### NATIONAL SENIOR CERTIFICATE
**NASIONALE SENIOR SERTIFIKAAAT**

### MATHEMATICS P2/WISKUNDE V2

### GRADE/GRAAD 10

### NOVEMBER 2015

### SPECIAL ANSWER BOOK
**SPESIALE ANTWOORDEBOEK**

<table>
<thead>
<tr>
<th>QUESTION VRAAG</th>
<th>MARK PUNT</th>
<th>INITIAL PARAAF</th>
<th>MODERATION MODERERING</th>
<th>INITIAL PARAAF</th>
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<td>TOTAL TOTAAL (100)</td>
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This answer book consists of 16 pages.

*Hierdie antwoordeboek bestaan uit 16 bladsye.*
QUESTION/VRAAG 1

<table>
<thead>
<tr>
<th>14</th>
<th>15</th>
<th>16</th>
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<tbody>
<tr>
<td>19</td>
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<td>22</td>
<td>23</td>
<td>24</td>
<td>24</td>
<td>29</td>
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</tbody>
</table>

Solution/Oplossing

1.1

\[ M = T_{19} \cdot (19, 19) = T_{19} \times T_{19} = 19 \]

1.2

\[ Q_1 = 17 \]

\[ Q_3 = 22 \]

1.3

\[ \text{min} = 14 \quad Q_1 = 17 \quad M = 19 \quad Q_3 = 22 \quad \text{max} = 29 \]

1.4.1

\[ \text{min} = 15 \quad Q_1 = 19 \quad M = 23 \quad Q_3 = 26 \quad \text{max} = 30 \]

\[ \text{IQR} = Q_3 - Q_1 = 26 - 19 = 7 \]

1.4.2

\[ Q_1 = 19 \text{ s } 25\% \]

\[ > 19 \text{ s } 75\% \]

1.5

\[ \text{Girls} \leq 23 \text{ s } \frac{13}{14} \times 100 = 78.94 \ldots \%
\]

\[ \text{Boys} \leq 23 \text{ s } M = 50 \%
\]

\[ \therefore \text{Girls} \quad \text{answer only} \quad 0/2 \]

Marks Punte

(1) 1

(2) 2

[10]
### NUMBER OF HOURS (h)/GETAL UUR (h)  | FREQUENCY/FREKWENSIE
---|---
0 < h ≤ 2 | 10
2 < h ≤ 4 | 15
4 < h ≤ 6 | 30
6 < h ≤ 8 | 25
8 < h ≤ 10 | 35
10 < h ≤ 12 | 15

---

### Solution/Oplossing

2.1. **Median class = 6 < h ≤ 8**

2.2. **\[ \bar{X} = \frac{(1 \times 10) + (2 \times 15) + (5 \times 30) + (7 \times 35) + (9 \times 25) + (11 \times 5)}{10 + 15 + 30 + 35 + 25 + 5} = \frac{730}{120} = 6.08 \text{ h} \]**

**Answer only 3/2, don’t penalise unit.**
### QUESTION/VRAAG 3

**Solution/Oplossing**

<table>
<thead>
<tr>
<th>Marks</th>
<th>3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td></td>
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</tbody>
</table>

\[ \begin{align*}
DB &= \sqrt{(-4 - 2)^2 + (4 - (-4))^2} \quad \boxed{\text{Correct}} \\
&= \sqrt{100} \\
&= 10 \\
\text{wrong formula} & \quad 0/3
\end{align*} \]

<table>
<thead>
<tr>
<th>Marks</th>
<th>3.0</th>
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<tbody>
<tr>
<td>3.2</td>
<td></td>
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</table>

\[ \begin{align*}
M(x_M, y_M) &= \left( \frac{4 + (-4)}{2}, \frac{0 + (-1)}{2} \right) \\
&= \left( 0, -\frac{1}{2} \right) \\
\text{wrong formula} & \quad 0/3
\end{align*} \]
3.3

\[
\begin{align*}
\text{MAD} & = \frac{0 - 4}{-4 - 0} = \frac{1}{2} \checkmark \\
A(0; 4) & \quad \text{D}(-4; 2)
\end{align*}
\]

Wrong formula 0/3

3.4

\[
\begin{align*}
m_{AB} & = \frac{-4 - 4}{4 - 0} = -2 \checkmark \\
A(0; 4) & \quad B(4; -4)
\end{align*}
\]

Product of gradients

\[
\begin{align*}
m_{AB} \cdot m_{AD} & = \left(\frac{1}{2}\right) \cdot (-2) = -1 \checkmark
\end{align*}
\]

\[AD \parallel AB\]

