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Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL/*NASIONALE* SENIOR CERTIFICATE/*SERTIFIKAAT*

GRADE/*GRAAD* 12

SEPTEMBER 2026

MATHEMATICS P2/*WISKUNDE V2* MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: 150

This marking guideline consists of 17 pages.
Hierdie nasienriglyn bestaan uit 17 bladsye.

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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 a question, mark the crossed-out version.
- Consistency accuracy applies in ALL aspects of the marking guideline. 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 the correct reason. (A reason mark may only be awarded only if the statement is correct.
S/R	Award a mark if a statement and a reason are both correct.

NOTA:

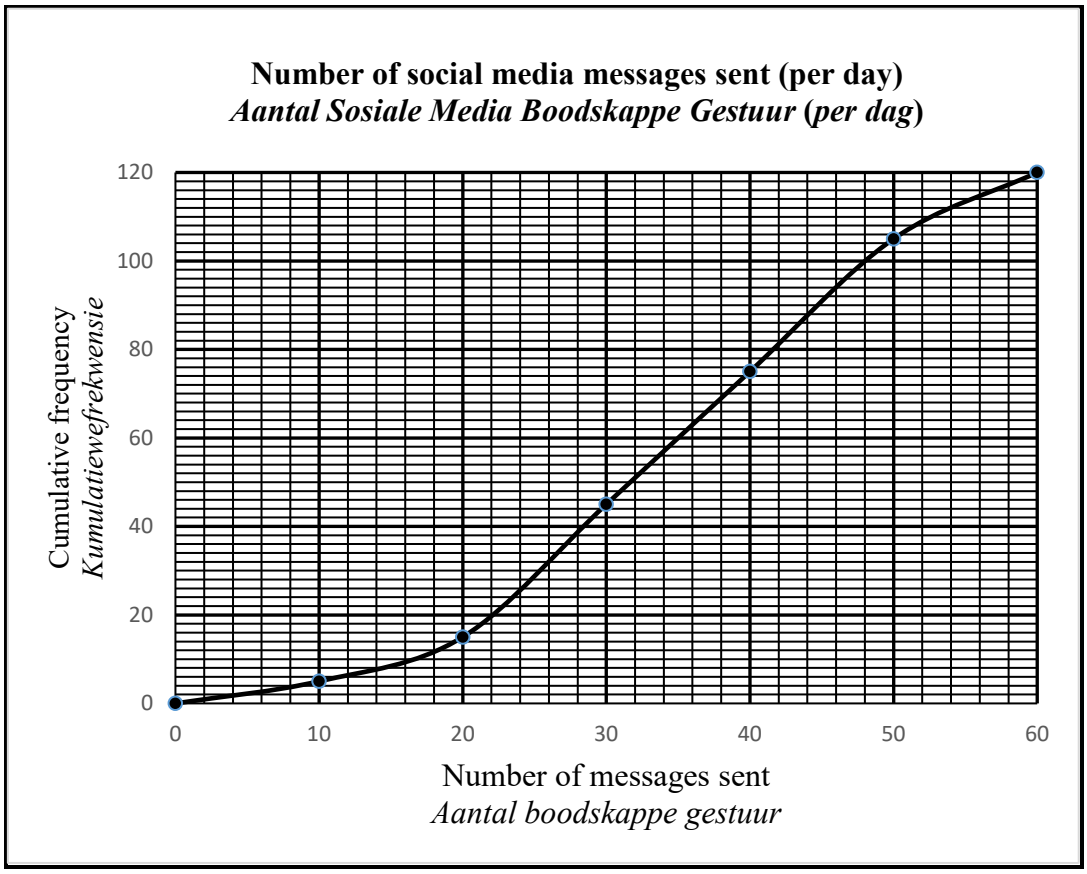
- *As 'n kandidaat 'n vraag TWEEKEER beantwoord, merk slegs die EERSTE poging.*
- *As 'n kandidaat 'n poging van 'n vraag doodtrek en dit nie oordoen nie, merk die doodgetrekte poging.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyn toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Om antwoorde/waardes te aanvaar om 'n probleem op te los, word NIE toegelaat nie.*

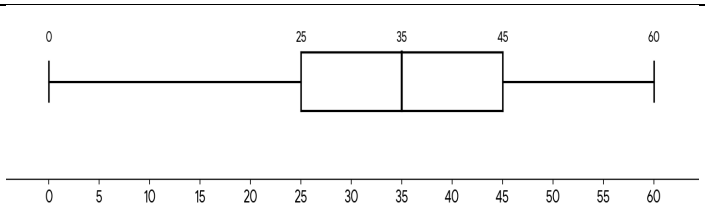
MEETKUNDE	
S	*'n Punt vir korrekte bewering.* (*'n Punt vir 'n bewering is onafhanklik van die rede*.)
R	*'n Punt vir 'n korrekte rede.* (*'n Punt word slegs vir die rede toegeken as die bewering korrek is*.)
S/R	*Ken 'n punt toe as die bewering en rede beide korrek is.*

