

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA



GRADE/GRAAD 12

MATHEMATICS P2/WISKUNDE V2
FEBRUARY/MARCH/FEBRUARIE/MAART 2018
MARKING GUIDELINES/NASIENRIGLYNE

DEPARTMENT OF BASIC EDUCATION
PRIVATE BAG 3006, PRETORIA 0001
2018-03-06
APPROVED MARKING GUIDELINES
PUBLIC EXAMINATIONS

Approved
C. M. M. M.
6/8/2018

MARKS/PUNTE: 150

These marking guidelines consist of 22 pages.
Hierdie nasienriglyne bestaan uit 20 bladsye.

Approved
6-03-2018
M. J. M. M.
06-03-2018
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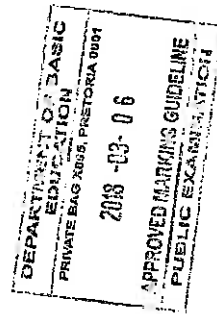
NOTE:

- 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 guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.
- As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte poging.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasiemriglyme toegepas. Hou op nasien by die tweede berekeningsfout.
- Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.

GEOMETRY	
S	A mark for a correct statement (A statement mark is independent of a reason.) 'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede.)
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.) 'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is.)
S/R	Award a mark if the statement AND reason are both correct. Ken 'n punt toe as beide die bewering EN rede korrek is.

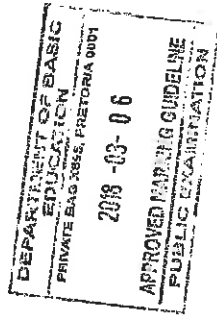


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QUESTION/VRAAG 1

Days/Dae	1	2	3	4	5	6	7	8	9	10
Units of blood/ Eenhede bloed	45	59	65	73	79	82	91	99	101	106

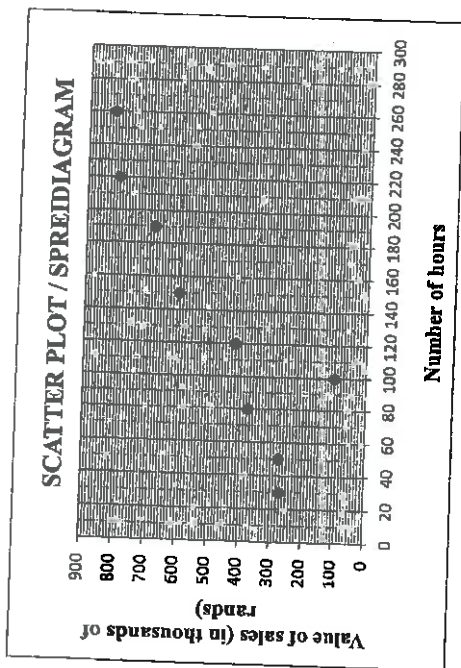
1.1.1	$\bar{x} = \frac{800}{10} = 80$	Answer only: full marks	✓ 800 (addition of units)
1.1.2	$\sigma = 18,83$	No penalty for rounding	✓ answer (CA if + 10) ✓ answer (A)
1.1.3	(61,17; 98,83) Days 1, 2, 8, 9 and 10 lie outside 1 standard deviation from the mean ∴ 5 days	Correct answer only: full marks provided that 1.1.1. & 1.1.2 both correct	✓ mean - 1 SD ✓ mean + 1 SD ✓ answer
1.2.1	Skewed to the left or negatively skewed/ Skeef na links of negatief skeef		✓ answer
1.2.2	A = 65 B = 99	Answers without labelling: 1/2	✓ answer ✓ answer
1.3	Now total = $95 \times 10 = 950$ ∴ Units not counted = $950 - 800 = 150$		✓ answer (CA from 1.1.1) ✓ answer (CA from 1.1.1) ✓ answer (CA from 1.1.1)



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QUESTION/VRAAG 2

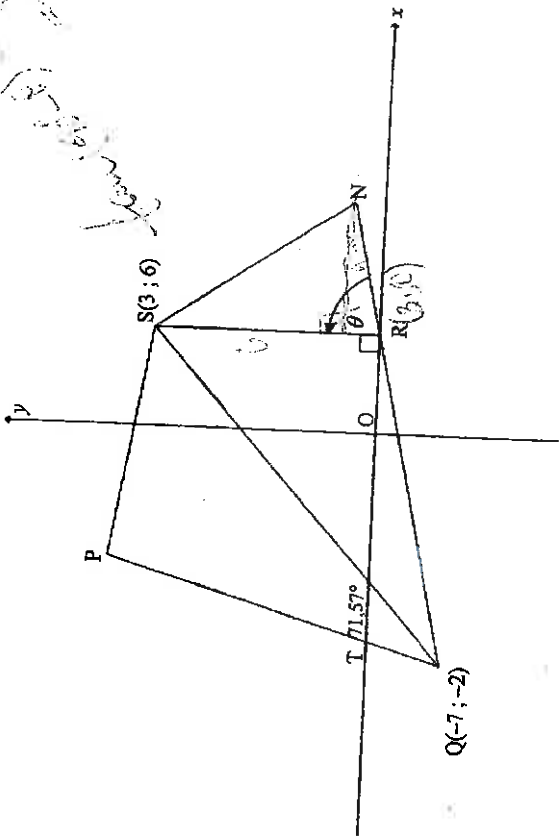
Number of hours Aantal uur	30	50	80	100	120	150	190	220	260
Value of sales (in thousands of rands) Waarde van verkope (in duisend rand)	270	275	376	100	420	602	684	800	820



