Education and Sport Development

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

GRADE 11

TECHNICAL MATHEMATICS P2/ *TEGNIESE WISKUNDE V2*

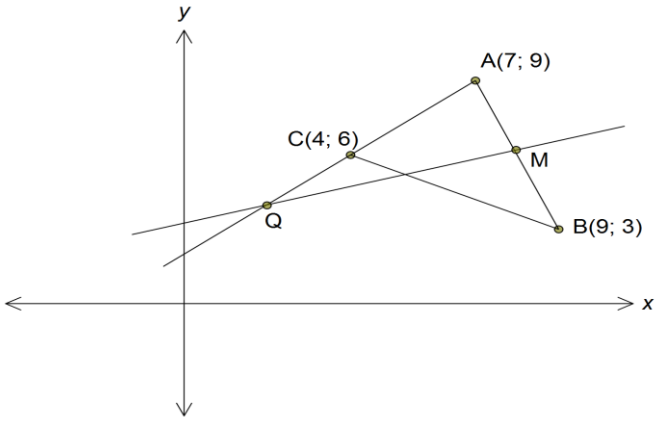
MID-YEAR EXAMINATION2018/ *HALFJAAR EKSAMEN 2018*

MARKING GUIDELINE/ *MERKRIGLYNE*

TOTAL MARKS/ *TOTAL PUNTE*: 100

This marking guideline consist of 11 pages./ *Hierdie merkriglyne bestaan uit 11 bladsye.*

QUESTION 1

		
1.1	$m_{AB} = \frac{9-3}{7-9}$ $m_{AB} = -3$	✓ $m_{AB} = \frac{9-3}{7-9}$ ✓ $m_{AB} = -3$ (2)
1.2	$M\left(\frac{7+9}{2}; \frac{9+3}{2}\right)$ M (8 ; 6)	✓ method/ *metode* ✓ answer/ *antw* (2)
1.3	$m_{QM} = \frac{1}{3}$ $y - y_1 = m(x - x_1)$ $y - 6 = \frac{1}{3}(x - 8)$ $y = \frac{1}{3}x + 3\frac{1}{3}$	✓ $m_{QM} = \frac{1}{3}$ ✓ formula/ *formulae* ✓ substitution/ *substitusie* ✓ answer/ *antwoord* (4)
1.4	$m_{QA} = \frac{9-6}{7-4}$ $= 1$ $y - y_1 = m(x - x_1)$ $y - 9 = 1(x - 7)$ $y = x + 2$ $\frac{1}{3}x + \frac{10}{3} = x + 2$ $x + 10 = 3x + 6$ $x = 2$ Q (2; 4)	✓ substitution/ *substitusie* ✓ $m_{QA} = 1$ ✓ substitution/ *substitusie* ✓ $y = x + 2$ ✓ equating 2 graphs/ *grafieke gelykstel* ✓ $x = 2$ ✓ Q (2; 4) (7)

1.5	$QA = \sqrt{(9-4)^2 + (7-2)^2}$ $= \sqrt{5^2 + 5^2}$ $= \sqrt{50}$ $QB = \sqrt{(3-4)^2 + (9-2)^2}$ $= \sqrt{(-1)^2 + 7^2}$ $= \sqrt{50}$ $\therefore QA = QB$	✓ substitution/ *substitusie* ✓ QA = $\sqrt{50}$ ✓ QB = $\sqrt{50}$ (3)
1.6	D(6; 0)	✓ $x = 6$ ✓ $y = 0$ (2)

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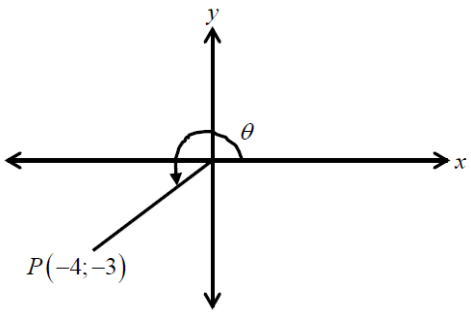
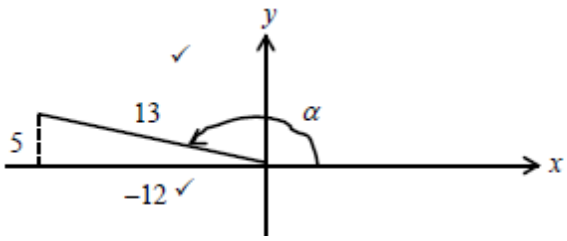
QUESTION 2