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QUESTION/*VRAAG 1*



1.1	104 learners/*leerders*	✓✓ answer/*antwoord*	(2)
1.2	$Q_2 = 35$	✓✓ answer/*antwoord*	(2)
1.3	$Q_1 = 25 \quad Q_3 = 45$ IQR / $IKV = 45 - 25 = 20$	✓ Q_1 ✓Q_3 ✓ answer/*antwoord*	(3)
1.4	 **Number of messages sent / *Aantal boodskappe gestuur***	✓ correct min & max ✓ correct box and whisker diagram	(2)
1.5	mean > median which indicates that the data is positively skewed, meaning fewer learners sent significantly more messages than the rest. *gemiddelde > mediaan wat aandui dat die data positief skeef is, wat beteken dat minder leerders baie meer boodskappe as die res gestuur het.*	✓ mean > median *gemiddelde > mediaan* ✓ explanation *verduideliking*	(2)
			[11]

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QUESTION/*VRAAG 2*

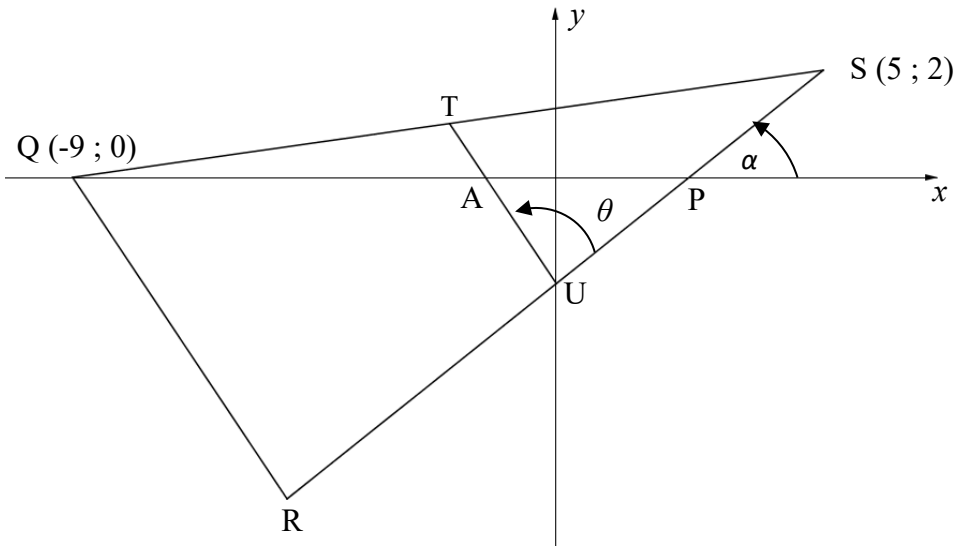
Learner / *Leerder*	1	2	3	4	5	6	7	8
Number of hours (*x*) *Aantal ure (x)*	5	12	15	20	25	30	42	45
Javelin distance (*y*) *Spiesgooi afstand (y)*	130	118	115	95	88	72	48	30

2.1	$\delta = 32{,}89$	✓✓ answer/*antwoord*	(2)
2.2	$r = -0{,}99$	✓ answer/*antwoord*	(1)
2.3	$a = 146{,}80 \quad b = -2{,}47$ $y = 146{,}80 - 2{,}47x$	✓ *a* ✓*b* ✓ answer/*antwoord*	(3)
2.4.1	$y = 146{,}80 - 2{,}47(35)$ $= 60{,}35$	✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(2)
2.4.2	No**,** as the strong negative correlation suggests that more gym training is associated with decreasing throwing distances. *Nee, soos die sterk negatiewe korrelasie voorstel dat meer gimnasium oefening word assosieer met afname in spiesgooi afstande.*	✓ for No / *vir Nee* ✓ explanation/ *verduideliking*	(2)
			[10]

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QUESTION/*VRAAG 3*



3.1	$x_T = \frac{-9+5}{2}; y_T = \frac{0+2}{2}$ $x_T = -2 \quad ; y_T = 1$ $T(-2;1)$	✓ $x_T = -2$ ✓ $y_T = 1$	(2)
3.2	$5y = 4(0) - 10$ $y = -2$ $U(0;-2)$	✓ $x = 0$ ✓ $y = -2$	(2)
3.3	$SU = \sqrt{(5-0)^2 + (2+2)^2}$ $= \sqrt{41}$	✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(2)
3.4	$y = -\frac{3}{2}x - \frac{27}{2}$ $m_{QR} = -\frac{3}{2}$ $m_{TU} = \frac{1+2}{-2-0}$ $= -\frac{3}{2}$ $\therefore QR \parallel TU \qquad [m_{QR} = m_{TU}]$	✓ m_{QR} ✓ correct substitution *korrekte vervanging* ✓ m_{TU}	(3)
3.5	$TU = \sqrt{(-2-0)^2 + (1+2)^2}$ $= \sqrt{13}$ $QR = 2TU = 2\sqrt{13}$ [line through midpt $\parallel$ to 2nd side] [*lyn deur middelpunt* $\parallel$ *aan 2de sy*]	✓ $TU = \sqrt{13}$ ✓ $QR = 2\sqrt{13}$	(2)

