Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

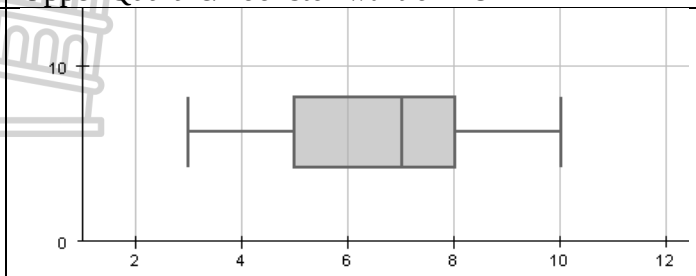
NOVEMBER 2022

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

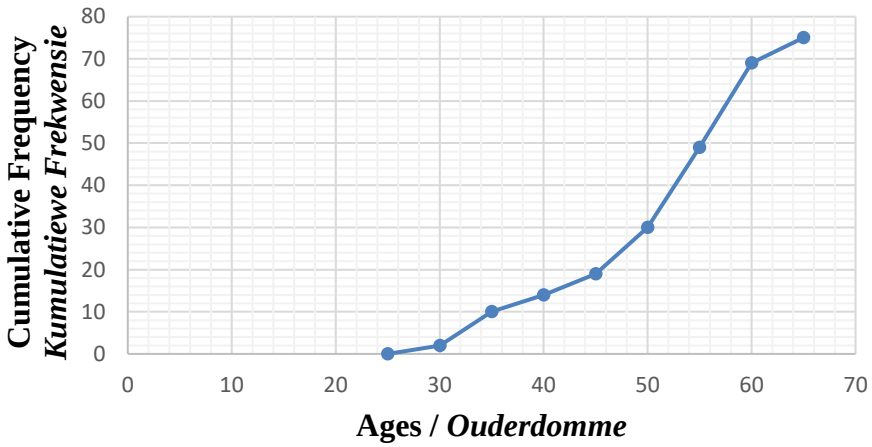
MARKS/*PUNTE*: 150

This marking guideline consists of 16 pages./
Hierdie nasienriglyn bestaan uit 16 bladsye.

QUESTION 1/*VRAAG 1*

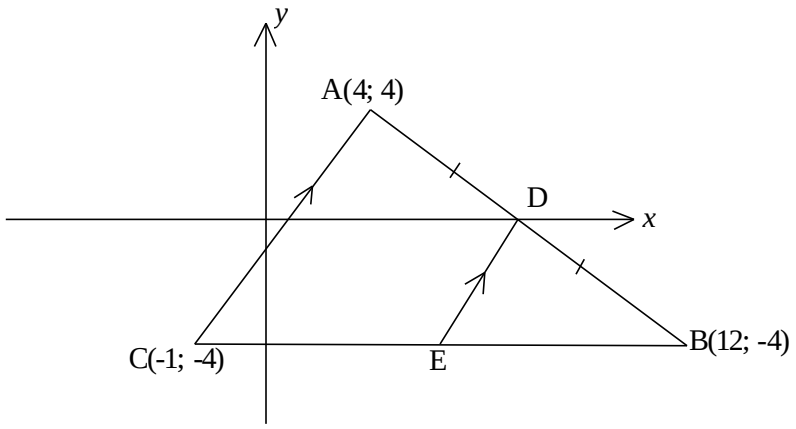
1.1	$\bar{x} = 6{,}4$	✓ answer / *antwoord*	(1)
1.2	Min/*Min* = 3; Max./*Maks.* = 10; Lower Quartile/*Onderste kwartiel* = 5; Median/*Mediaan* = 7; Upper Quartile/*Boonste kwartiel* = 8	✓ for both min. and max. *vir beide min. en maks.* ✓ for the rest / *vir die res*	(2)
1.3		✓ for the box / *vir die mond* ✓ whiskers / *snorre*	(2)
1.4	Skewed to the left, mean is smaller than the median **OR** longer rectangle on the left. *Skeef na links, Gemiddelde is kleiner as mediaan **OF** langer reghoek op linkerkant.*	✓ answer / *antwoord* ✓ reason / *rede*	(2)
1.5	Standard deviation/*Standaardafwyking* = 2, 01	✓✓ answer / *antwoord*	(2)
1.6	Slept well, if bigger than 8,61. / *Het goed geslaap, indien groter as 8,61.* Answer 1 learner./ *Antwoord 1 leerder*	✓ 8,61 ✓ answer / *antwoord*	(2)
			[11]

