



Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sport Ontwikkeling
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NORTH WEST PROVINCE

GRADE 12

**MATHEMATICS P2 / WISKUNDE V2
MID-YEAR EXAMINATION / HALFJAAAREKSAMEN
MEMORANDUM**

JUN 2019

MARKS/PUNTE: 150

This memorandum consist of 20 pages./Hierdie memorandum bestaan uit 20 bladsye.



NOTE

- If a candidate answers a question twice, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/ values in order to solve a problem is NOT acceptable.

GEOMETRY	
S	A mark for a correct statement (A statement mark is independent of a reason)
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct)
S/R	Award a mark if statement AND reason are both correct

NOTAS

- Indien 'n kandidaat 'n vraag twee keer beantwoord, merk slegs die EERSTE poging.
- Indien 'n kandidaat 'n antwoord doodgetrek het en geen ander poging of antwoord het nie, word die antwoord wat doodgetrek is nagesien.
- Volgehoue akkuraatheid geld in ALLE aspekte van die memorandum. Hou op nasien wanneer die 2de berekeningsfout gemaak word.
- Om antwoorde / waardes te aanvaar ten einde 'n probleem op te los, is NIE aanvaarbaar nie.

MEETKUNDE	
S	'n Punt vir 'n korrekte bewering (“statement”) (Hierdie punt vir die bewering is onafhanklik van die rede.)
R	'n Punt vir die korrekte rede (Hierdie punt kan slegs toegeken word indien daar 'n korrekte bewering is.)
S/R	Punt word toegeken slegs indien bewering EN rede beide korrek is.

QUESTION/Vraag 1

1.1	1	✓ answer/ <i>antw</i> (1)
1.2	$50 \leq x < 60$	✓ extremes / <i>interval</i> ✓ notation / <i>notasie</i> (2)
1.3	Mean/ <i>Gemiddeld</i> = 45,67% Interval 1 std deviation: 27,07% _ _ _64,27% Number of learners = $25 - 0$ = 25	✓ interval / <i>interval</i> ✓ method/ <i>metode</i> ✓ answer / <i>antw</i> (3)
1.4	No of learners obtain $\geq 70\%$ = $30 - 27$ = 3 % of distinctions = $\frac{3}{30} \times 100$ = 10%	✓ $30 - 27$ ✓ 3 ✓ $\frac{3}{30} \times 100$ ✓ answer / <i>antw</i> (4)

[10]

QUESTION/Vraag 2

<p>2.1</p>	<table border="1"> <thead> <tr> <th>Number Getal</th> <th>(Number – mean)² (getal – gemiddeld)²</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>4</td> </tr> <tr> <td>4</td> <td>36</td> </tr> <tr> <td>10</td> <td>2.1.1a = 0</td> </tr> <tr> <td>x</td> <td>2.1.2b = (x – 10)²</td> </tr> <tr> <td>y</td> <td>2.1.3c = (y – 10)²</td> </tr> </tbody> </table>	Number Getal	(Number – mean) ² (getal – gemiddeld) ²	8	4	4	36	10	2.1.1a = 0	x	2.1.2b = (x – 10)²	y	2.1.3c = (y – 10)²	<p>✓ a = 0 (1) ✓ b = (x – 10)²(1) ✓ c = (y – 10)² (1)</p>
Number Getal	(Number – mean) ² (getal – gemiddeld) ²													
8	4													
4	36													
10	2.1.1a = 0													
x	2.1.2b = (x – 10)²													
y	2.1.3c = (y – 10)²													
<p>2.2</p>	<p>Mean/<i>gemiddeld</i> = 10 $\therefore \frac{4+8+10+x+y}{5} = 10$ x + y = 28 y = 28 – x.....(1)</p> <p>Std deviation/<i>standaardafwyking</i> = 4</p> $\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$ $\therefore \sqrt{\frac{36+4+0+(x-10)^2+(y-10)^2}{5}} = 4$ <p>(x – 10)² + (y – 10)² = 40.....(2)</p> <p>Subst y in (2)</p> <p>(x – 10)² + (28 – x – 10)² = 40 x² – 20x + 100 + x² – 36x + 324 = 40 2x² – 56x + 384 = 0 x² – 28x + 192 = 0 (x – 12)(x – 16) x = 12 or x = 16 y = 16 or y = 12</p>	<p>✓ $\therefore \frac{4+8+10+x+y}{5} = 10$ ✓ y = 28 – x.....(1)</p> $\therefore \sqrt{\frac{36+4+0+(x-10)^2+(y-10)^2}{5}} = 4$ <p>✓ (x – 10)² + (y – 10)² = 40.....(2)</p> <p>✓ substitution / <i>subst</i></p> <p>✓ std form/ <i>standaardvorm</i></p> <p>✓ x-values / <i>x-waardes</i> ✓ y-values / <i>y-waardes</i> (8)</p>												

[11]

