higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

INGENIEURSWETENSKAP N1

30 JULIE 2019

Hierdie nasienriglyn bestaan uit 12 bladsye.

Kopiereg voorbehou

✓ = 1 punt
√ = ½-punt

AFDELING A

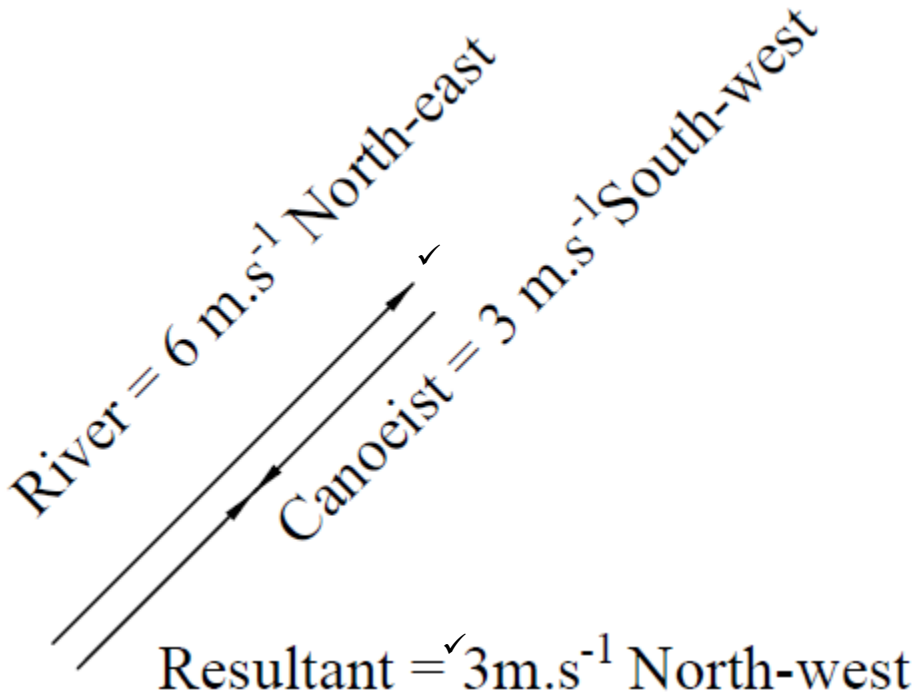
VRAAG 1

1.1	1.1.1	Skalaar		
	1.1.2	Ekwilibrant		
	1.1.3	Kinetiese energie		
	1.1.4	Temperatuur		
	1.1.5	Geleier		
			(5 × 1)	(5)
1.2	1.2.1	C		
	1.2.2	A		
	1.2.3	F		
	1.2.4	E		
	1.2.5	D		
			(5 × 1)	(5)
1.3	1.3.1	C		
	1.3.2	B		
	1.3.3	B		
	1.3.4	C		
	1.3.5	D		
			(5 × 1)	(5)
1.4	1.4.1	Onwaar		
	1.4.2	Waar		
	1.4.3	Onwaar		
	1.4.4	Onwaar		
	1.4.5	Onwaar		
			(5 × 1)	(5)
				[20]

TOTAAL AFDELING A: 20

VRAAG 2: DINAMIKA

2.1



(2)

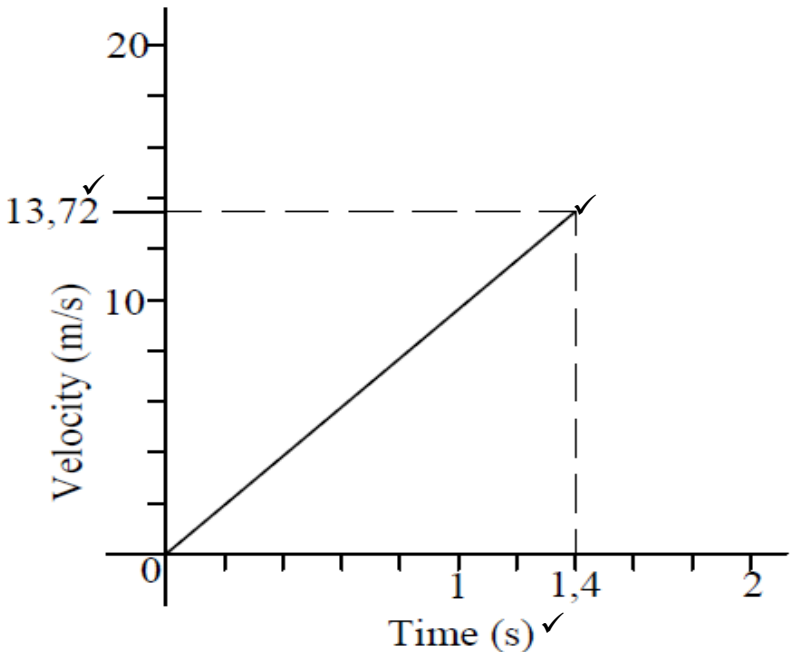
2.2 2.2.1 A (1)

