basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

GRADE/*GRAAD* 12

MARKS/*PUNTE*: 150

Symbol/*Kode*	Explanation/*Verduideliking*
M	Method/*Metode*
MA	Method with accuracy/*Metode met akkuraatheid*
CA	Consistent accuracy/*Volgehoue akkuraatheid*
A	Accuracy/*Akkuraatheid*
C	Conversion/*Herleiding*
S	Simplification/*Vereenvoudiging*
RT	Reading from a table/a graph/document/diagram/*Lees vanaf tabel/grafiek/diagram*
SF	Correct substitution in a formula/*Korrekte vervanging in formule*
O	Opinion/Explanation/*Opinie/Verduideliking*
P	Penalty, e.g. for no units, incorrect rounding off, etc./*Penalisasie, bv. vir geen eenhede/verkeerde afronding, ens.*
R	Rounding off/*Afronding*
NPR	No penalty for rounding/*Geen penalisasie vir afronding nie*
AO	Answer only/*Slegs antwoord*
MCA	Method with consistent accuracy/*Metode met volgehoue akkuraatheid*

These marking guidelines consist of 19 pages.
Hierdie nasienriglyne bestaan uit 19 bladsye.

NOTE:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out (cancelled) an attempt to a question and NOT redone the solution, mark the crossed out (cancelled) version.
- Consistent accuracy (CA) applies in ALL aspects of the marking guideline; however it stops at the second calculation error.
- If the candidate presents any extra solution when reading from a graph, table, layout plan and map, then penalise for each extra item presented.
- As a general marking principle, if a candidate has incurred one mistake and there is evidence of sound mathematics thereafter, then that candidate should lose one mark only.

LET WEL:
- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek (kanselleer) en nie oordoen nie, merk die doodgetrekte (gekanselleerde) poging.*
- *Volgehoue akkuraatheid (CA) word in ALLE aspekte van die nasienriglyne toegepas, dit hou op by die tweede berekeningsfout.*
- *Wanneer 'n kandidaat aflesings vanaf 'n grafiek, tabel, uitlegplan en kaart geneem en ekstra antwoorde gee, penaliseer vir elke ekstra item.*
- *'n Algemene merkbeginsel is dat indien 'n kandidaat een fout maak en daarna voortgaan met korrekte wiskunde, dat die kandidaat slegs een punt verloor.*

QUESTION/*VRAAG* 1 [39 MARKS/*PUNTE*]

Q/*V*	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
1.1.1	✓A ✓A Bothaville and/*en* Viljoenskroon.	1A Bothaville 1A Viljoenskroon (2)	MP L2
1.1.2	✓✓A ✓✓A South West and South. *Suidwes en Suid*	2A SW 2A S (any order) (4)	MP L2
1.1.3	Bloemfontein Welkom NAMPO = 152 km + 75 km = 227 km ✓A Bloemfontein Bultfontein NAMPO = 100 km + 120 km = 220 km ✓A ∴ via Bultfontein. ✓O **OR/*OF*** Bloemfontein – Welkom – NAMPO 220 km – 75 km = 145 km ✓A Bloemfontein – Bultfontein – NAMPO 220 km – 120 km = 100 km ✓A ∴ via Bultfontein ✓O	1A correct value 1A correct value 1O conclusion **OR/*OF*** 1A correct value 1A correct value 1O conclusion	MP L4

Q/*V*	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L

	OR/*OF*
	
	 Bultfontein to/*tot* NAMPO = 120 km✓A
	 Bloemfontein to/*tot* Bultfontein = 100 km ✓A
	 120 km + 100 km = 220 km ✓A
	
	 OR/*OF*
	
	 Bloemfontein to/*tot* NAMPO = 220 km ✓A
	 220 km − 100km to/*tot* Bultfontein = 120 km✓A
	 120 km is the distance to NAMPO ✓A
	 120 km is die afstand tot by NAMPO
	
	 OR/*OF*
	
	 Bloemfontein to/*tot* NAMPO = 220 km ✓A
	 Bultfontein to/*tot* NAMPO = 120 km ✓A
	 Bloemfontein to/*tot* Bultfontein = 220 km − 120 km
	                          = 100 km ✓A
	
	 OR/*OF*
	
	 Nampo Park to/*tot* Bothaville = 15 km
	
	 Bothaville to/*tot* Bultfontein = 105 km ✓A
	
	 ∴ Nampo Park to/*tot* Bloemfontein
	                      ✓A
	 = 15 km + 105 km + 100 km
	
	 = 220 km ✓A
		OR/*OF*
		
		 1A correct value
		 1A correct value
		 1A conclusion
		
		 OR/*OF*
		
		 1A correct value
		 1A correct value
		 1A conclusion
		
		 OR/*OF*
		
		 1A correct value
		 1A correct value
		
		 1A conclusion
		
		 OR/*OF*
		
		 1A correct value
		
		 1A correct value
		
		 1A conclusion
		
		                      (3)	

1.1.4	Distance/*Afstand* = speed/*spoed* × time/*tyd*
	
	 150 km = 88 km/h × time/*tyd* ✓SF
	 Time/*Tyd* = $\dfrac{150}{88}$h ✓S
	      = 1,7045…
	      = 1h 42 min ✓C
	
