



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE/ NASIONALE**

**GRADE/*GRAAD***

**MATHEMATICS P2/*WISKUNDE V2***

**NOVEMBER 2019**

**MARKS/*PUNTE*: 100**

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

**NOTE:**

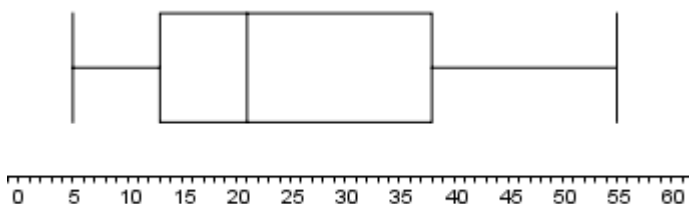
- If a candidate answer a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

**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<br>(1)                       |
| 1.1.2 | Position of the median $= \frac{n+1}{2}$<br>$= 10^{\text{th}}$ position<br>median = 24<br>Posisie van die mediaan $= \frac{n+1}{2}$<br>$= 10^{\text{de}}$ posisie<br>mediaan = 24 | ◆answer/antwoord<br>(1)                       |
| 1.1.3 | Interquartile range $= Q_3 - Q_1$<br>$= 38 - 13$<br>$= 25$<br>Variasiewydte $= Q_3 - Q_1$<br>$= 38 - 13$<br>$= 25$                                                                | ✓ $Q_3$<br>✓ $Q_1$<br>✓answer/antwoord<br>(3) |

| 1.1.4               |  <p>A box plot is shown on a horizontal number line ranging from 0 to 60. The number line has major tick marks every 5 units, labeled from 0 to 60. The box plot consists of a central box with a vertical line inside representing the median. The left whisker extends to the minimum value, and the right whisker extends to the maximum value.</p> <table><tr><th>Statistic</th><th>Value</th></tr><tr><td>Minimum</td><td>5</td></tr><tr><td>First Quartile (Q1)</td><td>15</td></tr><tr><td>Median</td><td>21</td></tr><tr><td>Third Quartile (Q3)</td><td>38</td></tr><tr><td>Maximum</td><td>55</td></tr></table> | Statistic | Value | Minimum | 5 | First Quartile (Q1) | 15 | Median | 21 | Third Quartile (Q3) | 38 | Maximum | 55 | <p>✓box/<i>mond</i></p> <p>✓whiskers/<i>snor</i><br/>(2)</p> |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|---------|---|---------------------|----|--------|----|---------------------|----|---------|----|--------------------------------------------------------------|
| Statistic           | Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |       |         |   |                     |    |        |    |                     |    |         |    |                                                              |
| Minimum             | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |       |         |   |                     |    |        |    |                     |    |         |    |                                                              |
| First Quartile (Q1) | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |       |         |   |                     |    |        |    |                     |    |         |    |                                                              |
| Median              | 21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |       |         |   |                     |    |        |    |                     |    |         |    |                                                              |
| Third Quartile (Q3) | 38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |       |         |   |                     |    |        |    |                     |    |         |    |                                                              |
| Maximum             | 55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |       |         |   |                     |    |        |    |                     |    |         |    |                                                              |