2.2.2
$$speed = \frac{\Delta s}{\Delta t}$$
$$speed = \frac{(30-0)}{(5-1)}$$
$$\underline{\underline{speed = 7{,}5\ m/s}}$$ ✓ (1)

2.3
$$speed = \frac{s}{t}$$
$$speed = \frac{80}{1{,}167}$$
$$\underline{\underline{speed = 68{,}552\ km/h}}$$ ✓ (1)

2.4
$$F = m.g$$
$$F = 2{,}4 \times 9{,}8$$
$$\underline{\underline{F = 23{,}52N}}$$ ✓ (1)

2.5 2.5.1



(2)

2.5.2 Swaartekragversnelling. (1)

2.6
- Massa van 'n liggaam is die hoeveelheid materie waaruit 'n liggaam bestaan.√
- Gewig is die aantrekkingskrag tussen 'n liggaam en die aarde.√ (1)

2.7 $w = m.g$

$m = \frac{w}{g}$

$m = \frac{282}{3{,}711}$

$m = 75{,}99\ kg$ ✓

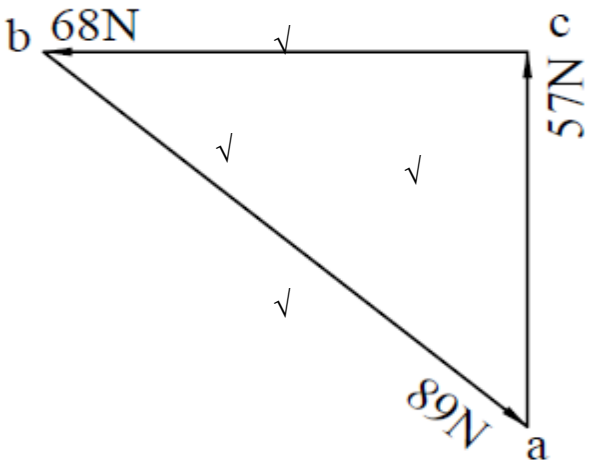
$m = 76\ kg$

(1)
[11]

VRAAG 3: STATIKA

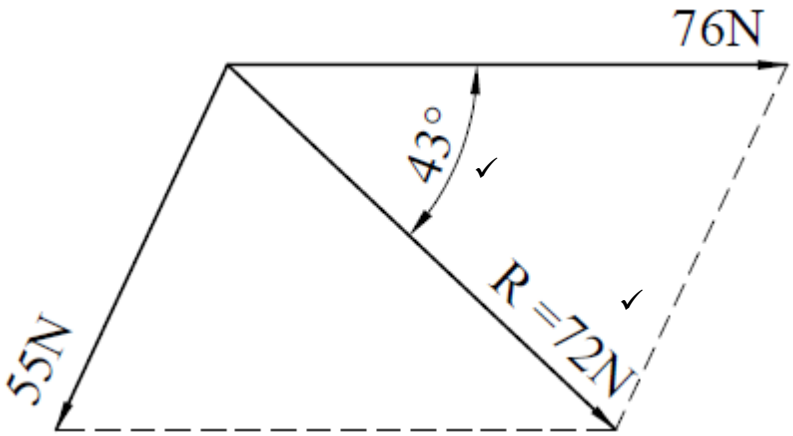
3.1 Wanneer drie kragte in ewewig is, kan dit deur die sye van ‘n driehoek in grootte en rigting voorgestel word. (1)

