



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION/ SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P2/WISKUNDE V2

2015

MEMORANDUM

MARKS/PUNTE: 150

APPROVED
W. M. M. J. - E. P. M. M.
15/05/2015

[Signature]
W. M. M. J. - E. P. M. M.
15/05/2015

This memorandum consists of 18 pages.
Hierdie memorandum bestaan uit 18 bladsye.

+ ASSEMBLY OF
5 pages.

DEPARTMENT OF BASIC
EDUCATION
155-13-17

NOTE:

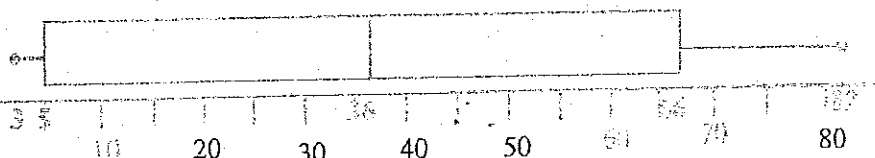
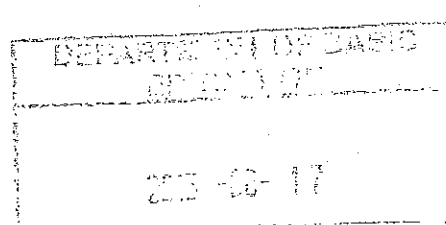
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord van 'n vraag doodgetrek het en nie oorgedoen het nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.
- Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.

QUESTION/VRAAG 1 (no penalty for rounding in this question)

3	4	4	5	23	29	32	36	40	47	56	66	68	76	82
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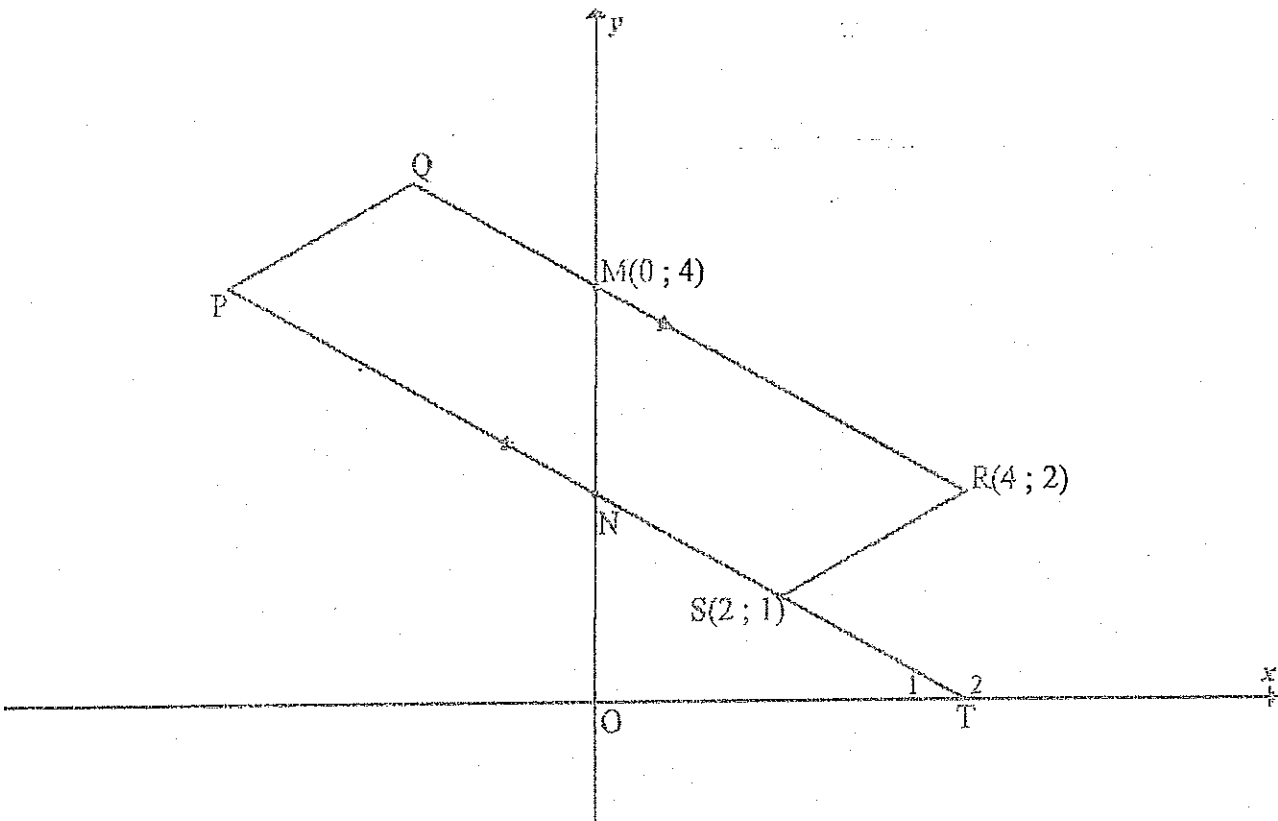
1.1.1	Mean/gemiddelde = $\frac{571}{15}$ = 38,07 years/jaar	✓ $\frac{571}{15}$ ✓ answer/antw (2)
1.1.2	Median/mediaan = 36 years/jaar	✓ answer/antw (1)
1.1.3	IQR/KV = 66 - 5 = 61 years/jaar	✓ $Q_3 = 66$ ✓ $Q_1 = 5$ ✓ answer/antw (3)
1.1.4	Standard deviation/standaardafwyking = 26,388... = 26,39 years/jaar	✓✓ answer/antw (2)
1.2		✓ max & min ✓ median/ mediaan ✓ quartiles/ kwartiele (3)
1.3	The data is skewed to the right/Die data is skeef na regs OR/OF positively skewed/positief skeef	 ✓ answer/antw (1) (12)

QUESTION/VRAAG 2 (no penalty for rounding in this question)

Number of Saturdays attended	12	11	10	10	9	9	7	6	5	4	12	11	6
Mark (as a %)	96	91	78	83	75	62	70	68	56	34	88	90	59

2.1	$a = 22,26252159\dots$ $b = 5,898100173\dots$ $\therefore \hat{y} = 5,90x + 22,26$	$\checkmark 22,26$ $\checkmark 5,90$ \checkmark equation/vgl (3)
2.2	$r = 0,92$ (0,9205276443...)	$\checkmark \checkmark$ answer/antw (2)
2.3	There is a very strong relationship between the variables/ <i>Daar is 'n baie sterk verband tussen die veranderlikes.</i>	\checkmark very strong/ <i>baie sterk</i> (1)
2.4	$\therefore \hat{y} \approx 69,447 = 69,45 \approx 69\%$ (accept 70%) OR/OF $\therefore \hat{y} \approx 5,90(8) + 22,26$ $\approx 69,46\%$ $\approx 69\%$ (accept 70%)	$\checkmark \checkmark$ answer/antw (2) \checkmark substitution/ <i>substitusie</i> \checkmark answer/antw (2) [8]

