GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATIONS
VOORBEREIDENDE EKSAMEN
2023

MARKING GUIDELINES/
NASIENRIGLYNE

TECHNICAL MATHEMATICS/*TEGNIESE WISKUNDE*
(PAPER/*VRAESTEL* 2)

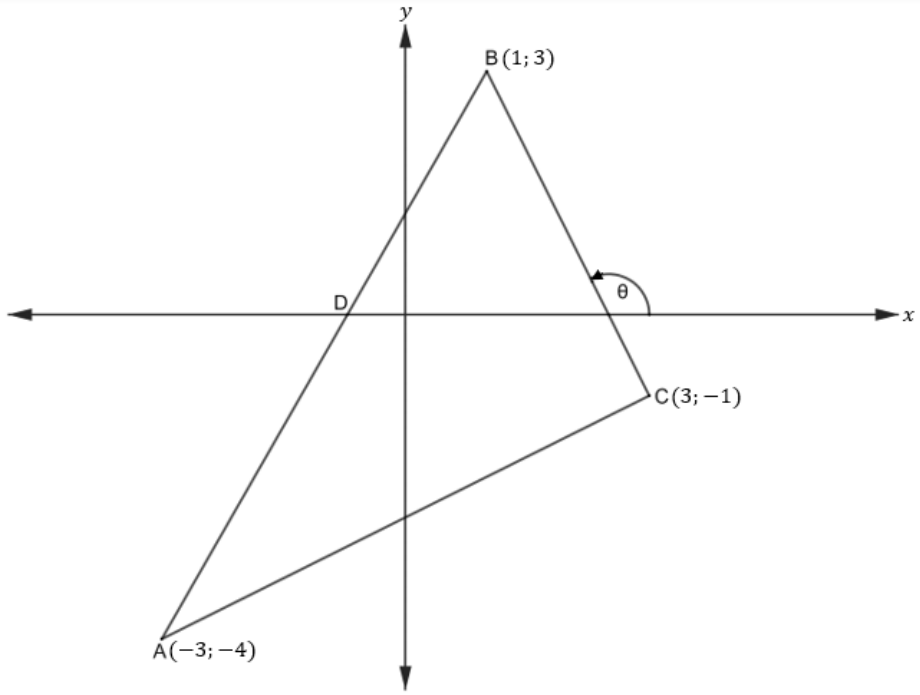
26 pages/*bladsye*

Marking Codes/*Nasienkodes*	
A	Accuracy/*Akkuraatheid*
CA	Consistent accuracy/*Volgehoue akkuraatheid*
M	Method/*Metode*
R	Rounding/*Afronding*
NPR	No penalty for rounding/*Geen penalisering vir afronding nie*
NPU	No penalty for units omitted/*Geen penalisering indien eenhede weggelaat nie*
SF	Simplification/*Vereenvoudiging*
F	Substitution in correct formula/*Vervanging in korrekte formule*
ST	Statement/*Bewering*
ST/RE	Statement and Reason/*Bewering en Rede*
AO	Answer Only / *Slegs antwoord*

NOTES:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and did not redo it, mark the crossed-out version.
- Consistent accuracy applies in all aspects of the marking guidelines.

NOTAS:
- *Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n poging van 'n vraag deurgehaal het en dit nie oorgedoen het nie, sien die doodgetrekte weergawe na.*
- *Volgehoue akkuraatheid is deurgaans op alle aspekte van die nasienriglyne van toepassing.*

QUESTION/*VRAAG* 1



1.1	$AB = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$		
	$AB = \sqrt{(1-(-3))^2 + (3-(-4))^2}$	✓ SF	A
	$AB = \sqrt{16+49}$		
	$AB = \sqrt{65}$	✓ $\sqrt{65}$	CA
	$AB = 8,06$ units/*eenhede*	✓ $8,06$ **AO: Full marks** **AO: Volpunte** **NPR**	CA (3)
1.2	M $\left(\frac{x_A+x_C}{2}; \frac{y_A+y_C}{2}\right)$		
	= M $\left(\frac{-3+3}{2}; \frac{-4-3}{2}\right)$	✓ $x = 0$	A
	= M $\left(0; -2\frac{1}{2}\right)$ or $\left(0; -\frac{5}{2}\right)$ or/*of* $(0; -2,5)$	✓ $y = -2,5$	A (2)

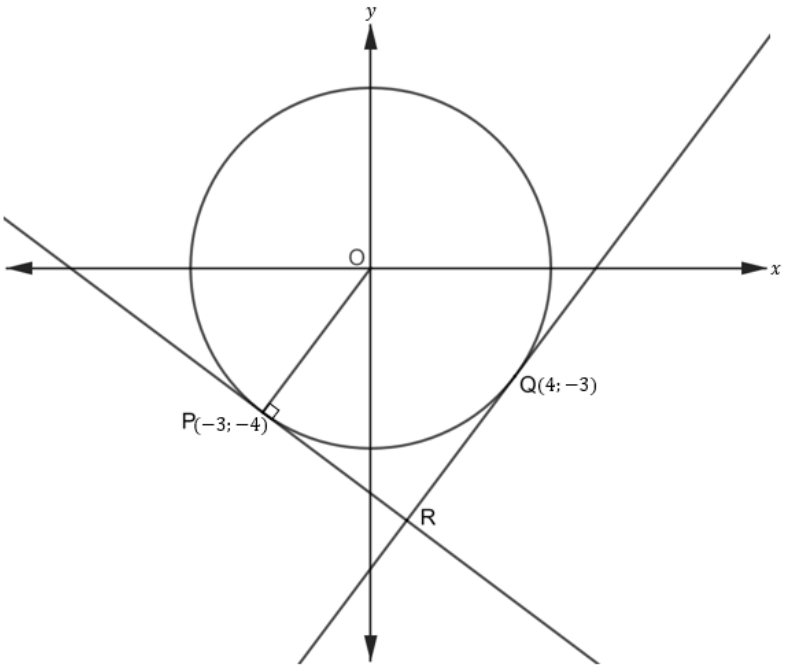
1.3	$m_{AB} = \frac{y_B - y_A}{x_B - x_A}$		
	$m_{AB} = \frac{-4-3}{-3-1}$		
	$m_{AB} = \frac{7}{4}$	✓ $m_{AB} = \frac{7}{4}$	A
	$y - 3 = \frac{7}{4}(x-1)$		
	$y = \frac{7}{4}x - \frac{7}{4} + 3$		
	$y = \frac{7}{4}x + \frac{5}{4}$	✓ $y = \frac{7}{4}x + \frac{5}{4}$	A
	for x – intercept, let $y = 0$		
	vir x–afsnit, stel y = 0		
	$0 = \frac{7}{4}x + \frac{5}{4}$	✓ M	A
	$\therefore \frac{7}{4}x = -\frac{5}{4}$		
	$x = -\frac{5}{7}$	✓ $x = -\frac{5}{7}$	CA
	$D\left(-\frac{5}{7}; 0\right)$		
	OR/*OF*	**OR/*OF***	
	$m_{AB} = \frac{y_B - y_A}{x_B - x_A}$		
	$m_{AB} = \frac{-4-3}{-3-1}$		
	$m_{AB} = \frac{7}{4}$	✓ $m_{AB} = \frac{7}{4}$	A
	$\frac{7}{4} = \frac{3-0}{1-x}$	✓ $\frac{7}{4} = \frac{3-0}{1-x}$	A
	$7 - 7x = 12$	✓ S	CA
	$-7x = 5$		
	$x = -\frac{5}{7}$	✓ $x = -\frac{5}{7}$	CA
	$D\left(-\frac{5}{7}; 0\right)$		(4)