QUESTION/ Vraag 3

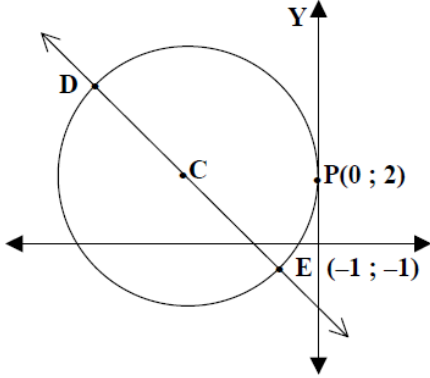
<p>3.1.1</p>	$AC = \sqrt{(-5-7)^2 + (1-(2))^2}$ $= \sqrt{(12)^2 + (3)^2}$ $= \sqrt{144 + 9}$ $= \sqrt{153}$ $= 12,37$	<p>✓ correct substitution <i>korrekte substitusie</i></p> <p>✓ answer/antw. (2)</p>
<p>3.1.2</p>	$M_{BC} = \frac{6-(2)}{1-7}$ $= \frac{8}{-6}$ $= \frac{-4}{3}$ $y - y_1 = m(x - x_1)$ $y - 6 = -\frac{4}{3}(x - 1)$ $3y - 18 = -4x + 4$ $3y = -4x + 22$	<p>✓ $-\frac{4}{3}$</p> <p>✓ correct subst. of (1;6) or (7; -2) <i>korrekte subst. van (1;6) of (7; -2)</i></p> <p>✓ equation in any form <i>Vgl. in enige vorm</i> (3)</p>
<p>3.1.3</p>	<p>$\hat{B} = \theta = \alpha - \beta$... Ext \angle / <i>buitehoek</i></p> $\tan \alpha = m_{BC} = -\frac{4}{3}$ <p>$\therefore \alpha = 126,9^\circ$</p> $\tan \beta = m_{AB} = \frac{5}{6}$ <p>$\therefore \beta = 39,8^\circ$</p> $\theta = \alpha - \beta$ $= 126,9^\circ - 39,8^\circ$ $= 87,1^\circ$ <p>$\therefore \hat{ABC} = 87,1^\circ$</p> <p>OR / OF</p>	<p>✓ $\tan \alpha = -\frac{4}{3}$</p> <p>✓ $\alpha = 126,9^\circ$</p> <p>✓ $\tan \beta = \frac{5}{6}$</p> <p>✓ $\beta = 39,8^\circ$</p> <p>✓ $\hat{ABC} = 87,1^\circ$ (5)</p>

	$\text{Distance AB} = \sqrt{(1+5)^2 + (6-1)^2}$ $= \sqrt{61}$ $\text{Distance BC} = \sqrt{(1-7)^2 + (6+2)^2}$ $= \sqrt{100}$ $= 10$ $\text{Distance AC} = \sqrt{(-5-7)^2 + (1+2)^2}$ $= \sqrt{153}$ $\cos \hat{B} = \frac{a^2 + c^2 - b^2}{2ac}$ $= \frac{10^2 + (\sqrt{61})^2 - (\sqrt{153})^2}{2(10)(\sqrt{61})}$ $= 0,051$ $\hat{B} = 87,1^\circ$	<p>✓ afstand AB = $\sqrt{61}$</p> <p>✓ afstand BC = 10</p> <p>✓ afstand AC = $\sqrt{153}$</p> <p>✓ substitution in cosine rule Subst in cos-reël</p> <p>✓ answer / antw (5)</p>
3.1.4	$P\left(\frac{-5+1}{2}; \frac{1+6}{2}\right)$ $P\left(-2; \frac{7}{2}\right)$	<p>✓ $x = -2$</p> <p>✓ $y = \frac{7}{2}$</p> <p>(2)</p>
3.1.5	$m_{AC} = \frac{-2-1}{7+5}$ $= \frac{-3}{12}$ $= \frac{-1}{4}$ <p>through / deur $(-1 ; 3)$</p> <p>equation/ vergelyking: $y - 3 = -\frac{1}{4}(x + 1)$</p> $y - 3 = -\frac{1}{4}x - \frac{1}{4}$ $\therefore y = \frac{-1}{4}x + 2\frac{3}{4} \text{ or } y = -\frac{1}{4}x + \frac{11}{4} \text{ or}$ $4y + x - 11 = 0$	<p>✓ $\frac{-1}{4}$</p> <p>✓ subst. $(-1 ; 3)$</p> <p>✓ equation in any form Vgl. in enige vorm</p> <p>(3)</p>

3.2	$m_{AB} = \frac{5}{6}$ $6x + 5y = 18$ $5y = -6x + 18$ $y = \frac{-6}{5}x + \frac{18}{5}$ $\therefore m_1 = \frac{-6}{5}$ $m_{AB} \cdot m_1 = -1$ $\therefore m_{AB} \perp 6x + 5y = 18$	$\checkmark m_{AB} = \frac{5}{6}$ $\checkmark y = \frac{-6}{5}x + \frac{18}{5}$ $\checkmark m_1 = -\frac{6}{5}$ $\checkmark m_{AB} \cdot m_1 = -1$ <p>(4)</p>
3.3	$m_{AB} = m_{AE}$ $\frac{6-1}{1+5} = \frac{1+3}{-5-a}$ $\frac{5}{6} = \frac{4}{-5-a}$ $-25 - 5a = 24$ $-5a = 49$ $a = -\frac{49}{5}$ <p>OR/OF</p> $m_{AB} = \frac{5}{6}$ $y - y_1 = m(x - x_1)$ $y - 6 = \frac{5}{6}(x - 1)$ $y = \frac{5}{6}x + \frac{31}{6}$ $-3 = \frac{5}{6}x + \frac{31}{6}$ $x = -\frac{49}{5}$	$\checkmark m_{AB} = m_{AE}$ <p>\checkmark substitution/subst</p> $\checkmark -25 - 5a = 24$ <p>\checkmark answer/ antw</p> $\checkmark m_{AB} = \frac{5}{6}$ <p>\checkmark substitution / subst</p> <p>\checkmark subst ($a; -3$)</p> <p>\checkmark answer / antw</p> <p>(4)</p>