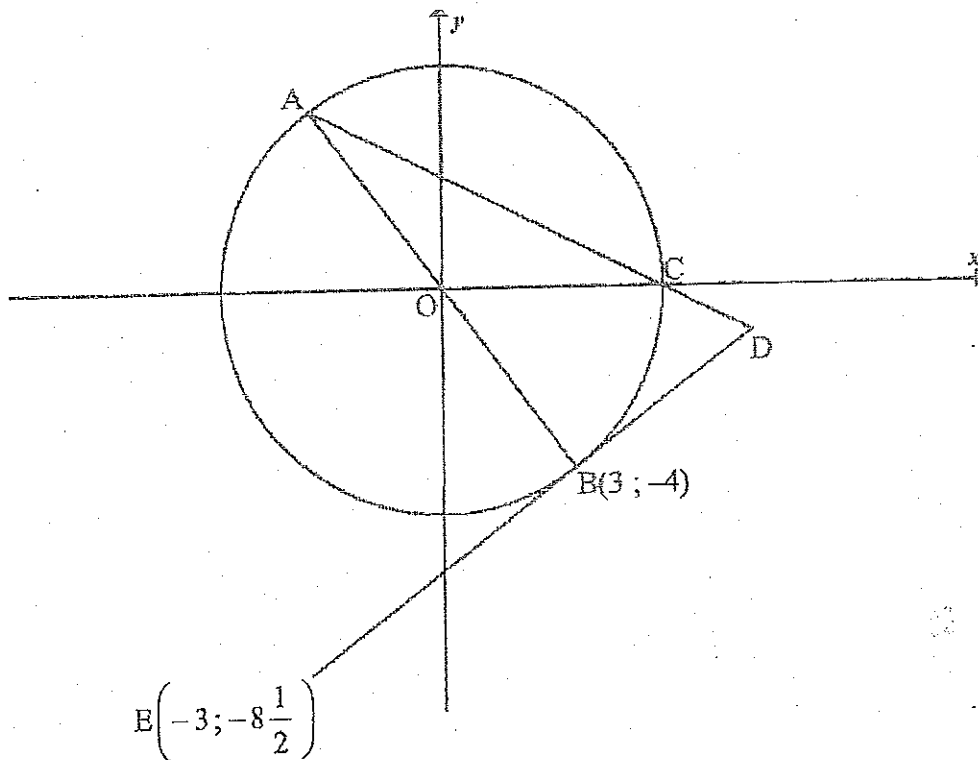
QUESTION/VRAAG 3



<p>3.1</p>	$m_{RS} = \frac{2-1}{4-2}$ $= \frac{1}{2}$	<p>✓ correct subst/ korrekte subst ✓ answer/antw (2)</p>
<p>3.2</p>	<p>PQ is $y = \frac{1}{2}x + 6$</p> <p>∴ PQ ∥ RS $\left(m_{PQ} = m_{RS} = \frac{1}{2} \right)$</p> <p>But/max PS ∥ QR</p> <p>∴ PQRS = parallelogram (opp sides of quad are / teenoorst sye v vh)</p> <p>∴ $PQ^2 = RS^2 = (4-2)^2 + (2-1)^2$ $= 2^2 + 1^2$</p> <p>∴ PQ = RS = $\sqrt{5} = 2,24$ (opp sides of m / teenoorst sye v m)</p>	<p>✓ S</p> <p>✓ S/R</p> <p>✓ subst of/subst v R(4 ; 2) and/en S(2 ; 1)</p> <p>✓ answer/antw (4)</p>

<p>3.3</p>	$m_{QR} = \frac{4-2}{0-4}$ $= -\frac{1}{2}$ $m_{PT} = m_{QR} = -\frac{1}{2} \quad (\text{PS} \parallel \text{QR})$ <p>Equation of <i>Vgl</i> van PT:</p> $y - y_1 = -\frac{1}{2}(x - x_1) \quad \dots \quad y = -\frac{1}{2}x + c$ $y - 1 = -\frac{1}{2}(x - 2) \quad \text{OR/OR} \quad 1 = -\frac{1}{2}(2) + c$ $y - 1 = -\frac{1}{2}x + 1 \quad \quad \quad 2 = c$ $y = -\frac{1}{2}x + 2 \quad \quad \quad y = -\frac{1}{2}x + 2$	<p>✓ m_{QR}</p> <p>✓ m_{PT}</p> <p>✓ subst of/subst v m and/en S(2 ; 1)</p> <p>✓ equation/vgl (4)</p>
<p>3.4</p>	<p>N(0 ; 2)</p>	<p>✓ coordinates (1)</p>
<p>3.5</p>	$\tan T_2 = m_{PT} = -\frac{1}{2}$ $T_2 = 153,4^\circ$ <p>Equation of <i>Vgl</i> van NR: $y = 2$</p> <p>∴ $\hat{RNS} = \hat{NTO}$ (alt \angles; NR \parallel OT)</p> $\hat{RNS} = \hat{NTO} = 180^\circ - 153,4^\circ$ $= 26,6^\circ$	<p>✓ $\tan T_2 = -\frac{1}{2}$</p> <p>✓ $T_2 = 153,4^\circ$</p> <p>✓ $y = 2$</p> <p>✓ S</p> <p>✓ $\hat{RNS} = 26,6^\circ$ (5) [16]</p>

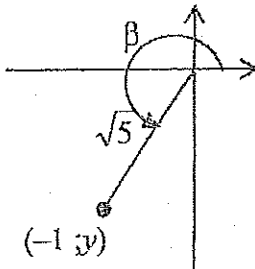
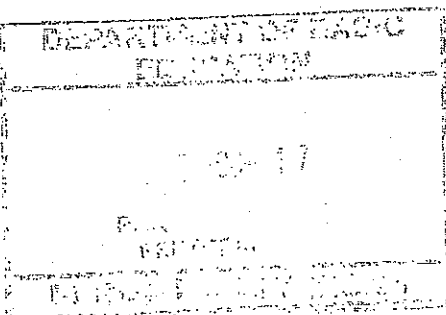
QUESTION/VRAAG 4