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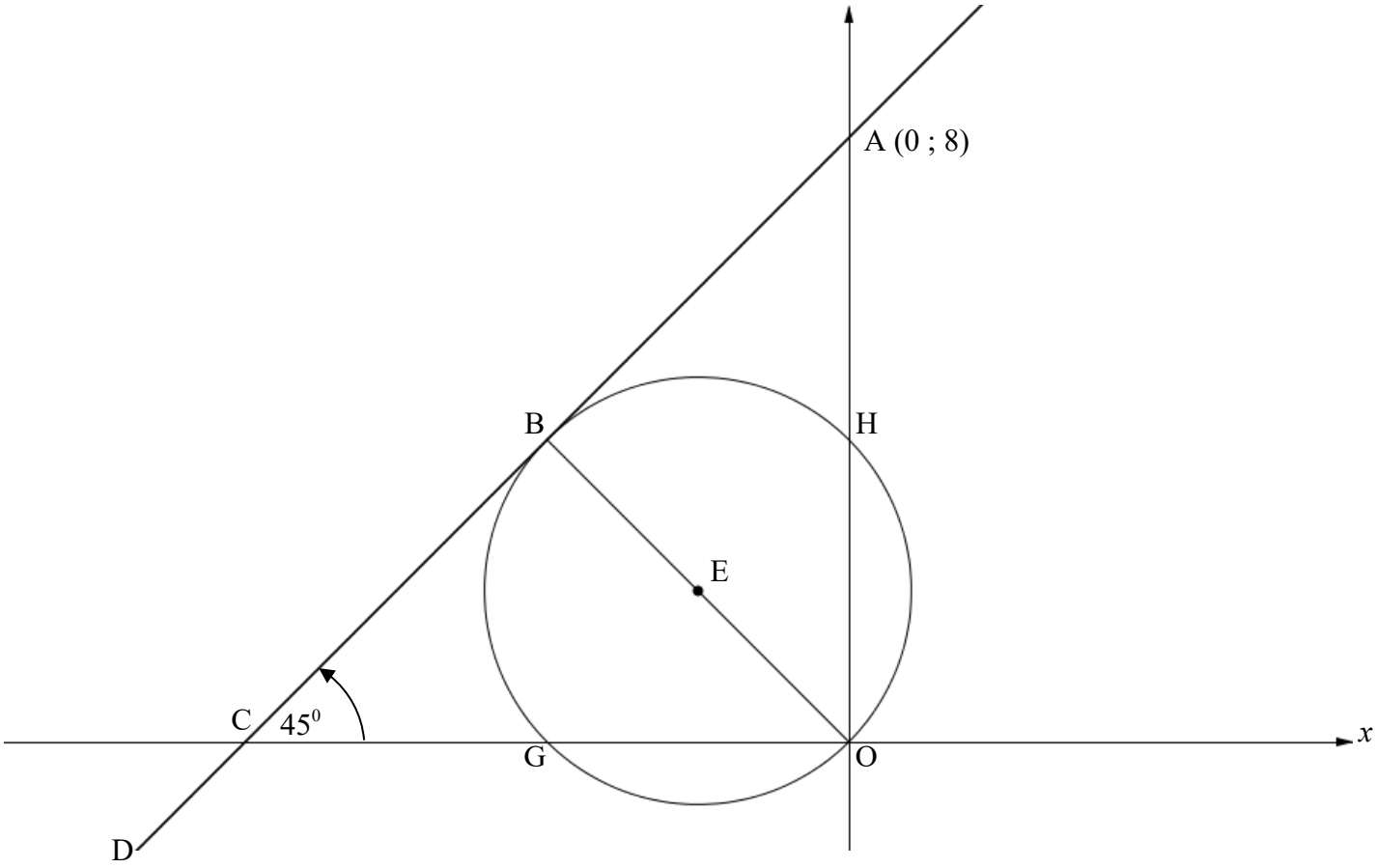
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3.6	$\tan T\hat{A}P = m_{TU} = -\frac{3}{2}$ $T\hat{A}P = 123.69^0$ $\tan\alpha = m_{SR} = \frac{4}{5}$ $\alpha = 38{,}66^0$ $\therefore \theta = 85.03^0$	✓ $\tan T\hat{A}P = m_{TU}$ ✓ inclination of TU *inklinasie van* TU ✓ inclination of SR *inklinasie van* SR ✓ answer/*antwoord*	(4)
3.7	$\hat{R} = \theta = 85.03^0$ [corresp.∠s:QR||TU] / [*ooreenk.∠e* : *QR* || *TU*] SR = 2SU [Midpoint *T*heorem.] / [*Middelpunt Stelling*] $\text{A.of}\Delta\text{SQR} = \frac{1}{2}\times \text{SR}\times \text{QR}\sin\text{R}$ $= \frac{1}{2}\times 2\sqrt{41}\times 2\sqrt{13}\times \sin 85{,}03^0$ $= 46$	✓ $\hat{R} = \theta$ ✓ SR=2SU ✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(4)
			[19]

