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PREPARATORY EXAMINATION/ VOORBEREIDENDE EKSAMEN

2022

11092

**TECHNICAL MATHEMATICS P2/
TEGNIESE WISKUNDE V2**

MARKING GUIDELINES/NASIENRIGLYNE

19 pages/bladsye

Marking Codes/Nasien kodes	
A	Accuracy/Akkuraatheid
CA	Consistent Accuracy/Konstante akkuraatheid
M	Method/Metode
R	Rounding/Afronding
NPR	No penalty for rounding/Geen penalisering vir afronding
NPU	No penalty for units omitted/Geen penalisering indien eenhede uitgelos word
S	Simplification/Vereenvoudiging
SF	Substitution in correct formula/Substitusie in die regte formule
ST	Statement/Stelling
RE	Reason/Rede
ST/RE	Statement and Reason/Stelling en Rede
AO	Answer Only/Slegs Antwoord

NOTES/AANTEKENINGE

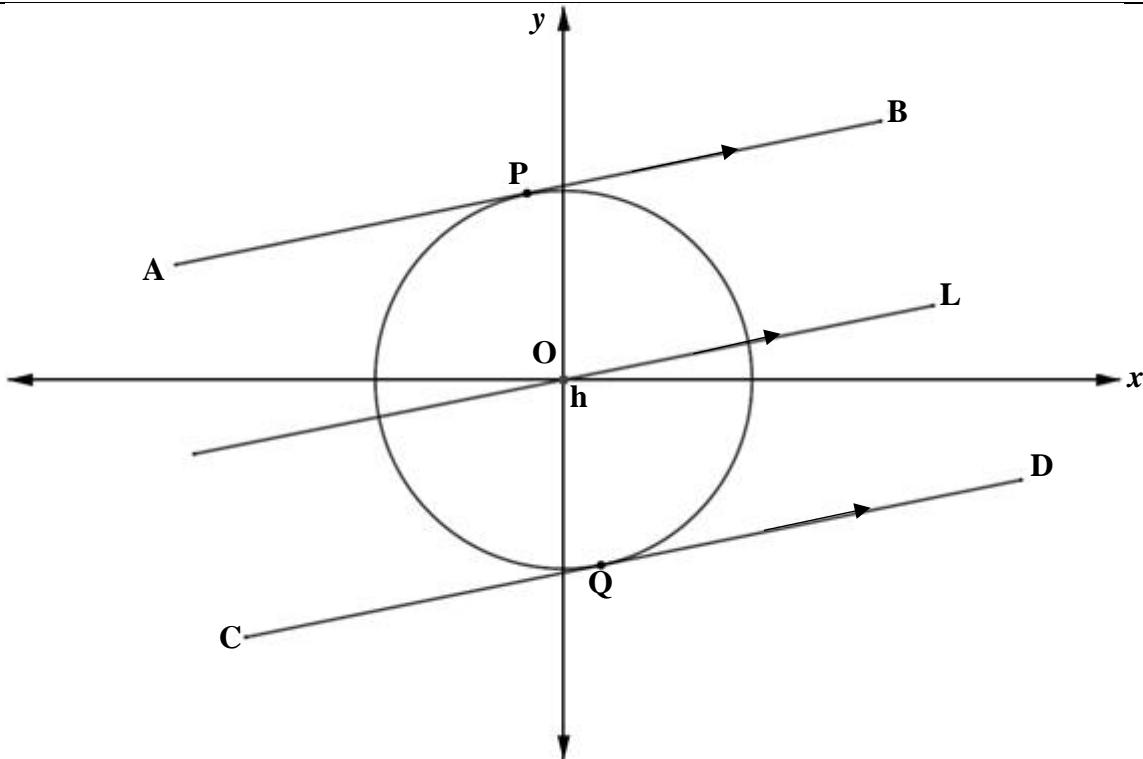
- If a candidate answers a question TWICE, only mark the FIRST attempt./Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die eerste poging.
- If a candidate has crossed out an attempt of a question and did not redo it, mark the crossed-out version./Indien 'n kandidaat 'n antwoord doodgetrek het, maar dit nie oorgedoen het nie, merk die doodgetrekte weergawe.
- Consistent Accuracy applies in all aspects of the marking guidelines./Volgehoue akkuraatheid is in al die nasienriglyne van toepassing.

QUESTION/VRAAG 1			
1.1	$\begin{aligned} AC &= \sqrt{(x_C - x_A)^2 + (y_C - y_A)^2} \\ &= \sqrt{(0 - (-7))^2 - (3 - 4)^2} \\ AC &= \sqrt{49 + 1} \\ AC &= \sqrt{50} \\ AC &= 5\sqrt{2} \text{ units/eenhede} \end{aligned}$	✓ SF ✓ $AC = 5\sqrt{2}$ or/of $\sqrt{50}$ AO – Full marks/Volpunte	A CA (2)
1.2	$K(0; 6)$	✓ $(0; 6)$ ACCEPT/AANVAAR: $x = 0$ and/en $y = 6$	A (1)
1.3	$\begin{aligned} M\left(\frac{-7+0}{2}; \frac{4+3}{2}\right) \\ M\left(-\frac{7}{2}; \frac{7}{2}\right) \\ M(-3,5; 3,5) \end{aligned}$	✓ $x = -\frac{7}{2} = -3,5 = -3\frac{1}{2}$ ✓ $y = \frac{7}{2} = 3,5 = 3\frac{1}{2}$	A A (2)