4.1	$A(-3; 4)$	$\checkmark x = -3$ $\checkmark y = 4$ (2)
4.2	$r^2 = (3)^2 + (-4)^2$ OR $r^2 = (-3)^2 + (4)^2$ $r^2 = 25$ \therefore Equation of the circle through A, B and C/ <i>Vgl vd sirkel deur A, B en C:</i> $x^2 + y^2 = 25$	\checkmark substitution/ <i>substitusie</i> $\checkmark r^2 = 25$ \checkmark answer/antw (3)
4.3	$r = 5$ $\therefore AB = 10$ units/eenhede	$\checkmark r = 5$ \checkmark answer/antw (2)
4.4	$AB \perp ED$ OR $\angle ABD = 90^\circ$ (radius \perp tangent/raaklyn) $BD^2 = AD^2 - AB^2$ (Theorem of Pythagoras/st v Pythagoras) $BD^2 = (\sqrt{25})^2 - (10)^2$ $BD^2 = 25$ $BD = 5$ units/eenhede	\checkmark B/R \checkmark subst into/in Pyth th/stelling \checkmark answer/antw (2)
4.5	area of/oppervlakte van $\triangle ABD = \frac{1}{2}$ base/basis \times height/hoogte $\frac{1}{2}(5)(10)$ 25 square units/vk eenhede	\checkmark formula/formule \checkmark substitution/ <i>substitusie</i> \checkmark answer/antw

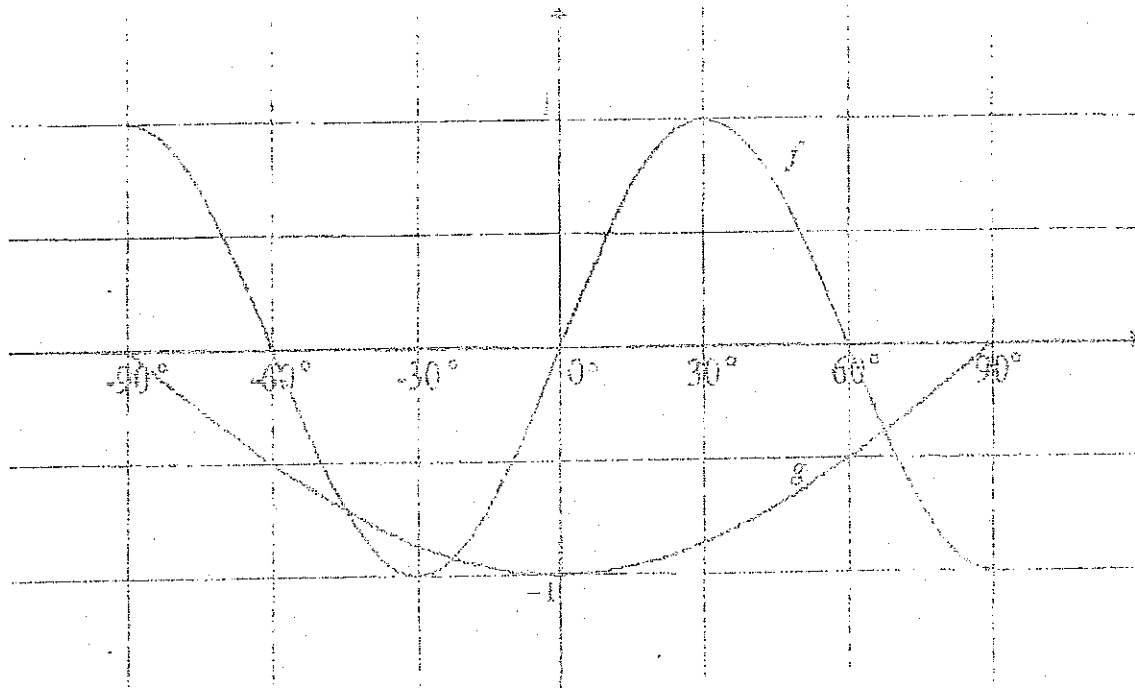
4.6	<p>AE is a diameter/middellyn (line subtending a right angle/ lyn onderspan 'n regte hoek)</p> <p>$AE = 4 - (-8,5) = 12,5$ units/eenhede</p> <p>$\therefore r = 6\frac{1}{4}$ or/of $\frac{25}{4}$</p> <p>Centre of new circle/middelpunt v nuwe sirkel:</p> <p>$= (-3; \frac{4 + -8,5}{2})$</p> <p>$(-3; -2\frac{1}{4})$ or $(-3; -\frac{9}{4})$ or $(-3; -2,25)$</p> <p>\therefore Equation of new circle/Vgl v nuwe sirkel:</p> <p>$(x + 3)^2 + (y + \frac{9}{4})^2 = \frac{625}{16} = 39,06$</p>	<p>✓ S/R</p> <p>✓ $AE = 12,5$</p> <p>✓ $r = 6\frac{1}{4}$ or/of $\frac{25}{4}$</p> <p>✓ $x = -3$</p> <p>✓ $y = -2\frac{1}{4}$</p> <p>✓ equation/vgl</p> <p>(6)</p> <p>[19]</p>
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QUESTION/VRAAG 5

<p>5.1</p>	$\cos \beta = -\frac{1}{\sqrt{5}} \text{ and/en } 180^\circ < \beta < 360^\circ$ $(-1)^2 + y^2 = (\sqrt{5})^2$ $1 + y^2 = 5$ $y^2 = 4$ $y = -2$ $\therefore \sin \beta = -\frac{2}{\sqrt{5}}$ 	<p><u>sketch/skets:</u></p> <ul style="list-style-type: none"> ✓ correct quad/ korrekte kwadr ✓ $x = -1$ ✓ subst into Pyth/ subst in Pyth ✓ value of/waarde van y ✓ value of/waarde van $\sin \beta$ <p>(5)</p>
<p>5.2</p>	$\frac{(-\tan x)(-\sin(90^\circ - x))}{4 \sin x}$ $\frac{(-\tan x)(-\cos x)}{4 \sin x}$ $\frac{\left(-\frac{\sin x}{\cos x}\right)(-\cos x)}{4 \sin x}$ $\frac{1}{4}$ 	<ul style="list-style-type: none"> ✓ $-\tan x$ ✓ $-\sin(90^\circ - x)$ ✓ $\sin x$ ✓ $-\cos x$ ✓ $\frac{\sin x}{\cos x}$ ✓ answer/antw <p>(6)</p>
<p>5.3.1</p>	$\tan A = \frac{\sin A}{\cos A} = \frac{p}{q}$	<ul style="list-style-type: none"> ✓ answer/antw <p>(1)</p>
<p>5.3.2</p>	$p^4 - q^4 = (p^2 + q^2)(p^2 - q^2)$ $= (\sin^2 A + \cos^2 A)(\sin^2 A - \cos^2 A)$ $= (1)(\sin^2 A - \cos^2 A)$ $= -1(\cos^2 A - \sin^2 A)$ $= -\cos 2A$	<ul style="list-style-type: none"> ✓ factors/faktore ✓ identity/identiteit ✓ -1 as CF/GF ✓ answer/antw <p>(4)</p>
<p>5.4.1</p>	$\text{LHS/LK} = \frac{\cos^2 \theta - \cos 2\theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\cos^2 \theta - (\cos^2 \theta - \sin^2 \theta)}{\sin \theta \cdot \cos \theta}$ $= \frac{\cos^2 \theta - \cos^2 \theta + \sin^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin \theta}{\cos \theta} = \tan \theta = \text{RHS/RK}$ <p>OR</p>	<ul style="list-style-type: none"> ✓ writing as single term/skryf as enkelterm ✓ expansion/ uitbreiding ✓ simplify/vereenv ✓ simplify/vereenv ✓ simplify/vereenv <p>(5)</p>