[23]

QUESTION / Vraag 4

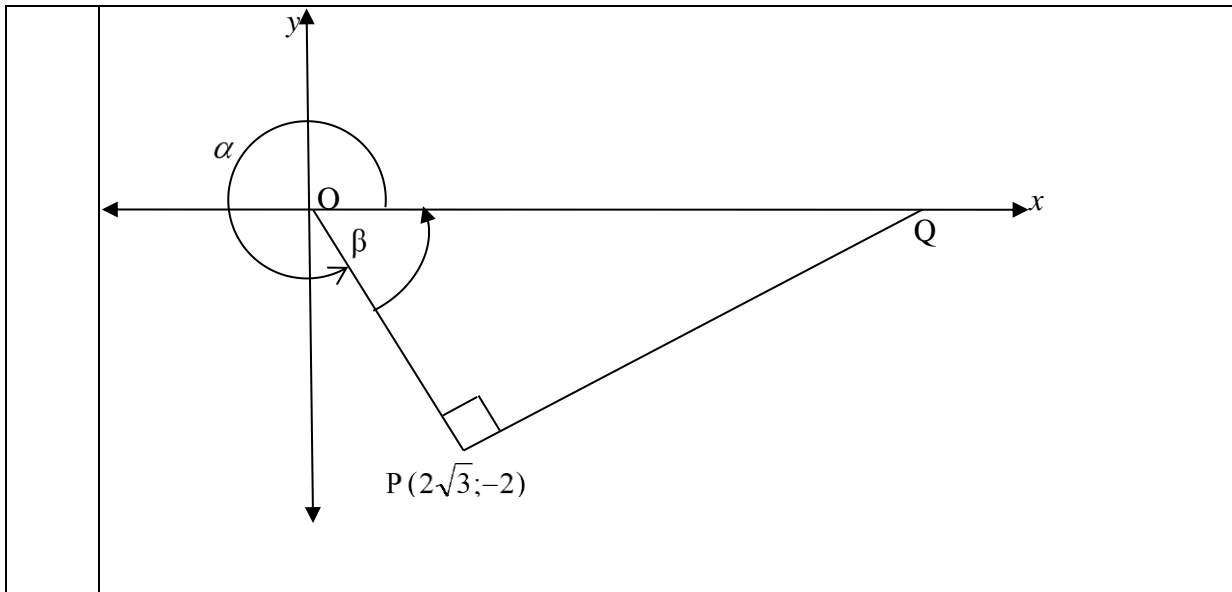
<p>4.1</p>		
<p>4.1</p>	<p>At C, $y = 2$ $3x + 4y + 7 = 0$ $3x + 4(2) + 7 = 0$ $3x = -15$ $x = -5$</p> <p>$C(-5; 2)$ $\therefore r = 5$ $(x - a)^2 + (y - b)^2 = r^2$ $(x + 5)^2 + (y - 2)^2 = 5^2$ Or / of $(x + 5)^2 + (y - 2)^2 = 25$</p> <p>OR/OF</p> <p>$CP^2 = CE^2$ $(x - 0)^2 + (2 - 2)^2 = (x + 1)^2 + (y + 1)^2$ $(x - 0)^2 + (2 - 2)^2 = (x + 1)^2 + (2 + 1)^2$ $x^2 = x^2 + 2x + 1 + 9$ $2x = -10$ $x = 5$</p> <p>$C(-5; 2)$ $\therefore r = 5$ $(x - a)^2 + (y - b)^2 = r^2$ $(x + 5)^2 + (y - 2)^2 = 5^2$ or $(x + 5)^2 + (y - 2)^2 = 25$</p>	<p>✓ $y = 2$</p> <p>✓ subst</p> <p>✓ x-value / x-waarde</p> <p>✓ $r = 5$</p> <p>✓ equation / vergelyking</p> <p>✓ method / metode</p> <p>✓ substitution / subst</p> <p>✓ x-value / x-waarde</p> <p>✓ $r = 5$</p> <p>✓ equation / vergelyking</p> <p>(5)</p>