1.4	$m_{BC} = -2$ $\therefore tan\theta = -2$ $Ref.\angle = 63{,}43°$ $\theta = 180° - 63{,}43°$ $= 116{,}57°$	✓ SF ✓ 116,57°	A CA (2)
1.5	$y = -2x + 5\ldots.$ ① $x^2 + y^2 = r^2$ $x^2 + y^2 = (\sqrt{5})^2$ $x^2 + y^2 = 5\ldots$ ② Subst. ① in ② or/*of Verv. ① in ②* $x^2 + (-2x + 5)^2 = 5$ $x^2 + 4x^2 - 20x + 25 = 5$ $5x^2 - 20x + 20 = 0$ $x^2 - 4x + 4 = 0$ $(x - 2)(x - 2) = 0$ $x = 2$ **OR/*OF***	✓ $x^2 + y^2 = 5$ ✓ SF ✓ S ✓ $x = 2$ **OR/*OF***	A CA CA CA

	$S(x;-2x+5)$	✓ $(x;-2x+5)$	A
	$x^2+y^2=(OS)^2$		
	$x^2+(-2x+5)^2=(\sqrt{5})^2$	✓ SF	A
	$x^2+4x^2-20x+25=5$		
	$5x^2-20x+20=0$		
	$x^2-4x+4=0$	✓ S	CA
	$(x-2\,(x-2)=0$		
	$x=2$	✓ $x=2$	CA
	OR/*OF*	**OR/OF**	
	$\sqrt{5}=\sqrt{(x-0)^2+(y-0)^2}$	✓ M	A
	$5=x^2+y^2$		
	$5=x^2+(-2x+5)^2$	✓ SF	CA
	$5=x^2+4x^2-20x+25$		
	$0=5x^2-20x+20$	✓ S	CA
	$x=\dfrac{-(-20)\pm\sqrt{(-20)^2-4(5)(20)}}{2(5)}$		
	$x=\dfrac{20\pm\sqrt{0}}{10}$		
	$x=2$	✓ $x=2$	CA (4)
			[15]