2.1	Outlier/Outskietter: (100 ; 100)	accept: 100 as answer	✓ answer
2.2	$a = 94,50273 \dots$ $b = 2,913729 \dots$ $\hat{y} = 94,50 + 2,91x$	Integral values: max 2/3 Swapped a and b: 2/3	✓ value of a ✓ value of b ✓ equation
2.3	$\hat{y} = 2,91(240) + 94,50$ (CA from 2.1) $= 792,90$ Value = R793 000 OR/OF $\hat{y} = 793,7978142$ (calculator) Value = R794 000	Penalise 1 mark if answer not in thousands of Rands	✓ substitution ✓ answer in thousands of Rands = ✓ answer in thousands of Rands
2.4	$b = 2,913729 \dots$ $\therefore R2\ 914$ OR/OF R2 910 (calculator)	Answer only: full marks	✓ value of b ✓ answer

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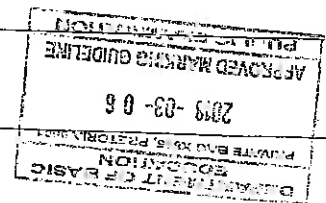
QUESTION/VRAAG 3



3.1	$x = 3$	✓ answer
3.2	$m_{QP} = \tan 71,57^\circ$ $= 3$	✓ answer ✓ $m_{QP} = \tan 71,57^\circ$
3.3	$y = mx + c$ $-2 = 3(-7) + c$ or $y - y_1 = m(x - x_1)$ $y = 3x + 19$	Answer only: full marks ✓ substitution of m & Q ✓ equation
3.4	$R(3; 0)$ $QR = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-7 - 3)^2 + (-2 - 0)^2}$ $= \sqrt{104}$ or $2\sqrt{26}$	(wrong R: CA if $x > 0$) ✓ substitution ✓ answer (in surd form)

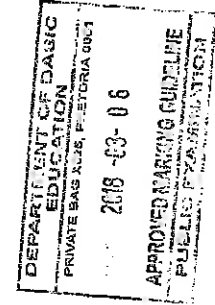
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3.5	$\tan(90^\circ - \theta) = \cot \theta$ $= \frac{0 - (-2)}{3 - (-7)}$ $= \frac{1}{5}$ $\tan \theta = \frac{1}{5} : 1/3$	(wrong R: CA if $x > 0$) ✓ gradient of QR/RN/QN ✓ substitution of Q & R ✓ answer
3.6	$RN = \frac{1}{2} \cdot 2\sqrt{26} = \sqrt{26}$ SR = 6 Area $\Delta RSN = \frac{1}{2} SR \cdot RN \cdot \sin \theta$ $= \frac{1}{2} \times 6 \times \sqrt{26} \times \frac{5}{\sqrt{26}}$ $= 15$ square units	✓ RN ✓ SR ✓ diagram (5 & $\sqrt{26}$) ✓ use of correct area rule ✓ substitution of $\sin \theta$ ✓ answer (6)
using calculator: max 4 marks		$\text{Area } \Delta RSN = \frac{1}{2} SR \cdot RN \cdot \sin \theta$ $= \frac{1}{2} (6) \left(\frac{1}{2} \sqrt{104}\right) \cdot \sin \theta$ $= \frac{3}{2} (\sqrt{104}) \cdot \sin \theta$ $= \frac{3}{2} (\sqrt{104}) \left(\frac{5}{\sqrt{26}}\right)$ $= 15$ square units