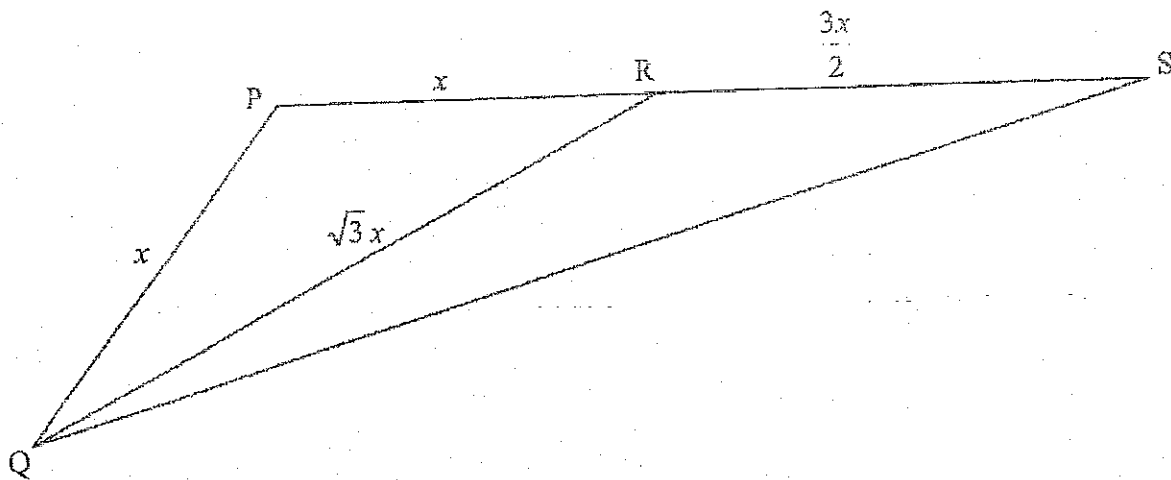
	$\begin{aligned} \text{LHS/LK} &= \frac{\cos^2 \theta - \cos 2\theta}{\sin \theta \cdot \cos \theta} \\ &= \frac{\cos^2 \theta - (2\cos^2 \theta - 1)}{\sin \theta \cdot \cos \theta} \\ &= \frac{1 - \cos^2 \theta}{\sin \theta \cdot \cos \theta} \\ &= \frac{\sin^2 \theta}{\sin \theta \cdot \cos \theta} \\ &= \frac{\sin \theta}{\cos \theta} \\ &= \tan \theta = \text{RHS/RK} \end{aligned}$	<ul style="list-style-type: none"> ✓ writing as single term/skryf as enkelterm ✓ expansion/uitbreiding ✓ simplify/vereenv ✓ identity/identiteit ✓ simplify/vereenv (5)
5.4.2	<p>Undefined when/Ongedefinieerd as: $\cos \theta = 0, \sin \theta = 0$ $\therefore \theta = 90^\circ$</p>	<ul style="list-style-type: none"> ✓✓ answer/antw (2)
5.5	$\begin{aligned} 2(2\sin x \cdot \cos x) + 3 \sin x &= 0 \\ 4\sin x \cdot \cos x + 3 \sin x &= 0 \\ \sin x (4\cos x + 3) &= 0 \\ \sin x = 0 \quad \text{or/of} \quad \cos x &= -\frac{3}{4} \end{aligned}$ <p>$x = 0^\circ + k \cdot 360^\circ$ or $180^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ OR/OF $x = k \cdot 180^\circ; k \in \mathbb{Z}$</p> <p>or/of $x = 138,59^\circ + k \cdot 360^\circ$ or $221,41^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ OR/OF $x = \pm 138,59^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$</p>	<ul style="list-style-type: none"> ✓ expansion/uitbreiding ✓ factorise/faktoriseer ✓ both equations/beide vgl's ✓ $x = 0^\circ + k \cdot 360^\circ$ or $180^\circ + k \cdot 360^\circ$ OR/OF $x = k \cdot 180^\circ$ ✓ $138,59^\circ + k \cdot 360^\circ$ or $221,41^\circ + k \cdot 360^\circ$ OR/OF $\pm 138,59^\circ + k \cdot 360^\circ$ ✓ $k \in \mathbb{Z}$ <p style="text-align: right;">(6) [29]</p>

QUESTION/VRAAG 6

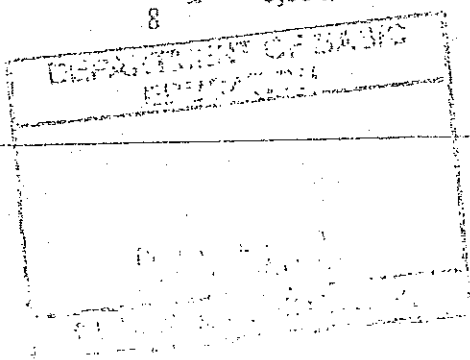


6.1	Period of/Periode van $f = 120^\circ$	✓ 120° (1)
6.2	$b = 3$	✓ $b = 3$ (1)
6.3	$x = -45^\circ$ or/of $x = -22,5^\circ$ or/of $x = 67,5^\circ$	✓ $x = -45^\circ$ ✓ $x = -22,5^\circ$ ✓ $x = 67,5^\circ$ (3)
6.4	$x \in (-45^\circ; -22,5^\circ) \cup (67,5^\circ; 90^\circ)$ OR/OF $-45^\circ < x < -22,5^\circ$ or/of $67,5^\circ < x \leq 90^\circ$	✓ critical values ✓ notation ✓ critical values ✓ notation (4) ✓ kritieke waardes ✓ notasie ✓ kritieke waardes ✓ notasie (1) (1)