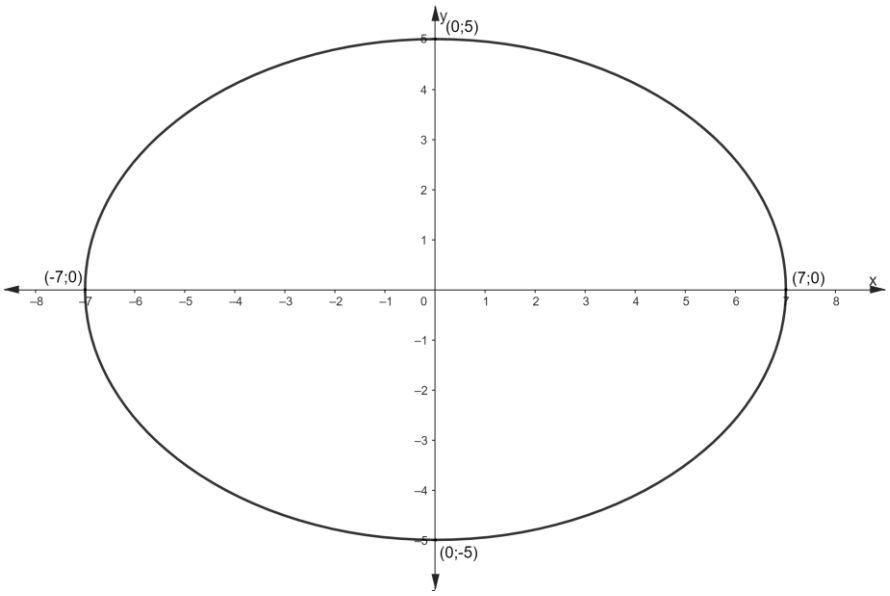
QUESTION/*VRAAG* 2

2.1

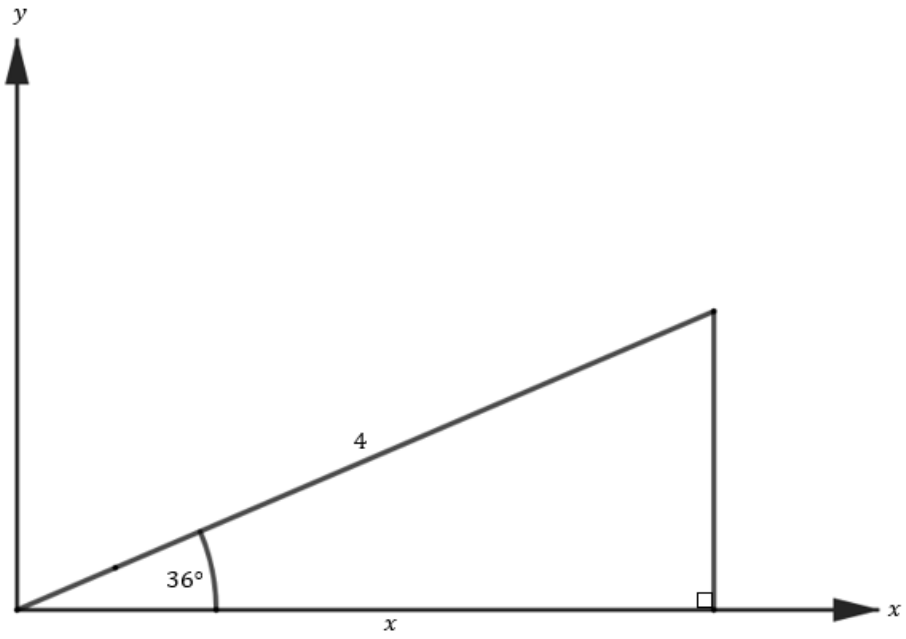


2.1.1	$r^2 = x^2 + y^2$ $r^2 = (-3)^2 + (-4)^2$ $r^2 = 25$ $x^2 + y^2 = 25$	✓ SF ✓ $x^2 + y^2 = 25$	A CA (2)

	2.1.2	$m_{OP} = \frac{y_P - y_O}{x_P - x_O}$ $= \frac{-4-0}{-3-0}$ $= \frac{4}{3}$	✓ $\frac{4}{3}$ CA
		$\therefore m_{\text{tangent/raaklyn}} = -\frac{3}{4}$	✓ $m_{\text{tang/raak}} = -\frac{3}{4}$ CA
		$y-(-4) = -\frac{3}{4}(x-(-3))$	✓ SF $(-3;-4)$ CA
		$y = -\frac{3}{4}x - \frac{9}{4} - 4$ $4y = -3x - 25$ $3x + 4y = -25$	
		OR/*OF*	**OR/*OF***
		$x.x_1 + y.y_1 = r^2$	✓ F A
		$x(-3) + y(-4) = 25$	✓ SF A
		$-4y = 3x + 25$	✓ SF 25 CA
		$3x + 4y = -25$	(3)
	2.1.3	$3x + 4y = -25\ldots$ ① $4x - 3y = 25\ldots$ ②	
		①× 3 $9x + 12y = -75\ldots$ ③	✓ $9x + 12y = -75$ A
		②× 4 $16x - 12y = 100\ldots$ ④	✓ $16x - 12y = 100$ A
		③+④ $25x = 25$	✓ $25x = 25$ CA
		$x = 1$	✓ $x = 1$ CA
		$y = -7$	✓ $y = -7$ CA
		$\therefore R(1;-7)$	
		OR/*OF*	**OR/*OF***
		$y = -\frac{3}{4}x - \frac{25}{4}$ $4x - 3y = 25$	
		$4x - 3\left(-\frac{3}{4}x - \frac{25}{4}\right) = 25$	✓ SF A
		$4x + \frac{9}{4}x + \frac{75}{4} = 25$	✓ S CA
		$\frac{25}{4}x = \frac{25}{4}$	✓ $\frac{25}{4}x = \frac{25}{4}$ CA
		$x = 1$	✓ $x = 1$ CA
		$y = -7$	✓ $y = -7$ CA
		$\therefore R(1;-7)$	(5)

2.2	$\frac{x^2}{7^2}+\frac{y^2}{5^2}=1$ $x=\pm\sqrt{49}=\pm 7$ $y=\pm\sqrt{25}=\pm 5$  	✓ Both/*Beide x* ✓ Both/*Beide y* ✓ Shape/*Vorm*	A A CA (3)
			[13]

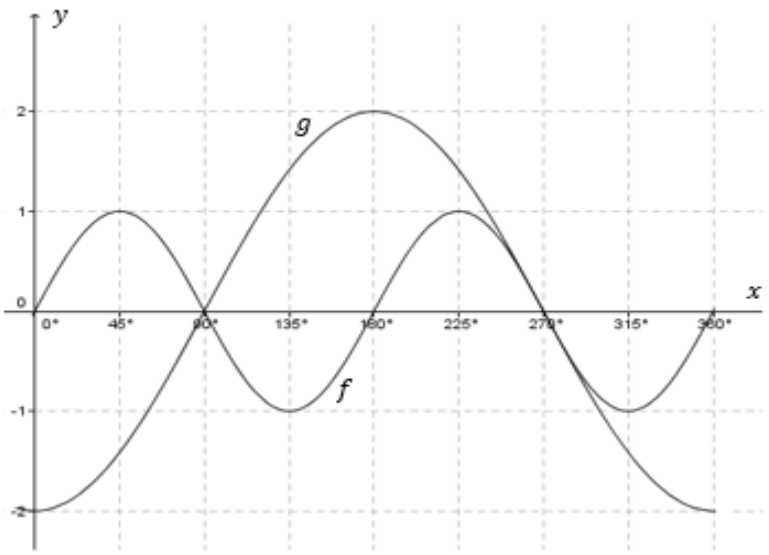
QUESTION/*VRAAG* 3				
3.1	3.1.1	$\cos(A + C)$ $= \cos(40° + 50°)$ $= \cos(90°)$ $= 0$	✓ 0 **AO: Full marks** ***AO: Volpunte***	A (1)
	3.1.2	$\frac{\cos(90° + 2A - C)}{\sin(180° - 3C)}$ $= \frac{\cos(90° + 80° - 50°)}{\sin(180° - 150°)}$ $= \frac{\cos 120°}{\sin 30°}$ $= \frac{\cos(180° - 60°)}{sin30°}$ $= \frac{-\cos 60°}{\sin 30°}$ $= \frac{-\frac{1}{2}}{\frac{1}{2}}$ $= -1$	✓ SF ✓ S – cos60° ✓ S sin 30° ✓ –1 **AO: $\frac{1}{4}$**	A CA CA CA (4)