1.6	$m_{BCG} = -\frac{1}{2}$ $\frac{1}{2} = \tan\beta$ $\beta = 26,6^\circ$ (Interior angle/Binnehoek) $C\hat{B}K = \beta = 26,6^\circ$ Alt. $\angle^s =$; ($BK \parallel x$ -axis $Verw. \angle^e =$; ($BK \parallel x$ -as))	$\checkmark m_{BCG} = -\frac{1}{2}$ $\checkmark SF$ $\checkmark \beta = 26,6^\circ$ $\checkmark C\hat{B}K = \beta = 26,6^\circ$ NPR	A A CA A (4)
			[14]

QUESTION/VRAAG 2

2.1

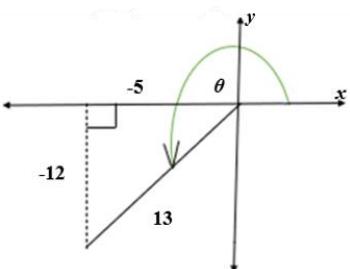


2.1.1

DO NOT MARK. / MOENIE MERK NIE.
MARKS REDISTRIBUTED IN QUESTION 2. / PUNTE IS HERVERDEEL IN VRAAG 2.

2.1.2	$x - 5y = 0$ $y = \frac{1}{5}x$ $m_{OP} = -5$ $y - 0 = -5(x - 0)$ $y = -5x$ $x^2 + y^2 = 26$ $x^2 + (-5x)^2 = 26$ $x^2 + 25x^2 = 26$ $26x^2 = 26$ $x^2 = 1$ $x = \pm 1$ $\therefore x = -1$ $y = -5(-1)$ $y = 5$ $\therefore P(-1; 5)$	$\checkmark y = \frac{1}{5}x$ $\checkmark m_{OP} = -5$ $\checkmark SF$ $\checkmark y = -5x$ $\checkmark SF$ $\checkmark x = -1$ $\checkmark SF$ $\checkmark y = 5$ $\checkmark (-1; 5)$	A A CA CA CA CA CA CA CA CA (9)
2.1.3	Q(1; -5)	$\checkmark x = 1$ $\checkmark y = -5$	CA CA (2)
2.1.4	$y - y_1 = m(x - x_1)$ $y - (-5) = \frac{1}{5}(x - 1)$ $y + 5 = \frac{1}{5}x - \frac{1}{5}$ $y = \frac{1}{5}x - \frac{26}{5}$ OR/OF $x \cdot x_1 + y \cdot y_1 = r^2$ $x(1) + y(-5) = 26$ $-5y = -x + 26$ $y = \frac{1}{5}x - \frac{26}{5}$	$\checkmark F$ $\checkmark SF$ $\checkmark y = \frac{1}{5}x - \frac{26}{5}$ OR/OF $\checkmark F$ $\checkmark SF$ $\checkmark \text{Equation/Vergelyking}$	A CA CA A CA CA (3)
2.2	DO NOT MARK. / MOENIE MERK NIE. MARKS REDISTRIBUTED IN QUESTION 2. / PUNTE IS HERVERDEEL IN VRAAG 2.		
			[14]

QUESTION/VRAAG 3

3.1.1	$cosec\theta$ $= \frac{1}{\sin\left(\frac{\pi}{3} \times \frac{180^\circ}{\pi}\right)}$ OR/OF $= \frac{1}{\sin \frac{\pi}{3}}$ $= \frac{1}{\sin 60^\circ}$ $= 1,15$ \checkmark SF & I \checkmark 1,15 AO – Full marks/Volpunte (2)	A CA (2)
3.1.2	$\cos(2\theta + \alpha)$ $= \cos\left[2\left(\frac{\pi}{3}\right) + \frac{\pi}{6}\right]$ $= \cos\left(\frac{5}{6}\pi \times \frac{180^\circ}{\pi}\right)$ $= \cos 150^\circ$ $= -0,87$ OR/OF $\cos(2\theta + \alpha)$ $= \cos\left[2\left(\frac{\pi}{3}\right) + \frac{\pi}{6}\right]$ $= \cos\left(\frac{5}{6}\pi\right)$ $= -0,87$ \checkmark SF \checkmark Conversion/ <i>Omskakeling</i> \checkmark 150° \checkmark -0,87 OR/OF $\checkmark \left(\frac{\pi}{3}\right)$ $\checkmark \frac{\pi}{6}$ $\checkmark \frac{5}{6}\pi$ $\checkmark -0,87$ AO – Full marks/Volpunte (4)	A A CA CA A A A CA CA (4)
3.2.1	$13\cos\theta = -5$  $\cos\theta = -\frac{5}{13}$ $x^2 + y^2 = r^2$ $(-5)^2 + y^2 = (13)^2$ $y^2 = 169 - 25$ $y = \pm 12$ $\therefore y = -12$ $\sin\theta = -\frac{12}{13}$ \checkmark Ratio/ <i>Verhouding</i> $-\frac{5}{13}$ \checkmark Method/ <i>Metode</i> $\checkmark y = -12$ OR/OF Diagram \checkmark Ratio/ <i>Verhouding</i> AO – Full marks/Volpunte (4)	A CA CA CA CA CA (4)