	                      ✓M
	 Arrival time/*Aankomstyd* = 18:45 + 1h42 min
	              = 20:27 ✓CA
	 NOT CORRECT ✓O
	 NIE KORREK nie
		
		 1SF correct values into formula
		 1S changing subject of formula
		
		 1C conversion
		
		 1M adding
		
		 1CA arrival time
		 1O verification
			M
			 L4

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L

	OR/*OF*
	 ✓M ✓A ✓C
	 From 18:45 to 20:00 is 1 hour 15 min = 1,25 hour
	 Van 18:45 tot 20:00 is 1 uur 15 min = 1,25 uur
	 Distance/ = speed × time
	 Afstand = 88 km/h × 1,25h ✓SF
	        = 110 km ✓S
	
	 ✓O
	 His timing is **not correct**, he is not yet in Sasolburg
	 *Sy tydsberekening is **nie reg nie**, hy is nog nie in Sasolburg nie.*
	
	 OR/*OF*
	 ✓M ✓A ✓C
	 From 18:45 to 20:00 is 1 hour 15 min = 1,25 hour
	 Van 18:45 tot 20:00 is 1 uur 15 min = 1,25 uur
	 Distance = speed × time
	 Afstand = *spoed × tyd*
	  150 km = speed × 1,25h ✓SF
	 Speed/*spoed* = $\dfrac{150}{1,25}$ km/h ✓S
	 ✓O = 120 km/h
	 He is **wrong**, he will have to drive faster to get to Sasolburg on time.
	 *Hy is **verkeerd**, hy sal vinniger moet ry om betyds in Sasolburg te kom*
	
	 OR/*OF*
	
	 Distance/*Afstand* = speed/*spoed* × time/*tyd*
	 150 km = 88 km/h × time/*tyd* ✓SF
	 Time/*Tyd* = $\dfrac{150}{88}$ h ✓S
	        = 1,7045…
	        = 1h 42 min ✓C
	 ✓MA ✓A
	 From 18:45 to 20:00 is 1 hour 15 min = 1,25 hour
	 Van 18:45 tot 20:00 is 1 uur 15 min = 1,25 uur
	 INCORRECT/*NIE KORREK NIE* ✓O
		OR/*OF*
		 1M subtracting time
		 1A elapsed time
		 1C conversion
		
		 1SF into correct formula
		 1S simplification
		
		 1O verification
		
		 OR/*OF*
		 1M subtracting time
		 1A elapsed time
		 1C conversion
		
		 1SF into correct formula
		
		 1S changing subject of formula
		
		 1O verification
		
		 OR/*OF*
		
		 1SF into correct formula
		
		 1S changing the subject of the formula
		
		 1C conversion
		
		 1MA subtracting
		 1A elapsed time
		 1O verification
		
		                            (6)	

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
1.2.1	Volume of a rectangular prism = length × width × height *Volume van n reghoekige prisma* = *lengte* × *breedte* × *hoogte* = 300 cm ✓C × 68,5 cm ✓C × 40 cm ✓SF = 822 000 cm³ ✓A or/*of* 822 ℓ Capacity/*Kapasiteit* = 485 ℓ = 485 000 cm³ ✓C Volume of the concrete (in cm³) *Volume van die beton (in cm³)* = 822 000 – 485 000 ✓MA = 337 000 ✓CA	1C m to cm 1C mm to cm 1SF substitution 1A volume 1C conversion 1MA subtracting capacity 1CA concrete volume (7)	M L3
1.2.2	Number of cows/*aantal koeie* = $\frac{485}{56}$ ✓MA $\qquad\qquad\qquad\qquad\quad$ = 8,66 ✓A CORRECT /*KORREK* ✓O **OR/*OF*** Volume = 56ℓ × 8 ✓MA $\qquad$ = 448 ℓ ✓A CORRECT /*KORREK* ✓O **OR/*OF*** Volume per cows/*per koei* = $\frac{485ℓ}{8}$ ✓MA $\qquad\qquad\qquad\qquad\quad$ = 60,625 ℓ ✓A CORRECT /*KORREK* ✓O **OR/*OF*** 56 × 8 ×1000 cm³ ✓MA = 448 000 cm³ ✓A CORRECT /*KORREK* ✓O	1MA dividing by 56 1A simplification 1O conclusion **OR/*OF*** 1MA multiplying by 8 1A simplification 1O verification **OR/*OF*** 1MA division by 8 1A simplification 1O verification **OR/*OF*** 1MA multiplying by 8; 1 000 1A simplification 1O verification (3)	M L4
1.2.3	Volume $= \frac{485}{2}$ = 242,5 ℓ ✓MA Time/*Tyd* $= \frac{242,5ℓ}{14,5\,ℓ/min}$ ✓MA $\qquad\qquad$ = 16,724… $\qquad\qquad$ ≈ 17 min ✓R	1MA dividing by 2 1MA dividing by rate 1R time	M L2