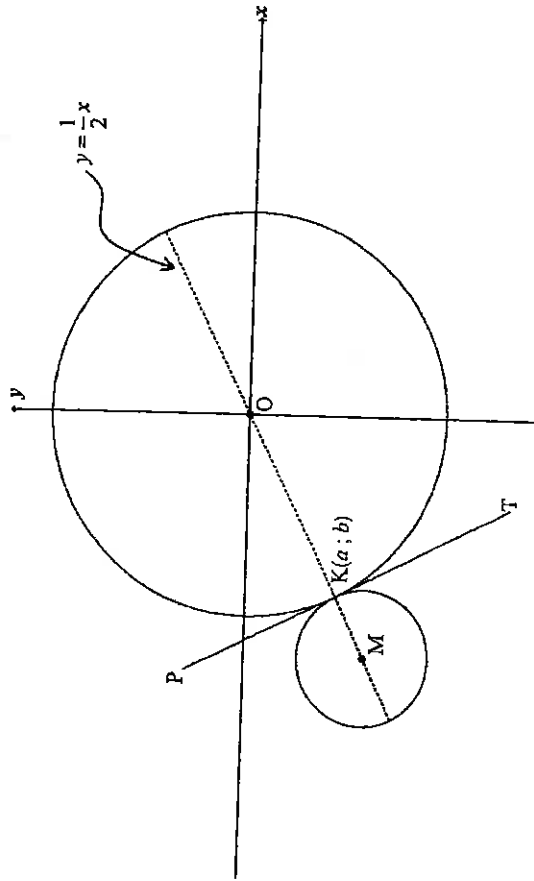
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OR/OF SR = 6 ⊥ height = 5 $A = \frac{1}{2} SR \times \perp h$ $= \frac{1}{2} (6)(5)$ $= 30$ square units		✓ SR ✓ ⊥ height ✓ use of correct area formula ✓ substitution of $\sin \theta$ ✓ answer (6)
Using $A = \frac{1}{2} b \times \perp h$ incorrectly: max 1/6		(6)



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QUESTION/VRAAG 4



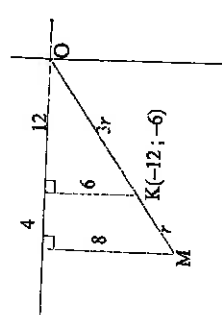
4.1	OK = $\sqrt{180}$ or $6\sqrt{5}$	✓ answer	(1)
4.2	$a^2 + b^2 = 180$ $b = \frac{1}{2}a$ $a^2 + \left(\frac{1}{2}a\right)^2 = 180$ $a^2 + \frac{1}{4}a^2 = 180$ $a^2 = 144 \therefore a = -12$ $b = \frac{1}{2}(-12)$ $K(-12; -6)$ (given)	✓ b in terms of a ✓ substitution ✓ $a^2 = 144$ ✓ substitution	(4)
	OR/OF $a^2 + b^2 = 180$ $a = 2b$ $(2b)^2 + b^2 = 180$ $5b^2 = 180$ $b^2 = 36 \therefore b = -6$ $a = 2(-6)$ $K(-12; -6)$ (given)	✓ a in terms of b ✓ substitution ✓ $b^2 = 36$ ✓ substitution	(4)

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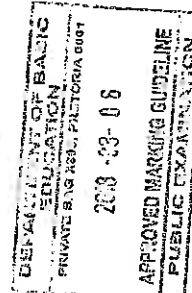
No penalty if x and y are not converted to a and b
 Error in simplification: max 2/4

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4.3.1	$m_{OK} = \frac{1}{2}$ $m_{PT} = -2$ $y = mx + c$ $-6 = -2(-12) + c$ $c = -30$ $y = -2x - 30$	$[y = \frac{1}{2}x]$ [radius \perp tangent/radiallyn] OR/OF $y - y_1 = m(x - x_1)$ $y - (-6) = -2(x - (-12))$ $c = -30$	$\checkmark m_{PT} = -2$ \checkmark substitution of m & K(-12; -6) \checkmark equation	(3)
4.3.2	$3MK = OK$ $\Rightarrow OM = \frac{4}{3}OK$ $M = \frac{4}{3}(-12; -6)$ $\therefore M(-16; -8)$	$3MK = OK$ $9MK^2 = OK^2 = 180$ $\therefore MK^2 = 20$ Let $M(x; y)$, then: $(x+12)^2 + (y+6)^2 = 20$ $(x+12)^2 + \left(\frac{1}{2}x+6\right)^2 = 20$ $x^2 + 24x + 144 + \frac{1}{4}x^2 + 6x + 36 = 20$ $5x^2 + 30x + 160 = 0$ $x^2 + 24x + 128 = 0$ $(x+16)(x+8) = 0$ $x = -16 \quad x = -8$ [since M is outside the large circle] $y = -8$ $M(-16; -8)$	$\checkmark 3MK = OK$ $\checkmark OM = \frac{4}{3}OK$ $\checkmark M = \frac{4}{3}(-12; -6)$ \checkmark x-coordinate \checkmark y-coordinate OR/OF $\checkmark 3MK = OK$ $\checkmark MK^2 = 20$ \checkmark equation \checkmark substitution \checkmark x-coordinate \checkmark y-coordinate $\checkmark 3MK = OK$ \checkmark diagram with values OR valid explanation \checkmark x-coordinate \checkmark y-coordinate	(6)

