basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
*NASIONALE
SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 10

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2019

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 100

These marking guidelines consist of 11 pages.
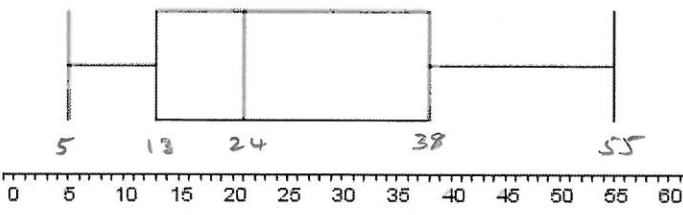*Hierdie nasienriglyne bestaan uit 11 bladsye.*

NOTE:
- If a candidate answer a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:
- *As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.*
- *Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.*

QUESTION/*VRAAG* 1

1.1.1	15 is the mode/*is die modus*	✓answer/*antwoord* (1)
1.1.2	Position of the median $= \dfrac{n+1}{2}$ $\qquad T_1, \cdots, T_{19}$ $\qquad\qquad = $ 10th position $\quad M = T_{\frac{1}{2}(1+19)}$ median $= 24$ $\qquad\qquad\qquad = T_{10}$ *Posisie van die mediaan* $= \dfrac{n+1}{2}$ $\qquad\qquad = 24$ $\qquad\qquad = $ 10*de posisie* *mediaan* $= 24$	✓answer/*antwoord* (1)
1.1.3	Interquartile range $= Q_3 - Q_1$ $\quad T_1, \cdots, T_9 \quad T_{11}, \cdots, T_{19}$ $\qquad\qquad\qquad = 38 - 13 \qquad Q_1 \qquad\qquad Q_3$ $\qquad\qquad\qquad = 25 \qquad = T_{\frac{1}{2}(1+9)} \quad = T_{\frac{1}{2}(11+19)}$ $\qquad\qquad\qquad\qquad\qquad = T_5 \qquad\quad = T_{15}$ *Variasiewydte* $= Q_3 - Q_1 \qquad = 13 \qquad\quad = 38$ $\qquad\qquad\qquad = 38 - 13$ $\qquad\qquad\qquad = 25$	✓Q_3 ✓Q_1 ✓answer/*antwoord* (3)
1.1.4		✓box/*mond* ✓whiskers/*snor* (2)
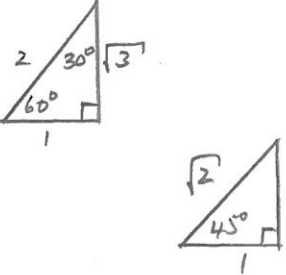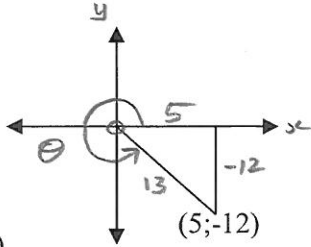
1.2.1	5 learners/*leerders*	✓ answer/*antwoord* (1)
1.2.2	40 learners/*leerders*	✓ answer/*antwoord* (1)
1.2.3	Range = max value – min value $\quad\quad\quad = 10 - 0$ $\quad\quad\quad = 10$ *Varisasiewydte = maks waarde – min waarde* $\quad\quad\quad = 10 - 0$ $\quad\quad\quad = 10$	✓ min and max/*min en maks* ✓ answer/*antwoord* (2)
1.2.4	Number of learners/*Getal leerders* $= 1 + 9 + 2 + 5 + 2$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad = 19$ Percentage/*Persentasie* $\quad\quad = \dfrac{19}{40} \times 100$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad = 47{,}5\%$	✓ no. of learners/*getal leerders* ✓ answer/*antwoord* (2)
1.2.5	$\bar{x} = \dfrac{(0 \times 2) + (1 \times 5) + (2 \times 2) + (3 \times 9) + \ldots + (10 \times 1)}{40}$ $\quad = \dfrac{195}{40}$ $\quad = \dfrac{39}{8}$ $\quad = 4{,}88$	✓ 195 ✓ 40 ✓ answer/*antwoord* (3)
		[16]