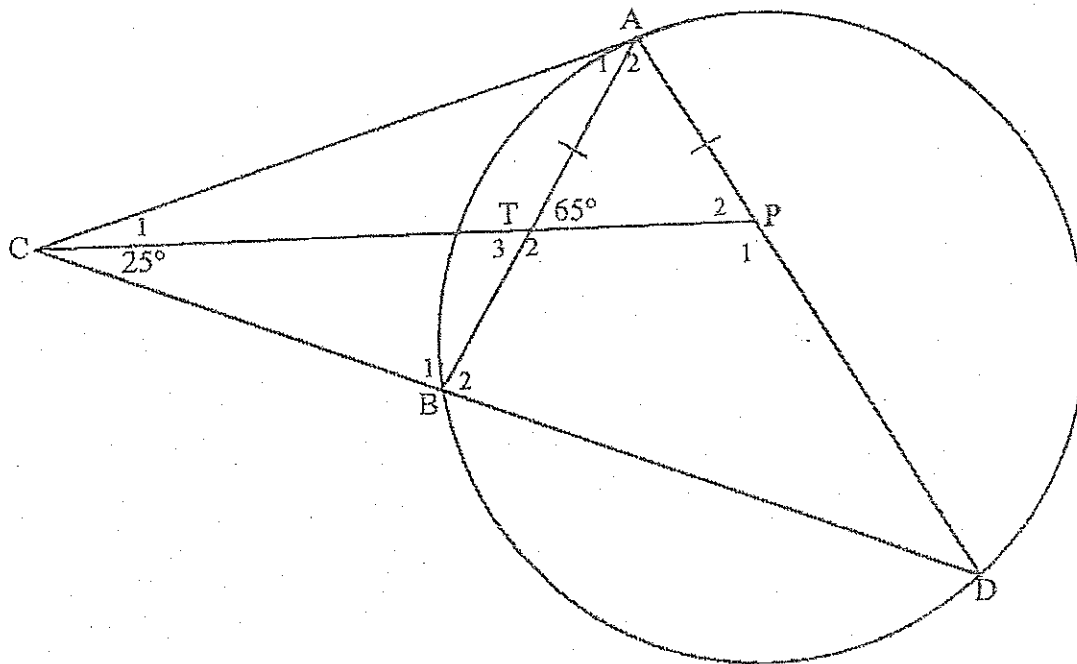
QUESTION/VRAAG 7



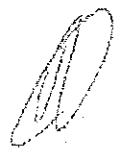
<p>7.1</p>	$QR^2 = PQ^2 + RP^2 - 2 \cdot PQ \cdot RP \cdot \cos \hat{P}$ $(\sqrt{3}x)^2 = x^2 + x^2 - 2 \cdot x \cdot x \cdot \cos \hat{P}$ $\cos \hat{P} = \frac{x^2 + x^2 - (\sqrt{3}x)^2}{2x \cdot x}$ $\cos \hat{P} = \frac{-x^2}{2x^2}$ $\cos \hat{P} = -\frac{1}{2}$ $\hat{P} = 120^\circ$	<p>✓ correct subst into cosine rule/korrek subst in cos-reël</p> <p>✓ cos \hat{P} as subj/onderw</p> <p>✓ simplify/vereenv</p> <p>✓ answer/antw</p> <p>(4)</p>
<p>7.2</p>	<p>$\hat{P}RQ = \hat{P}QR = 30^\circ$ (\angles opp equal sides/\anglee teenoor gelyke sye)</p> <p>$\hat{Q}RS = 150^\circ$ (\angles on a str line/\anglee op reguitlyn)</p> <p>Area of/Opp van $\Delta QRS = \frac{1}{2} (QR)(RS)(\sin \hat{Q}RS)$</p> $\frac{1}{2} (\sqrt{3}x) \left(\frac{3}{2}x\right) (\sin 150^\circ)$ $\left(\frac{3\sqrt{3}}{4}x^2\right) \left(\frac{1}{2}\right)$ $\frac{3\sqrt{3}}{8}x^2 = 0,65x^2$	<p>✓ S</p> <p>✓ S</p> <p>✓ correct subst into area rule/korrek subst in opp-reël</p> <p>✓ simplify/vereenv</p> <p>✓ answer/antw</p> <p>(5)</p> <p>(9)</p>



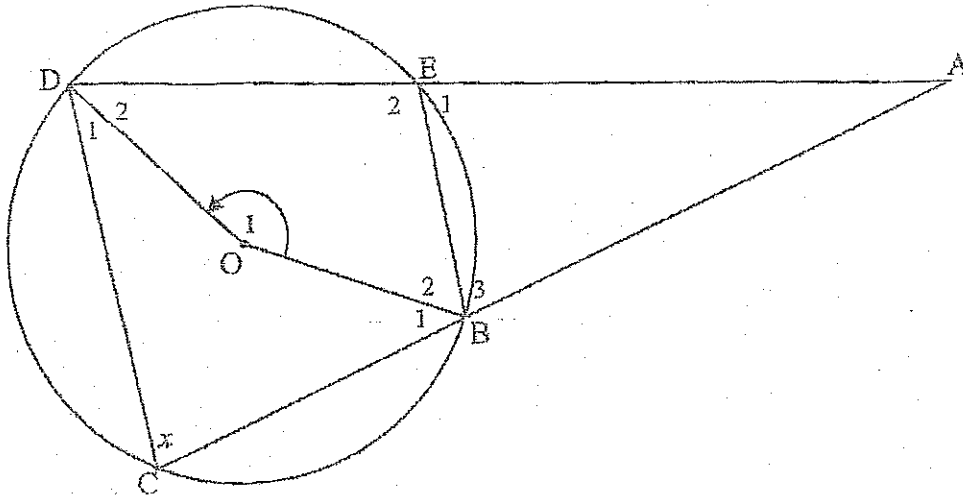
QUESTION/VRAAG 8



8.1.1	$\hat{P}_2 = 65^\circ$	(\angle s opp equal sides/ \angle s teenoor gelyke sye)	\checkmark S \checkmark R	(2)
8.1.2	$\hat{D} = 40^\circ$	(ext \angle of $\triangle CDP$ /buite \angle v $\triangle CDP$) OR/OF (\angle s on a str line; sum of \angle s in \triangle / \angle e op regt lyn; som v \angle e in \triangle)	\checkmark S \checkmark R	(2)
8.1.3	$\hat{A}_1 = 40^\circ$	(ext \angle of $\triangle CAT$ /buite \angle v $\triangle CAT$) OR/OF (\angle s on a str line; sum of \angle s in \triangle / \angle e op regt lyn; som v \angle e in \triangle)	\checkmark S \checkmark R	(2)
8.2	$\hat{A}_1 = \hat{D} = 40^\circ$ $\therefore CA$ is a tangent to the circle (\angle between line and chord)/ CA is 'n raaklyn aan die sirkel (\angle tussen lyn en koord)		\checkmark S \checkmark R	(2) (2)