QUESTION 2/*VRAAG 2*

<table>
<tr>
<td>2.1</td>
<td>
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<tr><th>Age
Ouderdom</th><th>Frequency
Frekwensie</th><th>Cumulative Frequency
Kumulatiewe Frekwensie</th></tr>
<tr><td>25 < A ≤ 30</td><td>2</td><td>2</td></tr>
<tr><td>30 < A ≤ 35</td><td>8</td><td>10</td></tr>
<tr><td>35 < A ≤ 40</td><td>4</td><td>14</td></tr>
<tr><td>40 < A ≤ 45</td><td>5</td><td>19</td></tr>
<tr><td>45 < A ≤ 50</td><td>11</td><td>30</td></tr>
<tr><td>50 < A ≤ 55</td><td>19</td><td>49</td></tr>
<tr><td>55 < A ≤ 60</td><td>20</td><td>69</td></tr>
<tr><td>60 < A ≤ 65</td><td>6</td><td>75</td></tr>
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</td>
<td>✓ for first 4
vir eerste 4
✓ last 4
laaste 4</td>
<td>(2)</td>
</tr>
<tr>
<td>2.2</td>
<td>Ages of Teachers
Ouderdomme van Onderwysers

</td>
<td>✓ start point
beginpunt
✓ end point
eindpunt
✓✓ shape
vorm</td>
<td>(4)</td>
</tr>
<tr>
<td>2.3</td>
<td>Median / Mediaan = 52 (Accept/Aanvaar 51 – 53)</td>
<td>✓✓ answer / antwoord</td>
<td>(2)</td>
</tr>
<tr>
<td>2.4</td>
<td>Percentage / Persentasie = $\frac{75-57}{75} = \frac{18}{75} = 24\%$</td>
<td>✓ calculation / berekening
✓ answer / antwoord</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[10]</td>
</tr>
</table>

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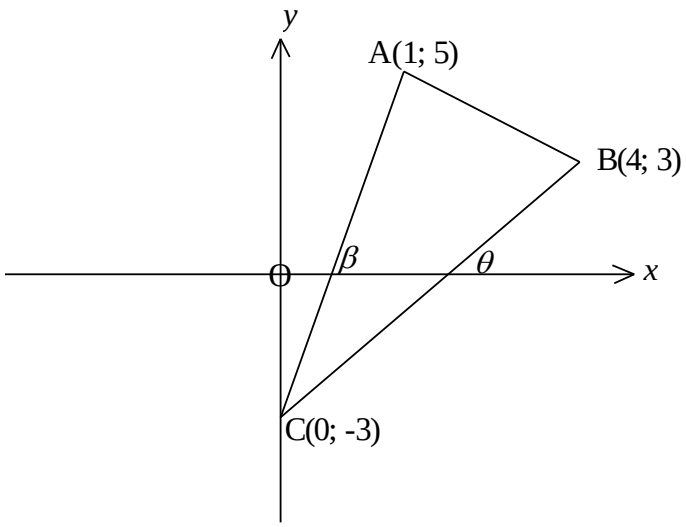
QUESTION 3/*VRAAG 3*



3.1	$AB = \sqrt{(12 - 4)^2 + (-4 - 4)^2}$ AB = 11,31 units / *eenhede*		✓ substitution / *vervanging* ✓ answer / *antwoord*	(2)
3.2	$D\left(\frac{4+12}{2}; \frac{4-4}{2}\right)$ = D(8; 0)		✓ substitution / *vervanging* ✓ answer / *antwoord*	(2)
3.3	$m = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ $y = mx + c$ $0 = \frac{8}{5} \times 8 + c$ $c = -\frac{64}{5}$ $\therefore y = \frac{8}{5}x - \frac{64}{5}$	$m = \frac{4-(-4)}{4-(-1)} = \frac{8}{5}$ $y - y_1 = m(x - x_1)$ $y - 0 = \frac{8}{5}(x - 8)$ $y = \frac{8}{5}x - \frac{64}{5}$	✓ gradient / *gradiënt* ✓substitution / *vervanging* ✓ y-intercept / *y-afsnit* ✓ answer / *antwoord*	(4)
3.4	$y = \frac{8}{5}x - \frac{64}{5}$ $-4 = \frac{8}{5}x - \frac{64}{5}$ $\therefore x = \frac{11}{5}$ $E\left(\frac{11}{2}; -4\right)$ **OR / *OF*** $E\left(\frac{11}{2}; -4\right)$ (Midpoint Theorem) / (*Middelpunt-Stelling*)		✓substitution -4 *vervanging -4* ✓ value of *x* *waarde van x* ✓coordinates of E *koördinate van* E **OR / *OF*** ✓ *x* – value / *waarde* ✓ *y* – value / *waarde* ✓ reason / *rede*	(3)
				[11]