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/*OF* Time to fill / *Tyd om vol te maak* $= 485 \ \ell \div 14,5 \ \ell/\text{min}$ ✓MA $= 33,44827586 \ \text{min}$ Time for half empty/ *Tyd vir half leeg* $= 33,44827586 \ \text{min} \div 2$ ✓MA $= 16,72413793$ ≈ 17 ✓R	**OR/*OF*** 1 MA dividing by rate 1MA dividing by 2 1R time (3)	
1.3.1	9,2 m ✓✓A	2A estimated distance [accept answers in the range 9,0 m to 9,5m (2)	MP L2
1.3.2	Measured distance/*Gemete afstand* $= 174 \ \text{mm}$ ✓A Distance from stand 10 to 17 $= 4,5 \times 7 + 5 = 36,5 \ \text{m}$ ✓A *Afstand vanaf stalletjie 10 tot 17* $= 4,5 \times 7 + 5 = 36,5 \ \text{m}$ Scale/*Skaal* $174 \ \text{mm} \quad : \quad 36,5 \ \text{m}$ ✓M $= 174 \ \text{mm} : 36 \ 500 \ \text{mm}$ $\approx \qquad 1 : 209,8$ ✓CA **OR/*OF*** Measured distance/*Gemete afstand* $= 174 \ \text{mm}$ ✓A Distance from stand 10 to 17 $= 4,5 \times 7 + 5 = 36,5 \ \text{m}$ ✓A *Afstand vanaf stalletjie 10 tot 17* $= 4,5 \times 7 + 5 = 36,5 \ \text{m}$ Scale/*Skaal* $17,4 \ \text{cm} = 36,5 \ \text{m}$ $1 \ \text{cm} \quad = 2,0977011\ldots\text{m}$ ✓M $\therefore \ 1 \ \text{cm} \ = \ 2,1 \ \text{m}$ ✓CA	1A measurement (as per province) 1A distance 1M concept of scale 1CA simplified scale **OR/*OF*** 1A measurement (as per province) 1A distance 1M concept of scale 1CA simplified scale [accept measured answers in the range $\pm$ 2 mm from province measurement] (4)	MP L3
1.3.3	4 m × 4 m = 16 m² is R22 942. $\therefore \ 1\text{m}^2 = \dfrac{22 \ 942}{16} = \text{R}1 \ 433,88$ Area stand 26/*Opp van stalletjie 26* $= 4 \ \text{m} \times 4,5 \ \text{m} = 18 \ \text{m}^2$ Cost/*Koste* $= \text{R}1 \ 433,88 \times 18 \ \text{m}^2$ ✓M $= \text{R}25 \ 809,84$ ✓CA $\therefore$ NOT VALID /*NIE GELDIG nie* ✓O	1MA unit price 1RT dimensions of stand 26 1M multiply by 18 1CA simplification 1O conclusion	F L4

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/OF	*OR/OF*	
	Area stand 26/*Opp van stalletjie 26* = 4 m × 4,5 m = 18 m^2 ✓RT	1RT dimensions of stand 26	
	Cost/*Koste* = $\dfrac{22\ 942}{16}$ ✓MA ×18 ✓M	1MA divide by 16 1M multiply by 18	
	= R25 809,75 ✓CA ∴ NOT VALID /*NIE GELDIG nie*✓O	1CA simplification 1O conclusion	
	OR/*OF*	**OR/*OF***	
	4 m × 4 m = 16 m^2 is R22 942 Stand/*stalletjie* 26 = 4 m × 4,5 m ✓RT	1RT dimensions of stand 26	
	Cost of stand 26 /*Koste vir stalletjie 26* ✓MA = R22 942 ÷ 4 × 4,5 ✓M = R25 809,75 ✓CA ∴ NOT VALID /*NIE GELDIG nie* ✓O	1MA divide by 4 1M multiply by 4,5 1CA simplification 1O conclusion	
	OR/*OF*	**OR/*OF***	
	4 m × 4 m = 16 m^2 is R22 942 ∴ 1m^2 = $\dfrac{22\ 942}{16}$ = R1 433,88 ✓MA 4 m × 4,5 m = 18 m^2 ✓RT is R25 000 ∴ 1m^2 = $\dfrac{25\ 000}{18}$ = R1 388, 89✓CA ∴ R1 433,88 ≠ R1 388,89 ∴ NOT VALID /*NIE GELDIG nie*	1MA unit price 1RT dimensions of stand 26 1M divide by 18 1CA simplification 1O conclusion NPR	
		(5)	
		[39]	

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T/L
	QUESTION/*VRAAG* 2 [38 MARKS/*PUNTE*]		
2.1.1	Mean/*Gemiddelde* = $\dfrac{\text{R287 240 000 000}}{\text{148 266}}$ ✓C ✓MA = R1 937 328,855 per year/*per jaar* Monthly mean = R1 937 328,855 ÷ 12 ✓MA *Maandelikse gemid.* = R161 444,07 ✓CA INCORRECT / *NIE KORREK nie* ✓O **OR/*OF***	1C billion to rand 1MA dividing by 148 266 1MA dividing by 12 1CA monthly income 1O conclusion **OR/*OF***	D L4
	Mean/*Gemid.* = $\dfrac{\overset{✓C}{287\,240\,000\,000}}{148\,266}$✓MA = R1 937 328,855 per year/*per jaar* ✓MA ✓CA Then: R161 000 × 12 = R1 932 000 per year/*per jaar* INCORRECT / *NIE KORREK nie* ✓O **OR/*OF***	1C billion to rand 1MA dividing by 148 266 1MA multiply by 12 1CA yearly income 1O conclusion **OR/*OF***	