2.1	$x = 54{,}73^0$ and $y = 142.89^0$	
2.1.1	$\tan(y - x)$ $\tan(142{,}89^0 - 54{,}73^0)$ $= \tan 88{,}16^0$ $= 31{,}1$	✓ 31,1 (1)
2.1.2	$\cos 3y$ $= \cos 3(142{,}89^0)$ $= \cos 428{,}67^0$ $= 0{,}36$	✓ $\cos 428{,}67^0$ ✓ answer/ *antwoord* (2)
2.2		
2.2.1	$\tan\theta = \frac{3}{4}$	✓ answer/ *antwoord* (1)
2.2.2	$r^2 = (-3)^2 + (-4)^2$ $r^2 = 25$ $r = 5$ $\sin\theta = -\frac{3}{5}$	✓ $r^2 = (-3)^2 + (-4)^2$ ✓ $r = 5$ ✓ $\sin\theta = -\frac{3}{5}$ (3)

2.3	$\sin\alpha = \frac{5}{13}$ and $\cos\alpha < 0$.  $13^2 = x^2 + 5^2$ $x^2 = 169 - 25$ $x^2 = 144$ $x = \pm 12$ $\therefore x = -12$ $\tan\alpha = \frac{5}{-12}$	✓sketch/ *skets* ✓Pyth ✓ – 12 ✓answer/ *antwoord* (4)

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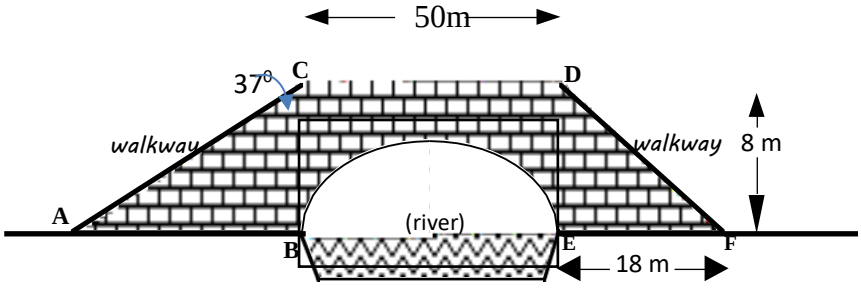
QUESTION 3

3.1.1	$\sin x = 0{,}234$ $x = 13{,}53^\circ$	✓ answer/ *antwoord* (1)
3.1.2	$\cot x = \tan 53^\circ + \sin 233^\circ$ $\cot x = 0{,}528$ $\tan x = 1{,}892...$ $x = 62{,}15^0$	✓ $\cot\theta = 0{,}528$ ✓ $\tan\theta = 1{,}892...$ ✓ $\theta = 62{,}15^0$ (3)
3.2	 	
	In ΔABC : $\cos 37^\circ = \frac{8}{AC}$ AC = 10,02*m*	✓ $\cos 37^\circ = \frac{8}{AC}$ ✓ AC = 10,02*m*

	In ΔDEF : $DF^2 = 18^2 + 8^2$ DF = 19,7 *m* Walkway/ *Loopvlak* = 10,02 + 50 + 19,7 = 79, 72 *m* Yes, the bridge is designed properly because Walkway < 100 *m* *Ja, brug is reg ontwerp volgens voorskrif, want* *Loopvlak < 100m*	✓ Pythagoras ✓ DF = 19,7 *m* ✓ walkway/ *loopvlak* = 79, 72m ✓Yes/ *Ja* ✓ reason/ *rede* (7) L4

