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Basic Education
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NATIONAL SENIOR CERTIFICATE

GRADE/*GRAAD* 12

MATHEMATICS P2/*WISKUNDE V2*

FEBRUARY/MARCH/*FEBRUARIE/MAART* 2016

MEMORANDUM

MARKS: 150

PUNTE: 150

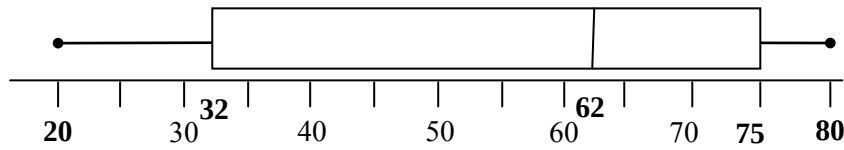
**This memorandum consists of 21 pages./
*Hierdie memorandum bestaan uit 21 bladsye.***

NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an attempt of a question and did not redo 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.

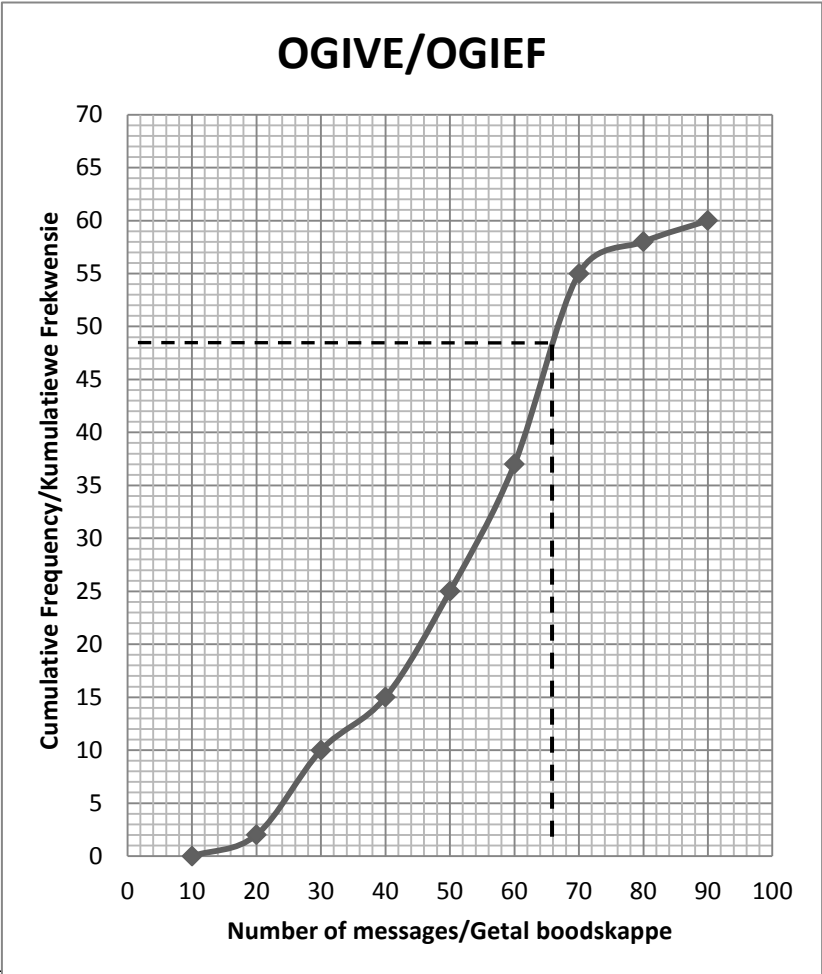
LET WEL:

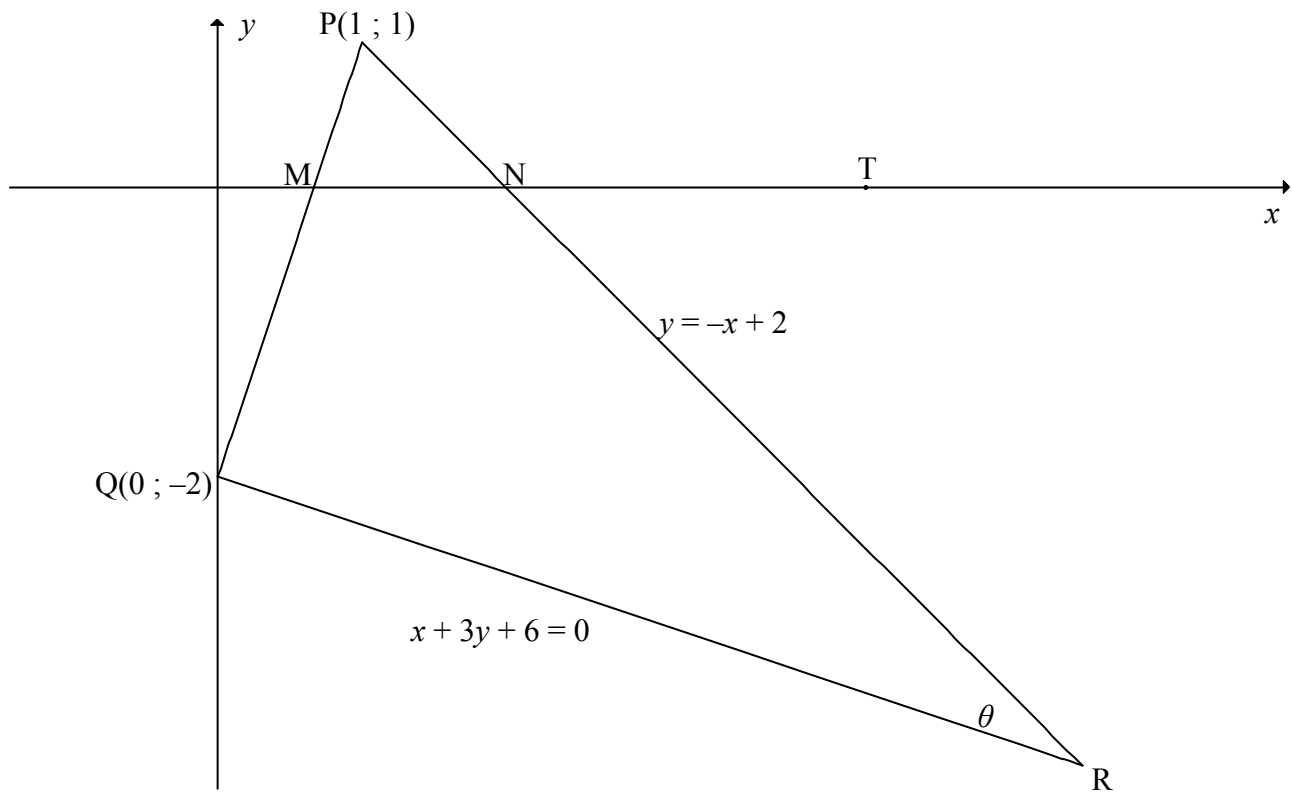
- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- Indien 'n kandidaat 'n antwoord doodgetrek en nie oorgedoen het nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.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

QUESTION/VRAAG 1

1.1	The data is skewed to the left/ <i>Die data is skeef na links.</i> OR/OF The data is negatively skewed/ <i>Die data is negatief skeef.</i>	✓ answ/antw ✓ answ/antw (1)									
1.2	Range/ <i>Omvang</i> = 80 – 20 = 60	✓ max. – min. ✓ answ/antw (2)									
1.3	25% of the learners failed/ <i>van die leerders het gedruip</i>	✓ ✓ answ/antw (2)									
1.4	$54 = \frac{445 + T_4}{9}$ $T_4 = 41$ <table border="1"><tr><td>20</td><td>28</td><td>36</td><td>41</td><td>62</td><td>69</td><td>75</td><td>75</td><td>80</td></tr></table>	20	28	36	41	62	69	75	75	80	✓ 20 ✓✓ 41 ✓ 62 ✓ 75 ✓ 80 (6) [11]
20	28	36	41	62	69	75	75	80			