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QUESTION/*VRAAG 4*



4.1	$m_{AD} = \tan 45^0 = 1$	✓ answer/*antwoord*	(1)
4.2	$m_{OB} = -1$ $0 = -1(0) + c$ $c = 0$ $\therefore y = -x$	✓ gradient of OB *gradiënt van* OB ✓ correct substitution *korrekte vervanging* O(0 ; 0) ✓ equation/*vergelyking*	(3)
4.3	$-x = x + 8$ $-2x = 8$ $x = -4$ $y = -(-4) = 4$ $B(-4;4)$	✓ equating equations *gelyk stel van vergelykings* ✓ *x*-coordinate / *x-koördinaat* ✓ *y*-coordinate/*y-koördinaat*	(3)
4.4	$OB = \sqrt{(0-(-4))^2 + (0-4)^2}$ $= 4\sqrt{2}$ $\therefore r = 2\sqrt{2}$	✓ correct substitution *korrekte vervanging* ✓ length of OB/*lengte van* OB ✓ radius/*radius*	(3)

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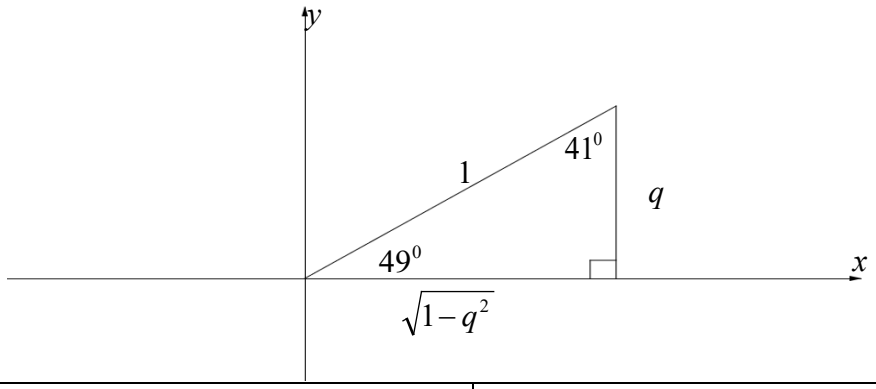
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4.5	$x_E = \frac{0-4}{2}$; $y_E = \frac{0+4}{2}$ $= -2$; $= 2$ $\therefore (x+2)^2 + (y-2)^2 = 8$	✓ x_E ✓ y_E ✓ LHS/*LK* ✓RHS/*RK*	(4)
4.6	$m_{\tan} = 1$ $y - 0 = 1(x - 0)$ [tangent passing through origin] [*raaklyn gaan deur die oorsprong*] $y = x$ $t = 0$ *or* $t = 8$	✓✓ answer/*antwoord*	(2)
4.7	$D_{\text{between 2 centres}} = \sqrt{(4+2)^2 + (8-2)^2}$ $= 6\sqrt{2} = 8{,}49$ $r_1 + r_2 = 2\sqrt{2} + 3 = 5{,}83$ $\therefore$ The 2 circles do not touch each other. $[D > r_1 + r_2]$ *Die 2 sirkels raak nie mekaar nie.*	✓ D between 2 centres *afstand tussen 2 middelpunte* ✓ $r_1 + r_2$ ✓ conclusion/ ✓ R *gevolgtrekking*	(4)
			[20]

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QUESTION/*VRAAG 5*

5.1.1			
	$1^2 = x^2 + q^2$ $x = \sqrt{1-q^2}$ $\tan 41^0 = \dfrac{\sqrt{1-q^2}}{q}$	✓ x from Pythagoras or diagram above *x vanaf Pythagoras of diagram hierbo* ✓answer/*antwoord*	(2)
5.1.2	$\cos 229^0 = -\cos 49^0$ $= -\sqrt{1-q^2}$	✓reduction/*reduksie* ✓answer/*antwoord*	(2)
5.1.3	$\sin 4^0 = \sin(49^0 - 45^0)$ $= \sin 49^0 \cos 45^0 - \sin 45^0 \cos 49^0$ $= q.\dfrac{\sqrt{2}}{2} - \dfrac{\sqrt{2}}{2}.\sqrt{1-q^2}$ $= \dfrac{\sqrt{2}\left(q - \sqrt{1-q^2}\right)}{2}$	✓ use of compound angles *gebruik van saamgestelde hoeke* ✓ expansion/*uitbreiding* ✓✓correct substitution for each term *korrekte vervanging vir elke term*	(4)
5.2	$f(x) = \dfrac{\sin(x-180^0).\sin(90^0+x)}{\sin^2 x - \cos^2(360^0 - x)}$ $= \dfrac{(-\sin x)(\cos x)}{\sin^2 x - (-\cos x)^2}$ $= \dfrac{-\sin x \cos x}{\sin^2 x - \cos^2 x}$ $= \dfrac{-\frac{1}{2}\sin 2x}{-(\cos^2 x - \sin^2 x)}$ $= \dfrac{-\frac{1}{2}\sin 2x}{-\cos 2x}$ $= \dfrac{1}{2}\tan 2x$	✓ $(-\sin x)$ ✓ $\cos x$ ✓ $(-\cos x)^2$ ✓ $\frac{1}{2}\sin 2x$ ✓ $-(\cos^2 x - \sin^2 x)$ ✓ $\cos 2x$ ✓ answer/*antwoord*	(7)
5.2.2	$x = -135^0$ *or / of* $x = -45^0$	✓ ✓ each x-value / *elke x-waarde*	(2)
			[17]