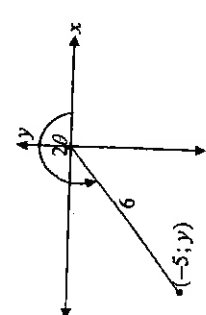


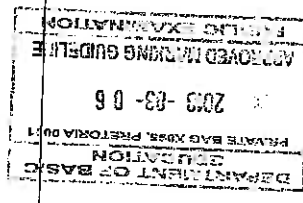
<p>3MK = OK $9MK^2 = OK^2 = 180$ $\therefore MK^2 = 20$</p> <p>Let $M(x; y)$, then $y = \frac{1}{2}x$:</p> <p>$(x+12)^2 + (y+6)^2 = 20$ $(x+12)^2 + \left(\frac{1}{2}x+6\right)^2 = 20$</p> <p>$4(x+12)^2 + (x+12)^2 = 80$ $(x+12)^2 = 16$ $x+12 = \pm 4$ $x = -16 \quad x \neq -8$ [since M is outside the large circle] $y = -8$ $M(-16; -8)$</p> <p>(6)</p>	<p>✓ 3MK = OK ✓ $MK^2 = 20$ ✓ equation ✓ substitution ✓ x-coordinate ✓ y-coordinate</p>
<p>4.3.3</p> <p>$(x - (-16))^2 + (y - (-8))^2 = \left(\frac{1}{3}\sqrt{180}\right)^2$ $(x+16)^2 + (y+8)^2 = 20$</p> <p>(2)</p>	<p>✓ LHS (CA from 4.3.2) ✓ RHS (CA from 4.1)</p>
<p>4.4</p> <p>$OK < r < OK + 2KM$</p> <p>$\sqrt{180} < r < \sqrt{180} + \frac{2}{3}\sqrt{180}$ $6\sqrt{5} < r < 10\sqrt{5}$</p> <p>(3)</p>	<p>✓ ✓ values ✓ inequality</p>
<p>4.5</p> <p>$x^2 + 32x + (16)^2 + y^2 + 16y + (8)^2 = 256 + 64 - 240$ $(x+16)^2 + (y+8)^2 = 80$</p> <p>New circle/nuwe sirkel: Centre/middepunt $(-16; -8)$ & $r = 4\sqrt{5}$</p> <p>Original circle/loorspronklike sirkel: $M(-16; -8)$ & $r = 2\sqrt{5}$</p> <p>This circle will never cut the circle with centre M as they have the same centre (concentric circles) but unequal radii/Hierdie sirkel sal nooit die sirkel met middepunt M sny nie, want hulle is konsentries, want het dieselfde middepunt met verskillende radii.</p> <p>(5)</p>	<p>✓ equation in centre, radius form ✓ Centre: $(-16; -8)$ ✓ $r = 4\sqrt{5}$ (new) ✓ $r = 2\sqrt{5}$ (original) ✓ conclusion ("concentric" must be stated)</p> <p>(24)</p>



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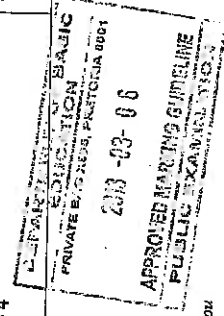
QUESTION/PRAAG 5

<p>5.1.1</p> <p>$\cos 2\theta = -\frac{5}{6}$, where $2\theta \in [180^\circ; 270^\circ]$</p>  <p>$y^2 = 6^2 - (-5)^2$ [Pythagoras] $y = \pm\sqrt{11}$ $(5; y)$ is in 3rd quadrant: $\therefore y = -\sqrt{11}$ $\sin 2\theta = -\frac{\sqrt{11}}{6}$</p> <p>OR/OF</p> <p>Getting to $\sin 2\theta = \frac{\sqrt{11}}{6}$; 3/4</p> <p>$\sin^2 2\theta = 1 - \cos^2 2\theta$ $= 1 - \left(-\frac{5}{6}\right)^2$ $= 1 - \frac{25}{36}$ $= \frac{11}{36}$ $\sin 2\theta = -\frac{\sqrt{11}}{6}$</p> <p>no calculator in 5.1</p>	<p>✓ diagram (3rd quadrant only) ✓ using Pythagoras ✓ y-value ✓ answer</p>
<p>5.1.2</p> <p>$\cos 2\theta = 1 - 2\sin^2 \theta$ $2\sin^2 \theta = 1 - \cos 2\theta$ $\sin^2 \theta = \frac{1 - \left(-\frac{5}{6}\right)}{2}$ $= \frac{11}{12} \times \frac{1}{2}$ $= \frac{11}{24}$</p>	<p>✓ value of $\sin^2 2\theta$ ✓ answer ✓ $\cos 2\theta = 1 - 2\sin^2 \theta$ ✓ substitution ✓ answer</p>