QUESTION/VRAAG 2

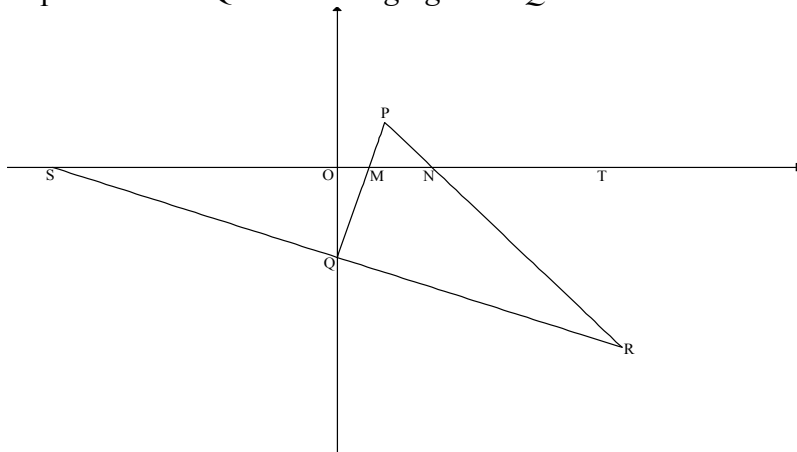
2.1	$\text{Mean/Gemiddelde} = \frac{2(15) + 8(25) + \dots + 2(85)}{60} = \frac{3080}{60}$ $= 51,33 \text{ messages per day/boodskappe per dag}$	✓ 3 080 ✓ $\frac{3080}{60}$ ✓ answ/antw (3)
2.2	OGIVE/OGIEF 	✓ grounding at (10 ; 0) ✓ plotting at upper limits ✓ plotting cumulative f ✓ smooth shape of curve ✓ geanker by (10 ; 0) ✓ stip by boonste limiete ✓ plot kumulatiewe f ✓ gladde vorm van kurwe (4)
2.3	Number of days/Getal dae = 60 – 46 (see on graph above/sien op grafiek hierbo) = 14 days/dae OR/OF Number of days/Getal dae = $2 + 3 + \frac{1}{2} \times 18 = 14 \text{ days/dae}$	✓ 46 (accept 45 – 49) ✓ answ/antw (accept 11 – 15) (2) ✓ add correct values/tel korrekte waardes by ✓ answ/antw (2) [9]

QUESTION/VRAAG 3

3.1	$m_{PQ} = \frac{1 - (-2)}{1 - 0}$ $= 3$	✓ subst (1 ; 1) & (0 ; -2) ✓ answ/antw (2)
3.2	$\text{QR: } y = -\frac{1}{3}x - 2$ $\therefore m_{QR} = -\frac{1}{3}$ $m_{PQ} \times m_{QR} = 3 \times -\frac{1}{3}$ $= -1$ $\therefore PQ \perp QR \quad \therefore \hat{PQR} = 90^\circ$	$\checkmark m_{QR} = -\frac{1}{3}$ $\checkmark m_{PQ} \times m_{QR} = -1$ (2)