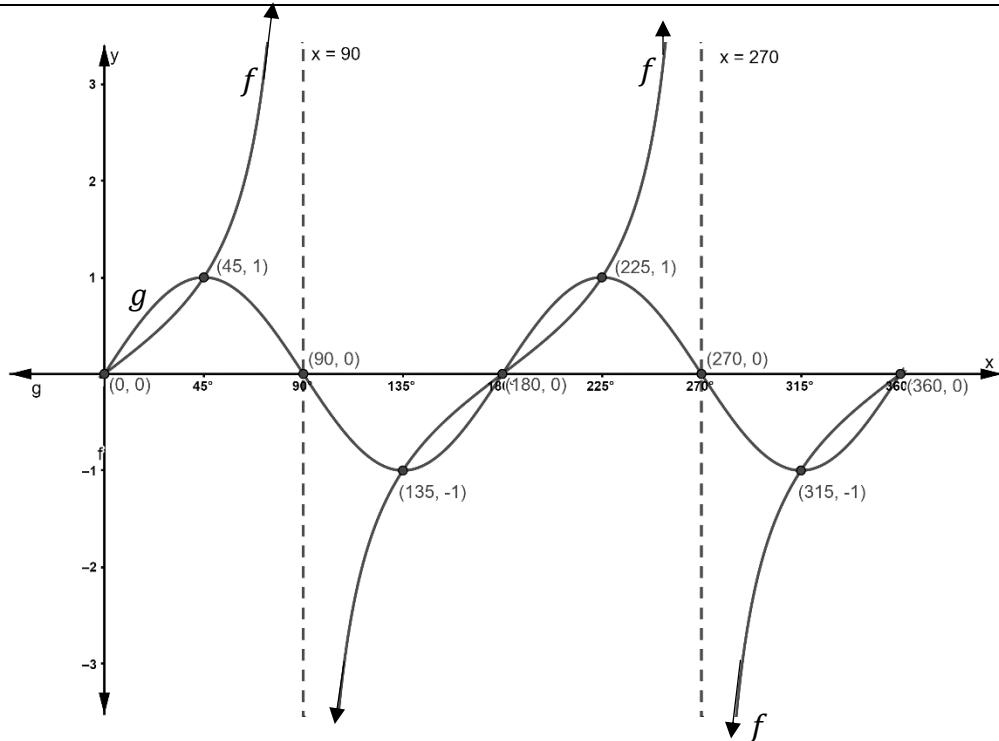
3.2.2	$\begin{aligned} & 2\tan\theta - 5\sec^2\theta \\ &= 2\left(\frac{-12}{-5}\right) - 5\left(\frac{13}{-5}\right)^2 \\ &= \frac{24}{5} - \frac{169}{5} \\ &= -29 \end{aligned}$	$\checkmark \text{ SF } \tan\theta = \frac{-12}{-5}$ $\checkmark \text{ SF } \sec\theta = \frac{13}{-5}$ $\checkmark -29$ AO 1 mark/punt	CA CA CA (3)
			[13]

QUESTION/VRAAG 4			
4.1	$\cot^2 x - \operatorname{cosec}^2 x = -1$	$\checkmark \text{ I } \operatorname{cosec}^2 x$	A (1)
4.2	$\begin{aligned} & \tan x \cdot \cot x - \frac{\sin x}{\operatorname{cosec} x} = \cos^2 x \\ & \text{LHS} = \tan x \cdot \frac{1}{\tan x} - \frac{\sin x}{\operatorname{cosec} x} \\ &= 1 - \frac{\sin x}{\frac{1}{\sin x}} \\ &= 1 - \sin x \times \frac{\sin x}{1} \\ &= 1 - \sin^2 x \\ &= \cos^2 x \\ & \text{OR/OF} \\ & \text{LHS} = \frac{\sin x}{\cos x} \cdot \frac{\cos x}{\sin x} - \frac{\sin x}{\frac{1}{\sin x}} \\ &= 1 - \sin x \times \frac{\sin x}{1} \\ &= 1 - \sin^2 x \\ &= \cos^2 x \\ & \text{LHS} = \text{RHS} \end{aligned}$	$\checkmark \text{ I } \frac{1}{\tan x}$ $\checkmark \text{ I } \frac{1}{\sin x}$ $\checkmark \text{ I } 1 - \sin^2 x$ OR/OF $\checkmark \text{ I } \frac{\sin x}{\cos x} \cdot \frac{\cos x}{\sin x}$ $\checkmark \text{ I } \frac{1}{\sin x}$ $\checkmark \text{ I } 1 - \sin^2 x$	A A CA A A CA (3)