<p>4.2</p>	<p>$DE = 2r = 10$ units</p>	<p>✓ answer / <i>antw</i> (1)</p>
<p>4.3</p>	<p> $\text{Mdpt PE} = \left(\frac{0-1}{2}; \frac{2-1}{2} \right)$ $= \left(-\frac{1}{2}; \frac{1}{2} \right)$ $m_{PE} = \frac{2+1}{0+1}$ $m_{PE} = 3$ $\therefore m_{\text{perp}} = -\frac{1}{3}$ $y - y_1 = m(x - x_1)$ $y - \frac{1}{2} = -\frac{1}{3} \left(x + \frac{1}{2} \right)$ $y = -\frac{1}{3}x + \frac{1}{3}$ <p>OR / OF</p> $\text{Mdpt PE} = \left(\frac{0-1}{2}; \frac{2-1}{2} \right)$ $= \left(-\frac{1}{2}; \frac{1}{2} \right)$ $m_{PE} = \frac{2+1}{0+1}$ $m_{PE} = 3$ $\therefore m_{\text{perp}} = -\frac{1}{3}$ <p>Perp bisector passes through C(- 5; 2) <i>Middelloodlyn gaan deur C(- 5; 2)</i> $y - 2 = -\frac{1}{3}(x + 5)$ OR/OF $2 = -\frac{1}{3}((-5) + c)$ $c = \frac{1}{3}$ $\therefore y = -\frac{1}{3}(x + 5)$ OR/OF $\therefore x + 3y - 1 = 0$</p> <p>OR / OF $CP^2 = CE^2$ $(x - 0)^2 + (y - 2)^2 = (x + 1)^2 + (y + 1)^2$ $x^2 + y^2 - 4y + 4 = x^2 + 2x + 1 + y^2 + 2y + 1$ $2x + 6y - 2 = 0$ $x + 3y - 1 = 0$</p> </p>	<p>✓ correct subst / <i>korrekte subst</i></p> <p>✓ midpt PE</p> <p>✓ $m_{PE} = 3$</p> <p>✓ $\therefore m_{\text{perp}} = -\frac{1}{3}$ / <i>loodregte m</i></p> <p>✓ subst in str line equation <i>Subst in reguit lyn vgl</i></p> <p>✓ answer/ <i>antw</i></p> <p>✓ correct substitution <i>Korrekte subst</i></p> <p>✓ midpt PE</p> <p>✓ $m_{PE} = 3$</p> <p>✓ $\therefore m_{\text{perp}} = -\frac{1}{3}$ / <i>loodregte m</i></p> <p>✓ subst in str line equation <i>Subst in reguit lyn</i></p> <p>✓ answer / <i>antw</i></p> <p>✓ method / <i>metode</i></p> <p>✓ substitution / <i>subst</i></p> <p>✓ $x^2 + y^2 - 4y + 4$</p> <p>✓ $x^2 + 2x + 1 + y^2 + 2y + 1$</p> <p>✓ $2x + 6y - 2 = 0$</p> <p>✓ answer / <i>antw</i> (6)</p>

4.4	<p>Subst $C(-5; 2)$ into $x + 3y - 0 = 0$</p> $\text{LHS} = 2(-5) + 6(2) - 2$ $= 0$ $= \text{RHS}$ <p>$\therefore C$ is on the perpendicular bisector of PE and given C is on DE</p> <p>\therefore the lines intersect at C</p> <p>$\therefore C$ is op die middelloodlyn van PE en C lê op DE</p> <p>\therefore die lyne sny by C</p> <p>OR/ OF</p> <p>Subst $x = 1 - 3y$ in $3x + 4y + 7 = 0$</p> $3(1 - 3y) + 4y + 7 = 0$ $3 - 9y + 4y + 7 = 0$ $5y = 10$ $y = 2$ $\therefore x = -5$	<p>✓ method / <i>metode</i></p> <p>✓ substitution / <i>subst</i></p> <p>✓ LHS = RHS = 0</p> <p>$LK = RK$</p> <p>✓ reasoning / <i>redenering</i></p> <p>✓ x – subject / <i>x-onderwerp</i></p> <p>✓ substitution / <i>subst</i></p> <p>✓ $y = 2$</p> <p>✓ $x = -5$</p> <p>(4)</p>
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[16]

QUESTION / Vraag 5



5.1

$$\tan \alpha = \frac{-2}{2\sqrt{3}} = \frac{-1}{\sqrt{3}}$$

$$\begin{aligned} \therefore \alpha &= 360^\circ - 30^\circ \\ &= 330^\circ \end{aligned}$$

$$\therefore \beta = 30^\circ$$

OR/ OF

$$\begin{aligned} \tan (-\beta) &= -\tan \beta \\ &= -\left(\frac{-2}{2\sqrt{3}}\right) \end{aligned}$$

$$\tan \beta = \frac{2}{2\sqrt{3}}$$

$$\beta = 30^\circ$$

✓ correct ratio

korrekte verhouding

✓ $\alpha = 330^\circ$

✓ $\beta = 30^\circ$

✓ substitution / *subst*

✓ $\tan \beta = \frac{2}{2\sqrt{3}}$

✓ $\beta = 30^\circ$

(3)

5.2

$$\begin{aligned} OP^2 &= (2\sqrt{3})^2 + (-2)^2 &= 12 + 4 \\ &= 16 \end{aligned}$$

$$\therefore OP = 4$$

✓ using distance formula

Gebruik afstandsformule

✓ answer / *antw*

(2)



5.3	$\frac{OP}{OQ} = \cos \beta$ $\therefore OQ = \frac{OP}{\cos \beta} = \frac{4}{\cos 30^\circ}$ $= \frac{4}{\frac{\sqrt{3}}{2}}$ $= \frac{8}{\sqrt{3}}$ $Q = \left(\frac{8\sqrt{3}}{3} ; 0 \right)$ <p>OR / OF</p> $\frac{OP}{OQ} = \cos 30^\circ$ $OQ = \frac{4}{\cos 30^\circ} = \frac{4}{\frac{\sqrt{3}}{2}}$ $OQ = \frac{8\sqrt{3}}{3}$ $Q = \left(\frac{8\sqrt{3}}{3} ; 0 \right)$	<p>✓ $\cos 30^\circ = \frac{\sqrt{3}}{2}$</p> <p>✓ $\frac{8}{\sqrt{3}}$</p> <p>✓ co-ordinates /<i>koördinate</i></p> <p>✓ $\cos 30^\circ = \frac{\sqrt{3}}{2}$</p> <p>✓ $\frac{8\sqrt{3}}{3}$</p> <p>✓ co-ordinates /<i>koördinate</i></p> <p>(3)</p>
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[8]