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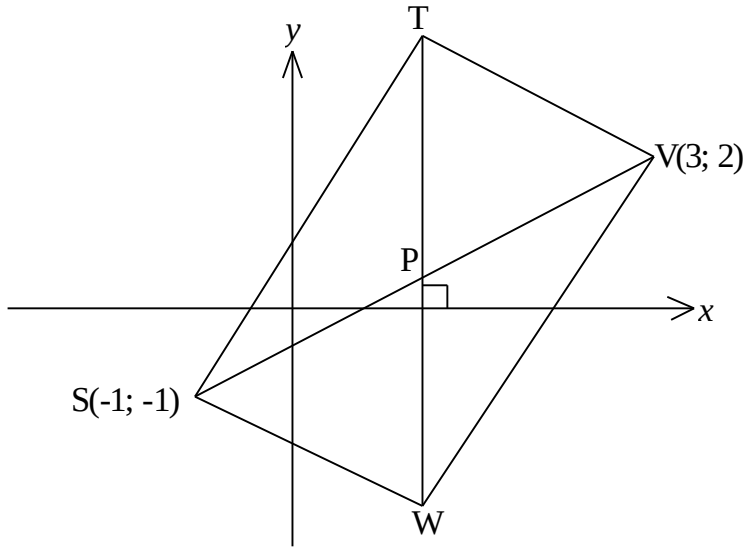
QUESTION 4/*VRAAG 4*



4.1	D(-3; -1)		✓ *x*-coordinate / *koördinaat* ✓ *y*-coordinate / *koördinaat*	(2)
4.2	$FC = \sqrt{(8-0)^2+(p+3)^2} = 12$ $64 + p^2 + 6p + 9 = 144$ $p^2 + 6p - 71 = 0$ Using the quadratic formula: $p = 5,94$ or $p = -11,94$ $p = 6$ or $p = -12$		✓ substitution into the formula and equating to 12 *vervanging in die formule en stel gelyk aan 12* ✓ squaring both sides *kwadreer albei kante* ✓ standard form/*standaardvorm* ✓ $p = 6$ ✓ $p = -12$	(5)
4.3	$m_{BC} = \frac{3-(-3)}{4-0} = \frac{3}{2}$ $\therefore \tan\theta = \frac{3}{2}$ $\therefore \theta = 56,31°$	$\tan\beta = 8$ $\therefore \beta = 82,87°$ $\therefore A\hat{C}B = 82,87° - 56,3°$ $\therefore A\hat{C}B = 26,56°$	✓ gradient of BC ✓ $\tan\theta = \frac{3}{2}$ ✓ for θ ✓ for β ✓ for $A\hat{C}B$	(5)
				[12]

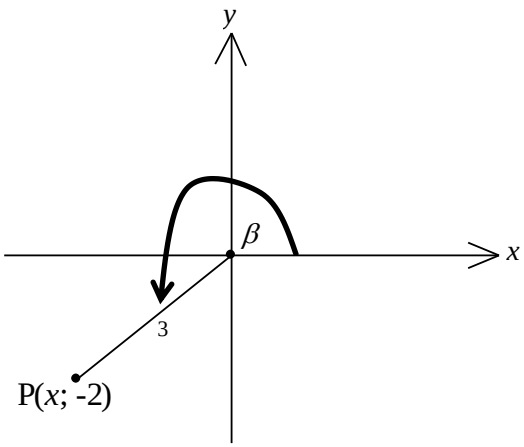
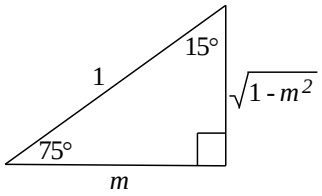
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QUESTION 5/*VRAAG 5*



	$P\left(\frac{-1+3}{2};\frac{-1+2}{2}\right)$ $= P\left(1;\frac{1}{2}\right)$ $SV = \sqrt{(3+1)^2+(2+1)^2}$ SV = 5 units / eenhede TW = 5 units / eenhede (diagonals of a rectangle) (hoeklyne van 'n reghoek) T(1; 3) W(1; -2)	✓ coordinates of P *koördinate van P* ✓ substitution / *vervanging* ✓ for/*vir* SV ✓ for/*vir* TW ✓ coordinates of T *koördinate van* T ✓ coordinates of W *koördinate van* W	(6)
			[6]

QUESTION 6/*VRAAG 6*

6.1	$\sin\beta = -\frac{2}{3}$  $x^2 = (3)^2 - (-2)^2$ $x = -\sqrt{5}$ $\therefore 1 + \tan^2\beta$ $= 1 + \left(\frac{-2}{-\sqrt{5}}\right)^2$ $= \frac{9}{5}$	✓ for solving for sin *oplos vir* sin ✓ sketch in the correct quad *skets in die korrekte kwadrant* ✓ value of *x/ waarde van x* ✓ substitution / *vervanging* ✓ answer / *antwoord*	(5)
6.2	 		
6.2.1	$\cos^2 105°$ $= \left[\cos(180° - 75)\right]^2$ $= (-\cos 75°)^2$ $= m^2$	✓ for/vir - cos 75° ✓ for/vir m^2	(2)
6.2.2	$\sin 15°$ $= \cos 75°$ $= m$	✓ for/vir $\cos 75°$ ✓ for/vir m	(2)
6.2.3	$\tan 15° = \frac{m}{\sqrt{1-m^2}}$ **OR / *OF*** $\tan 15° = \frac{\sin 15°}{\cos 15°} = \frac{\cos 75°}{\sin 75°} = \frac{m}{\sqrt{1-m^2}}$	✓✓ for correct answer only *vir korrekte antwoord* (accuracy / *akkuraatheid*)	(2)