3.2



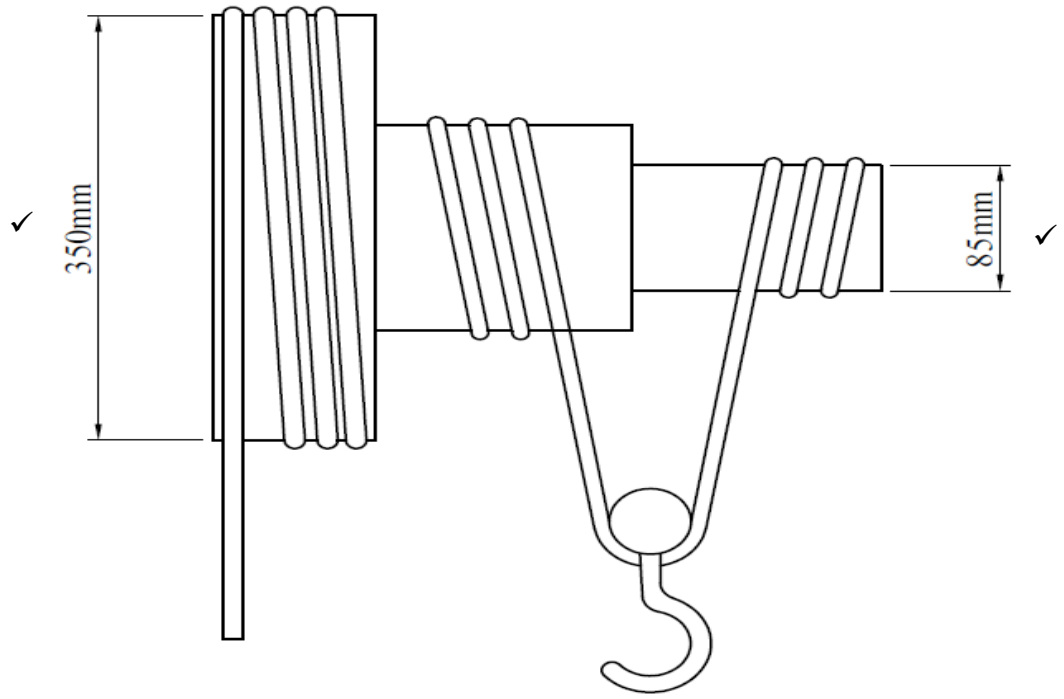
(2)

3.3



(2)

3.4



(2)

3.5 3.5.1

$$MA = \frac{W}{F}$$

$$MA = \frac{210 \times 9,8}{425} \checkmark$$

$$\underline{\underline{MA = 4,842}} \checkmark$$

(2)

3.5.2

$$VR = \frac{effort_distance}{load_distance}$$

$$VR = \frac{2}{0.3} \checkmark$$

$$\underline{\underline{VR = 6,667}} \checkmark$$

(2)

3.6

$$T = F.r$$

$$T = 45 \times 0.38 \checkmark$$

$$\underline{\underline{T = 17,1N.m}} \checkmark$$

(2)

3.7 Die tendens van ’n krag om die rotasiebeweging van ’n liggaam te veroorsaak of te verander. (1)

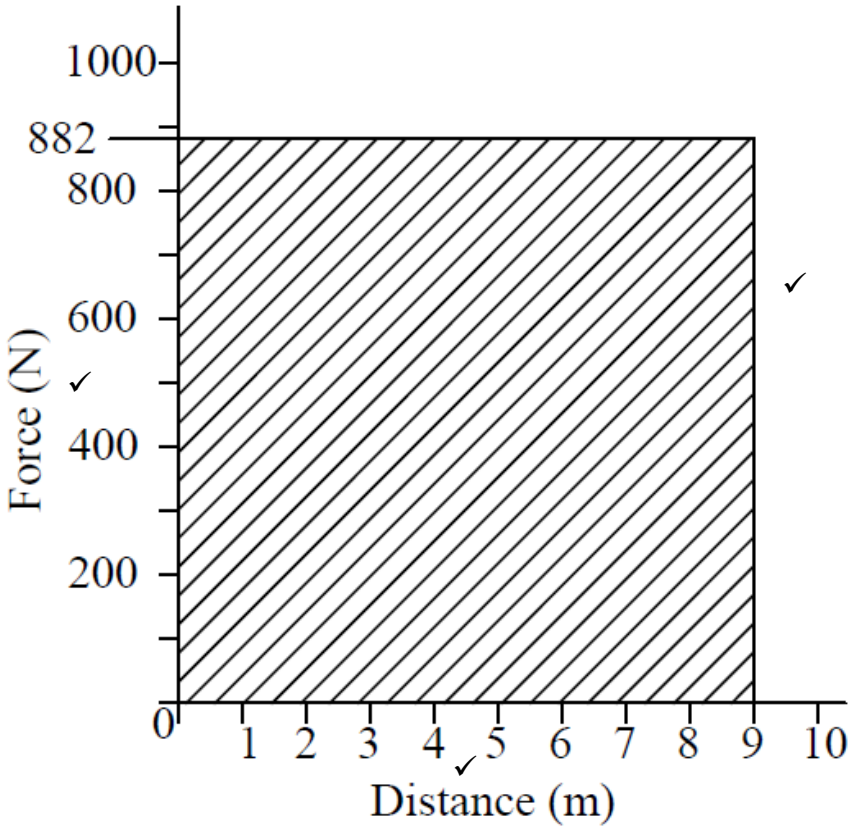
[14]