3.2			
	3.2.1	$\cos 36° = \frac{x}{4}$ $x = 4cos36°$ $x = 3{,}24$	✓ $4cos36°$ A ✓ 3,24 CA (2)
	3.2.2	$sin36° = \frac{y}{4}$ $y = 4sin36°$ $y = 2{,}35$ **OR/*OF*** $x^2 + y^2 = r^2$ $(4{,}24)^2 + y^2 = (4)^2$ $y^2 = 5{,}5024$ $y = 2{,}35$	✓ $sin36° = \frac{y}{4}$ A ✓ 2,35 CA **OR/*OF*** ✓ SF A ✓ 2,35 CA (2)

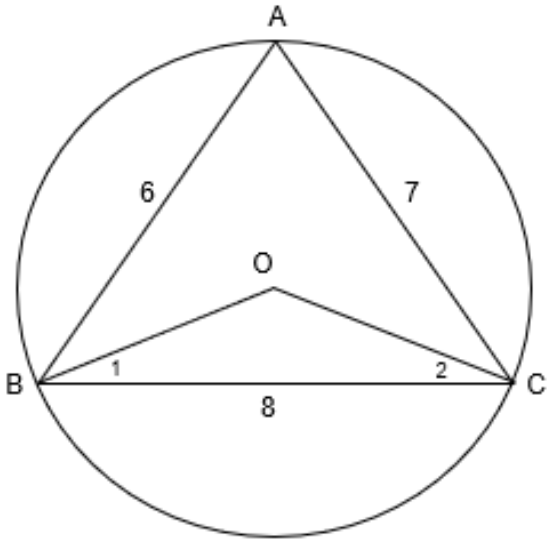
3.3	$sin\left(\frac{\pi}{3}\right)$ $= sin\left(\frac{\pi}{3} \times \frac{180^0}{\pi}\right)$ $= sin60^0$ $= \frac{\sqrt{3}}{2}$	✓ $\frac{\pi}{3} \times \frac{180^0}{\pi}$ ✓ $\frac{\sqrt{3}}{2}$ **P: if/*as* 0,87** $\frac{1}{2}$	A A (2)
			[11]

QUESTION/*VRAAG* 4			
4.1	$sin^2\beta$	✓ $sin^2\beta$	A
4.2	$\frac{\tan(180^0 - \beta).\sin(180^0 + \beta)}{sec\beta} + cos^2(360^0 - \beta)$ $= \frac{-tan\beta.(-\sin\beta)}{\frac{1}{\cos\beta}} + \cos^2\beta$ $= \left(-\frac{\sin\beta}{\cos\beta}\right)(\cos\beta)(-\sin\beta) + \cos^2\beta$ $= \sin^2\beta + \cos^2\beta$ $= 1$	✓ $-tan\beta$ ✓ $-sin\beta$ ✓ $\frac{1}{cos\beta}$ ✓ $\frac{sin\beta}{cos\beta}$ ✓ $\cos^2\beta$ ✓ $sin^2\beta + cos^2\beta$ ✓ 1	A A A A A CA CA (7)

4.3	LHS/LK $= cos\theta(1 + tan^2\theta)$		
	LHS/LK$= cos\theta\left(1 + \frac{sin^2\theta}{cos^2\theta}\right)$	✓ I $\frac{sin^2\theta}{cos^2\theta}$	A
	LHS/LK$= cos\theta\left(\frac{cos^2\theta + sin^2\theta}{cos^2\theta}\right)$	✓ S	A
	LHS/LK$= cos\theta\left(\frac{1}{cos^2\theta}\right)$		
	LHS/LK$= \frac{1}{cos\theta}$		
	LHS/LK$= sec\theta$	✓ S	A
	OR/*OF*	**OR/*OF***	
	LHS/LK = $cos\theta(1 + tan^2\theta)$		
	LHS/LK $= cos\theta(sec^2\theta)$	✓ I $sec^2\theta$	A
	LHS/LK $= cos\theta\left(\frac{1}{cos^2\theta}\right)$	✓ I $\frac{1}{cos^2\theta}$	A
	LHS/LK $= \frac{1}{cos\theta}$		
	LHS/LK $= sec\theta$	✓ S	A
			(3)
4.4	$2\tan(x + 10^0) = 3{,}464$		
	$\tan(x + 10^0) = 1,732$	✓ S	A
	Ref. ∠/Verw.∠ $= 60°$	✓ $60°$	A
	$x = 60^0 - 10^0$ or/*of* $x = 180^0 + 60^o - 10^0$	✓ 50^0	CA
	$x = 50^0$ $x = 230^o$	✓ 230^o	CA
	OR/*OF*	**OR/*OF***	
	$2\tan(x + 10^0) = 3{,}464$		
	$\tan(x + 10^0) = 1,732$	✓ S	A
	$x + 10° = 60°$	✓ $60°$	A
	$x = 50°$	✓ 50^0	CA
	or/*of*		
	$x + 10° = 180° + 60°$		
	$x = 230°$	✓ 230^o	CA
			(4)
			[15]

QUESTION/*VRAAG* 5			
5.1		f:✓ Shape/*Vorm* ✓ x-int./*afs.* ✓ TP/*DP* g:✓ Shape/*Vorm* ✓ TP/*DP* ✓ x-int./*afs.*	A A A A A A (6)
5.2	180°	✓ 180°	A (1)
5.3	$sin2x + 2cosx = 0$ $sin2x = -2cosx$ $\therefore x = 90^0$ or/*of* $x = 270^0$	✓ 90^0 ✓ 270^0	CA CA (2)
5.4	$-2 \leq y \leq 2$ **OR/*OF*** $y \in [-2; 2]$	✓ Endpoints/ *Eindpunte* ✓ Notation/*Notasie* **OR/OF** ✓ Endpoints/ *Eindpunte* ✓ Notation/*Notasie*	A A A A (2)
			[11]