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QUESTION 4

4.1	$134,251 = 134^\circ 15' 04''$	✓ ✓ answer/ *antwoord* (2)
4.2	$27^\circ 36' 54'' = 27 + 0,6 + 0,015$ $= 27, 615^\circ$	✓ ✓ answer/ *antwoord* (2)
4.3	$\frac{\pi}{4} + \frac{2\pi}{3} = \frac{\pi}{4} \times \frac{180^\circ}{\pi} + \frac{2\pi}{3} \times \frac{180^\circ}{\pi}$ $= 45^\circ + 120^\circ$ $= 165^\circ$	✓ multiplying by $\frac{180^\circ}{\pi}$ ✓ 45° ✓ 120° ✓ answer/ *antwoord* (4)
4.4	$\sin\frac{\pi}{2} + \cos\frac{\pi}{4} = \sin\frac{\pi}{2} \times \frac{180^\circ}{\pi} + \cos\frac{\pi}{4} \times \frac{180^\circ}{\pi}$ $= \sin 90^\circ + \cos 45^\circ$ $= 1 + \frac{\sqrt{2}}{2}$ $= \frac{2 + \sqrt{2}}{2}$	✓ multiplying by $\frac{180^\circ}{\pi}$ / *vermenigvuldig met* $\frac{180^\circ}{\pi}$ ✓ $\sin 90^\circ + \cos 45^\circ$ ✓ substitution/ *substitusie* ✓ answer/ *antwoord* (4)
4.5	$\theta = \frac{s}{r}$ $= \frac{5}{10}$ $= 0,5 rad$	✓ formula/ *formule* ✓ substitution/ *substitusie* ✓ answer/ *antwoord* (3)

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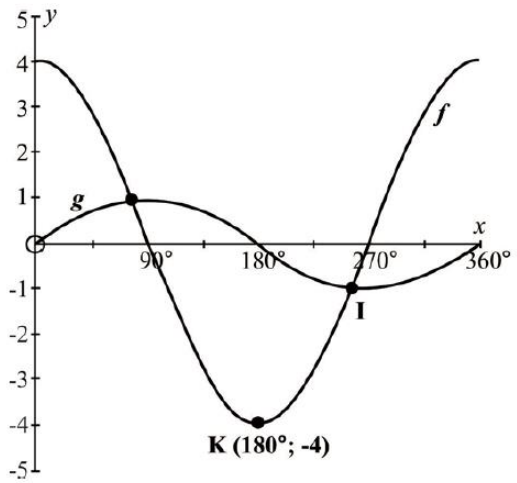
QUESTION 5

		
5.1	$a = 4$ $b = 1$	✓ $a = 4$ ✓ $b = 1$ (2)
5.2	$-4 \le y \le 4$ or $y \in [-4;4]$	✓ answer/ *antwoord* (1)
5.3	I$(255{,}96^\circ;-0{,}97)$	✓ *x*-value/ *x-waarde* ✓ *y*-value/ *y-waarde* (2) Accept / *Aanvaar :* $x = 250^\circ$ to 265° $y = -0{,}7$ to $-0{,}9$...
5.4.1	$x \in (90^\circ;270^\circ)$ OR $90^\circ < x < 270^\circ$	✓ answer/ *antwoord* (1)
5.4.2	$x = 0^\circ$ or $x = 360^\circ$	✓ $x = 0^\circ$ ✓ $x = 360^\circ$ (2)