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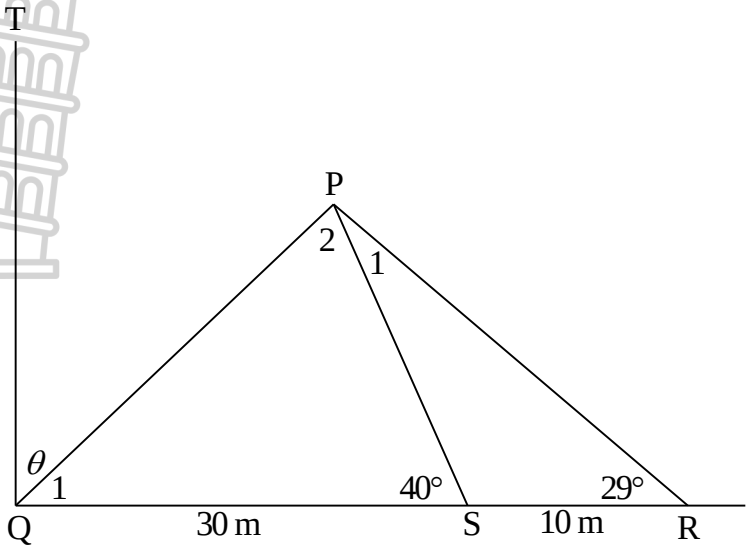
6.3.1	$\dfrac{\cos(180°-k).\sin(k-90°)-1}{\tan^2(540°+k).\sin(90°+k).\cos(-k)}$ $=\dfrac{-\cos k.-\cos k-1}{\tan^2 k.\cos k.\cos k}$ $=\dfrac{\cos^2 k-1}{\frac{\sin^2 k}{\cos^2 k}.\cos^2 k}$ $=\dfrac{-\sin^2 k}{\sin^2 k}$ $=-1$	✓ for/*vir* $-\cos k$ ✓ for/*vir* $-\cos k$ ✓ for/*vir* $\tan^2 k$ ✓ for/*vir* $\cos k$ ✓ for/*vir* $\cos k$ ✓ for changing $\tan^2 k$ *vir verandering van* $\tan^2 k$ ✓ for answer / *vir antwoord*	(7)
6.3.2	$\tan^2 k.\cos^2 k=0$ $\tan^2 k=0$ or/*of* $\cos^2 k=0$ $\tan k=0$ or/*of* $\cos k=0$ $\therefore k=0°$ or/*of* $k=90°$ or/*of* $k=180°$ or/*of* $k=270$ or/*of* $k=360°$	✓ $\tan^2 k.\cos^2 k=0$ $\tan^2 k=0$ or/*of* $\cos^2 k=0$ ✓✓ $\tan k=0$ or/*of* $\cos k=0$ ✓ $k=0°$; $k=90°$ ✓ $k=180°$; $k=270°$ ✓ $k=360°$	(6)
6.4	$\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}=\dfrac{4\tan\theta}{\cos\theta}$ LHS/*LK* $=\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}$ $=\dfrac{1+2\sin\theta+\sin^2\theta-1+2\sin\theta-\sin^2\theta}{(1-\sin\theta)(1+\sin\theta)}$ $=\dfrac{4\sin\theta}{1-\sin^2\theta}$ $=\dfrac{4\sin\theta}{\cos^2\theta}$ $=\dfrac{4\tan\theta}{\cos\theta}=$ RHS/*RK*	✓ for/*vir* LCD/*KGD* ✓ for/*vir* $1+2\sin\theta+\sin^2\theta$ ✓ for/*vir* $-1+2\sin\theta-\sin^2\theta$ ✓ for/*vir* $\dfrac{4\sin\theta}{1-\sin^2\theta}$ ✓ for/*vir* $\cos^2\theta$	(5)