|       |                                                                                                                                                                                                                        |                                                                                        |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1.2.1 | 5 learners/ <i>leerders</i>                                                                                                                                                                                            | ♦ answer/ <i>antwoord</i><br>(1)                                                       |
| 1.2.2 | 40 learners/ <i>leerders</i>                                                                                                                                                                                           | ♦ answer/ <i>antwoord</i><br>(1)                                                       |
| 1.2.3 | <p>Range = max value – min value<br/> <math>= 10 - 0</math><br/> <math>= 10</math></p> <p>Variasiewydte = maksimumwaarde – minimumwaarde<br/> <math>= 10 - 0</math><br/> <math>= 10</math></p>                         | <p>✓ min and max/<i>min en maks</i></p> <p>♦ answer/<i>antwoord</i><br/>(2)</p>        |
| 1.2.4 | <p>Number of learners/<i>Getal leerders</i> <math>= 1 + 9 + 2 + 5 + 2</math><br/> <math>= 19</math></p> <p><math>= \frac{19}{40} \times 100</math><br/> <math>= 47,5\%</math></p> <p>Percentage/<i>Persentasie</i></p> | <p>♦ no. of learners/<i>getal leerders</i></p> <p>♦ answer/<i>antwoord</i><br/>(2)</p> |
| 1.2.5 | $\bar{x} = \frac{(0 \times 2) + (1 \times 5) + (2 \times 2) + (3 \times 9) + \dots + (10 \times 1)}{40}$ $= \frac{195}{40}$ $= \frac{39}{8}$ $= 4,88$                                                                  | <p>♦ 195<br/> ✓ 40</p> <p>♦ answer/<i>antwoord</i><br/>(3)</p>                         |
|       |                                                                                                                                                                                                                        | [16]                                                                                   |

**QUESTION/VRAAG 2**

|       |                                                                                                                            |                                                                                |
|-------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 2.1.1 | $AE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(1+2)^2 + (3+1)^2}$ $= 5 \text{ cm}$                                  | ♦ substitution/<br>vervanging<br>♦ answer/antwoord<br>(2)                      |
| 2.1.2 | $m_{AC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3-1}{1-2}$ $= -2$                                                          | ♦ substitution/<br>vervanging<br>✓ answer/antwoord<br>(2)                      |
| 2.1.3 | $x_c = \frac{x_1 + x_2}{2}$ $2 = \frac{1+x}{2}$ $x = 3$ $B(3;-1)$ $y_c = \frac{y_1 + y_2}{2}$ $1 = \frac{y+3}{2}$ $y = -1$ | ♦ substitution/<br>vervanging<br>♦ x-value/-waarde<br>♦ y-value/-waarde<br>(3) |

|     |                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                             |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 2.2 | $BE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3+2)^2 + (-1+1)^2}$ $= 5 \text{ cm}$ <p>OR/OF</p> $BE = 3 + 2 \text{ (horizontal line/horizontaal)}$ $= 5$ $BE = AE \text{ and } AF = BF$ $\therefore \text{AFBE is a kite/vlieër (2 adjacent sides = but opposite sides not equal)}$ $(2 \text{ aangrensende sye = maar teenoorgelyke nie gelyknie})$                      | <p>❖ BE</p> <p>❖ kite/vlieër</p> <p>❖ justification/<br/>regverdiging</p> <p>(3)</p>                                        |
| 2.3 | $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3-1)^2 + (-1-3)^2}$ $= 2\sqrt{5} \text{ cm}$ $\therefore AC = \sqrt{5} \text{ cm}$ <p>In <math>\triangle ACF</math></p> $A = 45^\circ$ $\tan 45^\circ = \frac{CF}{\sqrt{5}}$ $CF = \sqrt{5} \text{ cm}$ $\text{Area} = \frac{1}{2} \times AB \times CF$ $= \frac{1}{2} \times 2\sqrt{5} \times \sqrt{5}$ $= 5 \text{ cm}^2$ | <p>❖ AB</p> <p>❖ ratio/verhouding</p> <p>❖ CF</p> <p>❖ substitution/<br/>vervanging</p> <p>❖ answer/antwoord</p> <p>(5)</p> |
|     |                                                                                                                                                                                                                                                                                                                                                                                   | <b>[15]</b>                                                                                                                 |