3.5

\[
\begin{align*}
\text{ABCD is a rectangle because it is a} \\
\text{1. right angled} \\
\text{2. interior \( \angle = 90^\circ \) } 
\end{align*}
\]

3.6

\[
\begin{align*}
m_{KL} & = m_{AD} \quad \text{given} \\
& = \frac{1}{2} \quad (3.3)
\end{align*}
\]

Clearly \( c = -\frac{9}{2} \)

\[
\begin{align*}
y & = \frac{1}{2}x - \frac{9}{2} \checkmark
\end{align*}
\]

must be an eqn

3.7

\[
\begin{align*}
\text{DB} & = 10 \quad (2.1) \quad \text{OR} \quad A \frac{x}{4} : y : 2 \rightarrow D \\
\checkmark & \quad \text{AC diagonal rect =} \\
y_A = 4 & \quad \rightarrow y_C = -6 \checkmark
\end{align*}
\]

\[\text{both pts opp sides}\]

\[\text{llgm ll \ equal gradients } \checkmark\]

\[\text{OR} \ldots \text{pg} \ 9\]
QUESTION/VRAAG 4

Solution/Oplossing

| 4.1.1 | $\tan \hat{P} = \frac{10}{24}$  
\[ \hat{P} = \frac{5}{12} \]  
\[ \checkmark \] |

| 4.1.2 | $\sin \hat{Q} = \frac{6}{10}$  
\[ \hat{Q} = \frac{3}{5} \]  
\[ \checkmark \] |

| 4.1.3 | $\cos \theta = \frac{10}{26}$  
\[ \hat{R} = \frac{5}{13} \]  
\[ \checkmark \] |

| 4.1.4 | $\cos \hat{Q} = \frac{1}{26}$  
\[ \cos \hat{Q} = \frac{5}{13} \]  
\[ \checkmark \] |

| 4.2 | $\sin \hat{Q} = \frac{8}{20}$  
\[ \hat{Q} = \frac{4}{5} \]  
\[ \checkmark \] |

|  | $\tan \theta = \frac{24}{10}$  
\[ \hat{\theta} = \frac{12}{5} \]  
\[ \checkmark \] |

|  | $\sin \hat{R} = \frac{4}{5}$  
\[ \hat{R} = \frac{12}{5} \]  
\[ \checkmark \] |

|  | $\tan \theta = \frac{4}{3}$  
\[ \theta = \frac{20}{240} \]  
\[ \checkmark \] |

Marks/Punte

| 4.1.1 | 1 |
| 4.1.2 | 1 |
| 4.1.3 | 1 |
| 4.1.4 | 1 |
| 4.2  | 3 |

Total: 7 points
QUESTION/VRAAG 5

5.1

Solution/Oplossing

5.1.1

\[ 17 \cos \beta + 15 = 0 \]
\[ \cos \beta = -\frac{15}{17} = \frac{-15}{17} \]
\[ r = 17 \]
\[ x^2 + y^2 = r^2 \]
\[ (-15)^2 + y^2 = (17)^2 \]
\[ 225 + y^2 = 289 \]
\[ x^2 + y^2 = 64 \]
\[ x = \frac{2 \sqrt{64}}{17} \]
\[ x = \frac{16}{17} \]
\[ y = \frac{15}{17} \]

5.1.2(a)

\[ \sin \beta = -\frac{8}{17} \]

5.1.2(b)

\[ \cos^2 30^\circ = \left( \frac{\sqrt{3}}{2} \right)^2 \]
\[ \cos 30^\circ = \frac{\sqrt{3}}{2} \]
\[ \tan 30^\circ = \frac{\sqrt{3}}{3} \]
\[ \tan \beta = -\frac{8}{15} \]
\[ \cos^2 30^\circ \cdot \tan \beta = \frac{3}{4} \cdot \frac{8}{15} = \frac{2}{5} \]

Marks:

5.1.1 (4)
5.1.2(a) (1)
5.1.2(b) (3)
<table>
<thead>
<tr>
<th>Solution/Oplossing</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.3 [ \tan \theta_1 = \frac{2}{15} ] [ \theta_1 = \tan^{-1} \left( \frac{2}{15} \right) ] [ \approx 28.07^\circ ]</td>
<td>2</td>
</tr>
<tr>
<td>[ \theta_1 ]</td>
<td></td>
</tr>
<tr>
<td>[ 180^\circ + 28.07^\circ ]</td>
<td></td>
</tr>
<tr>
<td>[ = 208.07^\circ ]</td>
<td></td>
</tr>
<tr>
<td>Answer only</td>
<td>2/2</td>
</tr>
<tr>
<td>5.2.1 [ \tan x = 2.22 ] [ x = \tan^{-1} (2.22) ]</td>
<td>2</td>
</tr>
<tr>
<td>[ \approx 65.75^\circ ]</td>
<td></td>
</tr>
<tr>
<td>Rounding</td>
<td>-1</td>
</tr>
<tr>
<td>5.2.2 [ \cos (x+10^\circ) = 0.179 ] [ \text{Let } A = x+10^\circ ]</td>
<td>3</td>
</tr>
<tr>
<td>[ \cos A = 0.179 ] [ A = \cos^{-1} (0.179) ] [ \approx 79.68^\circ ]</td>
<td></td>
</tr>
<tr>
<td>[ x+10^\circ = 79.68^\circ ]</td>
<td></td>
</tr>
<tr>
<td>[ x \approx 69.69^\circ ]</td>
<td></td>
</tr>
<tr>
<td>5.2.3 [ \frac{\sin x}{\sqrt{125}} = 2 = 1.24 ] [ \sin x = 2 \times 1.24 ] [ \sin x = \frac{81}{125} ] [ x = \sin^{-1} \left( \frac{81}{125} \right) ] [ \approx 40.39^\circ ]</td>
<td>3</td>
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</tbody>
</table>
3.7. \( m_{BC} = m_{AD} \checkmark \text{opp. sides II gm II} \)
\[ = \frac{1}{2} \quad \text{grad's} = \]

\[ \therefore y = \frac{1}{2}x + c \]

\[ \text{Sub } B(4; -4) \]
\[ -4 = \frac{1}{2}(4) + c \checkmark \]
\[ -6 = c \]

\[ \therefore y = \frac{1}{2}x - 6 \]

\[ \therefore C(0; -6) \checkmark y \text{int} \]
### QUESTION/VRAAG 6

<table>
<thead>
<tr>
<th>Solution/Oplossing</th>
<th>Marks Punte</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A = 2$</td>
<td>(1)</td>
</tr>
<tr>
<td>$\min_{t=3} = -2 + 3 = 1$</td>
<td>(1)</td>
</tr>
<tr>
<td>$f(t) = \begin{cases} 0 &amp; if \quad 0^\circ \leq t \leq 180^\circ \ 360^\circ &amp; if \quad 180^\circ &lt; t \leq 360^\circ \end{cases}$</td>
<td></td>
</tr>
<tr>
<td>$f(x) \cdot g(x) &gt; 0 ; \therefore ; y_f \cdot y_g &gt; 0$ \quad $x \in (90^\circ ; 270^\circ)$</td>
<td>(2)</td>
</tr>
<tr>
<td>$y = -2 \cos x$ \quad $h \quad y = 2 \cos x - 3$</td>
<td>(2)</td>
</tr>
<tr>
<td>$y = \cos x ; \therefore ; y \in [-1; 1]$</td>
<td></td>
</tr>
<tr>
<td>$y = 2 \cos x ; \therefore ; y \in [-2; 2]$</td>
<td></td>
</tr>
<tr>
<td>$y = 2 \cos x - 3 ; \therefore ; y \in [-5; -1]$</td>
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</table>
**QUESTION/VRAAG 7**

![Diagram of a prism](image)

<table>
<thead>
<tr>
<th>Solution/Oppossing</th>
<th>Marks/Punte</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.1</strong></td>
<td></td>
</tr>
<tr>
<td>[ V = \frac{1}{3} \times (30 \times 30) \times 8 + 30 \times 30 \times 150 ]</td>
<td></td>
</tr>
<tr>
<td>[ = 2400 + 135000 ]</td>
<td></td>
</tr>
<tr>
<td>[ = 137400 \text{ cm}^3 ]</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7.2</strong></td>
<td></td>
</tr>
<tr>
<td>[ TSA = 4 \times (\frac{1}{2} (30), 17) ]</td>
<td></td>
</tr>
<tr>
<td>[ = 4 \times 255 ]</td>
<td></td>
</tr>
<tr>
<td>[ = 1020 \text{ cm}^2 ]</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7.3</strong></td>
<td></td>
</tr>
<tr>
<td>[ V_{\text{new}} = \frac{1}{3} (15 \times 15) \times 8 + 15 \times 15 \times 150 ]</td>
<td></td>
</tr>
<tr>
<td>[ = 600 + 33750 ]</td>
<td></td>
</tr>
<tr>
<td>[ = 34350 \text{ cm}^3 ]</td>
<td></td>
</tr>
<tr>
<td>[ \therefore \text{n} = \frac{137400}{34350} = 4 ]</td>
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*Note: must calculate answer and only 0/2 if not.*

