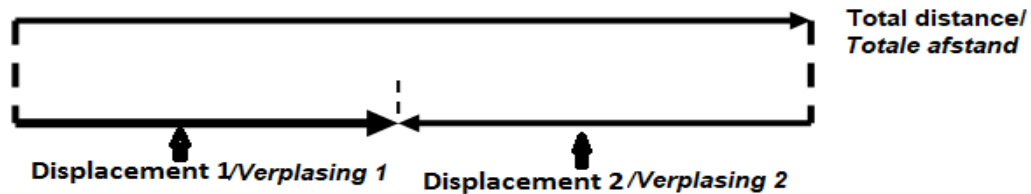
(10 x 2) **[20]**



QUESTION/VRAAG 2

- 2.1 Vector is a physical quantity with both magnitude and direction and ✓✓
 scalar is a physical quantity with magnitude only. ✓✓
Vektor is 'n fisiese hoeveelheid met beide grootte en rigting ✓✓ en
skalaar is fisiese hoeveelheid met slegs grootte. ✓✓ (4)

2.2



- Orientation of vectors; ✓ Total Distance ✓ Displacement 1 ✓
 Displacement 2 ✓
Rigting van vektore ; ✓ Totale afstand ; ✓ Verplasing 1 ; ✓ Verplasing 2 ✓ (4)

- 2.3 2.3.1 Distance from home to shop + shop to point of rest/
Afstand van huis na winkel + winkel na punt van rus
 $= 500 \text{ m} + 280 \text{ m}$ ✓
 $= 780 \text{ m}$ ✓ (2)

- 2.3.2 Displacement = distance travelled to shop + (- distance from
 shop to point of rest) ✓
Verplasing = afstand afgelê na winkel + (-afstand vanaf winkel
na punt van rus) ✓
 $= 500 \text{ m} + (-280 \text{ m})$ ✓
 $= 220 \text{ m}$ (easterly direction/oostelike rigting) ✓ (3)

- 2.4 $t = 48 \text{ s}$
 $s = 400 \text{ m}$
 $\text{Speed} = \frac{\text{distance}}{\text{time}}$ ✓ / $\text{Spoed} = \frac{\text{afstand}}{\text{tyd}}$ ✓
 $= \frac{400}{48}$ ✓
 $= 8,333 \text{ m/s}$ ✓ (3)

- 2.5 2.5.1 48 s to hours / 48 s na ure
 $= \frac{48}{3600}$ ✓
 $= 0,0133 \text{ hours/uur}$ ✓ (2)

- 2.5.2 400 m to km/ 400 m na km
 $= \frac{400}{1000}$ ✓
 $= 0,4 \text{ km}$ ✓ (2)

$$\begin{aligned}
 2.5.3 \quad &= \frac{1\,800}{900\,000} \\
 &= \frac{18 \times 100}{900 \times 1\,000} \checkmark \\
 &= \frac{18}{9\,000} \checkmark \\
 &= 0,002 \quad \text{OR/OF} \quad \frac{2}{1\,000} \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 2.5.4 \quad t &= \frac{vf-vi}{a} \checkmark \\
 &= \frac{280-140}{35} \checkmark \\
 &= 4 \text{ s} \checkmark
 \end{aligned}
 \tag{4}$$

2.6 2.6.1 Scalar / Skalaar \checkmark (1)

2.6.2 Vector / Vektor \checkmark (1)

2.6.3 Vector / Vektor \checkmark (1)

2.6.4 Scalar / Skalaar \checkmark (1)

2.6.5 Scalar / Skalaar \checkmark (1)

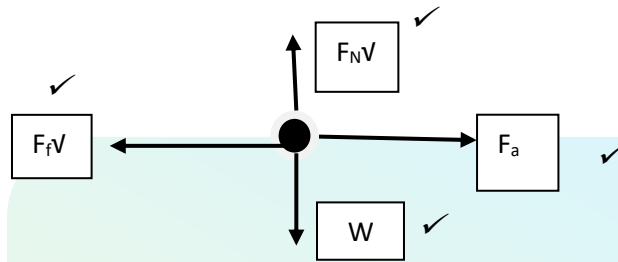
[32]

QUESTION/VRAAG 3

3.1 3.1.1 Tension force is a pulling force/ stretching force; it causes the object on which it acts to tend to stretch. ✓✓/Spanningskrag is die trek/trekkrag; dit veroorsaak dat die voorwerp waarop dit inwerk rek. ✓✓ (2)

3.1.2 Compressive force causes the object on which it acts to tend to compress (to be squashed or compacted) ✓✓/Kompressiekrak veroorsaak dat die voorwerp waarop krag inwerk, saamgepers word (om platgedruk of gekompakteer word). (2)

3.2



F_f : Frictional Force / Wrywingskrag

F_N : Normal / Normale

F_a : Applied Force / Toegepaste krag

F_g/W : Weight or Gravitational force / Gewig of Gravitatiekrak

(4)

3.3 F_f (Frictional force)/(wrywingskrag) ✓ F_a (Applied force / Toegepaste krag) ✓



(3)

