higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

INGENIEURSWETENSKAP N4

5 Augustus 2021

Hierdie nasienriglyn bestaan uit 11 bladsye.

Kopiereg voorbehou

✓ = 1 punt
☑ = ½ punt

AFDELING A

VRAAG 1

1.1 C
1.2 C
1.3 A
1.4 A
1.5 A

(5 × 1) **[5]**

VRAAG 2

2.1 Onwaar
2.2 Waar
2.3 Waar
2.4 Onwaar
2.5 Onwaar

(5 × 1) **[5]**

VRAAG 3

3.1 C
3.2 F
3.3 E
3.4 A
3.5 D

(5 × 1) **[5]**

VRAAG 4

4.1 Arbeid
4.2 Rigting
4.3 Materie
4.4 Neutrone
4.5 Materie

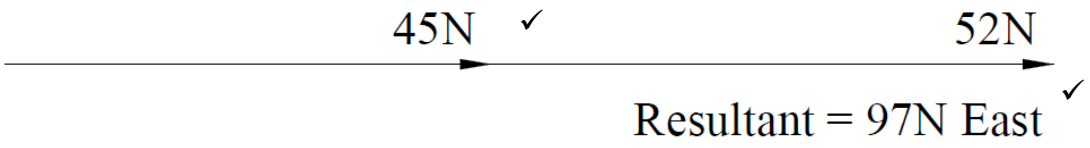
(5 × 1) **[5]**

TOTAAL AFDELING A: 20

AFDELING B

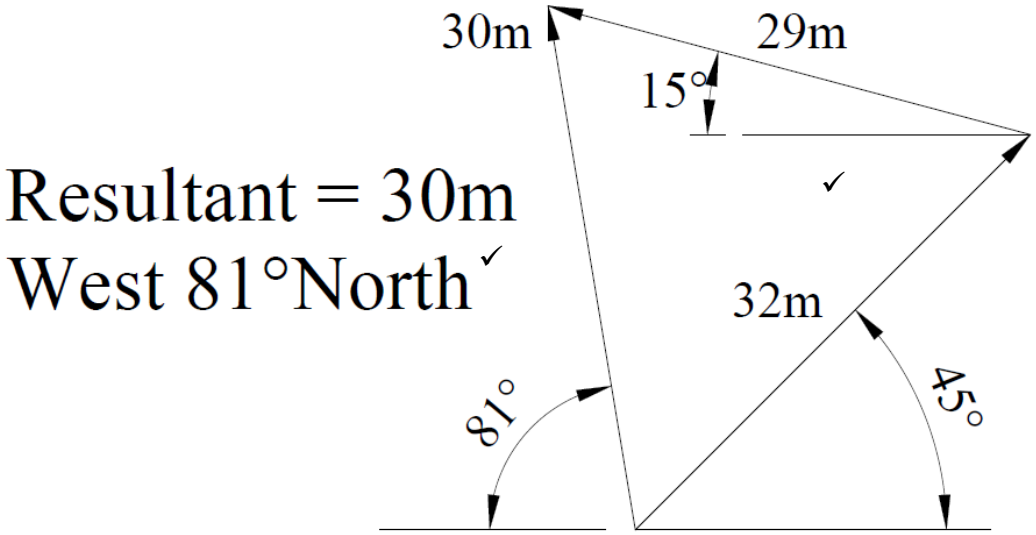
VRAAG 5

5.1



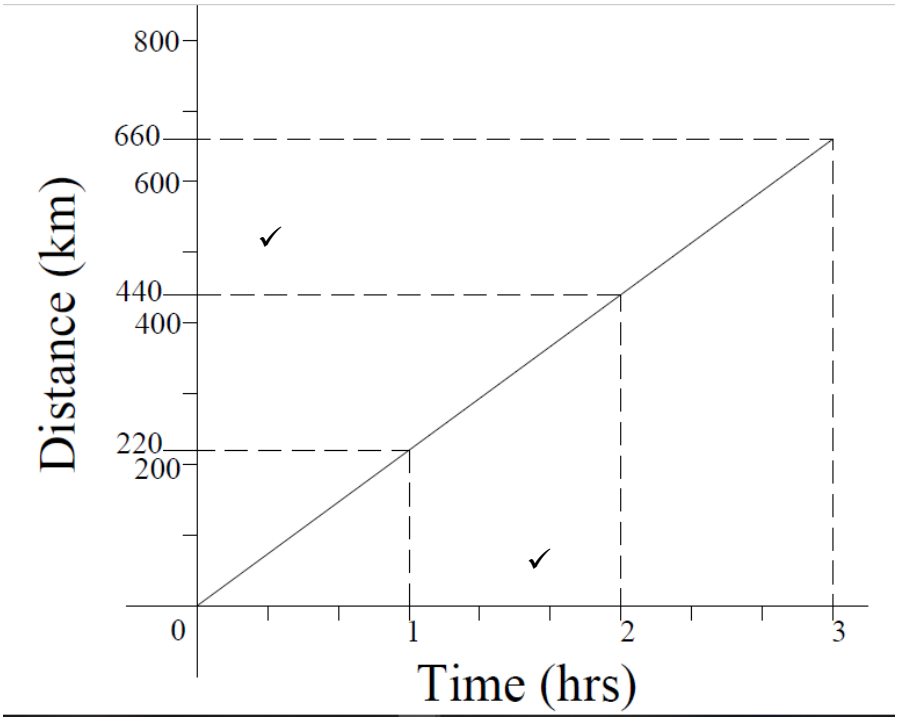
(2)

5.2



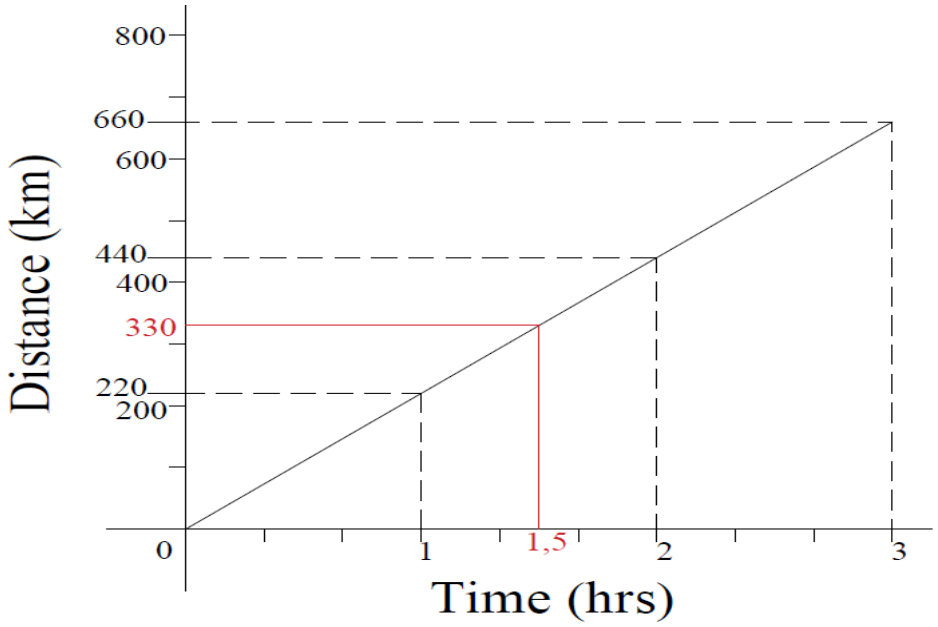
(2)

5.3 5.3.1



(2)

5.3.2



$s = v \times t$

$s = 220 \times 1,5$

$\underline{s = 330km}$ ✓ (1)