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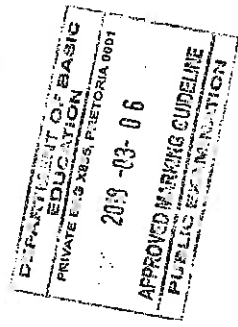
5.2	$\sin(180^\circ - x) \cdot \cos(-x) + \cos(90^\circ + x) \cdot \cos(x - 180^\circ)$ $= \sin x \cdot \cos x - \sin x(-\cos x)$ $= 2 \sin x \cdot \cos x$ $= \sin 2x$	$\checkmark \sin x$ $\checkmark \cos x$ $\checkmark -\sin x$ $\checkmark -\cos x$ \checkmark simplification \checkmark answer	(6)
5.3	$\sin 3x \cdot \cos y + \cos 3x \cdot \sin y$ $\sin(3x + y)$ $= \sin 270^\circ$ $= -1$	\checkmark compound angle \checkmark answer	(2)
5.4.1	$2 \cos x = 3 \tan x$ $2 \cos x = \frac{3 \sin x}{\cos x}$ $2 \cos^2 x = 3 \sin x$ $2(1 - \sin^2 x) = 3 \sin x$ $2 - 2 \sin^2 x = 3 \sin x$ $2 \sin^2 x + 3 \sin x - 2 = 0$	$\checkmark \tan x = \frac{\sin x}{\cos x}$ \checkmark multiplying by $\cos \theta$ $\checkmark \cos^2 x = 1 - \sin^2 x$	(3)
5.4.2	$2 \sin^2 x + 3 \sin x - 2 = 0$ $(2 \sin x - 1)(\sin x + 2) = 0$ $\sin x = \frac{1}{2}$ or $\sin x = -2$ (no solution) $x = 30^\circ + k \cdot 360^\circ$ or $x = 150^\circ + k \cdot 360^\circ$; $k \in \mathbb{Z}$	\checkmark factors \checkmark both values of $\sin x$ \checkmark no solution $\checkmark 30^\circ + k \cdot 360^\circ$ $\checkmark 150^\circ + k \cdot 360^\circ$; $k \in \mathbb{Z}$	(5)
5.4.3	$5y = 30^\circ + k \cdot 360^\circ$ or $5y = 150^\circ + k \cdot 360^\circ$ $y = 6^\circ + k \cdot 72^\circ$ or $y = 30^\circ + k \cdot 72^\circ$ $\therefore y = 144^\circ + 6^\circ$ or $y = 144^\circ + 30^\circ$ $y = 150^\circ$ or $y = 174^\circ$	$\checkmark y = 6^\circ + k \cdot 72^\circ$ $\checkmark y = 30^\circ + k \cdot 72^\circ$ $\checkmark 150^\circ$ $\checkmark 174^\circ$	(4)
5.5.1	OR/OF $144^\circ \leq y \leq 216^\circ$ $720^\circ \leq 5y \leq 1080^\circ$ $5y = 750^\circ$ or $5y = 870^\circ$ $y = 150^\circ$ or $y = 174^\circ$ $g(x) = -4 \cos(x + 30^\circ)$ maximum value = 4	$\checkmark 5y = 750^\circ$ $\checkmark 5y = 870^\circ$ $\checkmark 150^\circ$ $\checkmark 174^\circ$ \checkmark answer	(4)



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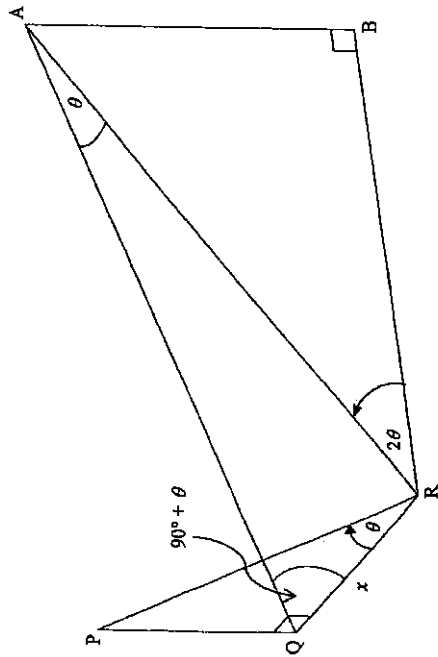
5.5.2	range of <i>waardeversameling</i> van $g(x)$: $-4 \leq y \leq 4$ OR/OF $y \in [-4; 4]$ \therefore range of <i>waardeversameling</i> van $g(x) + 1$: $-3 \leq y \leq 5$ OR/OF $y \in [-3; 5]$ Answer only: full marks	\checkmark range of $g(x)$ \checkmark answer	(2)
5.5.3	$y = -4 \cos(x + 30^\circ)$ shifted to the left/skuif na links: $y = -4 \cos(x + 30^\circ + 60^\circ)$ $= -4 \cos(x + 90^\circ)$ $= 4 \sin x$ $\therefore h(x) = -4 \sin x$ Answer only: full marks	\checkmark shift of 60° to the left \checkmark reduction \checkmark equation of h	(3)