QUESTION/*VRAAG* 2

2.1.1	$AE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\quad = \sqrt{(1+2)^2 + (3+1)^2}$ $\quad = 5 \text{ cm}$	$\checkmark$ substitution/ *vervanging* $\checkmark$ answer/*antwoord* (2)
2.1.2	$m_{AC} = \dfrac{y_2 - y_1}{x_2 - x_1}$ $\qquad = \dfrac{3-1}{1-2}$ $\qquad = -2$	$\checkmark$ substitution/ *vervanging* $\checkmark$ answer/*antwoord* (2)
2.1.3	$x_c = \dfrac{x_1 + x_2}{2} \qquad\qquad y_c = \dfrac{y_1 + y_2}{2}$ $2 = \dfrac{1+x}{2} \qquad\qquad\quad 1 = \dfrac{y+3}{2}$ $x = 3 \qquad\qquad\qquad\quad y = -1$ $\qquad B(3;-1)$	$\checkmark$ substitution/ *vervanging* $\checkmark$ x-value/-*waarde* $\checkmark$ y-value/-*waarde* (3)

2.2	$BE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
	$\quad = \sqrt{(3+2)^2 + (-1+1)^2}$	
	$\quad\quad = 5 \text{ cm}$	✓BE
	OR/*OF*	
	$BE = 3 + 2 \quad$ (horizontal line/*horisontale lyn*)	
	$\quad\quad = 5$	
	$BE = AE$ and/*en* $AF = BF$	
	$\therefore AFBE$ is a kite/*is 'n vlieër* (2 adj. sides = but opp. sides not equal	✓kite/*vlieër*
	(2 aangr. sye = maar teenoorg. sye is nie gelyk nie)	✓justification/ *regverdiging*
		(3)
2.3	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
	$\quad = \sqrt{(3-1)^2 + (-1-3)^2}$	
	$\quad\quad = 2\sqrt{5} \text{ cm}$	✓AB
	$\therefore AC = \sqrt{5} \text{ cm}$	
	In $\triangle ACF$	
	$\hat{A} = 45°$	
	$\tan 45° = \dfrac{CF}{\sqrt{5}}$	✓ratio/*verhouding*
	$\quad CF = \sqrt{5} \text{ cm}$	✓CF
	$Area = \dfrac{1}{2} \times AB \times CF$	
	$\quad\quad = \dfrac{1}{2} \times 2\sqrt{5} \times \sqrt{5}$	✓substitution/ *vervanging*
	$\quad\quad = 5 \text{ cm}^2$	✓answer/*antwoord* (5)
		[15]

1 pr (handwritten annotation with arrow)

QUESTION/*VRAAG* 3

3.1	$\sin^2 x + 2\cos y$ $= \sin^2 37° + 2\cos 44°$ $= 1{,}80$	✓ answer/*antwoord* (1)

3.2	$\dfrac{\sin 30°.\cot 45°}{\cos 30°.\tan 60°}$
	
	 $= \dfrac{\frac{1}{2}.1}{\frac{\sqrt{3}}{2}.\sqrt{3}}$ • no Δ's
	       or
	    • wrong Δ's
	
	 $= \dfrac{1}{3}$ 0/3
		✓ $\frac{1}{2}$ and/*en* 1
		
		 ✓ $\frac{\sqrt{3}}{2}$ and/*en* $\sqrt{3}$
		
		 ✓ answer/*antwoord* (3)

3.3.1	In $\triangle$ ACD, $\cos D = \dfrac{CD}{AD}$	✓ answer/*antwoord* (1)
3.3.2	In $\triangle$ CDE , $\cos D = \dfrac{DE}{CD}$	✓ answer/*antwoord* (1)
3.3.3	$\dfrac{CD}{AD} = \dfrac{DE}{CD}$ both/*beide* $= \cos D$ $ED = \dfrac{CD^2}{AD}$ $ED = \dfrac{25}{13}$ $ED = 1{,}92$ units/*eenhede*	✓ equating/ *gelykstelling* ✓ answer/*antwoord* (2)
3.4.1	$\cos\theta = \dfrac{5}{13} = \dfrac{x}{r}$ $y^2 = r^2 - x^2$ $= (13)^2 - (5)^2$ $= 144$ $y = -12$ (in the 4th quad/*in 4de kwad*) $\therefore \ \sin\theta = -\dfrac{12}{13}$	✓ diagram ✓ y-value/-*waarde* ✓ answer/*antwoord* (3)
3.4.2	$\sec\theta + \tan^2\theta + 1$ $= \dfrac{13}{5} + \left(\dfrac{-12}{5}\right)^2 + 1$ $= \dfrac{13}{5} + \dfrac{144}{25} + 1$ $= \dfrac{234}{25}$	✓ $\dfrac{13}{5}$ ✓ $\dfrac{-12}{5}$ ✓ simplification/ *vereenvoudiging* ✓ answer/*antwoord* (4)
		[15]