5.4 5.4.1 $w = m.g$

$w = 85 \times 1,6$

$\underline{w = 136N}$ ✓

5.4.2 $w = m.g$

$w = 85 \times 9,8$

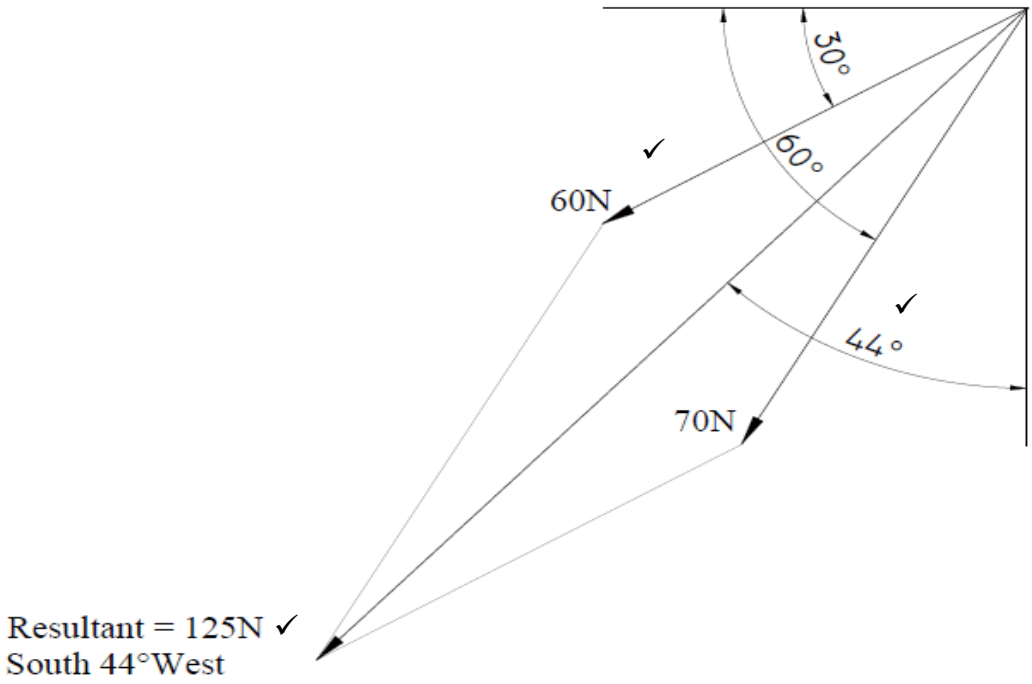
$\underline{w = 833N}$ ✓

(2 × 1) (2)

[9]

VRAAG 6

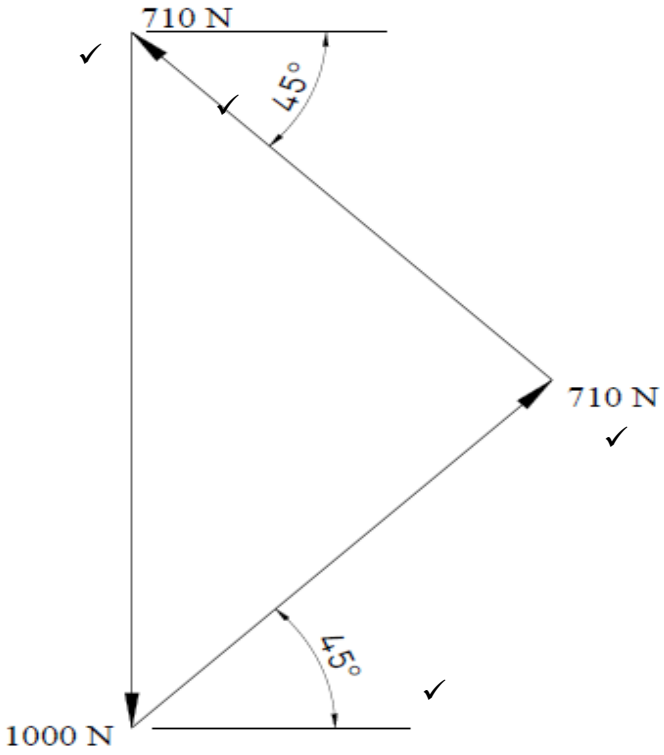
6.1



(3)