**QUESTION/VRAAG 3**

|       |                                                                                                                                                                                |                                                                                                                                                      |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.1   | $\sin^2 x + 2 \cos y$<br>$= \sin^2 37^\circ + 2 \cos 44^\circ$<br>$= 1,80$                                                                                                     | <p>❖ answer/antwoord (1)</p>                                                                                                                         |
| 3.2   | $\frac{\sin 30^\circ \cdot \cot 45^\circ}{\cos 30^\circ \cdot \tan 60^\circ}$<br>$= \frac{\frac{1}{2} \cdot 1}{\frac{\sqrt{3}}{2} \cdot \sqrt{3}}$<br>$= \frac{1}{3}$          | <p>❖ <math>\frac{1}{2}</math> and <math>1</math></p> <p>❖ <math>\frac{\sqrt{3}}{2}</math> and <math>\sqrt{3}</math></p> <p>❖ answer/antwoord (3)</p> |
| 3.3.1 | In $\triangle ACD$ , $\cos D = \frac{CD}{AD}$                                                                                                                                  | <p>❖ answer/antwoord (1)</p>                                                                                                                         |
| 3.3.2 | In $\triangle CDE$ , $\cos D = \frac{DE}{CD}$                                                                                                                                  | <p>❖ answer/antwoord (1)</p>                                                                                                                         |
| 3.3.3 | $\frac{CD}{AD} = \frac{DE}{CD}$ both $\text{beide} = \cos D$<br>$ED = \frac{CD^2}{AD}$<br>$ED = \frac{25}{13}$<br>$ED = 1,92 \text{ units/eenhede}$                            | <p>❖ equating/gelykstelling</p> <p>❖ answer/antwoord (2)</p>                                                                                         |
| 3.4.1 | $\cos \theta = \frac{5}{13}$<br>$y^2 = r^2 - x^2$<br>$= (13)^2 - (5)^2$<br>$= 144$<br>$y = -12$ (in the 4th quadrant in 4de kwad)<br>$\therefore \sin \theta = -\frac{12}{13}$ | <p>❖ diagram</p> <p>❖ y-value/-waarde</p> <p>❖ answer/antwoord (3)</p>                                                                               |

|       |                                                                                                                                              |                                                                                                                |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 3.4.2 | $\sec\theta + \tan^2\theta + 1$ $= \frac{13}{5} + \left(\frac{-12}{5}\right)^2 + 1$ $= \frac{13}{5} + \frac{144}{25} + 1$ $= \frac{234}{25}$ | $\frac{13}{5}$ $+ \frac{-12}{5}$ <p>◆ simplification/<br/>vereenvoudiging</p> <p>◆ answer/antwoord<br/>(4)</p> |
|       |                                                                                                                                              | [15]                                                                                                           |

**QUESTION/VRAAG 4**

|       |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                            |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.1.1 | $2\sin\theta + 1 = 1,28$<br>$2\sin\theta = 0,28$<br>$\sin\theta = 0,14$<br>$\theta = 8,05^\circ$                                                                                                                                                                                                                                    | <p>◆simplification/<br/>vereenvoudiging</p> <p>◆answer/antwoord<br/>(2)</p>                                                                                                |
| 4.1.2 | $\tan 2\theta = 4 \cot 60^\circ$<br>$\tan 2\theta = \frac{4}{\sqrt{3}}$<br>$2\theta = 66,5867.....^\circ$<br>$\theta = 33,29^\circ$                                                                                                                                                                                                 | <p><math>\frac{4}{\sqrt{3}}</math></p> <p>◆66,5867.....°</p> <p>◆answer/antwoord<br/>(3)</p>                                                                               |
| 4.2.1 | <p>In <math>\triangle ABC</math></p> $\sin A = \frac{BC}{AC} = \frac{5}{9}$<br>$CAB = 33,75^\circ$<br><br><p><b>OR/OF</b></p> $AB = 2\sqrt{14}$ (Pythagoras theorem/stelling van Pythagora)<br>$\cos A = \frac{2\sqrt{14}}{9}$<br>$A = 33,75^\circ$<br><br><p><b>OR/OF</b></p> $\tan A = \frac{5}{2\sqrt{14}}$<br>$A = 33,75^\circ$ | <p>◆ratio/verhouding</p> <p>◆answer/antwoord<br/>(2)</p> <p>◆ratio/verhouding</p> <p>◆answer/antwoord<br/>(2)</p> <p>◆ratio/verhouding</p> <p>◆answer/antwoord<br/>(2)</p> |



|  |  |                                               |
|--|--|-----------------------------------------------|
|  |  | ❖ BE – DB<br>❖ answer/ <i>antwoord</i><br>(4) |
|  |  | <b>[16]</b>                                   |