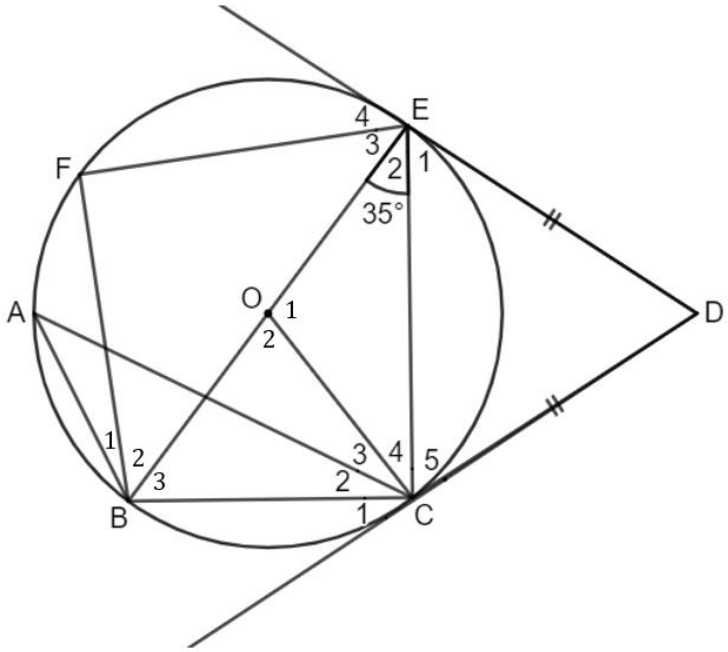
QUESTION/*VRAAG* 6



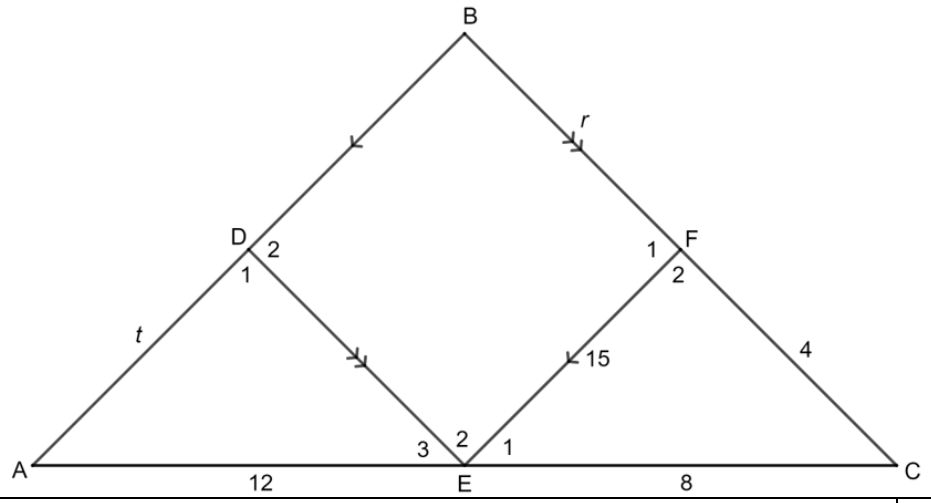
6.1	$cosA = \frac{AB^2+AC^2-BC^2}{2.AB.AC}$	✓ F	A
	$cosA = \frac{6^2+7^2-8^2}{2.6.7}$	✓ $cosA =$	A
	$cosA = \frac{1}{4}$	✓ SF	A
	$\hat{A} = 75,5^0$	✓ S	A
	OR/*OF*	**OR/*OF***	
	$BC^2 = AB^2 + AC^2 - 2AB.AC.\cos\hat{A}$	✓ F	A
	$8^2 = 6^2 + 7^2 - 2(6)(7)\cos\hat{A}$	✓ SF	A
	$-21 = -84\cos\hat{A}$	✓ S	A
	$\cos\hat{A} = \frac{1}{4}$	✓ $\cos\hat{A} = \frac{1}{4}$	A
	$\hat{A} = 75,5^0$		(4)
6.2	$B\hat{O}C = 2B\hat{A}C$ ∠ at cent. = 2 x ∠ at circ. *mdpt. ∠ = 2 x omtr.∠*	✓ RE	A
	$B\hat{O}C = 2(75,5^0)$		
	$B\hat{O}C = 151^0$	✓ 151^0	CA (2)

6.3	$O\widehat{B}C = \frac{180^0 - 151^0}{2}$		
	$O\widehat{B}C = 14,5^0$	✓ $14,5^0$	CA
	$\frac{OC}{\sin 14,5^0} = \frac{BC}{\sin 151^0}$	✓ SF	CA
	$OC = \frac{\sin 14,5^0 \times 8}{\sin 151^0}$		
	$OC = 4,13$	✓ 4,13	CA
	$\therefore\ d = 2 \times OC = 2(4,13) = 8,26$ units/*eenhede*	✓ 8,26	CA
	OR/*OF*	**OR/*OF***	
	$BC^2 = OB^2 + OC^2 - 2OB.OC.\cos B\widehat{O}C$	✓ F	A
	$8^2 = OB^2 + OB^2 - 2.OB.OB.\cos 151°$	✓ SF	CA
	$64 = 2.OB^2 + 1,75.OB^2$		
	$3,75.OB^2 = 64$		
	OB = 4,13	✓ 4,13	CA
	∴ d = 2(4,13) = 8,26 units/*eenhede*	✓ 8,26	CA
		NPR/NPU	(4)

6.4	Area of/*Opp van* $\Delta BOC = \frac{1}{2} \times OB \times OC \times sin B\hat{O}C$		
	Area of/*Opp van* $\Delta BOC = \frac{1}{2} \times 4{,}13 \times 4{,}13 \times sin 151^0$	✓ SF	CA
	Area of/*Opp van* $\Delta BOC = 4{,}1$ unit^2/*eenheid*^{2}	✓ 4,1	CA
	OR/*OF*	**OR/*OF***	
	P/*Omtrek* $_{\Delta OBC} = OB + OC + BC$		
	P/*Omtrek* $_{\Delta OBC} = 16{,}26$		
	Semi – Perimeter/*Omtrek* $= \frac{P}{2} = \frac{16{,}26}{2} = 8{,}13$		
	A/*Opp* $_{\Delta OBC} = \sqrt{\frac{P}{2}\left(\frac{P}{2} - OB\right)\left(\frac{P}{2} - OC\right)\left(\frac{P}{2} - BC\right)}$		
	A/*Opp* $_{\Delta OBC} = \sqrt{8{,}13(4)(4)(0{,}13)}$	✓ SF	CA
	A/*Opp* $_{\Delta OBC}$ = 4,1 units^2/*eenhede*^{2}	✓ 4,1	CA
		NPR/NPU	(2)
			[12]