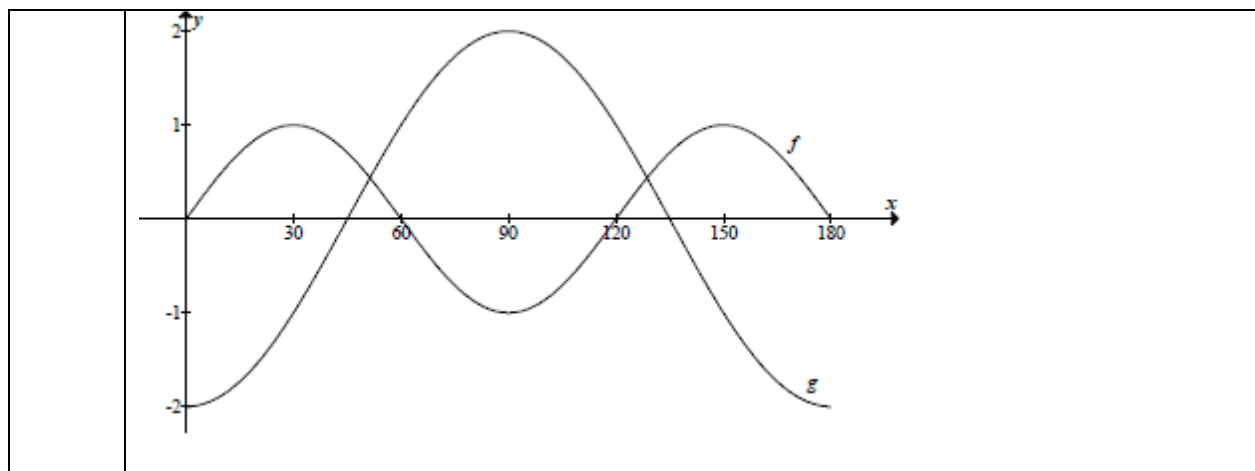
QUESTION/ Vraag 6

<p>6.1</p>	$\frac{\cos^2 15^\circ - \sin 15^\circ \cdot \cos 75^\circ}{\cos^2 15^\circ + \sin 15^\circ \cdot \tan 15^\circ}$ $= \frac{\cos^2 15^\circ - \sin 15^\circ \times \sin 15^\circ}{\cos^2 15^\circ + \sin 15^\circ \cdot \cos 15^\circ \times \frac{\sin 15^\circ}{\cos 15^\circ}}$ $= \frac{\cos^2 15^\circ - \sin^2 15^\circ}{\cos^2 15^\circ + \sin^2 15^\circ}$ $= \frac{\cos 2(15^\circ)}{1}$ $= \cos 30^\circ$ $= \frac{\sqrt{3}}{2}$	<p>✓ $\sin 15^\circ$</p> <p>✓ $\frac{\sin 15^\circ}{\cos 15^\circ}$</p> <p>✓ $\cos 2(15^\circ)$ or $\cos 30^\circ$</p> <p>✓ 1</p> <p>✓ answer / antw</p> <p>(5)</p>
<p>6.2</p>	$\frac{1 - \cos 2A}{\sin 2A} = \tan A$ $\text{LHS} = \frac{1 - \cos 2A}{\sin 2A}$ $= \frac{1 - (1 - 2\sin^2 A)}{2\sin A \cos A}$ $= \frac{2\sin^2 A}{2\cos A \sin A}$ $= \frac{\sin A}{\cos A}$ $= \tan A$ <p>∴ LHS = RHS / LK = RK</p>	<p>✓ $1 - 2\sin^2 A$</p> <p>✓ $2\sin A \cos A$</p> <p>✓ $2\sin^2 A$</p> <p>✓ $\frac{\sin A}{\cos A}$</p> <p>(4)</p>
<p>6.3</p>	$\cos 2x = \cos x + 2$ $2\cos^2 x - 1 - \cos x - 2 = 0$ $2\cos^2 x - \cos x - 3 = 0$ $(2\cos x - 3)(\cos x + 1) = 0$ $\cos x = \frac{3}{2} \text{ or } \cos x = -1$ <p>No solution $x = 180^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$</p> <p>Geen oplossing</p> $x = -180^\circ; 180^\circ$	<p>✓ $2\cos^2 x - 1$</p> <p>✓ $2\cos^2 x - \cos x - 3 = 0$</p> <p>✓ $(2\cos x - 3)(\cos x + 1) = 0$</p> <p>✓ $\cos x = \frac{3}{2}$ or $\cos x = -1$</p> <p>✓ $x = 180^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$</p> <p>✓ $x = -180^\circ; 180^\circ$</p> <p>(6)</p>

[15]