3.4 $F_R = F_a - F_f$ ✓

$= 100 - 100$ ✓

$= 0 \text{ N}$ ✓

(3)

3.5 No / Nee ✓

(1)

[15]

QUESTION/VRAAG 4

- 4.1 Equilibrant of force is the force that has the same magnitude as the resultant force ✓ but it acts in the opposite direction. ✓/
Ekwilibrante krag is 'n krag met dieselfde grootte as die van die resultant krag ✓ maar in die teenoorgestelde rigting. ✓ (2)

- 4.2 Upward forces = downward forces ✓/Opwaartse kragte = afwaartse kragte

Take moment about RA / Neem moment om RA

ACWM = CWM / AKWM = KWM

$$(80 \times 2) \checkmark + (70 \times 4) \checkmark + (100 \times 7) \checkmark + (30 \times 10) \checkmark - (RB \times 12) = 0 \checkmark$$

$$RA = 160 \text{ KN} \checkmark$$

Take moment about RB / Neem moment om RB

$$RB = 12 \times 12 \checkmark = 120 \text{ KN} \checkmark \quad (8)$$

- 4.3 Upward Forces = Downward Forces / Opwaartse Krag = afwaartse Krag

$$RA + RB \checkmark = 80 + 70 + 100 + 30$$

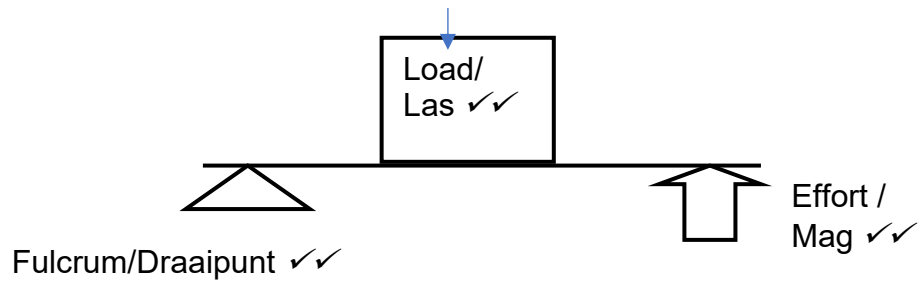
$$160 + 120 = 280 \text{ KN} \checkmark \quad (2)$$

- 4.4 4.4.1 Moment of a force about a point is defined as the turning effect of the force about that point. ✓✓/
Moment van 'n krag om 'n punt word gedefinieer as die draai-effek van die krag om die spesifieke punt. ✓✓ (2)

- 4.4.2 A beam is a rigid horizontal structural member designed to carry a vertical load. ✓✓/
'n Balk is 'n enkele onbuigsame lengte materiaal wat horisontaal gestut word en gebruik word om vertikale massa te dra of te ondersteun. ✓✓ (2)

- 4.5 $F = 20 \text{ N}$
 $d = 5,8 \text{ m}$
 $M = F \times d \checkmark$
 $= 20 \times 5,8 \checkmark$
 $= 116 \text{ N} \checkmark \quad (3)$

4.6



(6)

4.7 Wheelbarrow / *Kruiwa*
Nutcracker / *Neutekraker*
(Any ONE / *Enige EEN*)

(1)
[26]



QUESTION/VRAAG 5

5.1 Gravitational potential energy is the energy it has because of its position from the surface of the earth ✓✓ / *Gravitasie-potensiële energie is die energie as gevolg van sy posisie vanaf die oppervlak van die aarde.* (2)

5.2 Electric energy / *Elektriese energie* ✓
Heat energy / *Hitte-energie* ✓
Light energy / *Lig-energie* ✓
Sound energy / *Klank-energie* ✓ (4)

5.3 $E_k = \frac{1}{2} m v^2$ ✓
 $= \frac{1}{2} 0,45 (30)^2$ ✓
 $= 202,5 \text{ J}$ ✓ (3)

5.4 5.4.1 $E_m = E_p + E_k$ ✓
 $= 1,5 + 5$ ✓
 $= 6,5 \text{ J}$ (3)

5.4.2 $E_p = mgh$ ✓
 $1,5 = 0,1 \times 9,8 h$ ✓
 $\therefore \frac{1,5}{0,98} = \frac{0,98}{0,98} h$ ✓
 $h = 1,531 \text{ m}$ ✓

OR/OF

$E_p = mgh$ ✓
 $h = \frac{E_p}{mg}$ ✓
 $= \frac{1,5}{(0,1 \times 9,8)}$ ✓
 $h = 1,531 \text{ m}$ ✓

(4)
[16]

QUESTION/VRAAG 6

6.1 MORE THAN / MEER AS ✓ (1)

6.2 The sphere is negatively charged. ✓ / Die sfeer is negatief gelaa. ✓ (1)

6.3
$$n = \frac{\text{charge}}{\text{electron charge}} \checkmark / \frac{\text{lading}}{\text{elektron lading}} = \frac{Q}{e-}$$

$$= -6 \times 10^{-9} / 1,6 \times 10^{-19} \checkmark$$

$$= 3,75 \times 10^{10} \checkmark$$
 (3)