VRAAG 4: ENERGIE, ARBEID EN DRYWING

4.1
- Potensieel na kineties
- Elektries na meganies

(Enige 1 × 1) (1)

4.2 4.2.1



(3)

4.2.2
$$WD = F.s$$
$$WD = (90 \times 9{,}8).(30 \times 0.3)$$
$$\underline{\underline{WD = 7938J}}$$
$$\underline{\underline{WD = 7{,}938kJ}}$$

(1)

4.2.3
$$P = \frac{W}{t}$$
$$P = \frac{7938}{2{,}5 \times 60}$$
$$\underline{\underline{P = 52W}}$$

(1)

4.3 4.3.1
$$WD = F.s$$
$$WD = (500 \times 9{,}8) \times 1\,400$$
$$\underline{\underline{WD = 68\,600\,00J}}$$
$$\underline{\underline{WD = 6{,}86MJ}}$$

(2)

4.3.2 $$P = \frac{W}{t}$$

$$P = \frac{6860000}{1,5 \times 60}$$ ✓

$$\underline{\underline{P = 76222,222W}}$$

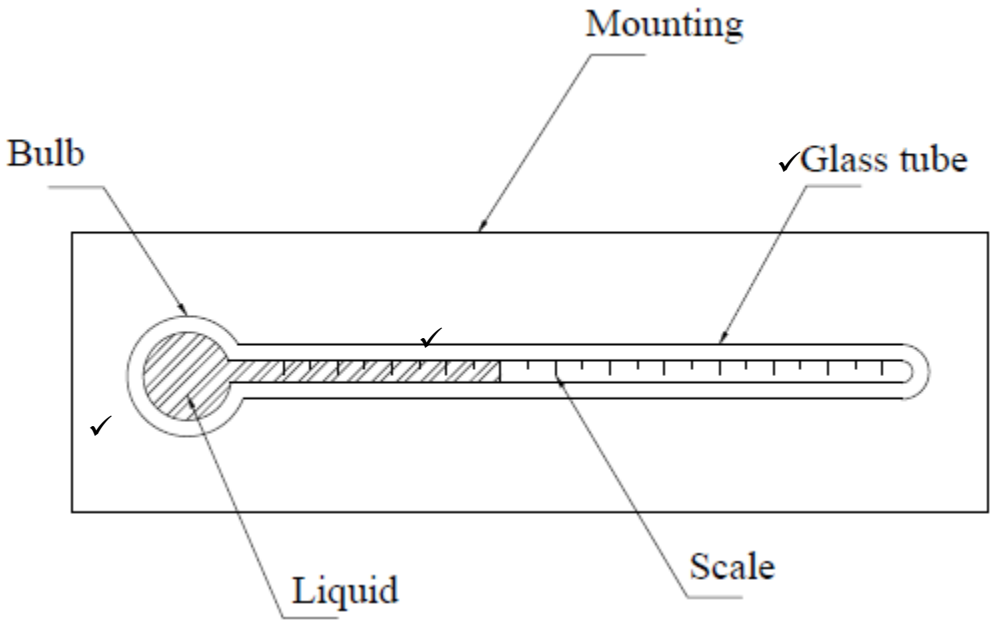
$$\underline{\underline{P = 76,222kW}}$$ ✓

(2)
[10]

VRAAG 5: WARMTE

5.1
- Warmte is ’n vorm van energie.
- Temperatuur is ’n aanduiding van die warmte of koue van ’n liggaam (2)

5.2



(3)