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Give reasons for your statements in QUESTIONS 8 and 9.
*Gee redes vir jou bewerings in VRAAG 8 en 9.*

**QUESTION/VRAAG 8**

<table>
<thead>
<tr>
<th>Solution/Oplossing</th>
<th>Marks Punte</th>
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<tbody>
<tr>
<td><strong>8.1.1</strong></td>
<td></td>
</tr>
<tr>
<td>[ \angle BDO = 36,87^\circ ] draws from bisect int ^{\perp} s</td>
<td>(1)</td>
</tr>
<tr>
<td><strong>8.1.2</strong></td>
<td></td>
</tr>
<tr>
<td>[ \angle ADO = 90^\circ ] draws from ( \perp )</td>
<td>(1)</td>
</tr>
<tr>
<td><strong>8.2</strong></td>
<td></td>
</tr>
<tr>
<td>[ \tan 36,87^\circ = \frac{AO}{8} ]</td>
<td></td>
</tr>
<tr>
<td>[ 8 \cdot \tan 36,87^\circ = AO ]</td>
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<tr>
<td>[ 6 \text{ cm} = ]</td>
<td>(2)</td>
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### Solution/Oplossing

<table>
<thead>
<tr>
<th>AD = 10</th>
<th>Pythag</th>
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<tbody>
<tr>
<td>AO = OC</td>
<td>diag rhomb bisect</td>
</tr>
<tr>
<td>[ \text{OE} = \frac{1}{2} (10) ]</td>
<td>con/midpt thm</td>
</tr>
<tr>
<td>[ \text{OE} = 5 ]</td>
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### Additional space/Bykomende ruimte

<table>
<thead>
<tr>
<th>Marks Punte</th>
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*Please turn over/Blaai om asseblief*
### Solution/Oplossing

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>9.1.1</td>
<td><strong>SAS</strong></td>
<td>✓</td>
</tr>
<tr>
<td>9.1.2</td>
<td>1 pr opp sides</td>
<td></td>
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<tr>
<td>9.1.3</td>
<td><strong>DE</strong> = ( \frac{1}{2} \cdot DF ) ✓ <strong>given</strong></td>
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### Marks/Punte

- 9.1.1: (1)
- 9.1.2: (1)
- 9.1.3: 2
9.2

\[ SB = BA \]

\[ RQ = QA \quad \text{given} \]

\[ \therefore RQ = QA \quad \text{const} \text{ midpoint}\]

However,

\[ RQ = SP \quad \text{opp sides} \parallel gm \]

\[ \therefore QA = SP \quad \text{both} = RQ \]

\[ \boxed{4} \quad \text{pg. 16} \]

9.2.2

\[ SP = AQ \quad \text{given} \]

\[ SP \parallel AQ \quad \text{given} \]

\[ \therefore S \text{PAQ} \quad \text{R 1 pr opp sides} \parallel gm \]

\[ \boxed{2} \]

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9.2.3

let \( MB = x \)

\( SB = BA \) \( \square \) given

\( SM = MQ \) \( \checkmark \) diaqs \( \perp \) gm bisect

\[ AQ = 2x \] \( \checkmark \) midpt \( \perp \) gm \( \checkmark \) \( \checkmark \)

\[ RQ = 2x \] \( \checkmark \) \( \checkmark \) \( \checkmark \) \( \checkmark \)

\[ AR = AQ \] (9.2.1)

\[ AF = 2x + 2x \]

\[ = 2x \]

\[ = 4x \]

\[ = 4 \cdot MB \]

---

Additional space/Bykomende ruimte

9.2.1.

\( \Delta SBP, ABO \)

1. \( SB = BA \) \( \square \) given

2. \( S_1 = A \) \( \square \) all \( \perp \) \( \perp \) \( \square \) \( \perp \) \( \perp \) \( \perp \)

3. \( B_1 = B \) \( \square \) \( \perp \) \( \perp \) \( \perp \) \( \perp \) \( \perp \)

\( \therefore \Delta SBP \equiv \Delta ABO \) \( AA \) \( \perp \) \( \perp \) \( \perp \) \( \perp \)

\[ \therefore SP = AQ \] \( \equiv \Delta \) \( \perp \) \( \perp \)

---

TOTAL/TOTAAL: 100