	Total monthly income of millionaires
	Totale maandelikse inkomste
	    = 161 000 × 148 266 ✓MA
	    = R23 870 826 000
	Total annual income/ *Totale jaarlikse inkomste*
	    = R23 870 826 000 × 12 ✓MA
	    = R286 449 912 000 ✓CA ✓C
	Total taxable annual income is R287,24 billion
	Totale belasbare inkomste is R287,24 *miljard*
	INCORRECT / *NIE KORREK nie* ✓O
	
	OR/*OF*
		
		1MA multiply by 148 266
		
		1MA multiply by 12
		1CA yearly income
		1C billion to rand
		
		1O conclusion
		
		OR/*OF*	

	Income per year per person/ *Jaarlikse inkomste per persoon* = R161 000 × 12 ✓MA Total income per year /*Totale jaarlikse inkomste* = R1 932 000 × 148 266 ✓MA ✓CA = R286 449 912 000 = R286,449912 billion /*miljard* ≠ R287,24 billion/*miljard* ✓C INCORRECT / *NIE KORREK nie* ✓O **OR/*OF***	1MA multiply by 12 1MA multiply by 148 266 1CA yearly income 1C billion to rand 1O conclusion **OR/*OF***	
	Income per year per person/ *Jaarlikse inkomste per persoon* = R0,161 million × 12 ✓MA Total income/*Totale inkomste* = R1,932 mil × 148 266 ✓MA = R286 449,912 mil ✓CA = R286,449912 billion/*miljard* ✓C ≠ R287,24 billion/*miljard* INCORRECT /*NIE KORREK nie* ✓O	1MA multiply by 12 1MA multiply by 148 266 1CA yearly income 1C billion to rand 1O conclusion	

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T/L
	OR/*OF* Income per year per person/ *Jaarlikse inkomste per persoon* ✓C = R0,000161 billion/*miljard* × 12 ✓MA Total income /*totale inkomste* = R0,001932 billion/ *miljard* × 148 266 ✓MA = R286,449912 billion /*miljard* ✓CA ≠ R287,24 billion/*miljard* INCORRECT/ *NIE KORREK nie* ✓O	**OR/*OF*** 1C billion to rand 1MA multiply by 12 1MA multiply by 148 266 1CA yearly income 1O conclusion (5)	
2.1.2	Number/*Getal* = 148 266 × $\frac{100}{105,0065}$ = $\frac{148\ 266}{1,050065}$ ✓MA ✓A = 141 196,97 ≈ 141 196 or 141 197 ✓CA	1MA dividing 1A 105,0065% 1CA simplification (3)	D L3
2.2.1	Medical scheme tax rebate/*Mediese- skema belasting krediet* ✓RT = R310 × 2 × 12 ✓MA = R7 440 ✓CA	1RT correct value 1MA multiplying 1CA simplification AO (3)	F L2
2.2.2	Tax payable/*Belasting betaalbaar* ✓A ✓A ✓SF = R532 041 + 45% (R2 045 364 – R1 500 000) = R777 454,80 ✓S Tax after rebate/*Belasting na korting* ✓M ✓MA = R777 454,80 – R14 067 – R7 713 = R755 674,80 Tax payable/*Belasting betaalbaar* = R755 674,80 – R7 440 ✓MCA = R748 234,80 ✓CA	**CA from Q2.2.1** 1A correct tax bracket 1A for 2 045 364 1SF correct substitution 1S simplification 1M subtracting rebates 1MA both correct values 1MCA subtracting MST rebate 1CA tax (8)	F L3
2.3.1	Earning/ *Verdienste* in Euro = $\frac{600\ 000}{7,47}$ ✓MA = 80 321,28514 ✓A Earning/*Verdienste* in rand = 80 321,28514 × 15,64 ✓MCA = R1 256 224,90 ✓CA	1MA dividing by euro 1A simplification 1MCA multiplying 1CA value	F L3

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/*OF* Conversion ratio/*Herleidingsverhouding* $= \dfrac{15,64}{7,47}$ ✓MA $= 2,093708166$ ✓A Earning/*Verdien* = Kr600 000 × 2,093708166 ✓M = R1 256 224,90 ✓CA **OR/*OF*** R15,64 = Kr7,47 ✓M R2,0937… = Kr1 ✓A ∴ Kr600 000 × R2,0937… ✓M = R1 256 224,90 ✓CA	**OR/*OF*** 1MA dividing by euro 1A simplification 1M multiplying 1CA simplification **OR/*OF*** 1M equation the rates 1A unit ratio 1M multiplying 1CA simplification (4)	