4.3	$ \begin{aligned} & \frac{\cos(180^\circ - x) \cdot \tan(180^\circ + x) \cdot \sin 240^\circ}{\sin^2 x \cdot \tan 210^\circ} \\ &= \frac{\cos(180^\circ - x) \cdot \tan(180^\circ + x) \cdot \sin(180^\circ + 60^\circ)}{\sin^2 x \cdot \tan(180^\circ + 30^\circ)} \\ &= \frac{-\cos x \cdot \tan x \cdot (-\sin 60^\circ)}{\sin^2 x \cdot \tan 30^\circ} \\ &= \frac{\cos x \cdot \frac{\sin x}{\cos x} \cdot \frac{\sqrt{3}}{2}}{\sin^2 x \cdot \frac{\sqrt{3}}{3}} \\ &= \frac{3}{2 \sin x} \\ &= \frac{3}{2} \cosec x \end{aligned} $	$\checkmark -\cos x$ $\checkmark \tan x$ $\checkmark -\sin 60^\circ$ $\checkmark \tan 30^\circ$ $\checkmark I \frac{\sin x}{\cos x}$ $\checkmark \frac{\sqrt{3}}{2} \text{ and/or } \frac{\sqrt{3}}{3}$ $\checkmark \frac{3}{2 \sin x} \text{ OR/OF } \frac{3}{2} \cosec x$	A A A A A A CA (7)
4.4	$\sin 2\alpha = \frac{\sqrt{3}}{2}$ Ref. \angle /Verw. $\angle = 60^\circ$ $2\alpha = 60^\circ$ or/of $2\alpha = 180^\circ - 60^\circ$ $\alpha = 30^\circ$ or/of $2\alpha = 120^\circ$ $\alpha = 60^\circ$	$\checkmark \sin 2\alpha = \frac{\sqrt{3}}{2}$ $\checkmark \text{ref. angle}/\text{Verw. } \angle$ $\checkmark \alpha = 30^\circ$ $\checkmark \alpha = 60^\circ$	A CA CA CA (4)

QUESTION/VRAAG 5

5.1

**For/Vir $g(x)$:**

- ✓ Shape/Vorm
- ✓ x -intercepts/afsnitte
- ✓ Turning points/Draaipunte

A
A
A
(3)

5.2 1

✓ 1

A
(1)

5.3 180° ✓ 180°

A
(1)

5.4 $-2 \leq y \leq 0$ OR/OF $y \in [-2; 0]$

- ✓ Endpoints/Eindpunte
- ✓ Notation/Notasie

A
A
(2)

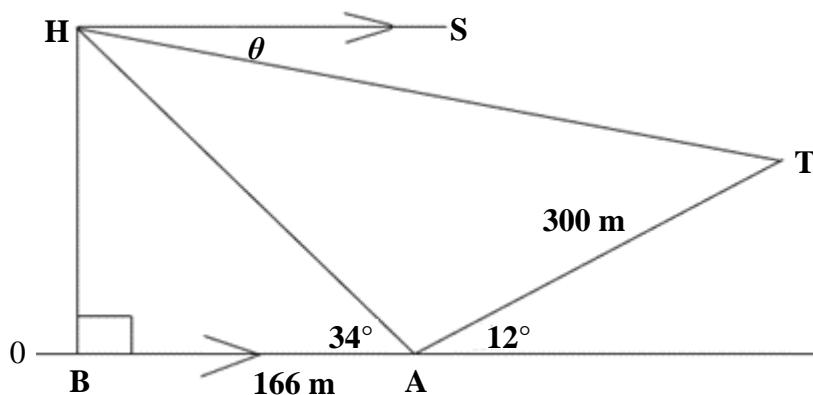
5.5 $90^\circ < x < 180^\circ$ OR/OF $x \in (90^\circ; 180^\circ)$

- ✓ Endpoints/Eindpunte
- ✓ Notation/Notasie

A
A
(2)

[9]