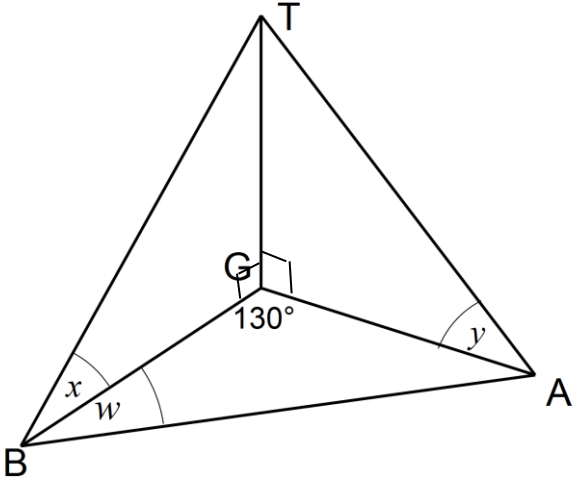
QUESTION / Vraag 7



7.1.1	$a = -2$	✓ answer / antw (1)
7.1.2	$b = 3$	✓ answer / antw (1)
7.1.3	$c = 2$	✓ answer / antw (1)
7.2.1	$y \in [-2;2]$ OR / OF $-2 \leq y \leq 2$	✓ answer / antw ✓ answer / antw (1)
7.2.2	120°	✓ answer / antw (1)
7.3.1	$x = 0^\circ$ $x = 180^\circ$	✓ $x = 0^\circ$ ✓ $x = 180^\circ$ (2)
7.3.2	$60^\circ < x < 120^\circ$ Or / of $x \in (60^\circ; 120^\circ)$	✓ answer / antw (1)

[8]

QUESTION/ Vraag 8

		
<p>8.1</p>	$\tan x = \frac{TG}{BG}$ $TG = BG \tan x$	$\checkmark \tan x = \frac{TG}{BG}$ $\checkmark TG = BG \tan x$ <p>(2)</p>
<p>8.2</p>	$\tan y = \frac{TG}{AG}$ $TG = AG \tan y$ $\therefore BG \tan x = AG \tan y$ $\frac{AG}{BG} = \frac{\tan x}{\tan y}$ $\hat{GAB} = 180^\circ - 130^\circ - w$ $= 50^\circ - w$ $\frac{BG}{\sin(50^\circ - w)} = \frac{AG}{\sin w}$ $\sin w = \frac{AG \cdot \sin(50^\circ - w)}{BG}$ $= \frac{\tan x \cdot \sin(50^\circ - w)}{\tan y}$	$\checkmark \tan y = \frac{TG}{AG}$ $\checkmark TG = AG \tan y$ $\checkmark BG \tan x = AG \tan y$ $\checkmark \frac{AG}{BG} = \frac{\tan x}{\tan y}$ $\checkmark \hat{GAB} = 50^\circ - w$ $\checkmark \frac{BG}{\sin(50^\circ - w)} = \frac{AG}{\sin w}$ $\checkmark \sin w = \frac{AG \cdot \sin(50^\circ - w)}{BG}$ <p>(7)</p>
<p>8.3</p>	$AB^2 = 8^2 + 6^2 - 2(8)(6) \cos 130^\circ$ $AB = 12,72$	\checkmark correct substitution <i>Korrekte substitusie</i> \checkmark answer / antw <p>(2)</p>

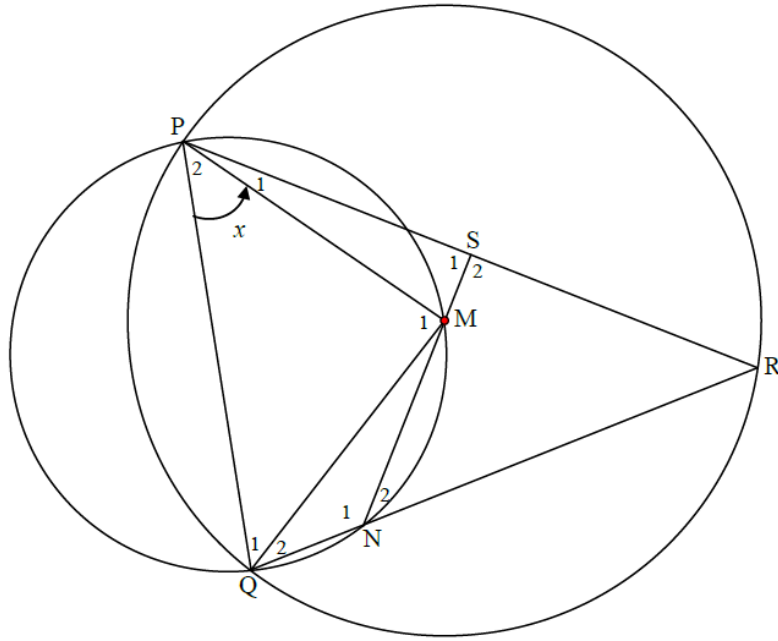
[11]