2.3.2	Total deductions/*totale aftrekkings*
	 = Kr229 760 + Kr48 000 + Kr37 200r
	 = Kr314 960 ✓A
	
	 Percentage/*Persentasie* = $\dfrac{Kr314960}{Kr600000}$ ✓M × 100%
	 ≈ 52,49% ✓CA
	
	 VALID/ *GELDIG* ✓O
	
	 OR/*OF*
	
	 Total deductions/*totale aftrekkings*
	  = Kr48 000 + Kr37 200 + Kr229 760
	 = Kr314 960 ✓A
	
	 Amount/*bedrag* = Kr600 000 × 52% ✓M
	 = Kr312 000 ✓CA
	
	 VALID/ *GELDIG* ✓O
	
	 OR/*OF*
	 220 760 + 48 000 + 37 200 = 314 960
	 To Euro = 314 960 ÷ 7,47 = €42 163,32
	 To rand = €42 163,32 × R15,64
	  = R659 434,32 ✓A
	
	 Percentage/ *Persentasie* = $\dfrac{R659\,434,32}{R1\,256\,224,98}$ × 100 % ✓M
	 = 52,493%
	 = 52% ✓CA
	
	 VALID/ *GELDIG* ✓O
		
		 1A total deductions
		
		 1M percentage calculation
		
		 1CA simplification
		
		 1O conclusion
		
		 OR/*OF*
		
		 1A total deductions
		
		 1M percentage calculation
		 1CA simplification
		
		 1O conclusion
		
		 OR/*OF*
		
		 1A total deductions
		
		 1M percentage calculation
		
		 1CA simplification
		
		 1O conclusion
		 (4)
			F
			 L4

Q/*V*	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
2.4.1	United States of America ✓✓A *Verenigde State van Amerika*	2A correct country (2)	D L2
2.4.2	$P = \dfrac{2}{23}$ ✓A ✓A $= 0,08695652174$ $\approx 0,087$ ✓R	1A numerator 1A denominator 1R correct form (3)	P L2
2.4.3 (a)	Q2 = 40 ✓✓A	2A median (2)	D L2
2.4.3 (b)	Q1 = 33 ✓A Q3 = 45 ✓A IQR = 45 – 33 ✓MCA = 12 CORRECT/*KORREK* ✓O	1A quartile 1 1A quartile 3 1MCA IQR with at least one correct value 1O verification (4)	D L4
		[38]	

QUESTION/*VRAAG* 3 [35 MARKS/*PUNTE*]			
Q/V	**Solution/*Oplossing***	**Explanation/*Verduideliking***	**T&L**
3.1.1	Rate per h/*Tarief per uur* $= \dfrac{\checkmark \text{MA} \ R31\,050}{\checkmark \text{M} \ 18} = R1\,725/h$ Rate /*Tarief* per min $= \dfrac{R1\,725}{60} = R28,75/\text{min}$ $\checkmark$CA **OR/*OF*** Rate per 18 hours/*Tarief per18 uur* $= \dfrac{R31\,050}{60} = R517,50 \ /18 \ h$ $\checkmark$MA Rate /*Tarief* per min $= \dfrac{R517,50}{18}$ $\checkmark$M $= R28,75/\text{min}$ $\checkmark$CA **OR/*OF*** 18 hours /*uur*$\times 60 = 1\,080$ minutes/ *minute* $\checkmark$ MA Solo rate/ *alleenvlug tarief* $= \dfrac{\checkmark \text{M} \qquad \checkmark \text{CA}}{} \ \dfrac{31\,050}{1\,080} = R28,75/\text{min}$	1MA dividing by 18 1M dividing by 60 1CA rate **OR/*OF*** 1MA dividing by 60 1M dividing by 18 1CA rate **OR/*OF*** 1MA conversion to minutes 1M dividing by 1 080 1CA rate AO (3)	F L2
3.1.2	Cost/*Koste* $\begin{aligned} &\overset{\checkmark \text{MA}}{} \qquad \overset{\checkmark \text{MA}}{} \\ &= 28 \times R2\,050 + R31\,050 + \dfrac{15}{3} \times R1\,242 + R700 + \\ & R6\,544 + 7 \times R190 \ \checkmark \ \text{MA} \end{aligned}$ $\begin{aligned} &\overset{\checkmark \text{M}}{} \\ &= R57\,400 + R31\,050 + R6\,210 + R700 + R6\,544 + \\ & R1\,330 \end{aligned}$ $= R103\,234$ $\checkmark$CA	1MA multiplying cost by hours 1MA theory lesson cost 1MA number of exams by cost 1M adding ALL values 1CA simplification (5)	F L3
3.2	Interest 1st year/*Rente 1ste jaar* $= R90\,000 \times 8,5\%$ $\checkmark$MA $= R7\,650$ $\checkmark$A Balance year 1/*Balans jaar 1* $= R\,90\,000 + R7\,650$ $= R97\,650$ $\checkmark$CA Interest 2nd year/*Rente 2de jaar* $= R97\,650 \times 8,5\%$ $= R8\,300,25$ $\checkmark$CA Balance at end of 2nd year/*Balans teen einde 2de jaar* $= R97\,650 + R8\,300,25$ $= R105\,950,25$ $\checkmark$CA The amount is ENOUGH/*Die bedrag is GENOEG* $\checkmark$O	1MA multiplying by the % 1A 1st year interest 1CA 1st year balance 1CA 2nd year interest 1CA 2nd year balance 1O conclusion CA from 3.1.2	F L4

