



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

TECHNICAL SCIENCES *TEGNIIESE WETENSKAPPE*

MARKING GUIDELINES FOR PRACTICAL ASSESSMENT TASKS EXPERIMENT 3/ *NASIENRIGLYNE VIR PRAKTIESE ASSESSERINGSTAKE EKSPERIMENT 3*

**GRADE 12
*GRAAD 12***

2020

**These marking guidelines consist of 6 pages.
*Hierdie nasienriglyne bestaan uit 6 bladsye.***

EXPERIMENT 3: THE POWER DISSIPATED IN BULBS CONNECTED IN SERIES AND PARALLEL

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EKSPERIMENT 3: DIE ARBEID ('POWER') WAT VERKWIS WORD IN GLOEILAMPE WAT IN SERIE EN PARALLEL VERBIND IS

1. PRACTICAL SKILLS /PRAKTIESE VAARDIGHEDE

CRITERIA/KRITERIA	MARKS/PUNTE
<p>Precaution:</p> <p><u>For variable power source:</u></p> <ul style="list-style-type: none"> Power source initially switched off, then set to 3 V ✓ <p><u>For cells power source.</u></p> <ul style="list-style-type: none"> Cells correctly connected in series in cell holders and the switch was initially off ✓ <p><i>Voorsorgmaatreëls:</i></p> <p><u>Vir verstelbare kragbron:</u></p> <ul style="list-style-type: none"> Kragbron aanvanklik afgeskakel en op 3 V gestel <p><u>Vir selle-kragbron.</u></p> <ul style="list-style-type: none"> Selle korrek verbind in serie in selhouers en die skakelaar was aanvanklik af 	2
<p>Set-up:</p> <ul style="list-style-type: none"> PART 1: <ul style="list-style-type: none"> Correct connection of the first step of the experiment (bulb, ammeter, switch, resistors and power source in series and the voltmeter in parallel to the bulb) ✓ Voltmeter set to most appropriate scale ✓ Ammeter (multimeters) set to most appropriate scale ✓ Correct addition of bulbs in series connection ✓ Circuit switched OFF before the commencement of PART 2 ✓ PART 2: <ul style="list-style-type: none"> Correct addition of bulbs in parallel connection ✓ Power source caution Switched OFF on completion of each circuit ✓ <p><i>Opstelling:</i></p> <ul style="list-style-type: none"> DEEL 1: <ul style="list-style-type: none"> Korrekte verbinding van die eerste stap van die eksperiment (gloeilamp, ammeter, skakelaar, weerstande en kragbron in serie en die voltmeter in parallel met die gloeilampe) Voltmeter op geskikte skaal gestel Ammeter (multimeters) op geskikte skale gestel Korrekte byvoeging van gloeilampe in serieverbinding Stroombaan AFgeskakel voordat met DEEL 2 begin is DEEL 2: <ul style="list-style-type: none"> Korrekte byvoeging van gloeilampe in parallelle verbinding Kragbron voorsorgmaatreëls AFgeskakel na voltooiing van elke lesing 	7

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2.1 **PART 1: DETERMINATION OF POWER DISSIPATED ACROSS BULBS CONNECTED IN SERIES**

DEEL 1: BEPALING VAN DIE ARBEID ('POWER') VERKWIS IN GLOEILAMPE WAT IN SERIE VERBIND IS

TABLE/TABEL 3.1

NO. OF BULBS/ GETAL GLOEILAMPE	$V_{\text{bulb(s)}/\text{gloeilamp(e)}}$ (V)	$I_{\text{circuit/stroombaan}}$ (A)	DETERMINE THE POWER DISSIPATED / BEPAAAL DIE ARBEID VERKWIS
1	3 V	0,4 A	$P = VI \checkmark$ $P = 3 \times 0,4 \checkmark$ $P = 1,2 \text{ W} \checkmark$
2	3 V	0,29 A	$P = VI$ $P = 3 \times 0,29 \checkmark$ $P = 0,87 \text{ W} \checkmark$
3	3 V	0,21 A	$P = VI$ $P = 3 \times 0,21 \checkmark$ $P = 0,63 \text{ W} \checkmark$

(9)

2.2 An increase in the number of bulbs results in an increase in the resistance✓ and an increase in resistance results in a decrease in the current.✓

'n Toename in die getal gloeilampe veroorsaak 'n verhoging in die weerstand, en 'n verhoging in die weerstand veroorsaak 'n verlaging in die stroomsterkte.

3.1 **PART 2: DETERMINATION OF POWER DISSIPATED ACROSS BULBS CONNECTED IN PARALLEL**

DEEL 2: BEPALING VAN DIE ARBEID ('POWER') VERKWIS IN GLOEILAMPE WAT IN PARALLEL VERBIND IS

TABLE/TABEL 3.2

NO. OF BULBS/ GETAL GLOEILAMPE	$V_{\text{bulb(s)}/\text{gloeilamp(e)}}$ (V)	$I_{\text{circuit/stroombaan}}$ (A)	POWER DISSIPATED/ ARBEID VERKWIS
1	3 V	0,4 A	$P = V I$ ✓ $P = 3 \times 0,4$ ✓ $P = 1,2 \text{ W}$ ✓
2	3 V ✓	0,72 A ✓	$P = V I$ $P = 3 \times 0,72$ ✓ $P = 2,16 \text{ W}$ ✓
3	3 V	0,89 A	$P = V I$ $P = 3 \times 0,89$ ✓ $P = 2,67 \text{ W}$ ✓

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3.2 An increase in the number of bulbs results in a decrease in resistance (because the net resistance is the sum of reciprocals of individual resistors). ✓