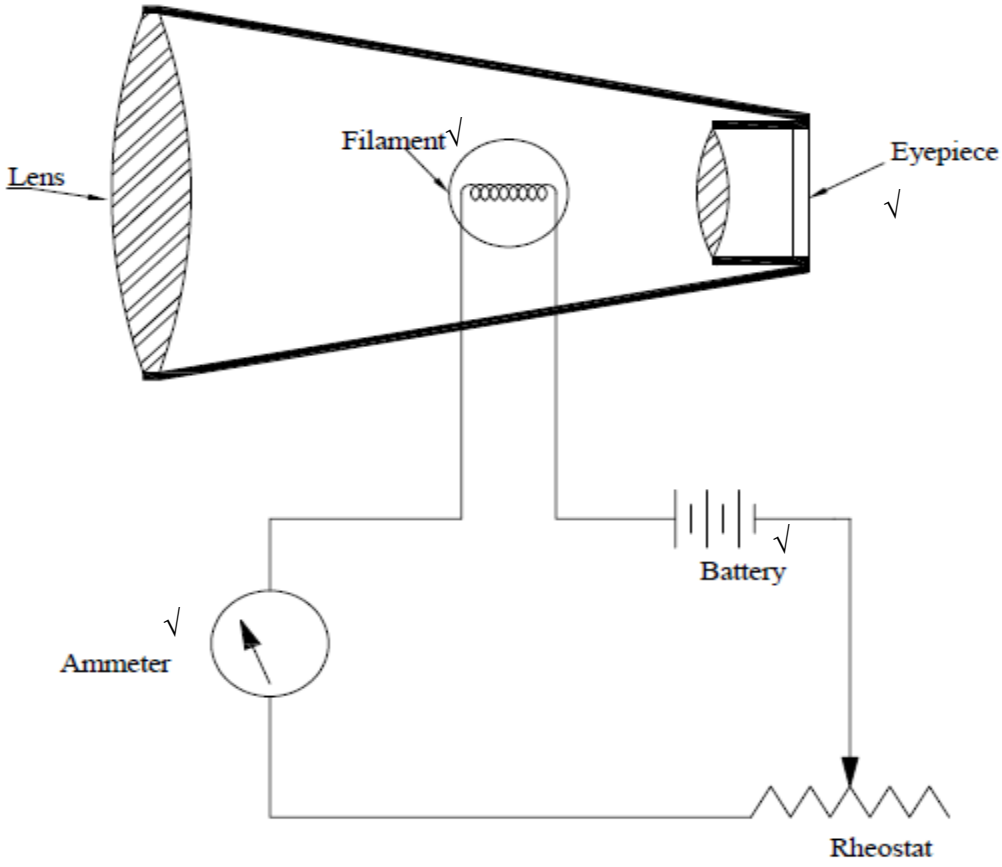
5.3

VOORDEEL	NADEEL
• Vinnige reaksie op veranderinge in temperatuur	• Kan nie baie lae temperature meet nie
• Kleef nie aan die glas nie	• Giftig
• Sigbaar	• Duur
• Hoë kookpunt	
• Sit eweredig uit	
• Goeie geleier van warmte (Enige EEN)	(Enige EEN)

(2 × 1) (2)

5.4 Vloeistowwe – konveksie
Vakuum – straling (2)

5.5



(2)

5.6 $Q = m.c.\Delta t$

$Q = 60 \times 4\ 200 \times (-25 - 25)$✓

$Q = 126\ 000\ 00J$

$\underline{\underline{Q = 12{,}6MJ}}$✓

(2)

5.7 $\Delta L = L_f - L_o$

$\Delta L = 4{,}31 - 4{,}29$

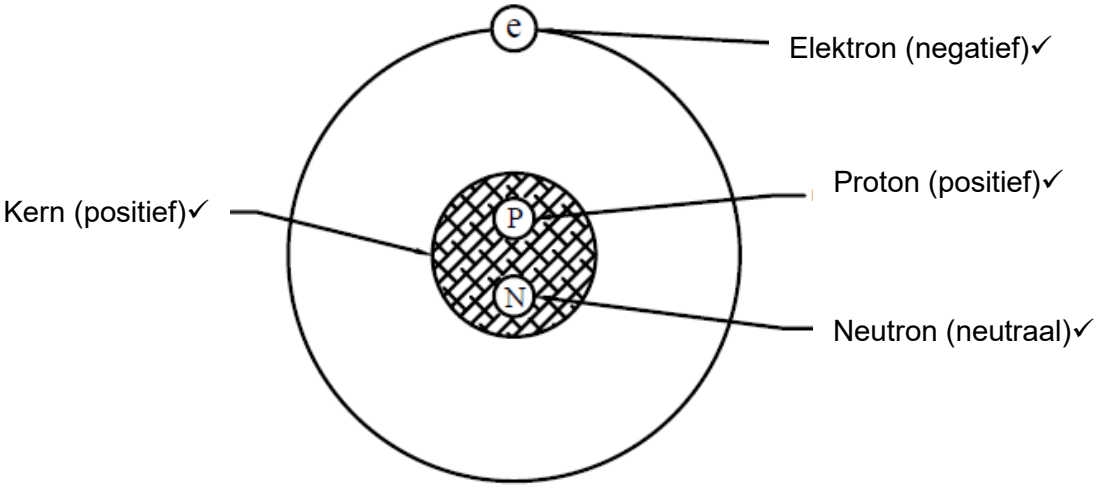
$\underline{\underline{\Delta L = 0{,}02\ m}}$