QUESTION/*VRAAG* 7				
7.1	the angle that the chord subtends in the alternate segment. *die hoek in die teenoorstaande sirkel segment.*		✓ RE	A (1)
7.2				
	7.2.1	$\angle^s$ opp. = sides/ $\angle^e$ *teenoor = sye*		✓ RE A (1)
	7.2.2	①$\hat{C}_1 = \hat{E}_2 = 35°$	∠ tan chord ∠ *raaklyn koord*	✓ ST/*RE* A
		②$\hat{A} = \hat{C}_1 = 35°$	∠ tan chord ∠ *raaklyn koord*	✓ ST A
		③$\hat{C}_4 = \hat{E}_2 = 35°$	$\angle^s$ opp = sides $\angle^e$ teenoor = sye	✓ ST A
			OR/*OF*	**OR/*OF***
		①$\hat{C}_1 = \hat{E}_2 = 35°$	∠ tan chord ∠ *raaklyn koord*	✓ ST/*RE* A
		②$\hat{A} = \hat{E}_2 = 35°$	$\angle^s$ in same segment $\angle^e$ *in dies. segment*	✓ ST/*RE* A
		③$\hat{C}_4 = \hat{E}_2 = 35°$	$\angle^s$ opp equal sides $\angle^e$ *teenoor = sye*	✓ ST A (3)

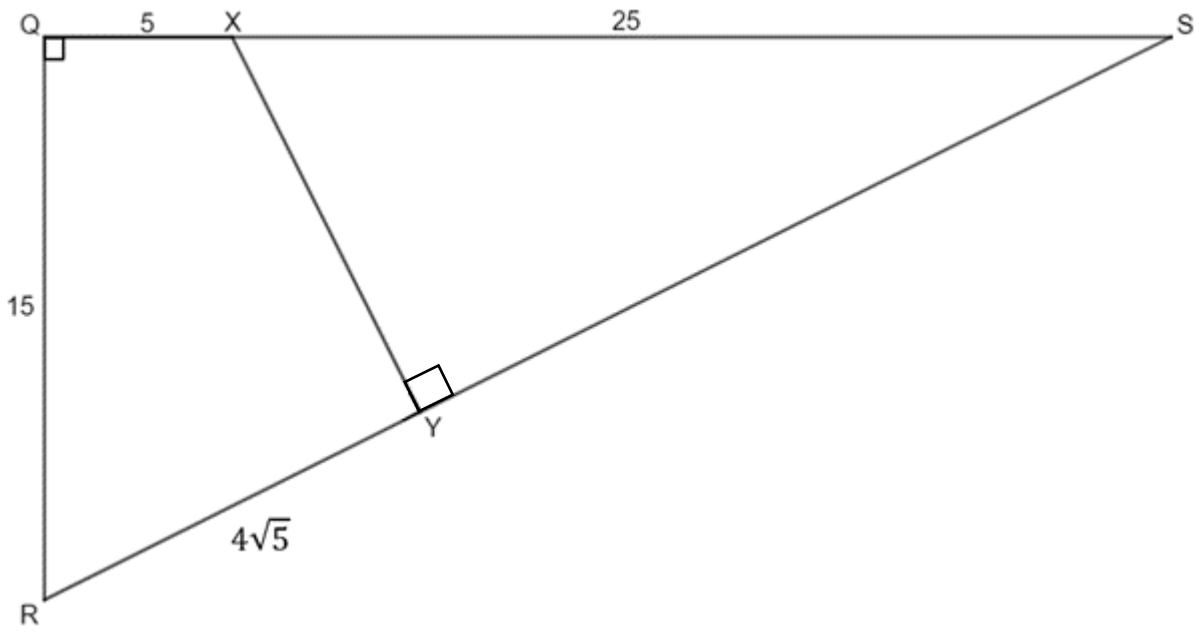
	7.2.3	$E\hat{C}B = 90°$	∠ in semi-circle ∠ in halwe sirkel	✓ ST/RE	A
		$\hat{B}_3 = 180° - 90° - 35°$ $\hat{B}_3 = 55°$	Int. ∠Δ/ *binne* $\angle^e\Delta$	✓ ST	CA
		$\hat{C}_5 = \hat{B}_3 = 55°$	∠ tan chord/∠ *raaklyn koord*	✓ ST	CA (3)
	7.2.4	$E\hat{O}C = 2 \times C\hat{B}O$	∠ at cent. = 2 x ∠ at circ.	✓ ST	A
			mdpt.∠ = 2x Omtr. ∠	✓ RE	A (2)
					[10]

QUESTION/*VRAAG* 8					
8.1	corresponding/*ooreenstemmende*			✓ ST	A (1)
8.2					
	8.2.1	$\frac{BF}{CF} = \frac{AE}{CE}$ $\frac{r}{4} = \frac{12}{8}$ $r = 6$	prop theorem/*eweredigheid*; EF ∥ AB	✓ ST ✓ RE ✓ 6	A A CA (3)
	8.2.2	Parallelogram.	Both pairs of opposite sides are parallel *Twee pare teenoorst. sye ewewydig*	✓ ST ✓ RE	A A (2)