[33]



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QUESTION/VRAAG 6



6.1.1	$\tan \theta = \frac{PQ}{QR} = \frac{PQ}{x}$ $\therefore PQ = x \tan \theta$	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Answer only: full marks</div>	<ul style="list-style-type: none"> ✓ trig ratio ✓ answer 	<p>OR/OF</p> $\frac{QR}{\sin P} = \frac{PQ}{\sin PRQ}$ $\therefore PQ = \frac{x \cdot \sin \theta}{\sin(90^\circ - \theta)}$	<ul style="list-style-type: none"> ✓ trig ratio ✓ answer
6.1.2	$\frac{AR}{\sin QR} = \frac{QR}{\sin QAR}$ $AR = \frac{x \sin(90^\circ + \theta)}{\sin \theta}$	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">Answer only: full marks</div>	<ul style="list-style-type: none"> ✓ use of sine rule ✓ substitution into sine rule correctly 	<ul style="list-style-type: none"> ✓ trig ratio ✓ answer 	

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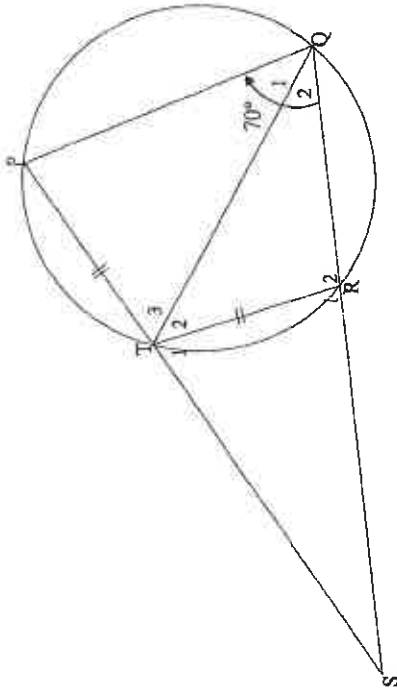
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6.2	$\sin 2\theta = \frac{AB}{AR}$ $AB = AR \sin 2\theta$ $= \frac{x \sin(90^\circ + \theta) \cdot \sin 2\theta}{\sin \theta}$ $= \frac{x \cos \theta \sin 2\theta}{\sin \theta}$ $= \frac{x \cos \theta \cdot 2 \sin \theta \cos \theta}{\sin \theta}$ $= 2x \cos^2 \theta$	<ul style="list-style-type: none"> ✓ substitution into trig ratio and AB as subject ✓ substitution of AR ✓ co-ratio ✓ $\sin 2\theta = 2 \sin \theta \cos \theta$ 	(4)
6.3	$\frac{AB}{QP} = \frac{2x \cos^2 12^\circ}{x \tan 12^\circ}$ $= 9$	<ul style="list-style-type: none"> ✓ substitution CA from 6.1.1) ✓ answer 	(2) [10]

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QUESTION/VRAAG 7

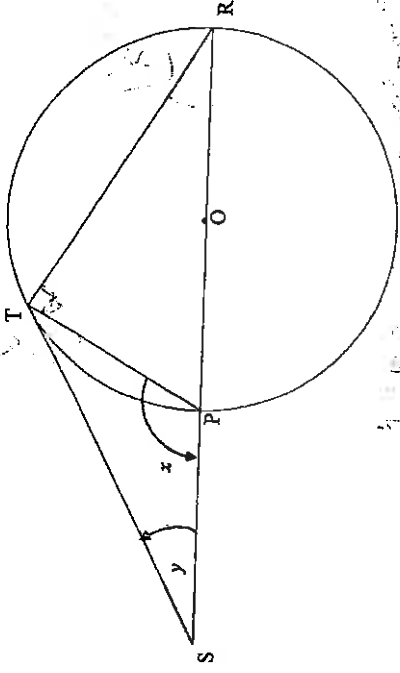


7.1.1	$\hat{T}_1 = 70^\circ$ [ext \angle of cyclic quad/buite \angle van koordenvl.]	\checkmark S \checkmark R	(2)
7.1.2	$\hat{Q}_1 = \hat{Q}_2 = 35^\circ$ [equal chords; equal \angle s/gebyte koorde; gebyte \angle e]	\checkmark S \checkmark R	(2)
7.2.1	$\hat{T}_2 = \hat{Q}_1 = 35^\circ$ [alt. \angle s/verwiss \angle e; PQ \parallel TR]	\checkmark S \checkmark R	(2)
7.2.2	$\frac{PT}{TS} = \frac{QR}{RS}$ $\frac{TR}{TS} = \frac{QR}{RS}$ [prop theorem/eweredigheid; PQ \parallel TR] [PT = TR]	\checkmark S \checkmark R	(2)
			[8]