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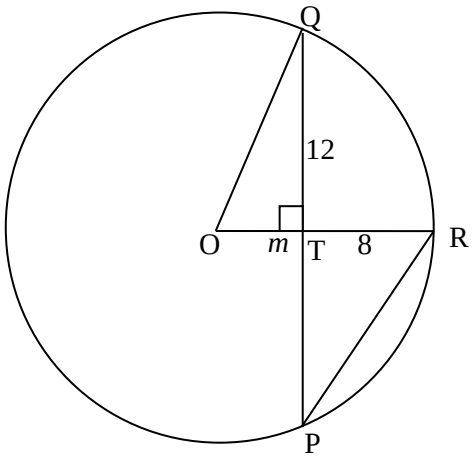
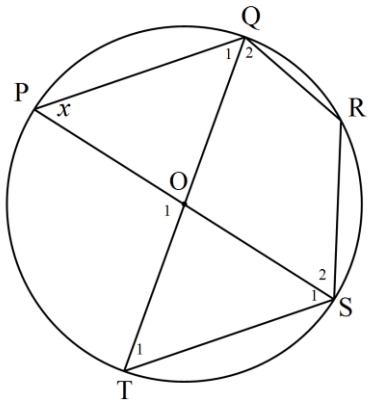
QUESTION 6

	In question 6 – 9 **S – denotes, Statement only / *slegs Bewering*** **R – denotes, Reason only / *slegs Rede*** **S/R – denotes, Statement and Reason. / *Bewering & Rede***	
6.1		
6.1.1	TQ = TP = 12 cm [line from centre perp to chord] *[lyn van midpt loodreg op koord]*	✓ S ✓ R (2)
6.1.2	OQ = OR = $m + 8$ [radii]	✓ S/R (1)
6.1.3	$OQ^2 = m^2 + 12^2$ [Pythagoras] $(m+8)^2 = m^2 + 12^2$ $m^2 + 16m + 64 = m^2 + 144$ $16m = 80$ $m = 5\text{cm}$	✓ S ✓ substitution/ *substitusie* ✓ simplification *vereenvoudiging* ✓ answer/ *antwoord* (4)
6.1.2	radius = $m + 8$ $=5 + 8$ $= 13\text{cm}$	✓ answer/ *antwoord* (1)

6.2	are supplementary/ *is supplementêr*	✓ answer/ *antwoord* (1)
6.3		
6.3.1	$\hat{Q}_1 = \hat{P} = x$ [radii] $\hat{T}_1 = \hat{P} = x$ [$\angle$ subt by QS/ *onderspan deur* QS]	✓ S✓ R ✓ S✓ R (4)
6.3.2 (a)	$\hat{R} + \hat{P} = 180^\circ$ [opp $\angle$ s of cyclic quad/ *teenoorst hoeke van kvh*] $\hat{R} = 180^\circ - 43^\circ$ $\hat{R} = 137^\circ$ [opp $\angle$ s of cyclic quad/ *teenoorst hoeke van kvh*]	✓ S✓ R (2)
6.3.2 (b)	$\hat{O}_1 = 2x$ [ext $\angle$ of ΔPOQ/ *buitehoek*] $\hat{O}_1 = 86^\circ$ [ext $\angle$ of ΔPOQ/ *buitehoek*]	✓ S ✓ R (2)
6.3.3	$\hat{Q}_1 = \hat{T}_1 = x$ or Alt angles = / *verwisselende hoeke* =	✓ reason (1)

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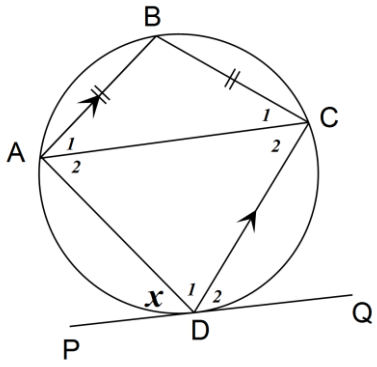
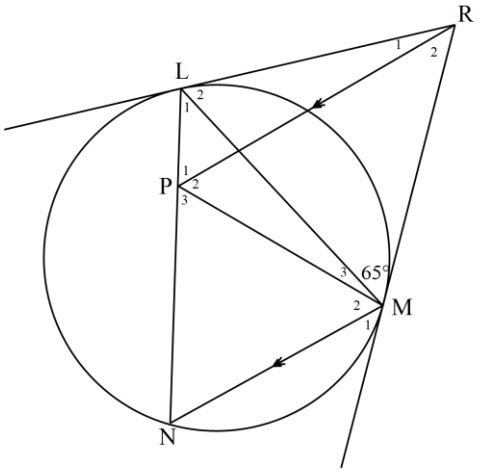
QUESTION 7