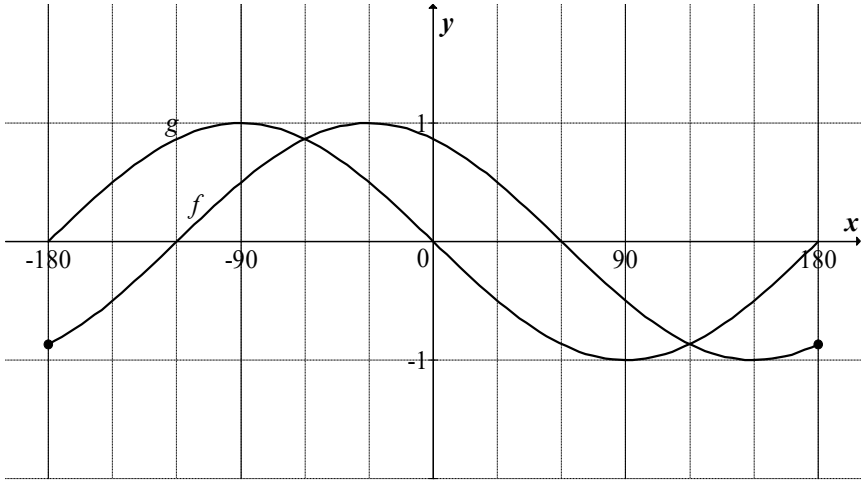
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QUESTION/*VRAAG 6*			
6.1	$\cos(A+B)=\cos(A-(-B))$ $=\cos A.\cos(-B)+\sin A\sin(-B)$ $=\cos A\cos B-\sin A\sin B$	✓ $\cos(A-(-B))$ ✓ expansion ✓ answer	(3)
6.2	$LHS=\dfrac{\sin 22^0.\cos 320^0+\sin 40^0\sin 68^0}{\sin 391^0.\cos 31^0}$ $=\dfrac{\cos 68^0.(\cos 40^0)+\sin 40\sin 68^0}{(\sin 31^0).\cos 31^0}$ $=\dfrac{\cos(68^0-40^0)}{\frac{1}{2}\sin 62^0}$ $=\dfrac{\cos 28^0}{\frac{1}{2}\sin 62^0}$ $=2.\dfrac{\sin 62^0}{\sin 62^0}$ $=2$	✓ $\cos 40^0$ ✓ $\cos 68^0$ ✓ $(\sin 31^0)$ ✓ $\cos(68^0-40^0)$ ✓ $\frac{1}{2}\sin 62^0$ ✓ $\sin 62^0$	(6)
6.3	$\cos 2x+5\sin x=3$ $1-2\sin^2 x+5\sin x-3=0$ $2\sin^2-5\sin x+2=0$ $(2\sin x-1)(\sin x-2)=0$ $\sin x=\dfrac{1}{2}$ *or / of* $\sin x\neq 2$ *ref. / verw.* $\angle=30^0$ $x=-330^0$ *or / of* $x=-210^0$	✓ $1-2\sin^2 x$ ✓standard form/*standaardvorm* ✓equations/*vergelykings* ✓✓ each x-value/*elke x-waarde*	(5)
			[14]