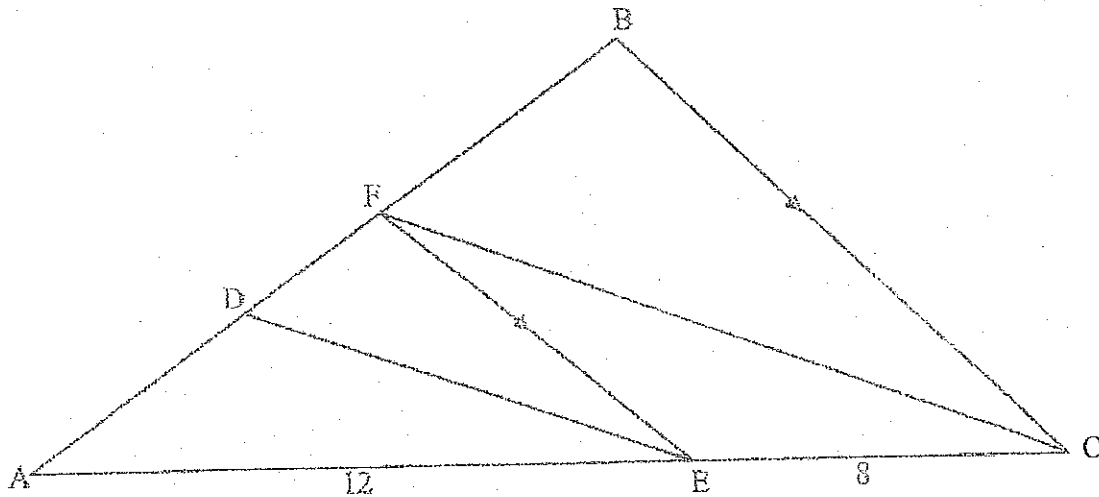
QUESTION/VRAAG 9



9.1.1	ext \angle of cyclic quad/buite \angle van koordevh	✓ R	(1)
9.1.2	\angle at centre = $2 \times \angle$ at circumference / midpts $\angle = 2 \times$ omtreks \angle	✓ R	(1)
9.2.1	$\hat{CDA} = \hat{E} = x$ (corresp \angle s/ooreenk \angle e; $EB \parallel DC$) $\therefore \hat{CDA} = \hat{C} = x$ $\therefore AC = AD$ (sides opp equal \angle s/sye teenoor gelyke \angle e)	✓ S ✓ R ✓ S ✓ (justification)	(4)
9.2.2	$\hat{A} = 180^\circ - 2x$ (sum of \angle s in Δ som van \angle e in Δ) $\hat{O}_1 = 2x$ OR $\hat{A} + \hat{O}_1 = 180^\circ - 2x + 2x = 180^\circ$ $\therefore ABOD$ is a cyclic quad/koordevh (opp \angle s quad supp/ teenoorst \angle e van vh suppl)	✓ S ✓ linking the 2 \angle s ✓ R	(3) [9]

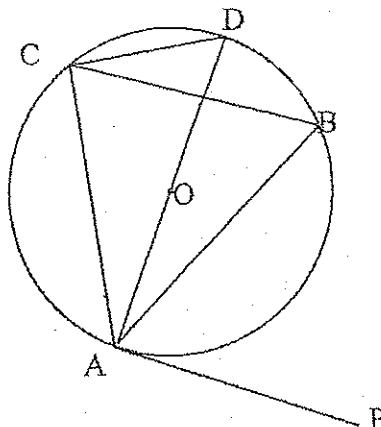
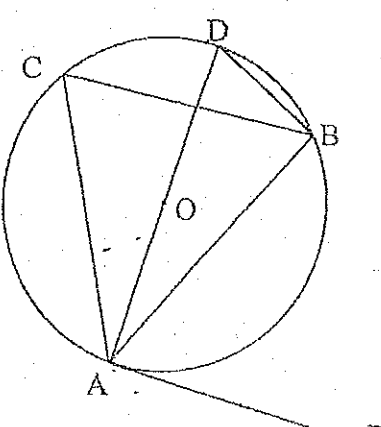
QUESTION/VRAAG 10

10.1	then the line is parallel to the third side/ <i>is die lyn ewewydig aan die derde sy.</i>	✓ S (3)
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10.2.1	$\frac{AE}{AC} = \frac{12}{20} = \frac{3}{5}$ $\frac{AD}{AF} = \frac{3}{5}$ $\therefore \frac{AE}{AC} = \frac{AD}{AF}$ $\therefore DE \parallel FC$ <p>(line divides two sides of Δ in prop/ <i>lyn verdeel twee sye v Δ in dieselfde verh</i>)</p>	✓ S ✓ S ✓ R (3)
10.2.2	$\frac{BF}{BA} = \frac{8}{20}$ $\therefore BF = \frac{8}{20}(14)$ $\therefore BF = \frac{28}{5} \text{ OR/OR } FB = 5\frac{3}{5} \text{ OR/OR } FB = 5,6$	✓ S/R ✓ substitute 14/ <i>stel 14 in</i> ✓ answer/antw (3) [7]

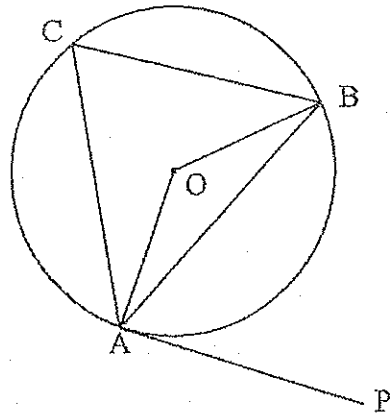
QUESTION/VRAAG 11

<p>11.1</p>	<p>Draw diameter AD and join DC. <i>Trek middellyn AD en verbind DC.</i></p>  <p>Proof/Bewys:</p> <p>$\hat{B}AP + \hat{B}AD = 90^\circ$ (tangent/raaklyn \perp radius) $\hat{D}CB + \hat{A}CB = 90^\circ$ (\angle in semi circle/halfsirkel) but $\hat{B}AD = \hat{D}CB$ (\angles in same segment/\anglee in dies segm) $\therefore \hat{B}AP = \hat{A}CB$</p> <p>OR/OF</p> <p>Draw diameter AD and join DB. <i>Trek middellyn AD en verbind DB.</i></p>  <p>Proof/Bewys:</p> <p>$\hat{P}AB + \hat{B}AD = 90^\circ$ (tangent/raaklyn \perp radius) $\hat{D}BA = 90^\circ$ (\angle in semi circle/halfsirkel) $\hat{B}AD + \hat{A}DB = 90^\circ$ (sum of \angles in Δ/som van \anglee in Δ) $\hat{A}DB = \hat{A}CB$ (\angles in same segment/\anglee in dies segm) $\therefore \hat{B}AP = \hat{A}CB$</p>	<p>✓ construction/ konstruksie</p> <p>✓ S ✓ R ✓ S ✓ R ✓ S/R</p> <p>(6)</p> <p>✓ construction/ konstruksie</p> <p>DEPARTMENT OF BASIC EDUCATION</p> <p>DR. ...</p> <p>✓ S ✓ R ✓ S ✓ R ✓ S/R</p> <p>(6)</p>
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OR/OF

Draw radii OA and OB.
Trek radii OA en OB.