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/*OF*	**OR/*OF***	
	The amount is increasing by 108,5% *Die bedrag verhoog met 108,5%* ✓✓ MA	2MA percentage increase	
	Balance at the end of the second year *Balans aan die einde van die 2de jaar* ✓ MA ✓ MA = R90 000 × 108,5% × 108,5% =R105 950,25 ✓CA The amount is ENOUGH/*Die bedrag is GENOEG* ✓O	1MA multiplying for 1st year 1MA multiplying for 2nd year 1CA simplification 1O conclusion CA from 3.1.2 (6)	
3.3.1	Students study more after failing/ more serious about their work. ✓✓ O *Studente leer harder nadat hulle gedruip het/ hulle is ernstiger oor hul werk.* **OR/*OF*** They have seen what the tests look like and prepare better for following tests/ gained experience. ✓✓ O *Hulle het gesien hoe die toetse lyk en berei hul beter voor vir opeenvolgende toets/ ondervinding opgedoen.* **OR/*OF*** They have more time to prepare/ more practice/ attended extra classes. ✓✓ O *Hulle het meer tyd om voor te berei/ meer oefening/ woon ekstra lesse by.*	2O reason (2)	D L4
3.3.2	24 is 20% A is 80% ✓ MA ∴A = 24 × 4 = 96 ✓ A **Or/*of*** 24 ÷ 20% = 120 A = 120 – 24 = 96 20% of/*van* B = 24 ✓ CA B = $\dfrac{24}{20\%}$ = 120 *or/of* B = 96 + 24 = 120 C = A = 96 ✓ CA D = 96 – 67 = 29 ✓ CA *or/of* D = 30% × 96 = 28,8 ≈ 29 **Or/of** 67 ÷ 70% = 95,7≈ 96 D = 96 – 67 = 29 Total that passed *Totaal wat deurgekom het* = 24 + 29 = 53 ✓CA	1MA multiplying by 4 1A value of A 1CA value of B 1CA value of C [accept 95] 1CA value of D [accept 28] 1CA total [accept 52]	D L3

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/*OF*	**OR/*OF***	
	$A = \dfrac{80\%}{20\%} \times 24$ ✓MA	1MA multiplying by 4	
	$= 96$ ✓A	1A value of A	
	Or/*of* A: $20\% = 24$ $1\% = \dfrac{24}{20\%} = 1,2$ ✓MA $80 \times 1,2 = 96$ ✓A		
	$B = \dfrac{100\%}{20\%} \times 24$ $= 120$ ✓CA	1CA value of B	
	$C = \dfrac{100\%}{70\%} \times 67 = 95,71 \approx 96$ ✓CA	1CA value of C [accept 95]	
	$D = \dfrac{30\%}{70\%} \times 67 = 28,71 \approx 29$ ✓CA	1CA value of D [accept 28]	
	Total that passed / *Totaal wat deurgekom het* $= 24 + 29 = 53$ ✓CA	1CA total NPR [accept 52] (6)	

3.4	Number of Days/*Aantal dae*
	 ✓M
	 $= 26\,000 \div 24 = 1083,333\ldots$
	
	 Number of hours/*aantal ure* $= 0,333\ldots \times 24 = 8$ ✓CA
	
	 Number of weeks/*aantal weke*
	 ✓M
	 $= 1083 \div 7 = 154,7142857\ldots$
	
	 Number of days/*Aantal dae* $= 0,71428\ldots \times 7 = 5$ ✓CA
	
	 154 weeks/*weke* 5 days/*dae* 8 hours/*uur*
	
	 VALID/ *GELDIG* ✓O
	
	 OR/*OF*
	
	 ✓M
	 Hours per week /*Uur per week* $= 24 \times 7 = 168$
	
	 Weeks / *Weke* $= \dfrac{26\,000}{168} = 154,7619047619$
	
	 Days/*Dae* $= 0,7619047619$ weeks/ *weke* $\times 7$
	  $= 5,333\ldots$ days/*dae* $= 5$ ✓CA
	