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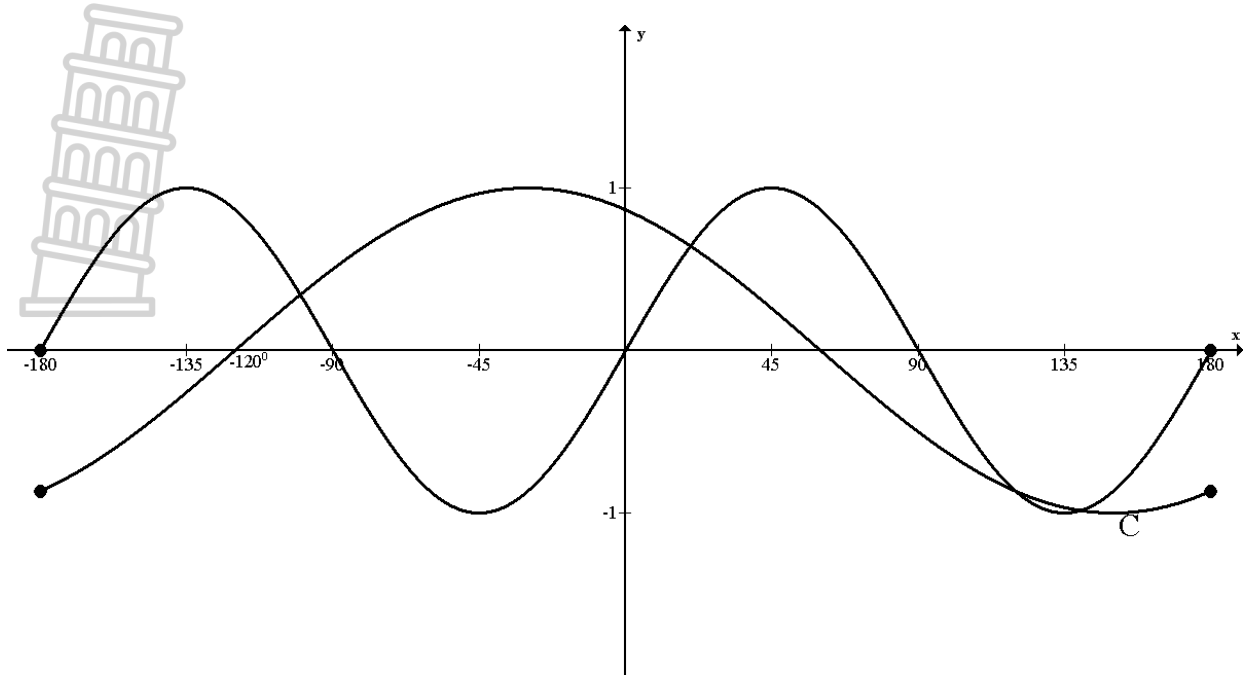
6.5	$6\sin^2\theta+\cos\theta=4$ $6(1-\cos^2\theta)+\cos\theta=4$ $6-6\cos^2\theta+\cos\theta-4=0$ $-6\cos^2\theta+\cos\theta+2=0$ $6\cos^2\theta-\cos\theta-2=0$ $(3\cos\theta-2)(2\cos\theta+1)=0$ $\cos\theta=\frac{2}{3}$ or/*of* $\cos\theta=-\frac{1}{2}$ $\theta=48{,}19°+360°.k$ or/*of* $\theta=311{,}81°+360°.k$ OR/*OF* $\theta=120°+360°.k$ or/*of* $\theta=240°+360°.k$ where/*waar* $k\in Z$	✓ for/*vir* $1-\cos^2\theta$ ✓ for the two general solutions/ *vir die twee algemene oplossings* ✓ for standard form/ *vir standaardvorm* ✓ for factors / *vir faktore* ✓ for the other two general solutions/ *vir die ander twee algemene oplossings* ✓ for answers of $\cos\theta=\frac{2}{3}$ *vir antwoorde van* $\cos\theta=\frac{2}{3}$ ✓ for answers of $\cos\theta=-\frac{1}{2}$ *vir antwoorde van* $\cos\theta=-\frac{1}{2}$	(7)
6.6	$p=\tan A+\sin A$ and/*en* $q=\tan A-\sin A$ $pq=(\tan A+\sin A)(\tan A-\sin A)$ $pq=\tan^2 A-\sin^2 A$ $pq=\frac{\sin^2 A}{\cos^2 A}-\sin^2 A$ $pq=\frac{\sin^2 A-\sin^2 A.\cos^2 A}{\cos^2 A}$ $pq=\frac{\sin^2 A(1-\cos^2 A)}{\cos^2 A}$ $pq=\tan^2 A.\sin^2 A$	✓ for substitution *vir vervanging* ✓ for multiplication *vir vermenigvuldiging* ✓ for changing $\tan^2 A$ *vir verandering van* $\tan^2 A$ ✓ for the numerator *vir die teller* ✓ for the common factor *vir die gemene faktor*	(5)
			[41]