Proof/Bewys:

$$\hat{OAB} + \hat{BAP} = 90^\circ \quad (\text{tangent/raaklyn } \perp \text{ radius})$$

$$\therefore \hat{BAP} = 90^\circ - \hat{OAB}$$

$$\hat{OAB} = \hat{OBA} \quad (\angle\text{s opp equal sides/ } \angle\text{e to gelyke sye})$$

$$\hat{AOB} = 180^\circ - 2\hat{OAB} \quad (\text{sum of } \angle\text{s in } \Delta/\text{som van } \angle\text{e in } \Delta)$$

$$\therefore \hat{ACB} = 90^\circ - \hat{OAB} \quad (\angle \text{ at centre} = 2 \times \angle \text{ at circumference/} \\ \text{midpts } \angle = 2 \times \text{omtreks } \angle)$$

$$\therefore \hat{BAP} = \hat{ACB}$$

✓ construction/
konstruksie

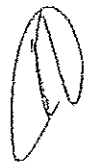
✓ S ✓ R

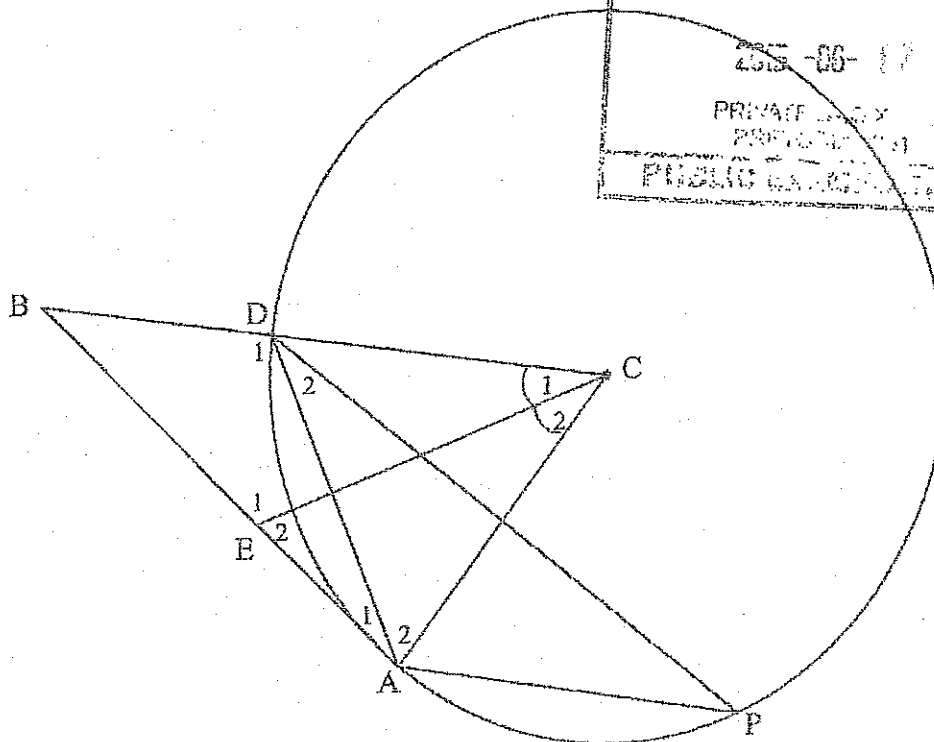
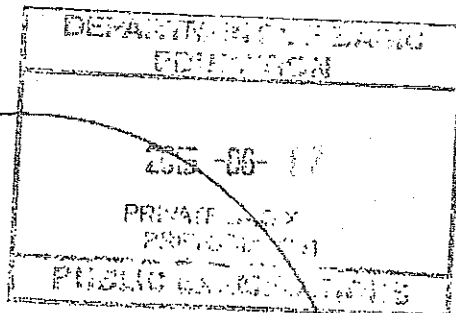
✓ S

✓ S/R

✓ S

(6)





<p>11.2.1</p>	<p>$\hat{DCA} = 2x$ (EC bisector) $\hat{P} = x$ (\angle at centre = $2 \times \angle$ at circumference/ <i>midpts</i> $\angle = 2 \times \text{omtreks} \angle$) $\hat{A}_1 = \hat{P} = x$ (tangent-chord theorem/<i>rkl-kd st</i>) In $\triangle BAD$ and $\triangle BCE$: $\hat{B} = \hat{B}$ (common/<i>gemeen</i>) $\hat{A}_1 = \hat{C}_1$ (proven above) $\therefore \triangle BAD \parallel \triangle BCE$ ($\angle \angle \angle$)</p> <p style="text-align: center;">OR/OF</p> <p>$\hat{DCA} = 2x$ (EC bisector) $\hat{P} = x$ (\angle at centre = $2 \times \angle$ at circumference/ <i>midpts</i> $\angle = 2 \times \text{omtreks} \angle$) $\hat{A}_1 = \hat{P} = x$ (tangent-chord theorem/<i>rkl-kd st</i>) In $\triangle BAD$ and $\triangle BCE$: $\hat{B} = \hat{B}$ (common/<i>gemeen</i>) $\hat{A}_1 = \hat{C}_1$ (proven above) $\hat{D}_1 = \hat{E}_1$ $\therefore \triangle BAD \parallel \triangle BCE$</p>	<p>✓ S ✓ R ✓ S ✓ R ✓ S ✓ S (with justification) ✓ R (7)</p> <p>✓ S ✓ R ✓ S ✓ R ✓ S ✓ S (with justification) ✓ S (7)</p>
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11.2.2(a)	$\hat{BAC} = 90^\circ$ (tangent/raakl \perp radius) $\therefore BC^2 = 8^2 + 6^2 = 100$ (Pythagoras theorem/stelling) $BC = 10$ $AC = DC = 6$ (radii) $\therefore BD = 10 - 6 = 4$ units/eenhede	✓ R ✓ substitution into Pyth theorem ✓ $BC = 10$ ✓ $DC = 6$ ✓ $BD = 4$ (5)
11.2.2(b)	$\frac{BA}{BC} = \frac{BD}{BE}$ ($\triangle BAD \parallel \triangle BCE$) $\therefore \frac{8}{10} = \frac{4}{BE}$ $\therefore BE = 5$ units/eenhede	✓ S ✓ substitution/substitusie ✓ $BE = 5$ (3)
11.2.2(c)	$AE = 3$ In $\triangle ACE$: $\tan x = \frac{3}{6}$ $\therefore x = 26,57^\circ$ OR/OF $\sin 2x = \frac{8}{10}$ $\therefore 2x = 53,1301\dots$ ($2x < 90^\circ$) $\therefore x = 26,57^\circ$	✓ correct trig ratio/korrekte trigvh ✓ correct trig eq/korrekte trigvgl ✓ answer/antw (3) ✓ correct trig ratio/korrekte trigvh ✓ correct trig eq/korrekte trigvgl ✓ answer/antw (3) [24]