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QUESTION/VRAAG 8

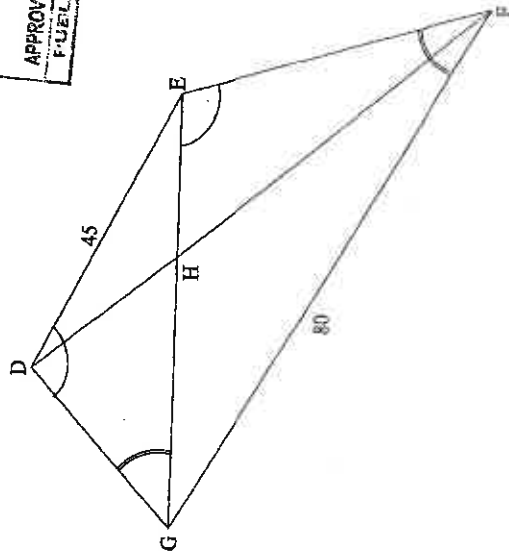


$\hat{P}\hat{T}\hat{R} = 90^\circ$ $x = 90^\circ + \hat{R}$ $\therefore \hat{R} = x - 90^\circ$ $\hat{S}\hat{T}\hat{P} = x - 90^\circ$ $x + x - 90^\circ + y = 180^\circ$ $\therefore y = 270^\circ - 2x$	[\angle in semi-circle/halfsirkel] [ext/buite \angle of van Δ] [tan chord theorem/raakl koördinstelling] [sum of som van \angle s/e in Δ]	\checkmark S/R \checkmark S/R \checkmark S \checkmark R \checkmark S \checkmark ANSWER	[6]
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QUESTION/VRAG 9



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 PUELS EXAMINATION

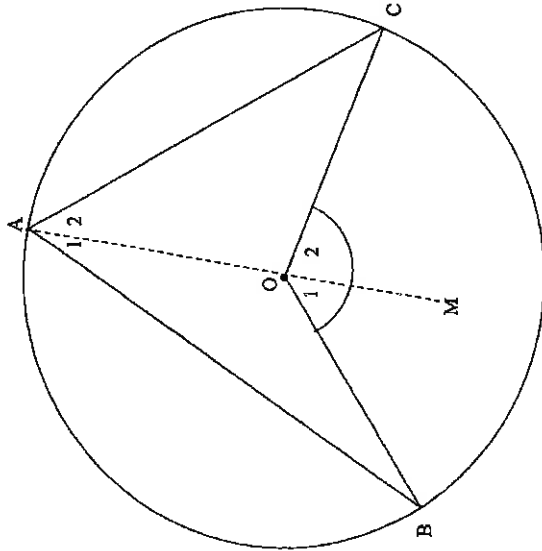
9.4	$\frac{GH}{EH} = \frac{FG}{DE}$ $\frac{GH}{60 - GH} = \frac{80}{45}$ $45 GH = 80(60 - GH)$ $45 GH = 4800 - 80 GH$ $125 GH = 4800$ $GH = 38,4$	<p>[Δs] [EH = 60 - GH]</p>	<p>✓ S ✓ substitution ✓ answer (3) [10]</p>
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9.1	equiangular Δs/gegelykoeke Δe OR/OF (∠∠∠)	✓ answer (1)
9.2	$\frac{GE}{GF} = \frac{DE}{GE}$ $GE^2 = 45 \times 80$ $GE = 60$	<p>[Δs] ✓ proportion ✓ substitution ✓ answer (3)</p>
9.3	<p>In ΔDEH and ΔFGH: DHE = FHG DEH = FGH EDH = GFH ∴ ΔDEH ΔFGH</p> <p>OR/OF In ΔDEH and ΔFGH: DHE = FHG DEH = FGH ∴ ΔDEH ΔFGH</p>	<p>[vert opp ∠s =/regoorst ∠e =] [Δs] [sum of/son van ∠s/e in Δ] (3)</p> <p>✓ S/R ✓ S/R ✓ S (3)</p> <p>[vert opp ∠s =/regoorst ∠e =] [Δs] [∠∠∠] (3)</p> <p>✓ S/R ✓ S/R ✓ R (3)</p>