	8.2.3	$\frac{AD}{DB} = \frac{AE}{EC}$	prop theorem/*eweredigheid*; DE ∥ BC	✓ RE	A
		$\frac{t}{15} = \frac{12}{8}$		✓ ST	A
		$t = \frac{45}{2}$			
		$t = 22{,}5$ or/*of* $\frac{45}{2}$ or/*of* $22\frac{1}{2}$		✓ 22,5	CA
				NPR	(3)
	8.2.4	$\frac{AD}{EF} = \frac{22{,}5}{15} = \frac{3}{2}$		✓ ST	CA
		$\frac{AE}{EC} = \frac{12}{8} = \frac{3}{2}$		✓ ST	CA
		$\frac{DE}{FC} = \frac{6}{4} = \frac{3}{2}$		✓ ST	CA
		$\therefore \frac{AD}{EF} = \frac{AE}{EC} = \frac{DE}{FC}$			
		$\therefore \Delta ADE \vert\vert\vert \Delta EFC$	sides in prop./*sye in verhouding*	✓ RE	CA
		OR / OF		**OR / OF**	
		$\hat{A} = \hat{E}_1$	Corr. $\angle's$ =; AB//EF Ooreenst. $\angle^e$ =; AB//EF	✓ ST/RE	CA
		$\hat{E}_3 = \hat{C}$	Corr. $\angle's$ =; DE//BC Ooreenst. $\angle^e$ =; DE//BC	✓ ST	CA
		$\hat{D}_1 = \hat{F}_2$	$3^{rd}\ \angle\ \Delta$ $3^{de}\ \angle\ \Delta$	✓ ST	CA
		$\therefore \Delta ADE \vert\vert\vert \Delta EFC$	$[\angle, \angle, \angle]$	✓ RE	CA
					(4)
					[13]

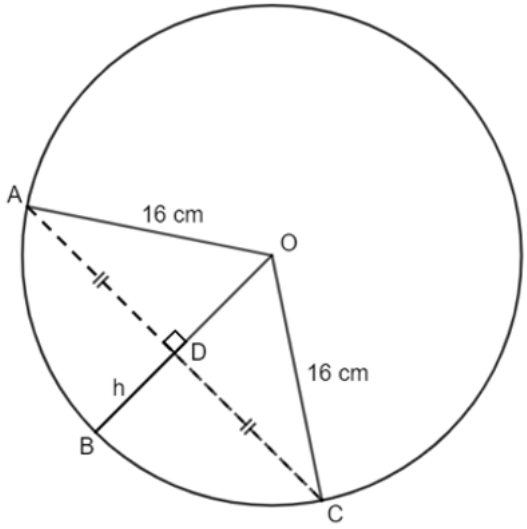
QUESTION/*VRAAG* 9

9.1



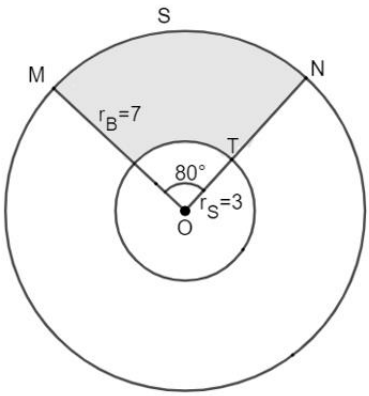
9.1.1	$\hat{S} = \hat{S}$	Common ∠/*Gemeensk.* ∠	✓ ST/RE	A
	$\hat{Q} = X\hat{Y}S$	Both/*Beide* 90° (Given / *Gegee*)	✓ ST/RE	A
	$\hat{R} = Y\hat{X}S$	$3^{rd}\ \angle\ \Delta / 3^{e}\ \angle\ \Delta$	✓ ST/RE	A
	$\Delta SYX \vert\vert\vert \Delta SQR$	$[\angle, \angle, \angle]$	✓ RE	A (4)
9.1.2	$\frac{SY}{SX} = \frac{SQ}{SR}$		✓ SR	A (1)
9.1.3	$\frac{SY}{SX} = \frac{SQ}{SR}$ $\frac{SY}{25} = \frac{30}{SY + 4\sqrt{5}}$ $SY(SY + 4\sqrt{5}) = 750$		✓ SF	A
	$SY^2 + 4\sqrt{5}SY - 750 = 0$		✓ S	CA
	$SY = \frac{-4\sqrt{5} \pm \sqrt{(4\sqrt{5})^2 - 4(1)(-750)}}{2(1)}$		✓ SF	CA
	$SY = 23{,}28$ or/of $SY = -32{,}22$	N. A./$N.v.T.$	✓ 23,28 **NPR/NPU**	CA (4)

9.2	9.2.1	$\frac{Area\ \Delta SYX}{Area\ \Delta SQR} = \frac{\frac{1}{2}\times(YS)(XY)}{\frac{1}{2}\times(QS)(QR)}$	✓ SF	CA
		$\frac{Area\ \Delta SYX}{Area\ \Delta SQR} = \frac{\frac{1}{2}\times(23{,}28)(5\sqrt{5})}{\frac{1}{2}(30)(15)}$	✓ SF	A
		$\frac{Area\ \Delta SYX}{Area\ \Delta SQR} = 0{,}60$ units^2/*eenhede*^{2}	✓ 0,60 **NPR/NPU**	CA (3)
	9.2.2	$A_{QRYS} = A_{\Delta SQR} - A_{\Delta SYX}$	✓ M	A
		$A_{QRYS} = \frac{1}{2}(30)(15) - \frac{1}{2}(23{,}28)(5\sqrt{5})$ $A_{QRYS} = 225 - 130{,}39$ ...	✓ SF	CA
		$A_{QRYS} = 94{,}86$ units^2/*eenhede*^{2}	✓ 94,86 **NPR/NPU**	CA (3)
				[15]

QUESTION/*VRAAG* 10			
			
10.1	$n = \frac{11000}{60}$ $n = \frac{550}{3}$ rev/s $n = 183{,}33$ rev/s	✓ 183,33 **NPR/NPU**	A (1)
10.2	$v = \pi Dn$ $v = \pi(0{,}32)\left(\frac{11000}{60}\right)$ $v = 58{,}6667\pi$ m/s $v = 184{,}30$ m/s	✓ F ✓ SF ✓ **NPR/NPU**	A A CA (3)
10.3	$\omega = 2\pi n$ $\omega = 2\pi\left(\frac{11000}{60}\right)$ $\omega = 366{,}67\pi$ rad/s $\omega = 1151{,}90$ rad/s	✓ F ✓ SF ✓ 1151,90 **NPR/NPU**	A CA CA (3)