(2)
[15]

VRAAG 6: DEELTJIESTRUKTUUR VAN MATERIE

6.1
- Gas – Stoom
- Vloeistof – Water
- Vaste stof – Ys (Enige DRIE korrekte voorbeelde) (3)

6.2



(4)

6.3 Wanneer warmte by water gevoeg word, begin die deeltjies vinniger en verder uitmekaar beweeg✓ totdat die water van fase verander✓ na gas waar die deeltjies baie vinnig beweeg en ver uitmekaar is.✓ (3)

6.4 Die volume vermeerder. (1)

[11]

VRAAG 7: ELEKTRISITEIT

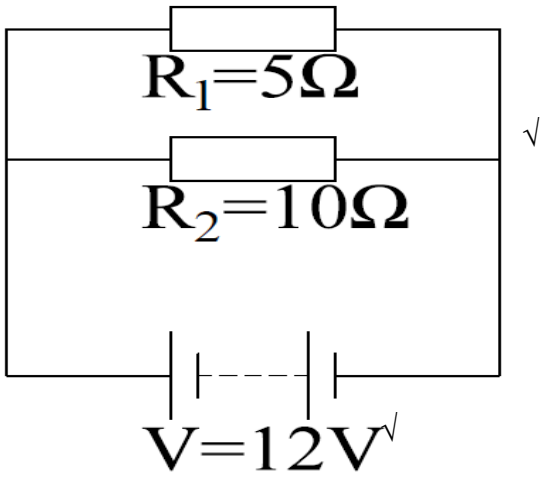
7.1
- Koper
- Silwer
- Goud
- Yster (Enige toepaslike 2 × 1) (2)

7.2
- In gelykstroom bly die polariteit dieselfde.
- In wisselstroom verander die polariteit teen ’n sekere tempo. (2)

7.3 Die dwarsdeursneearea wat die afmeting van die geleier is (1)

7.4
- Nikkelsilwer
- Brons (2)

7.5 7.5.1



√ √ (1)

7.5.2
$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$
$$\frac{1}{R_T} = \frac{1}{5} + \frac{1}{10} \checkmark$$
$$\underline{\underline{R_T = 3{,}333\Omega}} \checkmark$$
(2)

7.5.3
$$I = \frac{V}{R}$$
$$I = \frac{12}{3{,}333} \checkmark$$
$$\underline{\underline{I = 3{,}6A}} \checkmark$$
(2)

7.5.4
$$P = I^2R$$
$$P = 3{,}6^2 \times 3{,}333$$
$$\underline{\underline{P = 43{,}195W}}$$

OF

$$P = \frac{V^2}{R}$$
$$P = \frac{12^2}{3{,}333} \checkmark$$
$$\underline{\underline{P = 43{,}204W}}$$

OF

$$P = V.I$$
$$P = 12 \times 3{,}6 \checkmark$$
$$\underline{\underline{P = 43{,}2W}}$$
(2)

7.6 Die weerstandsvermoë van ’n goeie geleier is laag en dié van ’n slegte geleier is hoog. (1)

7.7
$$Q = I^2.R.t$$
$$t = \frac{Q}{I^2.R}$$
$$t = \frac{225\,000}{5^2 \times 44} \checkmark$$
$$\underline{\underline{t = 204{,}545s}} \checkmark$$
(2)

7.8
- Meer draaie
- Voeg kern in
- Vermeerder stroom (Enige 2 × 1) (2)

[19]

TOTAAL AFDELING B: 80
GROOTTOTAAL: 100

Kopiereg voorbehou