QUESTION/*VRAAG* 4

4.1.1	$2\sin\theta + 1 = 1,28$ $2\sin\theta \quad = 0,28$ $\sin\theta \quad = 0,14$ $\theta \quad = 8,05°$	✓ simplification/ *vereenvoudiging* ✓ answer/*antwoord* (2)
4.1.2	$\tan 2\theta = 4\cot 60°$ $\tan 2\theta \quad = \dfrac{4}{\sqrt{3}}$ $2\theta \quad = 66,5867......°$ $\theta \quad = 33,29°$ *(handwritten: $A = 2\theta$ etc)*	✓ $\dfrac{4}{\sqrt{3}}$ ✓ $66,5867......°$ ✓ answer/*antwoord* (3)
4.2.1	In $\triangle ABC$ $\sin A = \dfrac{BC}{AC} = \dfrac{5}{9}$ $C\hat{A}B = 33,75°$ **OR/OF** $AB = 2\sqrt{14}$ (Pythagoras theorem)/*stelling van Pythagoras* $\cos A = \dfrac{2\sqrt{14}}{9}$ $A = 33,75^0$ **OR/OF** $\tan A = \dfrac{5}{2\sqrt{14}}$ $A = 33,75^0$	✓ ratio/*verhouding* ✓ answer/*antwoord* (2) ✓ ratio/*verhouding* ✓ answer/*antwoord* (2) ✓ ratio/*verhouding* ✓ answer/*antwoord* (2)

4.2.2	$AB = \sqrt{9^2 - 5^2}$	$\checkmark$ ratio/*verhouding*
	$\quad = 7{,}48$ units/*eenhede*	$\checkmark AB$
	OR/*OF*	
	In $\triangle ABC$	
	$\cos \hat{A} = \dfrac{AB}{9}$	
	$AB = \cos 33{,}75° \times 9$	
	$AB = 7{,}48$ units/*eenhede*	
	OR/*OF*	
	$BC = 5$ units	
	$AB = \dfrac{5}{\tan 33{,}75°}$	
	$\quad = 7{,}48$ units/*eenhede*	
	$\therefore$ In $\triangle AEB$, $\hat{A} = 22{,}5°$	$\checkmark$ $B\hat{A}E = 22{,}5°$
	$\cos \hat{A} = \dfrac{AB}{AE}$	
	$\cos 22{,}5° = \dfrac{7{,}48}{AE}$	$\checkmark$ substitution/ *vervanging*
	$AE = 8{,}096...$	$\checkmark AE \qquad (5)$
	$AE = 8{,}10$	
4.2.3	In $\triangle ABE$	
	$BE = \sqrt{AE^2 - AB^2}$	
	$\quad = \sqrt{(8{,}1)^2 - (7{,}48)^2}$	$\checkmark BE$
	$\quad = 3{,}11$	
	OR/*OF*	
	$BE = \sin 22{,}5° \times 8{,}10 = 3{,}10$	
	OR/*OF*	
	$BE = \tan 22{,}5° \times 7{,}48 = 3{,}10$	
	In $\triangle ABD$	
	$\tan 11{,}25° = \dfrac{DB}{AB}$	
	$\therefore DB = \tan 11{,}25° \times 7{,}48$	
	$DB = 1{,}49$	$\checkmark DB$
	$DE = BE - DB$	$\checkmark BE - DB$
	$\quad = 3{,}10 - 1{,}49 \qquad or \qquad 3{,}11 - 1{,}49$	
	$\quad = 1{,}61$ units/*eenhede* $\qquad = 1{,}62$ units/*eenhede*	$\checkmark$ answer/*antwoord* (4)
		[16]

QUESTION/*VRAAG* 5

5.1.1	Period of/*Periode van* f: $360°$	✓ answer/*antwoord* (1)
5.1.2	Range of/*Waardeversameling van* g: $-2 \leq y \leq 0$ or/*of* $y \in [-2\,;0]$	✓ critical values/ *kritieke waardes* ✓ answer/*antwoord* (2)
5.1.3	2 solutions/*oplossings*	✓ answer/antwoord (1)
5.2	$90° \leq x \leq 270°$ or/*of* $x \in [90°\,;270°]$	✓ critical values ✓ notation (2)
5.3	$h(x) = -\sin x + 1$ Minimum T.P/*Draaipunt* $= (90°\,;0)$	✓✓ $(90°\,;0)$ (2)
		[8]