6.4
$$Q = \frac{V}{C} \checkmark$$

$$= \frac{6}{5 \times 10^{-6}} \checkmark$$

$$= 1\,200\,000 \text{ C OR/OF } 12\,00 \times 10^3 \text{ C} \checkmark$$
 (3)

6.5 6.5.1 States that the nett charge in an isolated system is constant during any physical process. ✓✓ Die netto lading in 'n geïsoleerde stelsel is konstant tydens enige fisiese proses. ✓✓ (2)

6.5.2 B TO C / B NA C ✓✓ (2)

6.5.3 C has an excess of electrons / C het 'n oormaat elektrone ✓ (1)

[13]

QUESTION/VRAAG 7

- 7.1 7.1.1 Electromotive force (emf) is the potential difference across the terminals of the cell ✓ when there is no current flowing in the circuit ✓/

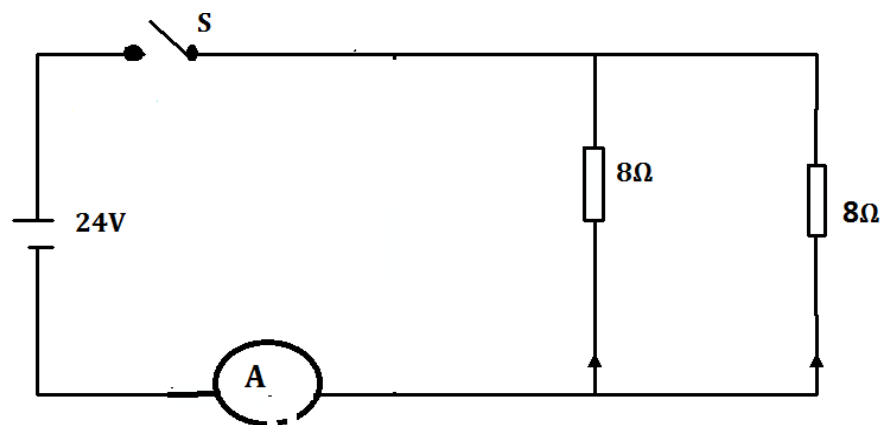
Elektromotoriese krag (emk) is die potensiaalverskil oor die terminale van die sel ✓ indien die stroombaan oop is of geen stroom vloei nie. ✓

(2)

- 7.1.2 Current is the rate of flow of charge. ✓✓/ *Elektriese stroom is die tempo van die vloei van lading. ✓✓*

(2)

- 7.2 7.2.1



Circuit / Stroombaan	1 mark / punt ✓
Resistors	1 mark each / punt elk ✓✓
Ammeter	1 mark / punt ✓
Switch / Skakelaar S	1 mark / punt ✓
Emf of 24 V / EMK van 24 V	1 mark / punt ✓

(6)

$$\begin{aligned}
 7.2.2 \quad R_p &= \frac{R_1 \times R_2}{R_1 + R_2} \checkmark \\
 &= \frac{8 \times 8}{8 + 8} \checkmark \\
 \therefore R_T &= 4 \, \Omega \checkmark
 \end{aligned}$$

OR/OF

$$\begin{aligned}
 \frac{1}{R_t} &= \frac{1}{R_1} + \frac{1}{R_2} \checkmark \\
 &= \left(\frac{1}{8} + \frac{1}{8} \right) \checkmark \\
 R_t &= 4 \, \Omega \checkmark
 \end{aligned}$$

(3)

[13]

QUESTION/VRAAG 8

- 8.1 Potential difference is the difference between the potentials of two points in an electric field. ✓✓ / *Dit is die verskil in die hoeveelheid energie wat ladingdraers tussen twee punte in 'n stroombaan het.*

OR/OF

It is the difference in the amount of energy that charge carriers have between two points in a circuit. ✓✓ / *Potensiaalverskil is die spanning tussen twee punte in 'n elektriese veld.* ✓✓

(2)

- 8.2 A – Ammeter ✓

V – Voltmeter ✓

(2)

- 8.3 8.3.1 $I_T = I_1 + I_2 + I_3$ ✓

$$I_T = 198 + 140 + 165 \text{ ✓}$$

$$= 503 \times 10^{-3} \text{ A ✓ OR/OF } 503 \text{ mA}$$

(3)

- 8.3.2 In a parallel circuit the voltage is constant. // *In 'n parallelle stroom is die spanning konstant.* ✓✓

(2)

- 8.3.3 Supply / *Battery* ✓

Resistors connected in parallel // *Resistors in parallel* ✓

Connecting wires / *Geleidingsdrade* ✓

Voltmeter ✓

(Any THREE / *Enige DRIE*) (3)

- 8.3.4 $I = \frac{Q}{t}$ ✓

$$Q = 2C, t = 0,6 \text{ s and } I = ?$$

$$= \frac{10}{0,6} \text{ ✓}$$

$$= 16,667 \text{ A ✓}$$

(3)

[15]**TOTAL/TOTAAL: 150**