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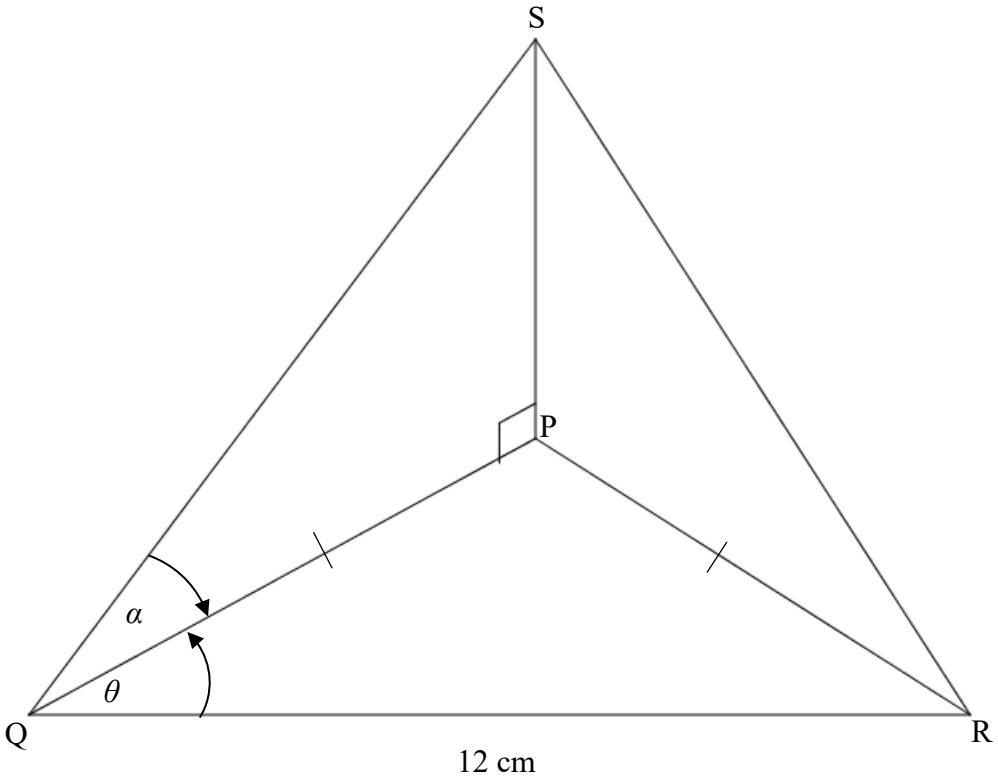
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QUESTION/*VRAAG 7*			
7.1	$a = 1$ $p = 30^0$	✓ value of a/ *waarde van a* ✓ value of p/ *waarde van p*	(2)
7.2	Period / *Periode* $= 360^0$	✓ answer/ *antwoord*	(1)
7.3		✓ correct TPs *Korrekte DPe* ✓ correct intercepts/ *korrekte afsnitte* ✓ shape/*vorm*	(3)
7.4	$x = -60^0$ *or / of* $x = 120^0$	✓ $x = -60^0$ ✓ $x = 120^0$	(2)
7.5	$-3 \le y \le -1$ **OR/*OF*** $y \in [-3\ ;\ -1]$	✓✓ correct answer /*korrekte antwoord*	(2)
			[10]

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QUESTION/*VRAAG 8*



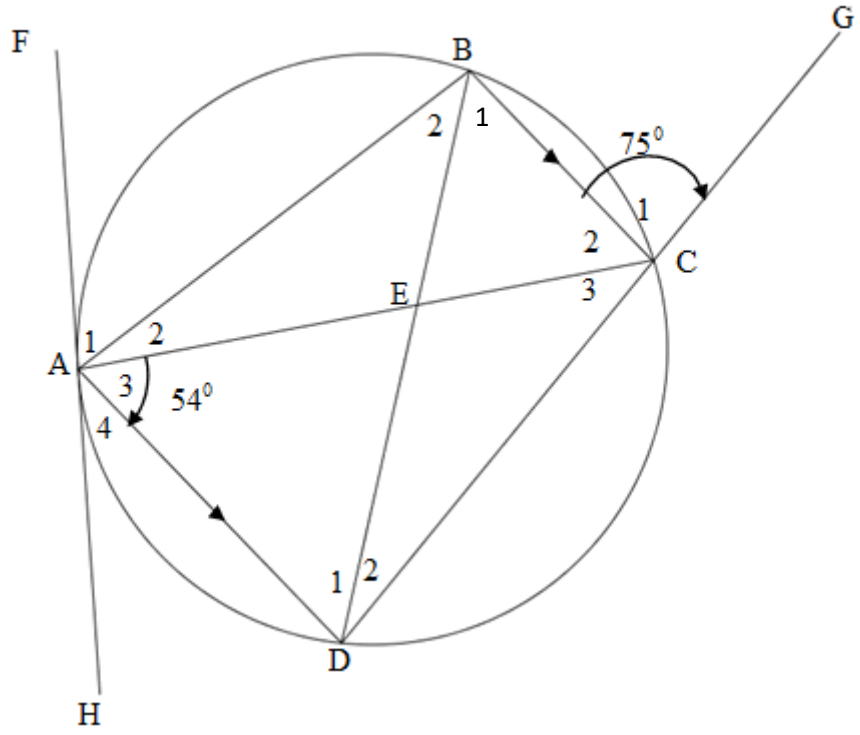
8.1	$\hat{QPR} = 180^0 - 2\theta$ $\frac{PQ}{\sin\theta} = \frac{12}{\sin(180^0 - 2\theta)}$ $PQ = \frac{12\sin\theta}{\sin 2\theta}$ $= \frac{12\sin\theta}{2\sin\theta.\cos\theta}$ $= \frac{6}{\cos\theta}$ $\frac{PQ}{SQ} = \cos\alpha$ $SQ = \frac{1}{\cos\alpha} \times \frac{6}{\cos\theta}$ $SQ = \frac{6}{\cos\theta\cos\alpha}$	✓ $\hat{QPR}$ ✓ sine rule / *sinusreël* ✓ correct substitution *korrekte vervanging* ✓ reduction/*reduksie* ✓ identity/*identiteit* ✓ simplification/*vereenvoudiging* $\frac{PQ}{SQ}$	(6)
8.2	$SQ = \frac{6}{\cos 50^0 \cos 35^0}$ $= 11{,}40$	✓ correct substitution/ *korrekte vervanging* ✓ answer/*antwoord*	(2)
			[8]