QUESTION / Vraag 9

<p>9.1.1 (a)</p>	<p>$\hat{C} = 32^\circ$ [tan chord theorem/ raaklyn-koordstelling]</p>	<p>✓ S ✓ R (2)</p>
<p>9.1.1 (b)</p>	<p>$\hat{BED} = 63^\circ + 32^\circ$ [ext \angle of Δ / buite \angle van Δ] $\hat{E}_1 + 32^\circ = 95^\circ$ [ext \angle of Δ / buite \angle van Δ] $\hat{E}_1 = 63^\circ$</p>	<p>✓ S/R ✓ S/R ✓ answer / antw (3)</p>
<p>9.1.2</p>	<p>$\hat{ABE} = \hat{BEA} = 63^\circ$ [\angles opp = sides/ \angle e teenoor=sye] $\therefore \hat{ABE} = \hat{CDE} = 63^\circ$ \therefore ABED is a cyclic quad [converse, ext \angle of cyclic quad ext \angle of quad = int opp \angle] \therefore ABED is 'n kvh [buite \angle van kvh, omgekeerd OF buite \angle v vierhoek = teenoorst binne \angle]</p>	<p>✓ S/R ✓ S ✓ R (3)</p>
<p>9.1.3</p>	<p>$\hat{E}_2 = \hat{B}_1 = 32^\circ$ [\angle's subt by same chord/ \angle e ondersp deur dieselfde koord] $\hat{B}_1 = \hat{C} = 32^\circ$ \therefore AB is a tangent to circle B, D and C. [converse of tan chord theorem \angle between line and chord] \therefore AB is 'n raaklyn aan sirkel B, D en C. [omgekeerde van raaklyn-koordst of \angle tussen lyn en koord]</p>	<p>✓ S/R ✓ S ✓ R (3)</p>
<p>9.1.4</p>	<p>$\hat{A}_1 = 180 - 2(63^\circ)$ [sum of \angles of Δ / som v \angle e van Δ] $\hat{A}_1 = 74^\circ$</p>	<p>✓ S/R ✓ S (2)</p>

9.2



9.2.1

$PM = QM$ [radii]
 $\hat{Q}_1 = \hat{P}_2 = x$ [\angle s opp = sides / \angle e teenoor = sye]
 $\hat{N}_2 = \hat{P}_2 = x$ [ext \angle of cyclic quad/buite \angle van kvh]

✓ S
 ✓ S ✓ R
 ✓ S ✓ R
 (4)

9.2.2

$\hat{M}_1 = 180^\circ - 2x$ [sum of \angle s of Δ / som v \angle e van Δ]
 $\hat{R} = 90^\circ - x$ [\angle at centre = 2 \angle at circumf]
 [middelpunts \angle = 2 omtreks \angle]

✓ S/R
 ✓ S ✓ R
 (3)

9.2.3

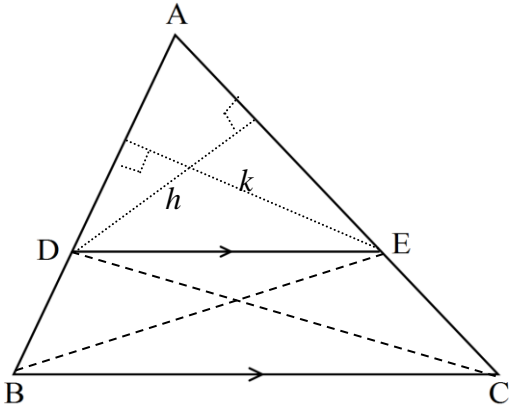
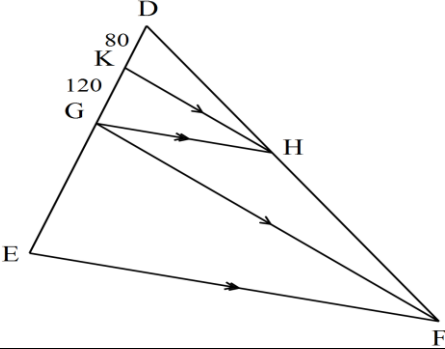
$\hat{N}_2 = \hat{P}_2 = x$ [Proved in / bewys in 9.2.1]
 $\hat{S}_2 + x + 90^\circ - x = 180^\circ$ [sum of \angle s of Δ /
 som v \angle e van Δ]
 $\hat{S}_2 = 90^\circ$
 $\therefore RS = SP$ [line from centre to chord /radius \perp koord]

✓ S/R
 ✓ S
 ✓ R
 (3)

[23]



QUESTION/ Vraag 10

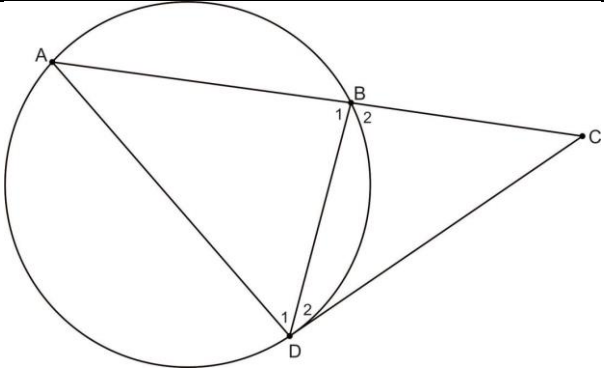
<p>10.1</p>		
<p>10.1</p>	<p>Construction: Join DC and BE. Draw height k on AD and height h on AE <i>Konstruksie: Verbind DC en BE. Trek hoogtelyn k op AD en hoogtelyn h op AE.</i> Proof / bewys:</p> $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DBE} = \frac{\frac{1}{2} \cdot AD \cdot k}{\frac{1}{2} \cdot DB \cdot k} = \frac{AD}{DB}$ $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DCE} = \frac{\frac{1}{2} \cdot AE \cdot h}{\frac{1}{2} \cdot EC \cdot h} = \frac{AE}{EC}$ <p>Area $\triangle DBE$ = Area $\triangle DEC$ [common base DE and same lines / <i>gemeenskaplike basis DE, dies lyne</i>] $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DBE} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$ $\therefore \frac{AD}{DB} = \frac{AE}{EC}$</p>	<p>✓ construction/ <i>konstruksie</i></p> <p>✓ areas</p> <p>✓ areas</p> <p>✓ S ✓ /R</p> <p>✓ equating areas / <i>areas gelykstel</i></p> <p>(6)</p>
<p>10.2</p>		
<p>10.2.1</p>	$\frac{DH}{HF} = \frac{80}{120} \text{ [Prop theorem/eweredigheidst; KH EF]}$ $\frac{DH}{HF} = \frac{2}{3}$	<p>✓ S ✓ R</p> <p>✓ answer / <i>antw</i></p> <p>(3)</p>