TOTAL/TOTAAL: 150



ADDENDUM FOR JUNE PAPER 2 MEMORANDUM

QUESTION 1	
1.1.1	Answer only: 2/2 marks
1.1.3	Answer only: 3/3 marks
	$\text{IQR} = 5 - 66 \checkmark \checkmark$ $= -61 \times$ $\text{IQR} = 82 - 3 \times x$ $= 79 \checkmark$
	2/3 marks
	1/3 marks
1.2	Mark CA from wrong box and whisker diagram: first look at box and if symmetrical, then look at whiskers

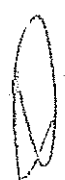
QUESTION 2	
2.1	$\hat{y} = 22,26x + 5,90$: 2/3 marks Answer only: 3/3 marks
2.2	$r = 1$: 0/2 marks
2.3	accept strong/sterk
2.4	Answer only: 2/2 marks

QUESTION 3	
3.1	Answer only: 2/2 marks Incorrect formula : B/D Correct formula, but $\frac{dx}{dy}$ for substitution : B/D
3.2	If $m_{PQ} = m_{RS} = \frac{1}{2}$ is given without stating that $PQ \parallel RS$, and linked to PQRS a parm. If no reason is given why PQRS is a parm: 3/4 marks
	award first 2 marks, else 0/2
3.3	$m_{PT} = \frac{1}{2}$: max 2/4 marks $S(2; 1)$ not substituted: max 2/4 marks
3.4	Answer must be in coordinate form On CA if y-value between 0 and 4

ADDENDUM FOR JUNE PAPER 2 MEMORANDUM

<p>3.5</p>	<p>Alternative solution: $NS = \sqrt{5}$ $NR = 4$ $\cos \hat{SNR} = \frac{4^2 + (\sqrt{5})^2 - (\sqrt{5})^2}{2(4)(\sqrt{5})}$ $= \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$ $\hat{SNR} = 26,6^\circ$ -1 penalty for rounding off incorrectly $m_{PT} \quad \frac{1}{2} : \text{max } 2/5 \text{ marks}$</p>	<p>✓ NS distance ✓ NR distance ✓ subst into cosine rule ✓ simplification ✓ answer(1 dec) (5)</p>
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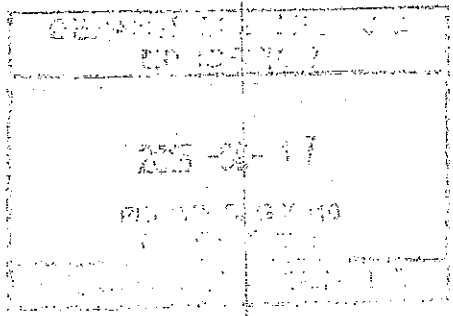
QUESTION 4		
4.2	Answer only: 3/3 marks	
4.3	<p>Answer only: 2/2 marks</p> <p>A(-3 ; 4) and B(3 ; -4)</p> $AB = \sqrt{(-3-3)^2 + (4+4)^2}$ $= \sqrt{36+64}$ $= \sqrt{100}$ $= 10$	<p>✓ subst ✓ answer (2)</p>
4.4	Answer only: 1/3 marks	
4.5	<p>Answer only: 3/3 marks Wrong formula: B/D</p>	
4.6	<p>Accept also as reason: converse \angles in semi-circle If AE is not used as diameter: B/D</p>	



ADDENDUM FOR JUNE PAPER 2 MEMORANDUM

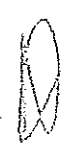
QUESTION 5	
5.1	Any other quadrant: max 3/5 marks
5.2	$\sin(x-90^\circ) = -\cos x$ $\sin(x-90^\circ) = -\sin x : 0/2$ $\frac{\sin x}{\cos x}$ can be implied if answer is correct
5.3.2	If multiplying by -1 : max 2/4
5.4.2	If $0^\circ, 90^\circ, 180^\circ$: 1/2 marks If $\tan 90^\circ$: 1/2 marks
5.5	All solutions must be in general form

✓ negative
✓ cos x



QUESTION 6	
6.4	$x = 61.5^\circ$; award 1 mark

QUESTION 7	
7.2	Area $\Delta QRS = \text{Area } \Delta PQS - \text{Area } \Delta PQR$ $= \frac{1}{2}(x)\left(\frac{5x}{2}\right)\sin 120^\circ - \frac{1}{2}(x)(x)\sin 120^\circ$ $= \frac{5\sqrt{3}}{8}x^2 - \frac{\sqrt{3}}{4}x^2$ $= \frac{3\sqrt{3}}{8}x^2 = 0,65x^2$
	✓✓ area ΔPQS ✓✓ area ΔPQR ✓ answer (5)
	If the 150° is used in the calculation the first two statements are implied. If they use 30° : max 3/5 marks max 5 marks



ADDENDUM FOR JUNE PAPER 2 MEMORANDUM

ANY ASSUMPTION WHICH IS NOT PROVED, CONSTITUTES A BREAKDOWN

QUESTION 8	
8.1	If assume that CA is a tangent: B/D
8.2	Accept also: converse tangent-chord theorem Reason must match the Statement

QUESTION 9	
9.1.1	ext \angle only : no marks
9.1.2	Accept also: \angle at centre theorem Accept also: \angle at centre; \angle at circumference
9.2.1	Accept also: corresp \angle s / ooreenk \angle e; \parallel lines
9.2.2	$\hat{A} = 180^\circ - 2x$ (opp \angle s quad supp) : B/D

QUESTION 10		
10.2.1	$\frac{AE}{EC} = \frac{12}{8} = \frac{3}{2}$ $\frac{AD}{DF} = \frac{3}{2}$ $\therefore \frac{AE}{EC} = \frac{AD}{DF}$ $\therefore DE \parallel FC$ <p>(line divides two sides of Δ in prop/ lyn verdeel twee sye v Δ in dieselfde verh)</p>	<p>✓ S</p> <p>✓ S</p> <p>✓ R</p> <p>(3)</p>
10.2.2	Reason can be: prop theorem OR $BC \parallel FE$	

QUESTION 11	
11.1	Need to tie up for final mark If construction not leading to proof of theorem, then B/D
11.2.2(b)	Answer only: 1/3 marks
11.2.2(c)	Answer only: 1/3 marks



ADDENDUM FOR JUNE PAPER 2 MEMORANDUM

No CA marking if ratio is incorrect.

10

[Handwritten mark]