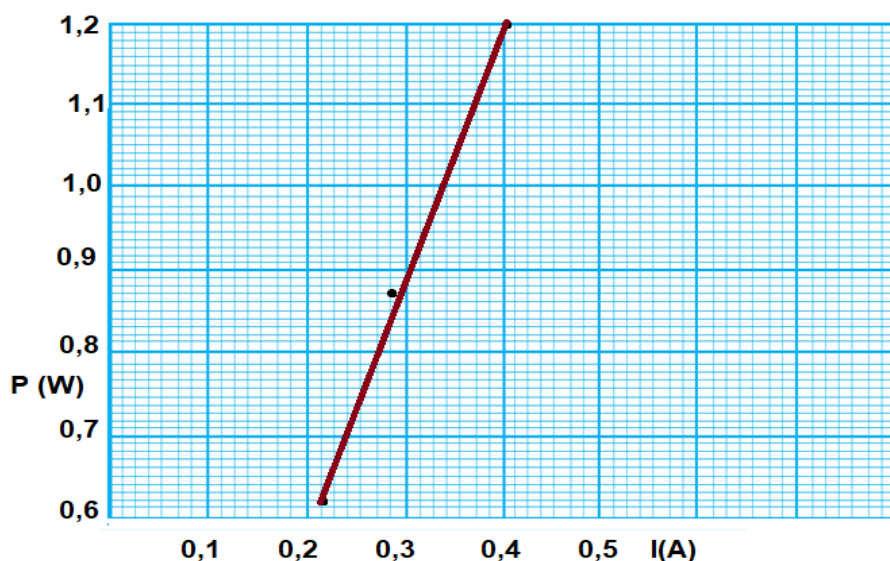
A decrease in resistance results in an increase in current. ✓

'n Toename in die aantal gloeilampe veroorsaak 'n afname in die weerstand (omdat die totale weerstand die som van die resiprook van die individuele weerstande is).

'n Afname in die weerstand veroorsaak 'n verhoging in die stroomsterkte.

(2)

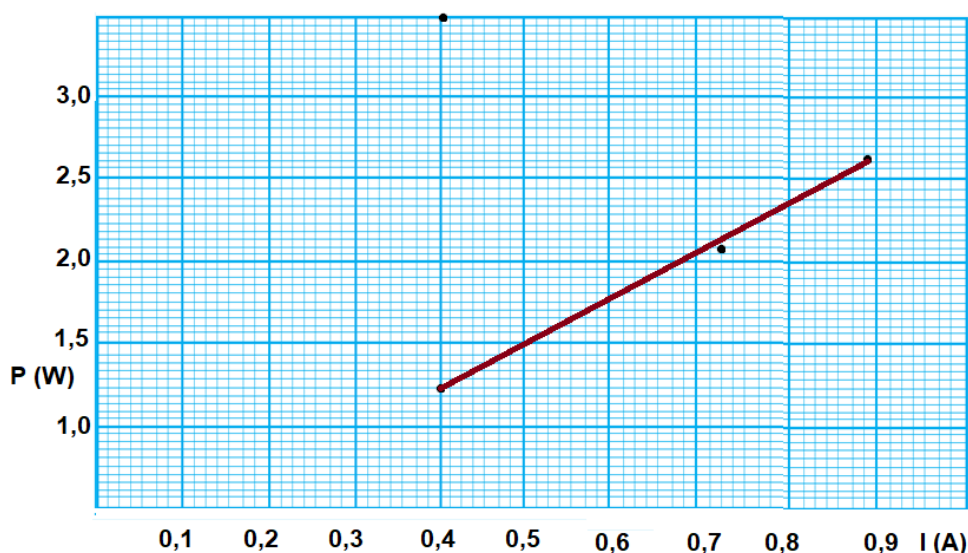
- 4.1 A graph of power versus current for series connection./
Grafiek van die arbeid (power) vir 'n serieverbinding



MARKING CRITERIA/NASIENRIGLYNE	
Heading/Opskrif	✓
Axis labelled with correct units/Asse benoem met korrekte eenhede	✓
3 points plotted/3 punte gestip	✓
A straight-line graph drawn/Reguitlyngrafiek getrek	✓

(4)

- 4.2 A graph of power versus current for parallel connection./
Grafiek van die arbeid (power) vir 'n parallelverbinding



MARKING CRITERIA/NASIENRIGLYNE	
Heading/Opskrif	✓
Axis labelled with correct units/Asse benoem met korrekte eenhede	✓
3 points plotted/3 punte gestip	✓
A straight-line graph drawn/ Reguitlyngrafiek getrek	✓

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5. As the number of bulbs are increased in series, the resistance of the circuit increases, but in parallel an increase in bulbs is a decrease in the total resistance. ✓
The power dissipated decreases with increase in number of bulbs in a series circuit ✓/
The power dissipated decreases with an increase in resistance/decrease in current.

AND

The power dissipated increases with increase in number of bulbs in a parallel circuit. ✓/
The power dissipated increases with a decrease in resistance/increase in current.

Soos die getal gloeilampe in die serie verbinding meer word, verhoog die weerstand van die stroombaan, maar in 'n parallele verbinding sal meer gloeilampe 'n verlaging in die totale weerstand veroorsaak.

Die arbeid ('power') wat verkwis word minder wanneer meer gloeilampe in serie verbind word./Die arbeid ('power') verkwis word minder met 'n toename in die weerstand/verlaging in stroomsterkte.

EN

Die arbeid ('power') verkwis word meer wanneer meer gloeilampe in parallel verbind word./Die arbeid ('power') verkwis word meer met 'n afname in die weerstand/toename in stroomsterkte.

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[40]