	 Hours/*Uur* $= 0,333\ldots$ days $\times 24 = 8$ ✓M
	
	  ☐154 weeks 5 days 8 hours ✓CA
	 VALID/ *GELDIG* ✓O
		1M dividing by 24
		
		 1CA hours
		
		 1M dividing by 7
		
		 1CA simplification
		
		 1O verification
		
		 OR/*OF*
		
		 1M multiply by 7
		
		 1CA days
		
		 1M multiply by 24
		
		 1CA hours
		
		 1O verification
			M
			 L4

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/OF	**OR/*OF***	
	Days /*Dae* = 154 × 7 = 1 078 ✓ M	1M multiply by 7	
	Total days/ *Totale dae*=1 078 + 5 = 1 083 ✓ CA	1CA simplification	
	Hours/*Uur* = 1 083 × 24 = 25 992 ✓ M	1M multiply by 24	
	Total hours/ *Totale ure* = 25 992 + 8 = 26 000 ✓ CA	1CA simplification	
	VALID/ *GELDIG* ✓ O	1O verification	
	OR/OF	**OR/*OF***	
	1 week = 7 days/*dae* = 7 ✓M × 24 h/*uur* = 168 hours/*uur*	1M multiply by 7	
	Hours/*Uur* = 154 × 168 = 25 872 ✓ CA	1CA simplification	
	Hours/*Uur* = 5 ✓M × 24 = 120	1M multiply by 24	
	Total hours/*Totale uur* = 25 872 + 120 + 8 = 26 000 ✓ CA	1CA simplification	
	VALID/ *GELDIG* ✓ O	1O verification (5)	
3.5.1	33 ✓✓A	2A value (2)	MP L2
3.5.2	Place seat face down. ✓✓A *Keer die sitplek om op die grond.* Attach the bench leg/s to the bench seat. *Heg die bank se pote aan die banksitplek.* Attach the long panel to bench leg/s. ✓✓A *Voeg die langpaneel in tussen beide pote van die bank* **OR/*OF*** Lift the bench leg, align dowels with hole on the bench seat and insert them. ✓✓A *Lig die bank se pote, kry dit gelyk met die gate in die banksitplek en druk dit in.* Insert the long panel./ *Voeg lang paneel in.*✓✓A **OR/*OF*** Insert the dowels of the bench leg into the seat, ✓✓A *Druk die tappe van die bank se pote in die sitplek.* Connect the long panel with the bench leg. ✓✓A *Verbind die langpaneel met die bank se pote.*	2A first instruction 2A second instruction [Any correct two] (4)	MP L4
3.5.3	It stabilises the bench/*dit stabiliseer die bank* . ✓✓O Keeps the bench sturdy/ steady/ strong/safe to sit on *Dit hou die bank stewig /bestendig/sterk/veilig* It prevents the bench from collapsing/*dit keer dat die bank inmekaar val.* It supports the bench legs/*ondersteun die bank pote.*	2O explanation (2)	MP L4
		[35]	

QUESTION/*VRAAG* 4 [38 MARKS/*PUNTE*]			
Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
4.1.1	Percentage increase/*Persentasie verhoging* $= \dfrac{14,5\text{ million} - 10,8\text{ million}}{10,8\text{ million}} \times 100\%$ ✓M ✓A $\approx 34,26\%$ ✓CA **OR/*OF*** Percentage increase/*Persentasie verhoging* $= \dfrac{14,5\text{ million}}{10,8\text{ million}} \times 100\% - 100\%$ ✓M ✓A $\approx 34,26\%$ ✓CA	1M subtracting values 1A denominator 1CA simplification **OR/*OF*** 1A denominator 1M subtracting values 1CA simplification NPU (million and %) (3)	D L2
4.1.2 (a)	Two/*Twee* **or/*of*** 2 ✓✓A	2A correct size (2)	D L2
4.1.2 (b)	Three/*Drie* **or/*of*** 3 ✓✓A	2A correct size (2)	D L2
4.1.3	2001: Number of households/*Aantal huishoudings* $= 33\% \times 10,8$ millionc ✓MA $= 3,564$ million/*miljoen* ✓CA 2011: Number of households/*Aantal huishoudings* $= 25\% \times 14,5$ million/*miljoen* ✓MA $= 3,625$ million/*miljoen* ✓CA Increase/*Toename* $= 3,625$ mil $- 3,564$ mil $\qquad\qquad = 0,061$ million/*miljoen* $\therefore$ INCORRECT, ✓O OR the number of households **increased**. $\therefore$ *NIE KORREK nie,* *OF die aantal huishoudings het **toegeneem**.*	1MA percentage calculation 1CA simplification 1MA percentage calculation 1CA simplification 1O conclusion (5)	D L4
4.1.4	✓✓O Rounding factor or effect of rounding. Rounded-off the decimals. *Afrondingseffek. Die desimale plekke is afgerond.*	2O reason (2)	D L4

Q/*V*	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L

4.1.5	$P_{(less\ than\ four)}$/*P(minder as vier)*
	   ✓RT
	$= 27\% + 19\% + 15\%$ ✓ MA
	