<p>10.2.2</p>	$\frac{EG}{GD} = \frac{HF}{HD} \text{ [Prop theorem/eweredigheidst; GH EF]}$ $\frac{EG}{200} = \frac{3}{2}$ $EG = 300$ $\therefore DE = 500 \text{ units/ eenhede}$	<p>✓ S ✓ R</p> <p>✓ S</p> <p>✓ EG = 300</p> <p>✓ answer / antw</p> <p style="text-align: right;">(5)</p>
<p>10.2.3</p>	$\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DCE} = \frac{\frac{1}{2} \cdot (80)(2x) \cdot \sin D}{\frac{1}{2} \cdot (200)(5x) \sin D}$ $= \frac{4}{25}$	<p>✓ subst on numerator <i>Subst in teller</i></p> <p>✓ subst on denominator <i>Subst in noemer</i></p> <p>✓ answer / antw</p> <p style="text-align: right;">(3)</p>

[19]

QUESTION/ Vraag 11

		
<p>11.1</p>	<p>In $\triangle ADC$ and $\triangle DBC$</p> <p>$\hat{A} = \hat{D}_2$ [tan chord theorem / raaklyn-koordst]</p> <p>$\hat{C} = \hat{C}$ [common/ gemeenskaplik]</p> <p>$\hat{ADC} = \hat{B}_2$ [sum of angles of \triangle/ binnehoek v \triangle]</p> <p>$\therefore \triangle ADC \parallel \triangle DBC$ [$\angle \angle \angle$]</p>	<p>✓ S/ R</p> <p>✓ S/R</p> <p>✓ S/R or/of $\angle \angle \angle$</p> <p>(3)</p>
<p>11.2</p>	<p>In $\triangle ADC$ and $\triangle DBC$</p> <p>$\frac{DC}{BC} = \frac{AC}{DC}$ [$\triangle s \parallel$, sides prop /sye eweredig]</p> <p>$DC^2 = AC \cdot BC$</p> <p>But $AC = AB + BC$</p> <p>$\therefore DC^2 = BC(AB + BC)$</p> <p>$DC^2 = AB \cdot BC + BC^2$</p> <p>$AB \cdot BC = DC^2 - BC^2$</p>	<p>✓ S/R</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p style="text-align: right;">(5)</p>

[8]

TOTAL: 150



TAXONOMY
DISTRIBUTION OF QUESTIONS IN TERMS OF COGNITIVE LEVELS (Table)

QUEST.	LEVELS				TOTAL	QUEST.	LEVELS				TOTAL
	1	2	3	4			1	2	3	4	
1.1	1				1	7.1.1	1				1
1.2	2				2	7.1.2	1				1
1.3		3			3	7.1.3	1				1
1.4			4		4	7.2.1	1				1
TOTAL	3	3	4		10	7.2.2	1				1
2.1	3				3	7.3.1	2				2
2.2				8	8	7.3.2		1			1
TOTAL	3			8	11	TOTAL	7	1	0	0	8
3.1.1	2				2	8.1	2				2
3.1.2	3				3	8.2			7		7
3.1.3			5		5	8.3	2				2
3.1.4	2				2	TOTAL	4	0	7	0	11
3.1.5		3			3	9.1.1 (a)	2				2
3.2		4			4	9.1.1 (b)		3			3
3.3		4			4	9.1.2		3			3
TOTAL	7	11	5	0	23	9.1.3		3			3
4.1			5		5	9.1.4	2				2
4.2	1				1	9.2.1		4			4
4.3			6		6	9.2.2		3			3
4.4		4			4	9.2.3			3		3
TOTAL	1	4	11	0	16	TOTAL	4	16	3	0	23
5.1		3			3	10.1		6			6
5.2	2				2	10.2.1		3			3
5.3			3		3	10.2.2			5		5
TOTAL	2	3	3	0	8	10.2.3				3	5
6.1			5			TOTAL	0	9	5	3	17
6.2		4				11.1		3			3
6.3			6			11.2				5	5
TOTAL	0	4	11	0	15	TOTAL	0	3	0	5	8
						GRAND TOTAL	33	53	46	18	150

COGNITIVE LEVELS	MARKS	JUNE 2019 (%)
L1: Knowledge (20%)	31	20,7%
L2: Routine Procedure. (35%)	54	36%
L3: Complex Procedure. (30%)	49	32,6%
L4: Solving Problems (15%)	16	10,7%
Grand Total	150	100%

COVERAGE OF CONTENT/TOPICS (Table)

TOPIC	QUESTION	CAPS	MARKS
Statistics	1, 2	20	21
Analytical geometry	3, 4	40	39
Trigonometry	5, 6, 7,8	40	42
Euclidean geometry	9, 10,11	50	48
TOTAL		150	150