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QUESTION/*VRAAG 9*

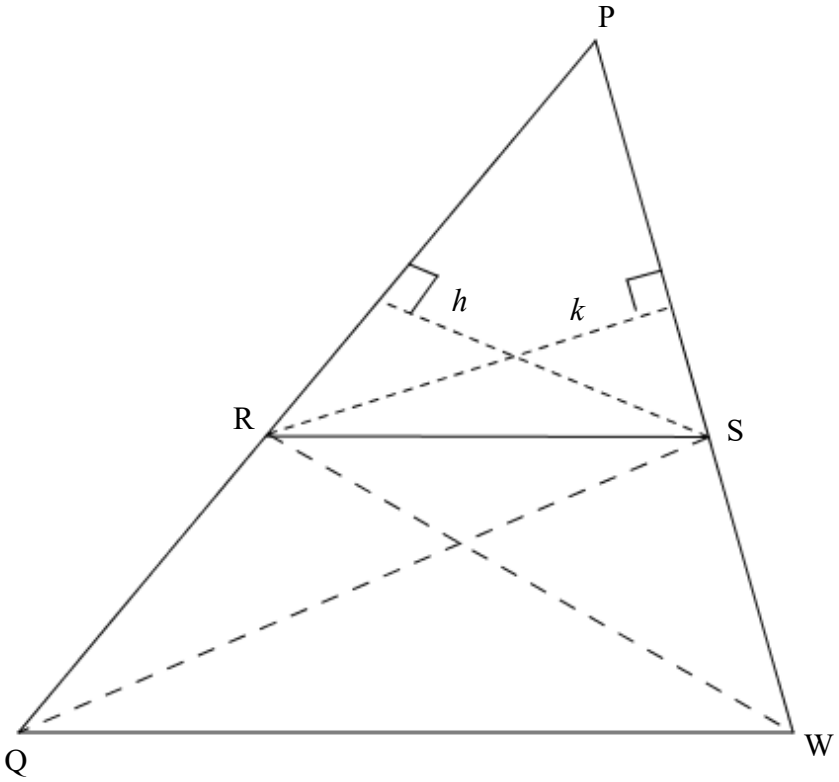
9.1	Opposite interior angle ✓	(1)



9.2.1	$\hat{A}_2 = 21^0$	[ext.∠ of a cyclic quad]/[*buite ∠ van koordevh*]	✓ S ✓R (2)
9.2.2	$D_2 = 21^0$	[∠s same seg]/[*∠e in dieselfde segment*]	✓ S ✓R (2)
9.2.3	$\hat{D} = 75^0$ $\hat{A}_1 = 54^0$	[corresp. ∠s; AD||BC] / [*ooreenk.∠e: AD || BC*] [Tan chord Thm.] / [*Raaklyn – koord – Stelling*]	✓ S/R ✓ S ✓R (3)
9.2.4	$\hat{A}_3 = \hat{C}_2 = 54^0$ $\hat{C}_2 = \hat{D}_1$ $\therefore AE = ED$	[alt. ∠s, AD || BC] [*∠s same seg*] [*sides opp = ∠s*]	✓S/R ✓ S ✓R (3)
			[11]

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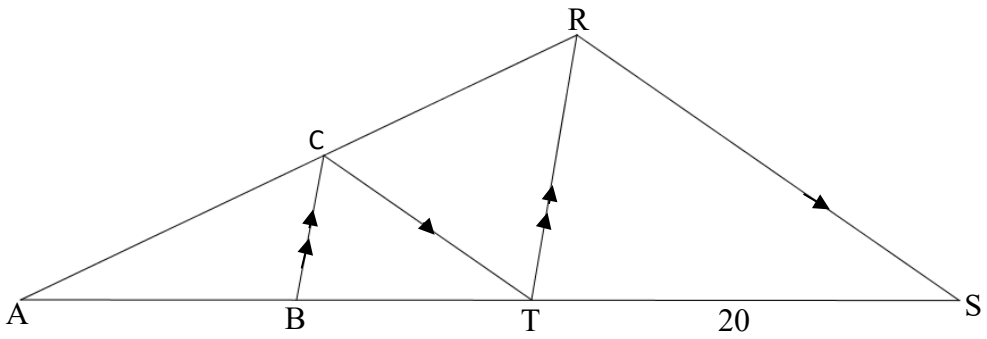
QUESTION/*VRAAG 10*



10.1	Constructions: Draw ⊥ height to PS and ⊥ height to PW. Join RW and SQ *Konstruksies: Teken ⊥ hoogte na PS en ⊥ hoogte na PW. Verbind RW en SQ*	✓ construction *konstruksie*	
	$\frac{\text{Area of/}van\ \Delta PRS}{\text{Area of/}van\ \Delta WRS} = \frac{\frac{1}{2}\times PS\times h}{\frac{1}{2}\times SW\times h} = \frac{PS}{SW}$ [*same height*] / [*dieselfde hoogte*]	✓ S/R	
	$\frac{\text{Area of/}van\ \Delta PRS}{\text{Area of/}van\ \Delta QRS} = \frac{\frac{1}{2}\times PR\times k}{\frac{1}{2}\times RQ\times k} = \frac{PR}{RQ}$ [*same height*] / [*dieselfde hoogte*]	✓ S	
	$\text{Area of/}van\ \Delta RSW = \text{Area of/}van\ \Delta QRS$ [*same base, betwen same parallel*] [*dies. basis, tussen dies. ‖ lyne*]	✓ S ✓ R	
	$\frac{\text{Area of/}van\ \Delta PRS}{\text{Area of/}van\ \Delta WRS} = \frac{\text{Area of/}van\ \Delta PRS}{\text{Area of/}van\ \Delta QRS}$ $\therefore \frac{PS}{SW} = \frac{PR}{RQ}$		(5)