QUESTION/VRAAG 6



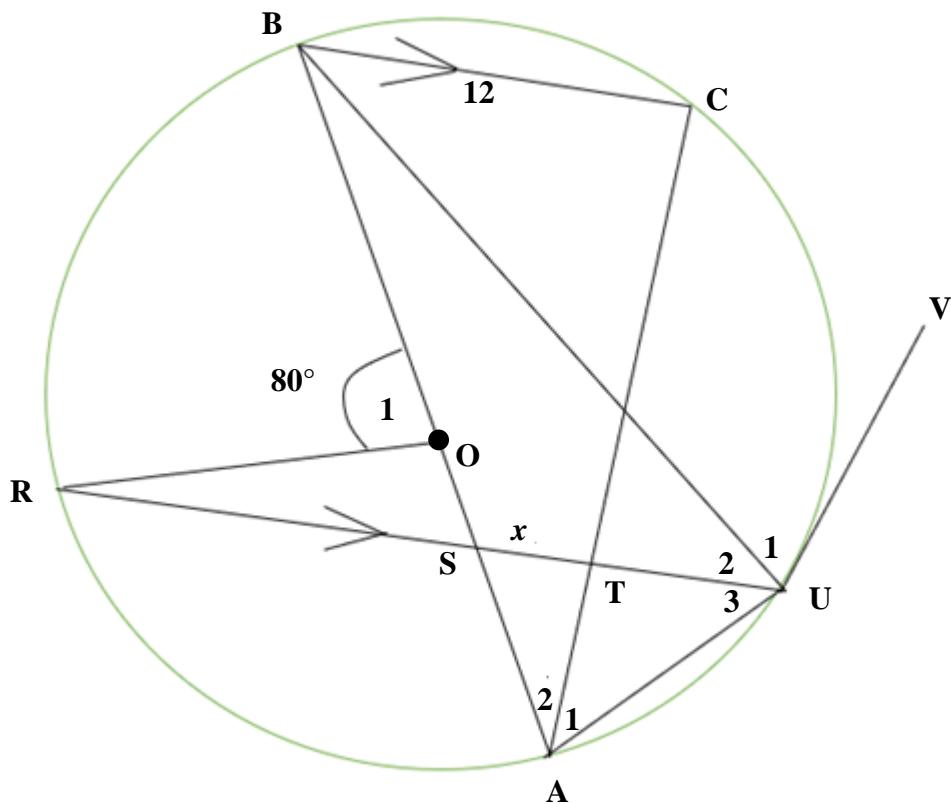
6.1	$\hat{HAT} = 180^\circ - 12^\circ - 34^\circ$ $\hat{HAT} = 134^\circ$	$\checkmark \hat{HAT} = 134^\circ$	A (1)
6.2	In ΔAHB : $\cos 34^\circ = \frac{166}{AH}$ $AH = \frac{166}{\cos 34^\circ} = 200,232$ $AH = 200 m$	$\checkmark \cos 34^\circ = \frac{166}{AH}$ $\checkmark AH = \frac{166}{\cos 34^\circ}$ AO 0 marks/punte	A A (2)
6.3	In ΔAHT : $HT^2 = AH^2 + AT^2 - 2AH \cdot AT \cdot \cos \hat{HAT}$ $HT^2 = 200^2 + 300^2 - 2(200)(300)\cos 134^\circ$ $HT^2 = 213359,0045$ $HT = 462 m$	$\checkmark F$ $\checkmark SF$ $\checkmark HT^2 = 213359,0045$ $\checkmark HT = 462 m$ PR	A A CA CA (4)
6.4	In ΔAHT : $\frac{\sin \hat{AHT}}{300 m} = \frac{\sin \hat{TAH}}{462 m}$ $\sin \hat{AHT} = \frac{300 \times \sin 134^\circ}{462}$ $\hat{AHT} = \sin^{-1} 0,467 \dots$ $\hat{AHT} = 27,8^\circ$	$\checkmark \frac{\sin \hat{AHT}}{300 m} = \frac{\sin \hat{TAH}}{462 m}$ $\checkmark \sin \hat{AHT} = \frac{300 \times \sin 134^\circ}{462}$ $\checkmark \hat{AHT} = 27,8^\circ$ NPR	A CA CA (3)
			[10]

QUESTION/VRAAG 7

7.1	is perpendicular to the chord (\perp to chord)/ <i>is loodreg op die koord (\perp op koord)</i>	<input checked="" type="checkbox"/> ST	A (1)
7.2			
7.2.1	$\hat{F}AE = \hat{B}_1 = 30^\circ$ tan chord/ <i>raaklyn koord</i> $\hat{F}AE = \hat{D}_1 = 30^\circ$ tan chord/ <i>raaklyn koord</i>	<input checked="" type="checkbox"/> ST <input checked="" type="checkbox"/> RE <input checked="" type="checkbox"/> ST/RE	A A A (3)
7.2.2 (a)	$\hat{D}_2 = \hat{E}_2 = 35^\circ$ \angle^s in the same segment/ \angle^e in dies. sirkel segment	<input checked="" type="checkbox"/> ST <input checked="" type="checkbox"/> RE	A A (2)
7.2.2 (b)	$\hat{A}BC = 90^\circ$ \angle in semicircle/ \angle in halwe sirkel OR/OF $\hat{A}BC = 90^\circ$ diameter subtends right angle/ <i>deursnee onderspan regtehoek</i>	<input checked="" type="checkbox"/> ST <input checked="" type="checkbox"/> RE <input checked="" type="checkbox"/> ST <input checked="" type="checkbox"/> RE	A A A A (2)

7.2.2 (c)	$B\hat{A}E + (\widehat{D}_1 + \widehat{D}_2) = 180^\circ$ opp. \angle^s cyclic quad. / $B\hat{A}E + 30^\circ + 35^\circ = 180^\circ$ $B\hat{A}E = 115^\circ$	✓ RE ✓ ST	A A (2)
7.2.2 (d)	$\widehat{E}_1 = \widehat{B}_1 + \widehat{B}_2$ $\widehat{E}_1 = 30^\circ + 35^\circ$ $\widehat{E}_1 = 65^\circ$	ext. \angle cyclic quad. / <i>buite</i> \angle kdvh. ✓ ST ✓ RE ✓ S	A A CA (3)
			[13]