10.4	In ΔODC:		
	$\frac{\text{OD}}{16} = sin30°$ **OR/OF** $\frac{\text{OD}}{16} = \text{cos}60°$	✓ $\frac{\text{OD}}{16}$	A
	$\text{OD} = 16\text{sin}30°$ **OR/OF** $\text{OD} = 16\text{cos}60°$	✓ $sin30°$ **OR/OF** $\text{cos}60°$	A
	$\text{OD} = 8$ cm		
	$h = 16 - \text{OD} = 16 - 8$		
	$h = 8\ cm$	✓ 8	CA (3)
10.5	$4h^2 - 4dh + x^2 = 0$	✓ F	A
	$4(8)^2 - 4(2 \times 16)(8) + x^2 = 0$	✓ SF	A
	$256 - 1024 + x^2 = 0$		
	$x^2 = 768$		
	$x = 16\sqrt{3}$		
	$x = 27{,}71$ cm	✓ 27,71	CA
	OR/*OF*	**OR/*OF***	
	$\text{AC}^2 = \text{OA}^2 + \text{OC}^2 - 2.\text{OA}.\text{OC}.\text{cos}120°$	✓ F	A
	$\text{AC}^2 = 16^2 + 16^2 - 2(16)(16).\text{cos}120°$	✓ SF	A
	$\text{AC} = 16\sqrt{3} = 27{,}71$ cm	✓ 27,71	CA
		NPR/NPU	(3)
			[13]

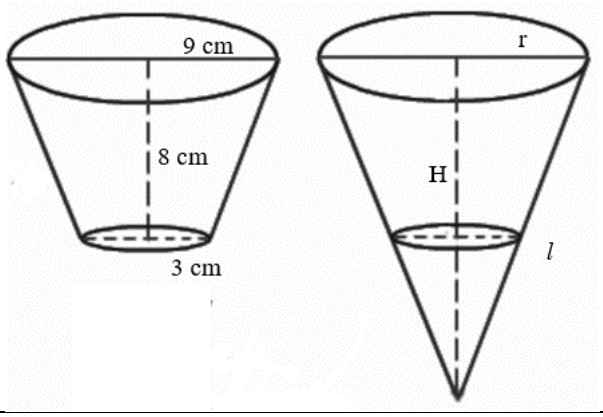
QUESTION/*VRAAG* 11



11.1	$80° \times \frac{\pi}{180°}$ $= \frac{4}{9}\pi$ $= 1{,}4\ radians$	✓ 1,4 **NPR/NPU**	A (1)
11.2	$s = r\theta$ $s = (7)\left(\frac{4}{9}\pi\right)$ $s = 9{,}77$ cm	✓ F ✓ SF ✓ 9,77 **NPR/NPU**	A CA CA (3)
11.3	$A_{Bigger\ Sector} = \frac{sr}{2}$ $A_{Bigger\ Sector} = \frac{(9{,}77)(7)}{2}$ $A_{Bigger\ Sector} = 34{,}20\ \text{cm}^2$ $A_{Smaller\ Sector} = \frac{r^2\theta}{2}$ $A_{Smaller\ Sector} = \frac{(3)^2\left(\frac{4}{9}\pi\right)}{2}$ $A_{Smaller\ Sector} = 6{,}26\ \text{cm}^2$ $A_T = 34{,}20 - 6{,}28$ $A_T = 27{,}92\ \text{cm}^2$	✓ 34,20 ✓ 6,26 ✓ M ✓ 27,92 **NPR/NPU**	CA CA A CA (4)
			[8]

QUESTION/*VRAAG* 12

12.1



12.1.1	$15^2 = 9^2 + (8 + y)^2$ $144 = (8 + y)^2$ $12 = 8 + y$ $y = 4\ cm$	✓ M A ✓ S CA ✓ 4 CA (3)
12.1.2	$V = V_{\text{cone/}keël} - V_{\text{cut-off/}afsny}$ $V = \frac{1}{3}\pi r^2 H - \frac{1}{3}\pi r^2 y$ $V = \frac{1}{3}(3{,}14)(9)^2(4 + 8) - \frac{1}{3}(3{,}14)(3)^2(4)$ $V = 1017{,}36 - 37{,}64$ $V = 979{,}72\ cm^3$	✓ M A ✓ SF A ✓ 979,72 CA **PR** (3)

	12.1.3	TSA = $SA_{cone/keël} - SA_{cut\text{-}off/afsny} + SA_{BASE/BASIS}$		
		$SA_{cone/keël} = (3{,}14)(9)(15)$		
		$SA_{cone/keël} = 423{,}9 \ldots cm^2$	✓ 423,9	CA
		$l_{cut\text{-}off/afsny} = \sqrt{4^2 + 3^2} = 5cm$	✓ 5	A
		$SA_{cut\text{-}off/afsny} = (3{,}14)(3)(5)$		
		$SA_{cut\text{-}off/afsny} = 47{,}1 \ldots cm^2$	✓ 47,1	CA
		$SA_{BASE/BASIS} = (3{,}14)(3)^2 = 28{,}26..cm^2$	✓ 28,26	CA
		$TSA = 423{,}9 - 47{,}1 + 28{,}26$		
		$TSA = 405{,}06\ cm^2$		
		Number of tins/*Aantal blikkies* $= \frac{405{,}06}{90}$		
		Number of tins/*Aantal blikkies* $= 4{,}5 \ldots = 5$ tins/*blikkies*	✓ 5	CA
				(5)
12.2	$A_T = a\left(\frac{O_1 + O_n}{2} + O_2 + O_3 + \ldots + O_{n-1}\right)$		✓ F	A
	$A_T = 5\left(\frac{7{,}4 + 8{,}1}{2} + 6{,}9 + 5{,}6 + 7{,}8 + 6{,}7 + 7{,}4\right)$		✓ SF	A
	$A_T = 5(42{,}15)$			
	$A_T = 210{,}75\ m^2$		✓ 210,75	CA
				(3)
				[14]

TOTAL/*TOTAAL:* **150**