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QUESTION 7/*VRAAG 7*

			
7.1	Exterior angle of a triangle / *Buitehoek van 'n driehoek*	✓ answer / *antwoord*	(1)
7.2	$\frac{PS}{\sin 29°} = \frac{10}{\sin 11°}$ $PS = \frac{10.\sin 29°}{\sin 11°}$ PS = 25,41 m	✓ for sub. in sine rule *vir verv. in sinus-reël* ✓✓ for the answer *vir die antwoord*	(3)
7.3	$PQ^2 = (30)^2 + (25,41)^2 - 2\times 30\times 25,41\times \cos 40°$ PQ = 19,44 m $\frac{\sin Q_1}{25,41} = \frac{\sin 40°}{19,44}$ $\sin Q_1 = \frac{25,41\times \sin 40°}{19,44}$ $\therefore \hat{Q}_1 = 57,16°$ $\therefore \theta = 32,84°$	✓ for sub. in the cosine rule *verv. in die cosinus-reël* ✓ for the answer PQ *vir die antwoord* PQ ✓for using the sine rule *vir gebruik van die sinus-reël* ✓ for/*vir* $\hat{Q}_1$ ✓ for/*vir* θ	(5)
			[9]

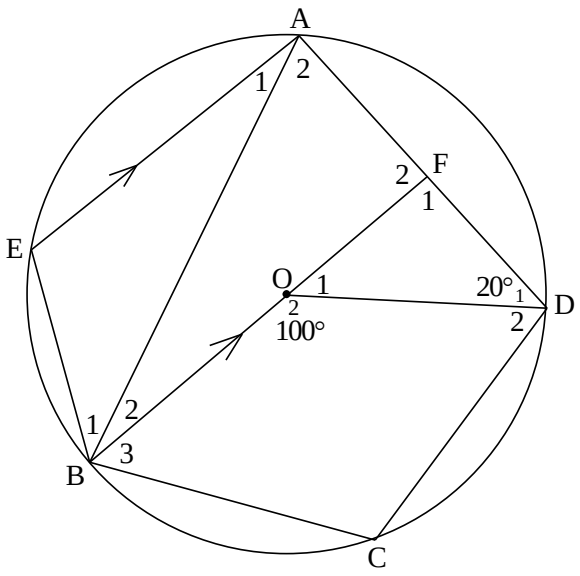
QUESTION 8 / *VRAAG 8*



8.1	$a = 2 \qquad b = -30°$	✓ for/*vir* a ✓ for/*vir* b	(2)
8.2	$C(150°; -1)$	✓ for/*vir* $150°$ ✓ for/*vir* -1	(2)
8.3	$-120° \leq x \leq -90°$	✓ for/*vir* $-120°$ ✓ for/*vir* $-90°$ ✓ for correct notation *vir korrekte notasie*	(3)
8.4	$f(x) = \sin 2\,(x - 30°)$	✓ for correct answer *vir korrekte antwoord*	(1)
			[8]

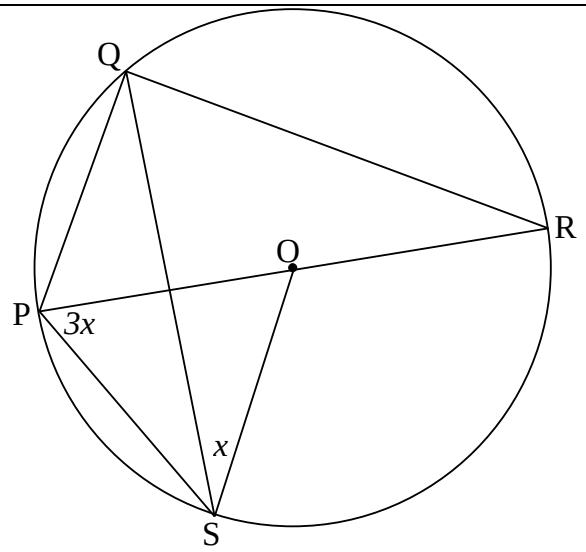
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QUESTION 9/*VRAAG 9*



9.1.1	< at centre = 2 x angle at the circumference *Middelpunts ∠ = 2 × Omtreks ∠*	✓ for the answer *vir die antwoord*	(1)
9.1.2	<'s on a straight line *∠'e op 'n reguitlyn*	✓ for the answer *vir die antwoord*	(1)
9.1.3	Exterior angle of a triangle / <'s of a triangle *Buitehoek van 'n driehoek / ∠e van 'n driehoek*	✓ for the answer *vir die antwoord*	(1)
9.1.4	$\widehat{A} = \widehat{F}_1$; corresponding angles = ; EA∥BOF *ooreenkomstige ∠e = ; EA || BOF*	✓ for the answer *vir die antwoord*	(1)
9.1.5	alternate angles = ; EA∥BOF *verwisselende hoeke = ; EA || BOF*	✓ for the answer *vir die antwoord*	(1)