QUESTION/VRAAG 8



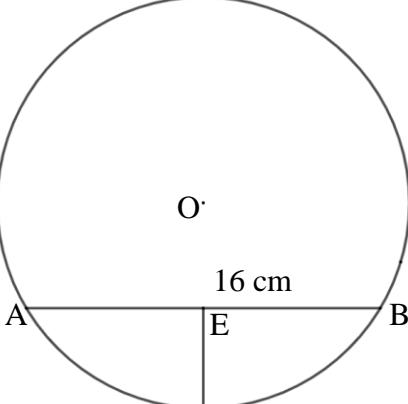
8.1	$A\hat{C}B = 90^\circ$ \angle in semicircle/ \angle in halwe sirkel $A\hat{U}B = 90^\circ$ diameter subtends right angle/ middellyn onderspan regte hoek OR/OF	✓ ST ✓ RE ✓ ST OR/OF	A A A
	$A\hat{C}B = 90^\circ$ \angle^s in semicircle/ \angle in halwe sirkel $A\hat{U}B = A\hat{C}B$ \angle^s in same segment/ \angle^e in dies. segment	✓ ST ✓ RE ✓ ST	A A A (3)

8.2.1	$\hat{O}_1 = 2 \hat{U}_2$	$\angle \text{ at centre} = 2 \times \angle \text{ at circ.}/$ $Mdpt.\angle = 2 \times Omtreks.\angle$	✓ RE	A
	$80^\circ = 2 \hat{U}_2$		✓ ST	A
	$\therefore \hat{U}_2 = 40^\circ$		✓ ST	A
	$\hat{U}_2 + \hat{U}_3 = 90^\circ$	$\angle \text{ in semicircle}/\angle \text{ in halwe sirkel}$	✓ RE	A
	$\hat{U}_3 = 90^\circ - 40^\circ$		✓ ST	CA
	$\hat{U}_3 = 50^\circ$		OR/OF	
	$R\hat{O}A = 180^\circ - 80^\circ$	Adj. \angle^s on str. line / Aangr. \angle^e op reguitlyn	✓ RE	A
	$R\hat{O}A = 100^\circ$		✓ ST	A
	$R\hat{O}A = 2 \times \hat{U}_3$	$\angle \text{ at centre} = 2 \times \angle \text{ at circ.}/$ $Mdpt.\angle = 2 \times Omtreks.\angle$	✓ RE	A
	$100^\circ = 2 \times \hat{U}_3$		✓ ST	A
	$\hat{U}_3 = 50^\circ$		✓ ST	CA (5)
8.2.2	$A\hat{B}U + A\hat{U}B + B\hat{A}U = 180^\circ$	Int. \angle^s Δ / Binne \angle^e Δ		
	$20^\circ + 90^\circ + B\hat{A}U = 180^\circ$			
	$B\hat{A}U = 70^\circ$		✓ ST	A
	$\hat{U}_1 = B\hat{A}U = 70^\circ$	tan chord/raaklyn koord	✓ ST ✓ RE	CA A (3)
8.2.3	$\Delta ABC \parallel\!/\!\Delta AST$	equiangular Δ /gelykhoekige Δ	✓ ST/RE	A
	$\frac{AB}{AS} = \frac{BC}{ST} = \frac{AC}{AT}$			
	$\frac{12}{x} = \frac{8}{2}$		✓ Ratio/Verhouding	A
	$24 = 8x$		✓ $24 = 8x$	CA
	$x = 3$		✓ $x = 3$	CA (4)
				[15]

QUESTION/VRAAG 9			
9.1	proportionally/eweredig	✓ ST	A (1)
9.2			
9.2.1	<p>In ΔABQ</p> $\frac{AR}{RB} = \frac{AS}{SQ}$ Proportionality/Eweredigheid; $SR \parallel BQ$ $\frac{AR}{12} = \frac{5x}{15x}$ $AR = 4$	✓ ST ✓ RE ✓ SF ✓ AR = 4 AO – Full marks/Volpunte	A A A CA (4)
9.2.2	<ul style="list-style-type: none"> • Trapezium/Trapesium • One pair of opposite sides are parallel/Een paar teenoorstaande sye is ewewydig. 	✓ ST ✓ RE	A A (2)
9.2.3	<p>In ΔPQC AND/EN ΔBSC:</p> $\frac{PC}{BC} = \frac{2}{12} = \frac{1}{6}$ $\frac{QC}{CS} = \frac{3}{18} = \frac{1}{6}$ $\frac{CS}{PQ} = \frac{18}{2} = \frac{9}{1}$ $\frac{PQ}{BS} = \frac{2}{12} = \frac{1}{6}$ $\therefore \frac{PC}{BC} = \frac{QC}{CS} = \frac{PQ}{BS} = \frac{1}{6}$ $\therefore \Delta PQC \parallel\!\!\! \Delta BSC$ Corr. sides in proportion/ Ooreenst. sye in verhouding	✓ ST ✓ ST ✓ ST ✓ RE	A A A A A (4)
			[11]