7.1		
7.1.1	$\hat{C}_2 = A\hat{D}P = x$ [tanPD/ chord AD/ *raaklyn-koord*] $\hat{A}_1 = \hat{C}_2 = x$ [Alt $\angle$s, AB//CD *verwiss. hoeke*] $\hat{C}_1 = \hat{A}_1 = x$ [$\angle$s opp = sides/ $\angle$*e teenoor = sye*] $\therefore A\hat{D}P = B\hat{C}A$ [both = *x/ albei = x*]	✓ S✓ R ✓ S✓ R ✓ S/R (5)
7.1.2	$\hat{B} + \hat{A}_1 + \hat{C}_1 = 180^\circ$ $\hat{B} + x + x = 180^\circ$ [sum of $\angle$s of ΔABC/ *som v* $\angle e$] $\hat{B} + 2x = 180^\circ$ $\therefore \hat{D}_1 = 2x$ [opp $\angle$s of quad ABCD suppl] *[teenst hoeke van kvh ABCD suppl]*	✓ S/R ✓ $\hat{B} + 2x = 180^\circ$ ✓ answer/ *antwoord* ✓ R (4)
7.1.3	$\hat{D}_2 + \hat{D}_1 + A\hat{D}P = 180^\circ$ [sum of $\angle$s of ΔADC] $\hat{D}_2 + 2x + x = 180^\circ$ *[som van $\angle$e van ΔADC]* $\hat{D}_2 + 3x = 180^\circ$ $\hat{D}_2 + 3(40^\circ) = 180^\circ$ $\hat{D}_2 = 60^\circ$	✓ S/R ✓ substitution/ *substitusie* ✓ answer/ *antwoord* (3)

7.2		
	$\hat{N} = L\hat{M}R = 65^\circ$ [tanRM/chordLM/ *raaklyn-koord*] $\hat{P}_1 = \hat{N} = 65^\circ$ [corresp ∠s, PR // NM/ *ooreenk*] $\hat{P}_1 = L\hat{M}R = 65^\circ$ ∴ LPMR is a cyclic quadrilateral [converse of ∠s in same seg] ∴ *LPMR is 'n kvh [hoeke in dies segment mgekeerd/* *LR onderspan = hoeke]*	✓ S ✓ R ✓ S ✓ R ✓ R (5)

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TOTAL:100

TAXONOMY LEVELS

		LEVEL1	LEVEL 2	LEVEL 3	LEVEL 4
1.1	Analytical geometry	2			
1.2		2			
1.3				4	
1.4				7	
1.5			3		
1.6					2
TOTAL	**20**				
2.1.1	Trigonometry	1			
2.1.2		2			
2.2.1		1			
2.2.2			3		
2.3				4	
TOTAL	**11**				
3.1.1	Trigonometry	1			
3.1.2			3		
3.2					7
TOTAL	**11**				
4.1	Circles, angles and angular movement	2			
4.2		2			
4.3			4		
4.4			4		
4.5		3			
TOTAL	**15**				
5.1	Trigonometry	2			
5.2		1			
5.3			2		
5.4.1			1		
5.4.2				2	
TOTAL	**8**				
6.1.1	Euclidean geometry	2			
6.1.2			1		
6.1.3				4	
6.2.4			2		
6.2		1			
6.3.1			4		
6.3.2(a)			3		
6.3.2(b)			2		
6.4		1			
TOTAL	**18**				
7.1.1	Euclidean geometry			5	
7.1.2				4	
7.1.3			3		
7.2.					5
TOTAL	**17**				
	GRAND TOTAL	**23**	**33**	**30**	**14**

CONTENT COVERED

	CONTENT	ACTUAL MARKS	%
1	Analytical geometry	21	21
2	Trigonometry	41	41
3	Circle, angles and angular movement	15	15
4	Euclidean geometry	34	34
	TOTAL	**100**	**100**