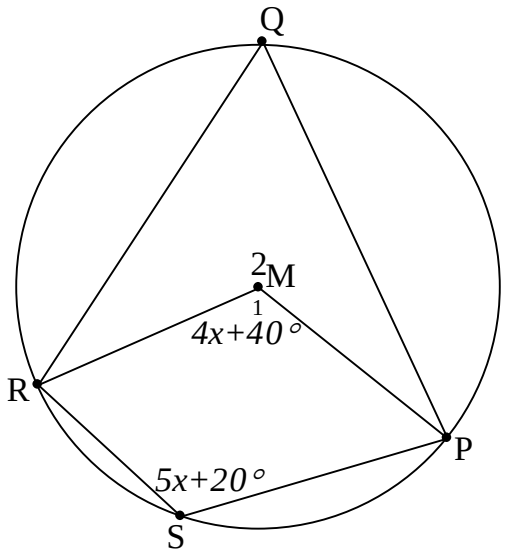
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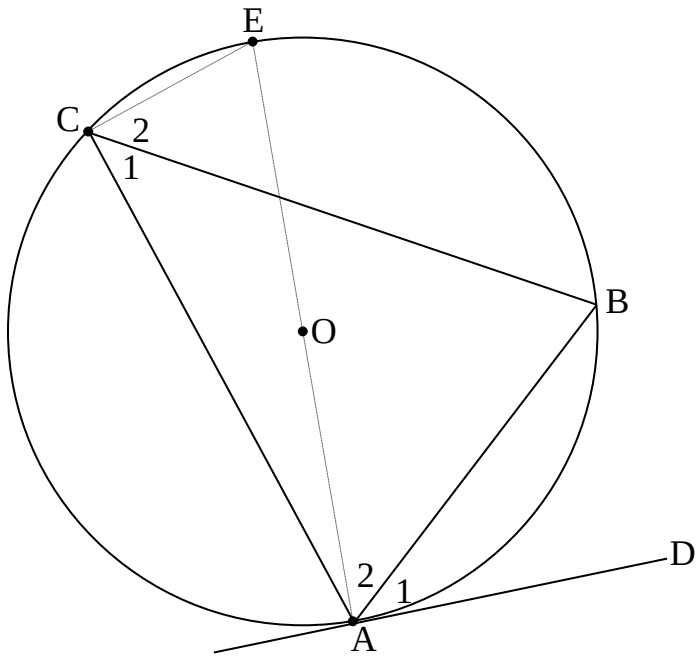
9.2.1	$S\hat{Q}R = 3x$ (<s in the same segment) (*∠e in dieselfde segment*)	✓ S ✓ R	(2)
9.2.2	$\hat{Q} = 90°$ (<s in a semi-circle) (*∠e in 'n halwe-sirkel*) $\therefore P\hat{Q}S = 90° - 3x$	✓ S ✓ R ✓ answer / *antwoord*	(3)
9.2.3	$P\hat{S}O = 3x$ (<s opposite equal sides) (∠e *teenoor gelyke sye*) $\therefore P\hat{S}Q = 2x$ ($Q\hat{S}O = x$)	✓ S ✓ R ✓ answer / *antwoord*	(3)
9.2.4	$P\hat{R}Q = 2x$ (<s in the same segment) (∠e *in dieselfde segment*)	✓ S ✓ R	(2)
9.2.5	$Q\hat{P}R = 180° - (2x + 90°)$ (<s of a triangle) (*∠e van 'n driehoek*) $= 90° - 2x$	✓ S and/*en* R ✓ answer / *antwoord*	(2)
			[17]

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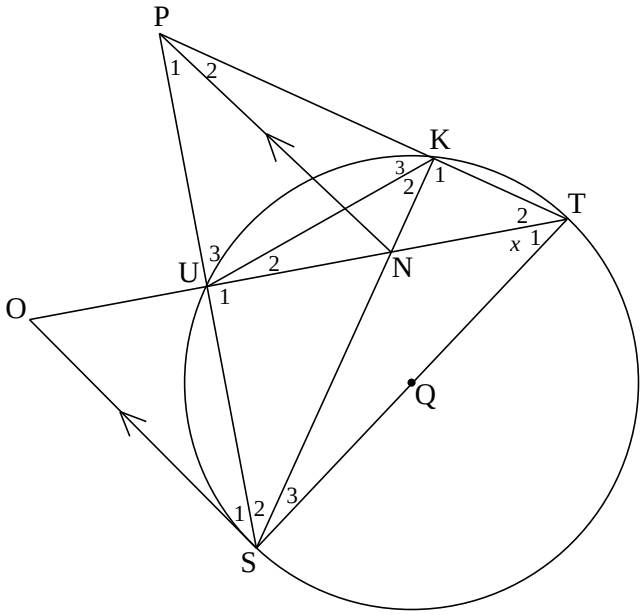
QUESTION 10/*VRAAG 10*