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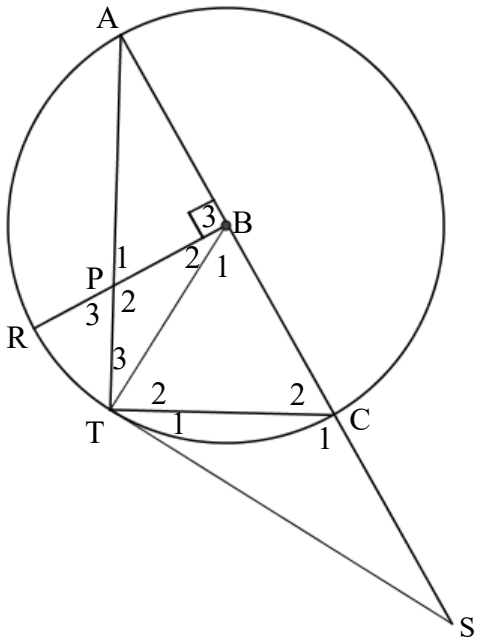
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10.2			
10.2.1	$\frac{AT}{TS}=\frac{AC}{CR}$ $[line\|\|to\ one\ side\ of\ a\ \Delta]/[lyn\ \|\|\ aan\ een\ sy\ van'n\ \Delta]$ $AT=\frac{20\times 3}{5}$ $=12$	✓ S ✓ R ✓ correct substitution *korrekte vervanging* ✓ AT	(4)
10.2.2	$\frac{AB}{AT}=\frac{AC}{AR}$ $[\text{line}\|\|\text{to one side of a}\ \Delta]$ $\frac{AB}{20}=\frac{5}{8}$ $AB=\frac{9}{2}$	✓ S ✓ correct substitution *korrekte vervanging* ✓ AB	(3)
			[12]

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QUESTION/*VRAAG 11*



11.1	$\hat{T}_1 = \hat{A}$ [tan chord theo.]/[*raaklyn – koord – stelling*] $\hat{A} = \hat{T}_3$ [∠s opp. = sides]/[*∠e teenoor = sye*]	✓S ✓R ✓ S/R	(3)
11.2	$A\hat{T}C = 90^0$ [∠ in semi-circle / ∠ subt. diameter] [*∠ in halwe sirkel / ∠ onderspan deur middellyn*] $\hat{B}_3 = 90^0$ [given]/[*gegee*] ∴ PBTC is a cyclic quad [ext ∠ of a quad = int opp. ∠ OR converse ext ∠ of a cyclic quad] ∴ *PBTC is 'n koordevh.* [*buite ∠ van 'n koordevh = teenoorst. binne ∠ OF omgek ker de buite ∠ van koordevh*]	✓ S ✓R ✓ R	(3)
11.3	$\hat{T}_1 = \hat{T}_3$ [proven in 11.1]/[*bewys in* 11.1] $\hat{C}_1 = \hat{P}_2$ [ext. ∠ of a cyclic quad]/[*buitehoek van kv*] $\hat{S} = \hat{B}_2$ [3rd ∠s / ∠e] **OR/*OF*** ∴ ΔSCT ||| ΔBPT [∠∠∠]	✓ S ✓ S ✓ R ✓ S **OR/*OF*** ✓ R	(4)

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11.4	$\frac{SC}{BP}=\frac{ST}{BT}$ $[\|\|\| \Delta s]$ $BT = AB$ [radii]/ [*radiusse*] $\therefore SC=\frac{ST.BP}{AB}$	✓S/R ✓S	(2)
11.5	$B\hat{T}S = 90^0$ [*rad* ⊥ tan]/ [*radius* ⊥ *raaklyn*]	✓ R	(1)
11.6	$TB = CS$ [both = BR]/[*albei = BR*] $BS^2 = BT^2 + TS^2$ [Pyth theo]/[*Pyth Stelling*] $(2CS)^2 = CS^2 + TS^2$ $4CS^2 = CS^2 + TS^2$ $3CS^2 = TS$ (1) but / *maar* $CS=\frac{TS.BP}{AB}$ from 11.4 $CS = AB = BR$ $CS^2 = TS.BP$ (2) $TS^2 = 3(TS.BP)$ $\therefore TS = 3BP$	✓ Application of Pyth. Toepassing van Pyth. ✓ Expressing BS in terms of CS BS *in terme van* CS *uitgedruk* ✓ simplification / *vereenvoudiging* ✓ $CS^2 = ST.BP$ ✓ substitute/*vervang* (2) in (1)	(5)
			[18]

TOTAL/*TOTAAL*: 150

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