QUESTION/*VRAAG* 6

6.1	Volume of the box/*van houer* $= L \times B \times H$ $3000 = 25 \times 15 \times x$ $x = \dfrac{3000}{375}$ $x = 8$ cm The height of the box/*hoogte van houer* $= 8$ cm	✓ formula/*formule* ✓ substitution/ *vervanging* ✓ answer/*antwoord* (3)
6.2	The diameter of each can is 5 cm./ *Die diameter van elke blikkie is 5* cm. The radius of each can is 2,5 cm./ *Die radius van elke blikkie is 2,5* cm.	✓ diameter ✓ answer/*antwoord* (2)
6.3	Volume of drink in a can/*van koeldrank in blikkie* $= \pi r^2 h$ $= \pi(2,5)^2(8)$ $= \pi(2,5)^2(8)$ $= 157,08$ cm^3	✓ substitution/ *vervanging* ✓ answer/*antwoord* (2)
6.4	Volume of the remaining space = V of the box − V of the 15 cans/ *Volume van oorblywende spasie = V van die houer − V van die 15 blikkies* $= 3000 - (15 \times 157,08)$ $= 3000 - 2356,20$ $= 643,80$ cm^3	✓ $3000 -$ $(15 \times 157,08)$ ✓ answer/*antwoord* (2)
		[9]

QUESTION/*VRAAG* **7**		
7.1.1	$\hat{EMF} = 120°$ ($\angle$'s on straight line/*op reguitlyn*) $\hat{F}_1 = \hat{E}_1 = 30°$ ($\angle$'s opp. = sides OR diag.of a rectangle = and bisec each other).	✓S/R ✓S/R (2)
7.1.2	$\hat{E}_1 = \hat{G}_1 = 30°$ (Alt. $\angle$'s : EF $\parallel$ HG) $\hat{L}_2 = \hat{G}_1 + \hat{GML}$ (ext. $\angle$ = sum of two opp. int. $\angle$'s) $\quad = 4\pi r^2$ $40° = 30° + \hat{GML}$ $\hat{GML} = 10°$	✓S/R ✓S/R ✓answer/*antwoord* (3)
7.2	Perimeter of/*Omtrek van* PQRS = 12 cm $\text{One side/}Een\,sy = \dfrac{12}{4} = 3$ cm $\therefore SR = 3$ cm PM = MR (diag. of *rhombus/rombus (ruit)* PQRS) PL = LS (given/*gegee*) In $\triangle$PSR $LM = \dfrac{1}{2}SR$ (Midpoint thm/*Middelpuntstelling*) $= \dfrac{1}{2}(3)$ $= \dfrac{3}{2} = 1,5$ cm	✓3cm ✓S/R ✓S/R ✓answer/*antwoord* (4)
		[9]

QUESTION/*VRAAG* 8

8.1	Bisect each other/*Halveer mekaar*	✓ answer/*antwoord* (1)
8.2.1	A line drawn from the midpoint of one side of a triangle parallel to another side bisects the third side./*'n Lyn wat van die middelpunt van een sy van 'n driehoek parallel aan 'n ander sy getrek word, halveer die derde sy.*	✓R (1)
8.2.2 (a)	In $\triangle VWP \equiv \triangle VRS$ 1. $WV = VR$ (proved/*bewys*) 2. $VP = SV$ (given/*gegee*) 3. $\hat{V}_1 = \hat{V}_3$ (vert. opp $\angle$s) $\therefore \triangle VWP \equiv \triangle VRS$ (SAS)	✓S ✓S/R ✓R (3)
8.2.2(b)	$WV = VR$ (proved/*bewys*) $VP = SV$ (given/*gegee*) $\therefore SWPR$ is a/'*n* //^{m} (diagonals bisect each other/ *hoeklyne halveer mekaar*)	✓S ✓R (2)
8.2.2(c)	$PQ \parallel SR$ ($WP \parallel SR$) $SP \parallel RQ$ (given/*gegee*) $\therefore PQRS$ is a parallelogram (both pairs of opp. sides are // *beide pare teenoorg. sye is //*) **OR/*OF*** $PQ \parallel SR$ ($WP \parallel SR$) $PQ = SR$ ($PQ = WP = SR$, proved/*bewys*) $\therefore PQRS$ is a //^{m} (one pair of opp. sides = and // *een paar teenoorg. sye = en//*)	✓S ✓R ✓R (3) ✓S ✓R ✓R (3)
8.2.3	$SR = TW$ (RSTW is $\parallel$ gram) But $SR = WP$ (proved/*bewys*) $WP = QP$ (given/*gegee*) $\therefore TQ = TW + WP + PQ$ $= 3SR$	✓S/R ✓S (2)
		[12]

TOTAL/*TOTAAL*: 100