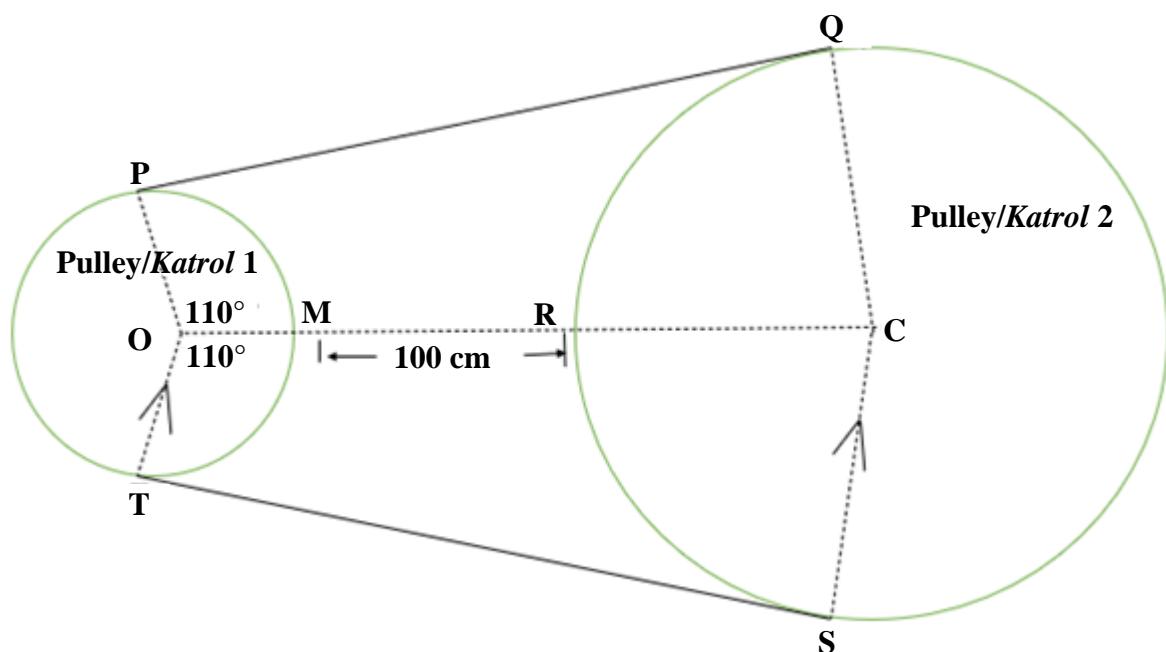
QUESTION/VRAAG 10

	 A diagram showing a circular dashed line representing the circumference of a circle. Inside the circle, there is a vertical double-bladed propeller. A horizontal line segment extends from the right side of the circle to its circumference, labeled "30 cm".		
10.1.1	<p>5 280 revolutions per minute/5 280 revolusies per minuut</p> $n = \frac{5280}{60}$ $n = 88 \text{ rev/s}$	$\checkmark n = 88 \text{ rev/s}$ NPU	A (1)
10.1.2	$v = \pi Dn$ $v = \pi(0,3)(88)$ $v = 26,40\pi \text{ m/s}$ $v = 82,94 \text{ m/s}$ OR/OF $\omega = 2\pi n$ $\omega = 2\pi \left(\frac{5280}{60}\right)$ $\omega = 552,920 \dots \text{rad/s}$ $\therefore v = \omega r$ $v = (552,920 \dots)(0,15)$ $v = 82,94 \text{ m/s}$	$\checkmark F$ $\checkmark \text{SF from/van 10.1.1}$ $\checkmark v = 82,94 \text{ m/s}$ OR/OF $\checkmark \omega = 552,920 \dots$ $\checkmark F$ $\checkmark v = 82,94 \text{ m/s}$ P – If 30 used, MAX 2 marks - As 30 gebruik is, MAKS 2 punte NPR	A CA CA A A CA (3)
10.1.3	$\omega = 2\pi n$ $\omega = 2\pi(88)$ $\omega = 176\pi \text{ rad/s}$ $\omega = 552,8 \text{ rad/s}$ OR/OF	$\checkmark F$ $\checkmark \text{SF from/van 10.1.1}$ $\checkmark \omega = 552,8 \text{ rad/s}$ OR/OF	A CA CA

	$\omega = \frac{v}{r}$ $\omega = \frac{82,94}{0,15}$ $\omega = 552,8 \text{ rad/s}$	✓ F ✓ SF from/van 10.1.2 ✓ $\omega = 552,8 \text{ rad/s}$ NPU/NPR	A CA CA (3)
10.2			
	$4h^2 - 4dh + x^2 = 0$ $4h^2 - 4(18) + (16)^2 = 0$ $4h^2 - 72h + 256 = 0$ $h = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $h = \frac{-(-72) \pm \sqrt{(-72)^2 - 4(4)(256)}}{2(4)}$ $h = \frac{72 \pm \sqrt{1088}}{8}$ $h = 13,12 \quad \text{OR/OF} \quad h = 4,88$ $\therefore h = 13,12 \text{ cm}$ OR/OF If/as $OE \perp AB$ then/dan $AE = EB = 8\text{cm}$ $OA^2 = OE^2 + AE^2$ Pythagoras $9^2 = OE^2 + 8^2$ $OE^2 = 17$ $OE = \sqrt{17}$ $CE = CO + OE$ $CE = 9 + \sqrt{17}$ $CE = 13,12$ OR/OF	✓ F ✓ SF ✓ S ✓ SF ✓ h = 13,12 cm OR/OF ✓ ST ✓ Method/Metode ✓ OE = $\sqrt{17}$ ✓ Method/Metode ✓ h = 13,12 cm OR/OF	A CA CA CA CA CA A CA CA CA CA CA CA CA CA