6.2

6.3



(1)

(3)

6.3.2

$$MA = \frac{load}{effort}$$

$$MA = \frac{300 \times 9,8}{650} \checkmark$$

$$\underline{MA = 4,523} \checkmark$$

(2)

6.4 $ACWM = CWM$

$3{,}5 \times F = (6 \times 20)(11{,}5 \times 15)$

$F = \dfrac{292{,}5}{3{,}5}$

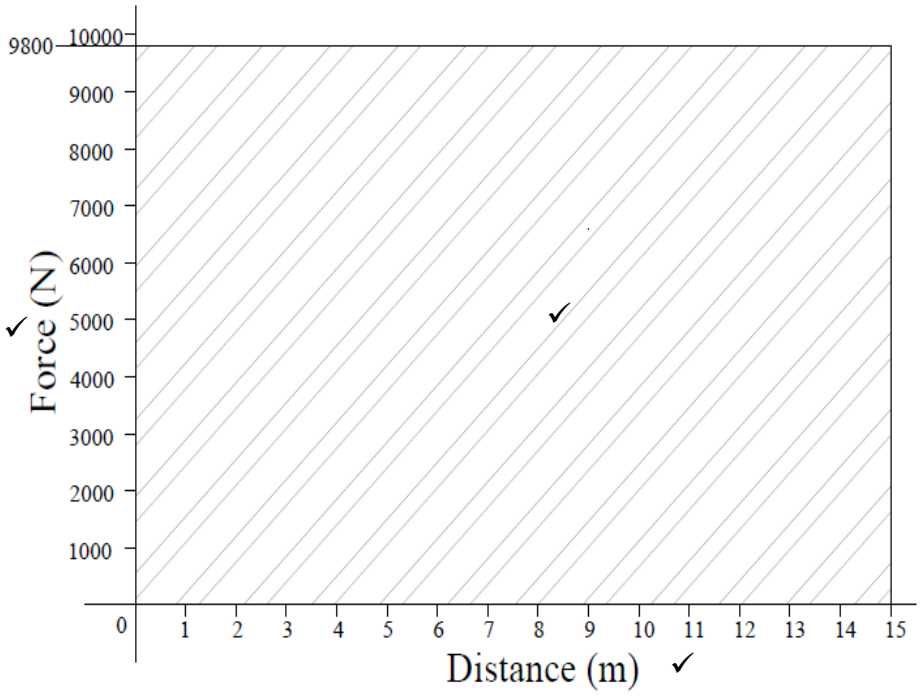
$\underline{F = 83{,}57N}$ (3)

6.5 Beweeg 'n liggaam
Stop 'n liggaam
Verander die rigting van 'n liggaam (Enige toepaslike antwoorde 2 × 1) (2)
[14]

VRAAG 7

7.1 7.1.1 Chemiese energie na kinetiese/meganiese energie
7.1.2 Elektriese energie na warmte-energie
7.1.3 Warmte-energie na chemiese energie
7.1.4 Potensiële energie na kinetiese energie
(4 × 1) (4)

7.2 7.2.1



(3)

7.2.2 $W = F.s$
$W = 9800 \times 15$
$W = 147000J$
$\underline{W = 147kJ}$ ✓ (1)

7.3 7.3.1 $km/h \rightarrow m/s$

$75 \div \frac{3600}{1000} = 20{,}833m/s$ ✓

$P = F \times v$
$F = \frac{P}{v}$
$F = \frac{1100}{20{,}833}$

$\underline{F = 52{,}8N}$ ✓✓ (3)

7.3.2 $P = \frac{W}{t}$
$W = P \times t$
$W = 1100 \times (6 \times 60)$ ✓
$W = 396000J$
$\underline{W = 396kJ}$ ✓ (2)

[13]