**QUESTION/VRAAG 5**

|       |                                                                                       |                                                                                             |
|-------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 5.1.1 | Period of/ <i>Periode van</i> $f$ : $360^\circ$                                       | <p>◆ answer/<i>antwoord</i></p> <p>(1)</p>                                                  |
| 5.1.2 | Range of/ <i>Waardeversameling van</i> $g$ : $-2 \leq y \leq 0$ or/of $y \in [-2; 0]$ | <p>◆ critical values/<i>kritieke waardes</i></p> <p>◆ answer/<i>antwoord</i></p> <p>(2)</p> |
| 5.1.3 | 2 solutions/ <i>oplossings</i>                                                        | <p>◆ answer/<i>antwoord</i> (1)</p>                                                         |
| 5.2   | $90^\circ \leq x \leq 270^\circ$ or/of $x \in [90^\circ; 270^\circ]$                  | <p>◆ critical values</p> <p>◆ notation</p> <p>(2)</p>                                       |
| 5.3   | $h(x) = -\sin x + 1$<br>Minimum T.P/ <i>Draaipunt</i> = $(90^\circ; 0)$               | <p>◆◆ <math>(90^\circ; 0)</math></p> <p>(2)</p>                                             |
|       |                                                                                       | <b>[8]</b>                                                                                  |

**QUESTION/VRAAG 6**

|     |                                                                                                                                                                                                               |                                                                                                                    |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 6.1 | Volume of the box/ <i>inhoud van houer</i> = $L \times B \times H$<br>$3000 = 25 \times 15 \times x$<br>$x = \frac{3000}{375}$<br>$x = 8 \text{ cm}$<br>The height of the box/ <i>hoogte van houer</i> = 8 cm | <p>◆ formula/<i>formule</i></p> <p>◆ substitution/<i>vervanging</i></p> <p>◆ answer/<i>antwoord</i></p> <p>(3)</p> |
| 6.2 | The diameter of each can is 5 cm./<br>Die diameter van elke blikkie is 5 cm.<br>The radius of each can is 2,5 cm./<br>Die radius van elke blikkie is 2,5 cm.                                                  | <p>◆ diameter</p> <p>◆ answer/<i>antwoord</i></p> <p>(2)</p>                                                       |

|     |                                                                                                                                                                                                                                   |                                                                                     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 6.3 | <p>Volume of drink in a can / <del>volume</del> <del>van</del> <del>koeldrank</del> <del>in</del> <del>blikkie</del> <del>e</del> <math>r^2 h</math></p> $= \pi (2,5)^2 (8)$ $= \pi (2,5)^2 (8)$ $= 157,08 \text{ cm}^3$          | <p>◆ substitution/<br/>vervanging</p> <p>◆ answer/antwoord</p> <p>(2)</p>           |
| 6.4 | <p>Volume of the remaining space = V of the box – V of the 15 cans/<br/> <i>Volume van oorblywende spasie = V van die houer – V van die blikkies</i></p> $= 3000 - (15 \times 157,08)$ $= 3000 - 2356,20$ $= 643,80 \text{ cm}^3$ | <p>◆ <math>3000 - (15 \times 157,08)</math></p> <p>◆ answer/antwoord</p> <p>(2)</p> |
|     |                                                                                                                                                                                                                                   | [9]                                                                                 |