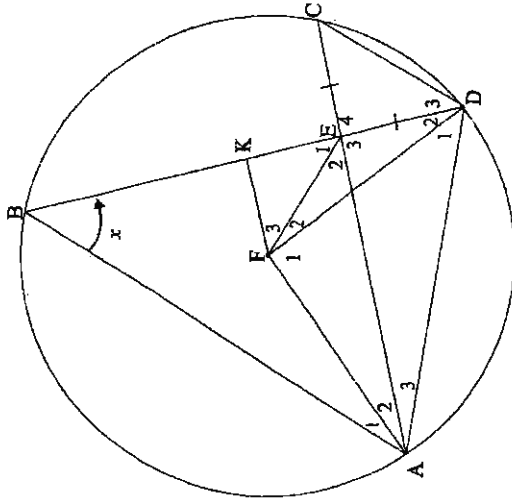
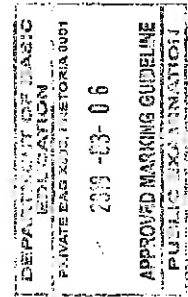
DEPARTMENT OF BASIC EDUCATION
 PRIVATE BAG 3015, PRETORIA 001
 2019-03-06
 APPROVED MARKING GUIDELINE
 PUELS EXAMINATION

QUESTION/VR44G 10

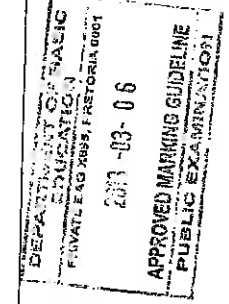
10.2



10.1	<p>Construction: AO is drawn and produced to M</p> <p>$\hat{O}_1 = \hat{A}_1 + \hat{B}$ But $\hat{A}_1 = \hat{B}$ $\therefore \hat{O}_1 = 2\hat{A}_1$</p> <p>Similarly/Netso: $\hat{O}_2 = 2\hat{A}_2$ $\therefore \hat{O}_1 + \hat{O}_2 = 2\hat{A}_1 + 2\hat{A}_2$ $= 2(\hat{A}_1 + \hat{A}_2)$ $\hat{B}\hat{O}\hat{C} = 2\hat{B}\hat{A}\hat{C}$</p>	<p>✓ Constr ✓ S/R ✓ S/R ✓ S ✓ S</p>	(5)
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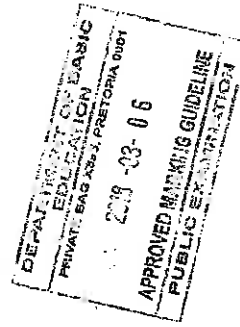


10.2.1(a)	$\hat{F}_1 = 2x$	[\angle centre = $2\angle$ at circum/midpts $\angle = 2\text{omtreks}\angle$]	✓ S ✓ R	(2)
10.2.1(b)	$\hat{C} = x$ OR/OF $\hat{C} = x$	[\angle s in the same seg/ \angle e in dieselfde segment]	✓ S ✓ R	(2)
10.2.2	$\hat{D}_3 = x$ $\hat{E}_3 = 2x$ $\therefore \hat{F}_1 = \hat{E}_3 = 2x$ \therefore AFED is a cyclic quadrilateral [converse \angle s in the same seg/ Is 'n koordvierhoek [omgekeerde \angle e in dieselfde segm]	[\angle centre = $2\angle$ at circum/midpts $\angle = 2\text{omtreks}\angle$] [\angle s opp equal sides/ \angle e teenoor = sye] [ext \angle of Δ /buite \angle van Δ]	✓ S/R ✓ S/R ✓ S ✓ R	(2)



10.2.3	$\hat{A}_2 + \hat{A}_3 + \hat{D}_1 + \hat{F}_1 = 180^\circ$ [sum of \angle s in Δ /som van \angle e in Δ] $\hat{A}_2 + \hat{A}_3 = \hat{D}_1$ [\angle s opp = sides/ \angle e teenoor = sye] $\therefore \hat{A}_2 + \hat{A}_3 = 90^\circ - x$ $\hat{E}_1 = \hat{A}_2 + \hat{A}_3 = 90^\circ - x$ $\hat{F}_1 = 90^\circ$ $\hat{F}_3 = x$ [ext. \angle of cyclic quad/buite \angle v koordent] [line from centre bisects chord]/ [lyn van midpt halveer koord] [sum of \angle s in Δ /som van \angle e in Δ]	✓ S ✓ S ✓ R ✓ S ✓ S ✓ R
10.2.4	$\hat{B}\hat{A}\hat{C} = \hat{D}_3$ [\angle s in the same seg/ \angle e in dieselfde segm] $AE = BE$ [sides opp equal \angle s/sye teenoor = \angle e] $\frac{\text{area } \Delta AEB}{\text{area } \Delta DEC} = \frac{\frac{1}{2}(BE)(AE) \cdot \sin \hat{A}EB}{\frac{1}{2}(EC)(ED) \cdot \sin \hat{D}EC}$ $6,25 = \frac{AE^2}{ED^2}$ $\therefore \frac{AE}{ED} = 2,5$	✓ S ✓ S ✓ substitution into area rule ✓ simplification of RHS ✓ answer (5) [24]

TOTAL/TOTAAL: 150



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