VRAAG 8

8.1 8.1.1 Termokoppel
OF
Termokoppelpirometer (1)

8.1.2
- Meet van temperature in hoogoonde
- Meet van temperature in plekke in masjiene wat moeilik bereikbaar is
- In hospitaaltermometers
- By diagnostiese toetsing van voertuigenjins
- In sommige toestelle soos stoomketels, waterverwarmers en oonde word dit as veiligheidskenmerke gebruik

(Enige korrekte antwoorde 2 × 1) (2)

8.2 8.2.1 Verandering van fase
8.2.2 Verandering van kleur
(2 × 1) (2)

8.3 $Q = m.c.\Delta t$
$Q = 150 \times 380 \times (650 - 25)$ ✓
$\underline{Q = 35{,}625MJ}$ ✓ (2)

8.4 8.4.1 $\Delta t = t_f - t_o$

$\Delta t = 34 - 18$

$\underline{\Delta t = 16°C}$ ✓

8.4.2 $\Delta l = l_f - l_o$

$\Delta l = 150,005 - 149,925$

$\underline{\Delta l = 80mm}$ ✓

(2 × 1) (2)

8.5 8.5.1 Bimetaalstrook
8.5.2 Verskil in lineêre uitsetting van verskillende materiale

(2 × 1) (2)

8.6 8.6.1
- Hoë vriespunt
- Duur
- Giftig (Enige EEN korrekte antwoord) (1)

8.6.2
- Lae kookpunt
- Nie maklik sigbaar nie
- Klou aan glas
- Sit nie eenvormig uit nie (Enige EEN korrekte antwoord) (1)

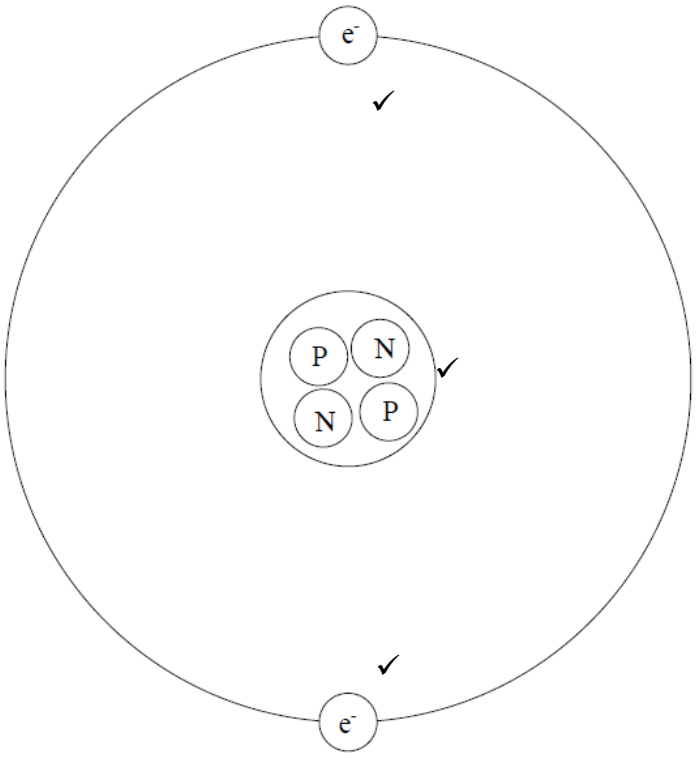
[13]

VRAAG 9

9.1 9.1.1 Meer energie as 'n vaste stof en minder energie as 'n gas
9.1.2 Baie spasie tussen die deeltjies
9.1.3 Baie sterk kragte tussen die deeltjies

(3 × 1) (3)

9.2



(3)

9.3 9.3.1 Dit word 'n vloeistof
9.3.2 Dit smelt

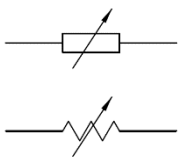
(2 × 1) (2)
[8]