| QUESTION/VRAAG 7 |                                                                                                                                                                                                                                                                                                                                            |                                                                                                               |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 7.1.1            | $\angle F_1 = \angle E_1 = 30^\circ$ ( $\angle$ 's on straight line oppreguitlyn)<br>$F_1 = E_1 = 30^\circ$ ( $\angle$ 's opp. = sides OR diag of a rectangle = and bisection each other).                                                                                                                                                 | $\checkmark$ S/R<br>$\checkmark$ S/R<br><br>(2)                                                               |
| 7.1.2            | $E_1 = G_1 = 30^\circ$ (Alt. $\angle$ 's: $EF \parallel HG$ )<br><br>$L_2 = G_1 + GML$ (ext $\angle$ = sum of two opp int $\angle$ 's)<br>$40^\circ = 30^\circ + GML$<br>$GML = 10^\circ$                                                                                                                                                  | $\diamond$ S/R<br><br>$\diamond$ S/R<br><br>$\diamond$ answer/antwoord<br><br>(3)                             |
| 7.2              | Perimeter/Omtrek van PQRS = 12 cm<br>$\text{One side/En sy} = \frac{12}{4} = 3 \text{ cm}$ $\therefore SR = 3 \text{ cm}$ $PM = MR$ (diag of rhombus/robufruit PQRS)<br>$PL = LS$ (given/gegee)<br>In $\triangle PSR$<br>$LM = \frac{1}{2}SR$ (Midpoint theorem/Middelpuntstelling)<br>$= \frac{1}{2}(3)$ $= \frac{3}{2} = 1,5 \text{ cm}$ | $\checkmark$ 3cm<br><br>$\diamond$ S/R<br><br><br>$\diamond$ S/R<br><br>$\diamond$ answer/antwoord<br><br>(4) |
|                  |                                                                                                                                                                                                                                                                                                                                            | [9]                                                                                                           |

**QUESTION/VRAAG 8**

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                               |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| 8.1          | Bisect each other/ <i>Halveer mekaar</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>answer/antwoord</p> <p>(1)</p>                             |
| 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.                                                                                                                                                                                                                                                                                                | <p>R</p> <p>(1)</p>                                           |
| 8.2.2<br>(a) | <p>In <math>\triangle VWP \equiv \triangle VRS</math></p> <p>1. <math>WV = VR</math> (proved/ewys)</p> <p>2. <math>VP = SV</math> (given/gegee)</p> <p>3. <math>\angle V_1 = \angle V_3</math> (vertical angles)</p> <p><math>\therefore \triangle VWP \equiv \triangle VRS</math> (SAS)</p>                                                                                                                                                                                                                                  | <p>S</p> <p>S/R</p> <p>R</p> <p>(3)</p>                       |
| 8.2.2(b)     | <p><math>WV = VR</math> (proved/ewys)</p> <p><math>VP = SV</math> (given/gegee)</p> <p><math>\therefore</math> SWPR is a rhombus (diagonals bisect each other/<br/>hoeklyn halveer mekaar)</p>                                                                                                                                                                                                                                                                                                                                | <p>S</p> <p>R</p> <p>(2)</p>                                  |
| 8.2.2(c)     | <p><math>PQ \parallel SR</math> (WP <math>\parallel</math> SR)</p> <p><math>SP \parallel RQ</math> (given/gegee)</p> <p><math>\therefore</math> PQRS is a parallelogram (both pairs of opposite sides are //<br/>beide pare teenoorgelyke is //)</p> <p><b>OR/OF</b></p> <p><math>PQ \parallel SR</math> (WP <math>\parallel</math> SR)</p> <p><math>PQ = SR</math> (PQ = WP = SR, proved/ewys)</p> <p><math>\therefore</math> PQRS is a rhombus (one pair of opposite sides = and //<br/>een paar teenoorgelyke = en //)</p> | <p>S R</p> <p>R</p> <p>(3)</p> <p>S R</p> <p>R</p> <p>(3)</p> |

|       |                                                                                                                                            |                                                        |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| 8.2.3 | $SR = TW$ (RSTW is a parallelogram)<br>But $SR = WP$ (proved previously)<br>$WP = QP$ (given)<br>$\therefore TQ = TW + WP + PQ$<br>$= 3SR$ | $\checkmark$ S/R<br><br><br><br><br>$\checkmark$ S (2) |
|       |                                                                                                                                            | [12]                                                   |

**TOTAL/TOTAAL:**  
**100**