$D = h + \frac{x^2}{4h}$ $18 = h + \frac{16^2}{4h}$ $72h = 4h^2 + 256$ $4h^2 - 72h + 256 = 0$ $h = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $h = \frac{-(-72) \pm \sqrt{(-72)^2 - 4(4)(256)}}{2(4)}$ $h = \frac{72 \pm \sqrt{1088}}{8}$ $h = 13,12 \quad \text{OR/OF} \quad h = 4,88$ $\therefore h = 13,12 \text{ cm}$	✓ F ✓ SF ✓ S ✓ SF ✓ h = 13,12 cm NPU/NPR	A CA CA CA CA CA (5)
[11]		

QUESTION/VRAAG 11



11.1	$S\hat{C}R + 110^\circ = 180^\circ$ $\therefore S\hat{C}R = 70^\circ$	✓ $S\hat{C}R = 70^\circ$	A (1)
11.2	$OC = OM + MR + RC$ $OC = 15 + 100 + 25$ $OC = 140 \text{ cm}$	✓ M ✓ $OC = 140 \text{ cm}$ AO – Full marks/Volpunte NPU/NPR	A CA (2)

11.3	$70^\circ \times \frac{\pi}{180^\circ}$ $= \frac{7}{18}\pi$ $= 1,22 \text{ radians/radiale}$	✓ M ✓ 1,22 or/of $\frac{7}{18}\pi$ AO – Full marks/Volpunten NPU/NPR (2)	A CA
11.4	$\hat{QCS} + \hat{SCR} + \hat{RCQ} = 360^\circ$ $\hat{QCS} = 360^\circ - 70^\circ - 70^\circ$ $\hat{QCS} = 220^\circ$	✓ M ✓ $\hat{QCS} = 220^\circ$ AO – Full marks/Volpunten (2)	A CA
11.5	$s = r\theta$ $s = (25) \left(220^\circ \times \frac{\pi}{180^\circ} \right)$ $s = 96 \text{ cm}$	✓ SF ✓ $\times \frac{\pi}{180^\circ}$ ✓ $s = 96 \text{ cm}$ NPU/NPR (3)	A A CA
11.6	Length of belt / = $s_1 + PQ + TS + s_2$ <i>Lengte van band</i> $= (15) \left(140^\circ \times \frac{\pi}{180^\circ} \right) + 220 + 220 + 96$ $= 572,65 \text{ cm}$	✓ M ✓ (15)(140°) ✓ $\times \frac{\pi}{180^\circ}$ ✓ 572,65 cm NPU/NPR (4)	CA CA A CA
			[14]

QUESTION/VRAAG 12			
12.1.1	$V = \pi r^2 h$ $V = \pi(4)^2(15)$ $V = 240\pi \text{ cm}^3$ $V = 753,98 \text{ cm}^3$	✓ SF ✓ 753,98 cm ³ or/of $240\pi \text{ cm}^3$ NPU/NPR (2)	A CA
12.1.2 (a)	Curved area of cone/ <i>Geboë area van die keël</i> = $\pi r l$ $= \pi(4)(5)$ $= 20\pi \text{ cm}^2$ $= 62,83 \text{ cm}^2$	✓ SF ✓ 62,83 cm ² or/of $20\pi \text{ cm}^2$ NPU/NPR (2)	A CA

12.1.2 (b)	Surface area of cylinder/ <i>Oppervlakte van silinder</i> $= \pi r^2 + 2\pi rh$ $= \pi(4)^2 + 2\pi(4)(15)$ $= 136\pi \text{ cm}^2$ $= 427,96 \text{ cm}^2$	✓ F ✓ SF ✓ 427,96 cm ² or/of 136π cm ² NPU/NPR	A CA CA (3)
12.1.3	Total surface area/ <i>Totale oppervlakte</i> = 62,83 + 427,96 Total surface area/ <i>Totale oppervlakte</i> = 490,09 cm ²	CA from/van 12.1.2 a & b ✓ 490,09 cm ² or/of 156π cm ² NPU/NPR	CA CA (1)
12.2	$A_T = a \left(\frac{o_1 + o_n}{2} + o_2 + o_3 + \dots + o_{n-1} \right)$ $A_T = 3 \left(\frac{1,7 + 1,8}{2} + 2,0 + 1,9 + 2,4 + 1,5 \right)$ $A_T = 3(9,55)$ $A_T = 28,65 \text{ m}^2$ OR/OF $A_T = a(m_1 + m_2 + m_3 + \dots + m_n)$ $A_T = 3 \left(\frac{1,7 + 2}{2} + \frac{2 + 1,9}{2} + \frac{1,9 + 2,4}{2} + \frac{2,4 + 1,5}{2} + \frac{1,5 + 1,8}{2} \right)$ $A_T = 3(1,85 + 1,95 + 2,15 + 1,95 + 1,65)$ $A_T = 3(9,55)$ $A_T = 28,65 \text{ m}^2$	✓ F ✓ SF ✓ 28,65 m ² OR/OF ✓ F ✓ SF ✓ 28,65 m ² AO – Full marks/Volpunten NPU/NPR	A A CA A A CA CA (3)
			[11]
		TOTAL/TOTAAL: 150	