VRAAG 10

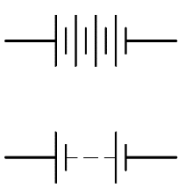
10.1 10.1.1 Geleier
10.1.2 Isoleerder
10.1.3 Geleier

(3 × 1) (3)

10.2 10.2.1



10.2.2



10.2.3



(3 × 1) (3)

10.3 10.3.1 $V = I \times R$

$V = 15 \times 14$ ✓

$\underline{V = 210V}$ ✓

10.3.2 $P = V \times I$

$P = 210 \times 15$ ✓

$\underline{P = 3150W}$ ✓

$P = I^2 R$

$P = 15^2 \times 14$

$\underline{P = 3150W}$

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

$P = \frac{210^2}{14}$

$\underline{P = 3150W}$

(2 × 2) (4)

10.4 $R_T = R_1 + R_2 + R_3$

$R_T = 16 + 35 + 29$ ✓

$\underline{R_T = 80\Omega}$ ✓ (2)

10.5
- Lengte
- Deursneeoppervlakte
- Tipe materiaal
- Temperatuur

(Enige korrekte antwoorde 3 × 1) (3)

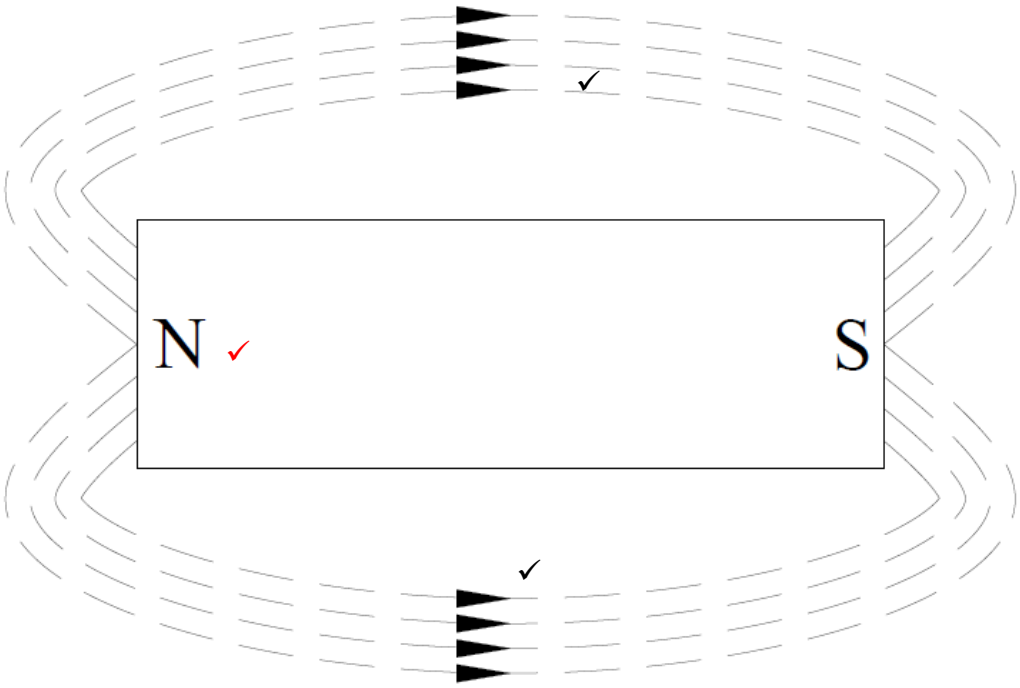
10.6 Die stroom sal afneem omdat die weerstand sal toeneem. (1)

10.7 $Q = I^2.R.t$

$Q = 11^2 \times 20 \times (15 \times 60)$ ✓

$\underline{Q = 2,178MJ}$ ✓ (2)

10.8



(3)

10.9
- Meer wikkelings
- Ysterkern
- Verhoogde stroom

(Enige korrekte antwoorde 2 × 1) (2)
[23]

TOTAAL AFDELING B: 80
GROOTTOTAAL: 100

Kopiereg voorbehou