	$= 61\%$ ✓CA
		1RT correct values
		1MA adding correct values
		
		1CA simplification
		       (3)
			P
			L2

4.2.1	✓RT ✓RT R20 to/*tot* R79	2RT correct class (2)	D L2
4.2.2	✓ MA 5,4 mil + 3,2 mil = 8,6 mil ✓ CA	1 MA adding correct values 1CA number of households AO (2)	F L2
4.2.3	Total income/*Totale inkomste* = R817 500 ✓ A Wong's household annual per capita *Wong huishouding jaarliks per capita* $= \dfrac{R817\,500}{3,5}$ ✓ SF ✓ A $= R233\,571,43$ ✓ CA Wong's household daily per capita/*daagliks per capita* $= \dfrac{R233\,571,4285}{365}$ ✓ MCA $= R639,92$ ✓ CA *OR/OF* Total annual income/*Totale jaarlikse inkomste* $= R276\,000 + R541\,500 = R817\,500$ ✓ A Wong's household daily income/*daagliks per inkomste* $= \dfrac{R817\,500}{365}$ ✓ MCA **or** $\boxed{\dfrac{R276\,000}{365} + \dfrac{R541\,500}{365}\\ = R756,16 + R1\,483,56\\ = R2\,239,72}$ $\approx R2\,239,73$ ✓ CA Family size/*Familie grootte* = 1 + 1 + 1 + 0,5 = 3,5 ✓ A Wong's household daily per capita *Wong huishouding daaglikse per capita* $= \dfrac{R2\,239,73}{3,5}$ ✓ SF $= R639,92$ ✓ CA	1A total income 1A family size 1SF substitution 1CA annual per capita 1MCA dividing annual per capita by 365 1CA daily per capita *OR/OF* 1A total household income 1MCA dividing by 365 1CA daily income 1A family size 1SF correct substitution 1CA daily per capita	F L3

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/OF	***OR/OF***	
	Total income/*Totale inkomste* = R817 500 ✓ A Family size/*Familie grootte* = 1 + 1 + 1 + 0,5 = 3,5 ✓ A Wong's household daily per capita/*daagliks per capita* $= \dfrac{R817\,500}{365 \times 3,5}$ ✓ MCA ✓ A ✓ SF = R639,92 ✓ CA	1A total household income 1A family size 1A denominator 1MCA dividing by 365 1SF Substitution 1CA daily per capita (6)	

4.2.4	Total per day/*Totaal per dag*
	
	 $= 4\% \times R280 = R11,20$ ✓ A
	
	 Total per year/*totaal per jaar*
	         ✓ A
	 = R11,20 × 365 = R4 088 ✓ CA
	
	 OR/OF
	
	        ✓ MCA
	 Rate per year/*Tarief per jaar* = R280 × 365 = R102 200
	
	 Amount spent on cellphones/ *Bedrag aan selfone gespandeer*
	 = R102 200 × 4% ✓ A
	
	 = R4 088 ✓ CA
		
		 1A daily value
		
		 1A multiply by 365
		 1CA simplification
		
		 OR/OF
		
		 1MCA multiply by year consistent with Q4.2.3
		
		 1A calculation 4%
		 1CA simplification
		 AO
		                                  (3)
			F
			 L3

4.3.1	Neo. ✓✓ A	2O correct name (2)	D L4
4.3.2	Elec/*Elek.* = R125 × 12,2 mil = R1 525 mil ✓ MA Water = R98 × 10,6 mil = R1 038,8 mil ✓ MA Monthly total in million / *Maandelikse total in miljoen* = R1 525 + R1 038,8 = R2 563,8 ✓ M Total spent on electricity and tap water **in millions**: *Totaal aan water en elektrisiteit gespandeer **in miljoene**:* = R2 563,8 × 12 = R30 765,6 ✓ CA	1MA electricity amount 1MA water amount 1M adding amounts 1CA simplification	F L3

Q/V	Solution/*Oplossing*	Explanation/*Verduideliking*	T&L
	OR/*OF*	**OR/*OF***	
	Elec/*Elek* = R125 × 12,2 mil = R1 525 mil Total for the year /*Totaal vir die jaar* = R1 525 million/*miljoen* × 12 = R18 300 million/*miljoen* ✓ MA	1MA electricity amount	
	Water = R98 × 10,6 mil = R1 038,8 mil Total for the year / *Totaal vir die jaar* = R1 038,8 million/*miljoen* × 12 = R12 465,6 million/*miljoen* ✓ MA	1MA water amount	
	Total spent on electricity and tap water in millions: *Totaal aan water en elektrisiteit gespandeer in miljoene:* ✓ M = R18 300 + R12 465,6 = R30 765,6 ✓ CA	1M adding amounts 1CA simplification	
	OR/*OF*	**OR/*OF***	
	Annual cost for electricity / *Jaarlikse elektrisiteit koste* = R125 × 12 = R1 500 Total electricity / *Totaal elektrisiteit* = R1 500 × 12,2 million = R18 300 million/*miljoen* ✓MA Annual cost for tap water/ *Jaarlikse water koste* = R98 × 12 = R1 176 Total /*Totaal* :water = R1 176 × 10,6 million/*miljoen* = R12 465,6 million/*miljoen* ✓MA	1MA electricity amount 1MA water amount	
	Total spent on electricity and tap water *Totaal aan water en elektrisiteit gespandeer:* = R18 300 million + R12 465,6 million ✓ M = R30 765,6 million/*miljoen* = R30 765 600 000 ✓ CA	1M adding amounts 1CA simplification (4)	
4.3.3	✓✓ O The scale on the axis (vertical / y axis) of the two graphs differs. *Die skaal op die as(vertikale / y-as) verskil.* The intervals on Graph A is 10% while Graph B is 40% *Die intervalle op Grafiek A is 10% terwyl Grafiek B 40% is*	2O reason (2)	D L4
		[38]	
		TOTAL/*TOTAAL*: 150	