10.1	$\hat{Q} = 2x + 20°$ (< at the centre = 2 × angle at the circumf.) (*Middelpunts*$\angle$ = 2 × *Omtrekshoek*) $\therefore 2x + 20° + 5x + 20° = 180°$ (opp. <s of a c.q.) (*teenoorst.* $\angle$*e van 'n k.v*) $7x + 40° = 180°$ $7x = 140°$ $\therefore x = 20°$ $\therefore \hat{Q} = 60°$ **OR / *OF*** $\hat{M}_2 = 360° - (4x + 40°)$ (<s around a point) ($\angle$*e rondom 'n punt*) $= 320° - 4x$ $320° - 4x = 2(5x + 20°)$ (< at the centre) / (*Middelpunts* $\angle$) $320° - 4x = 10x + 40°$ $14x = -280°$ $\therefore x = 20°$ $\therefore \hat{Q} = 60°$	✓ for/*vir* S ✓ for/*vir* R ✓ for S and R *vir* S *en* R ✓ for simplifying *vereenvoudiging* ✓ the answer *die antwoord* ✓ for S and R *vir* S *en* R ✓ for the answer *vir die antwoord* ✓ for S and R *vir* S *en* R ✓ for simplifying *vereenvoudiging* ✓ for the answer *vir die antwoord*	(5)

10.2			
	Construct diameter AE and join C to E. Label $\hat{C}_1$, $\hat{C}_2$ and $\hat{A}_2$ $\hat{C}_1 + \hat{C}_2 = 90°$ (< in a semi - circle) $\hat{A}_1 + \hat{A}_2 = 90°$ (tan $\perp$ rad) But $\hat{C}_2 = \hat{A}_2$ (<s in the same segment) $\therefore \hat{A}_1 = \hat{C}_1$	✓ for construction ✓ for S ✓ for R ✓ for S ✓ for R ✓ for S and R	
	Teken Middellyn AE *en verbind* C *aan* E. *Merk* $\hat{C}_1$, $\hat{C}_2$ *en* $\hat{A}_2$ $\hat{C}_1 + \hat{C}_2 = 90°$ ($\angle$ *in 'n halwe - sirkel*) $\hat{A}_1 + \hat{A}_2 = 90°$ (*raaklyn* $\perp$ *radius*) *Maar* $\hat{C}_2 = \hat{A}_2$ ($\angle$*e in dieselfde segment*) $\therefore \hat{A}_1 = \hat{C}_1$	✓ *vir konstruksie* ✓ *vir* S ✓ *vir* R ✓ *vir* S ✓ *vir* R ✓ *vir* S *en* R	(6)

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10.3.1	$\hat{U}_1 = 90°$ (<s in a semi - circle) (*∠e in 'n halwe - sirkel*) $\hat{K}_1 = 90°$ (<s in a semi - circle) (*∠e in 'n halwe - sirkel*) $\hat{K}_3 + \hat{K}_2 = 90°$ (<s on a straight line) (*∠e op 'n reguitlyn*) $\therefore \hat{U}_1 = \hat{K}_2 + \hat{K}_3 = 90°$ $\therefore$ PUNK is a c.q. (conv. exterior < of a c.q) PUNK *is 'n k.v* (*omgekeerde Buite∠ van k.v*)	✓ for/*vir* S and/*en* R ✓ for/*vir* S and/*en* R ✓ for/*vir* S and/*en* R ✓ for/*vir* S ✓ for/*vir* R	(5)
10.3.2	$\widehat{T}_2 = x$ (TO bisects S$\widehat{T}$P) / (TO halveer S$\widehat{T}$P) $\widehat{T}_1 = \widehat{K}_2 = x$ (<s in the same segment) *(∠e in dieselfde segment)* $\widehat{K}_2 = \widehat{P}_1 = x$ (<s in the same segment) (*∠e in dieselfde segment*) $\widehat{P}_1 = \widehat{S}_1 = x$ (alt. <s; PN ∥ OS) */ (Verw. ∠e ; PN* ∥ OS) $\therefore \widehat{S}_1 = \widehat{T}_1 = x$ $\therefore$ SO is a tangent (conv. tan-chord theorem) *SO is 'n raaklyn (omgekeerde raaklyn-koord stelling)*	✓ for S /*vir* S/✓ and/*en* R ✓ for S /*vir* S /and/*en* R ✓ S and/*en* R ✓ for conclusion *vir gevolgtrekking* ✓ for R /*vir* R	(6)
10.3.3	$\hat{T}_1 = \hat{T}_2 = x$ (proven/*bewys*) $\hat{S}_1 = \hat{T}_2 = x$ (proven/*bewys*) $\therefore$ POST is a c.q. (conv. <s in the same segment) POST *is 'n k.v.* (*omgekeerde ∠e in dieselfde segment*)	✓ for/*vir* S and/*en* R ✓ for S /*vir* S and/*en* R ✓ for R/*vir* R	(3)
			[25]

TOTAL/*TOTAAL*: 150

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