3.3	$-\frac{1}{3}x - 2 = -x + 2$ $\frac{2}{3}x = 4$ $x = 6$ $y = -4$ $\therefore R(6; -4)$	✓ equating/gelyk stel ✓ x-value/waarde ✓ y-value/waarde (3)
3.4	$PR = \sqrt{(1-6)^2 + (1-(-4))^2}$ $= \sqrt{50} = 5\sqrt{2}$ OR/OF $PR^2 = (1-6)^2 + (1-(-4))^2$ $= 50$ $\therefore PR = \sqrt{50} = 5\sqrt{2}$	✓ subst into/in distance formula/afstandsformule ✓ answ/antw in surd form/wortelvorm (2) ✓ subst into/in distance formula/afstandsformule ✓ answ/antw in surd form/wortelvorm (2)
3.5	PR is a diameter/ 'n middellyn [chord subtends/kd onderspan 90°] Centre of circle/Midpt v sirkel: $\left(\frac{1+6}{2}; \frac{1-4}{2}\right)$ $= \left(3\frac{1}{2}; -1\frac{1}{2}\right)$ $r = \frac{\sqrt{50}}{2} \text{ OR } \frac{5\sqrt{2}}{2} \text{ OR } 3,54$ $\therefore \left(x - \frac{7}{2}\right)^2 + \left(y + \frac{3}{2}\right)^2 = \frac{50}{4} \text{ OR } \frac{25}{2} \text{ OR } 12,5$	✓✓ S ✓✓ $\left(3\frac{1}{2}; -1\frac{1}{2}\right)$ ✓ r-value/waarde ✓ answ/antw (6)
3.6	m of/van radius = -1 $\therefore$ m of/van tangent/raaklyn = 1 Equation of tangent/Vgl van raaklyn: $y - y_1 = (x - x_1)$ $y = x + c$ $y - 1 = x - 1$ OR/OF $1 = 1 + c$ $\therefore y = x$ $y = x$	✓ m of tang/rkl ✓ subst m & P(1 ; 1) into/in eq of line/vgl v lyn ✓ answ/antw (3)
3.7	$\tan \hat{PNT} = m_{PR} = -1$ $\therefore \hat{PNT} = 135^\circ$ $\tan \hat{PMT} = m_{PQ} = 3$ $\therefore \hat{PMT} = 71,57^\circ$ $\hat{P} = 63,43^\circ$ [ext $\angle$ of Δ /buite $\angle$ v Δ] $\therefore \theta = 26,57^\circ$ [sum of $\angle$ s in Δ /som v $\angle$ e in Δ] OR/OF	✓ $\tan \hat{PNT} = -1$ ✓ $\hat{PNT} = 135^\circ$ ✓ $\hat{PMT} = 71,57^\circ$ ✓ $\hat{P} = 63,43^\circ$ ✓ answ/antw (5)

Extrapolation of RQ to S/Verlenging van RQ na S:



$$\tan \hat{PNT} = m_{PR} = -1$$

$$\therefore \hat{SNR} = 135^\circ$$

$$\tan \hat{NSR} = m_{RS} = -\frac{1}{3}$$

$$\therefore \hat{NSR} = 18,43^\circ$$

$$\theta = 180^\circ - (135^\circ + 18,43^\circ) \quad [\text{sum of } \angle\text{s in } \Delta/\text{som v } \angle\text{e in } \Delta]$$

$$= 26,57^\circ$$

OR/OF

$$PQ^2 = 1^2 + 3^2 = 10$$

$$PQ = \sqrt{10}$$

$$\therefore \sin \theta = \frac{PQ}{PR} = \frac{\sqrt{10}}{\sqrt{50}} = \frac{1}{\sqrt{5}}$$

$$\therefore \theta = 26,57^\circ$$

OR/OF

$$QR^2 = 6^2 + 2^2 = 40$$

$$QR = 2\sqrt{10}$$

$$\therefore \cos \theta = \frac{2\sqrt{10}}{\sqrt{50}} = \frac{2}{\sqrt{5}}$$

$$\therefore \theta = 26,57^\circ$$

OR/OF

$$\checkmark \tan \hat{PNT} = -1$$

$$\checkmark \hat{SNR} = 135^\circ$$

$$\checkmark \tan \hat{NSR} = -\frac{1}{3}$$

$$\checkmark \hat{NSR} = 18,43^\circ$$

$\checkmark$ answ/antw

(5)

$\checkmark$ subst into/in

distance formula/
afstandsformule

$\checkmark$ distance/afst PQ

$\checkmark$ correct trig ratio/
korrekte trig vh

$\checkmark$ correct trig eq/
korrekte trig vgl

$\checkmark$ answ/antw

(5)

$\checkmark$ subst into/in

distance formula/
afstandsformule

$\checkmark$ distance/afst PQ

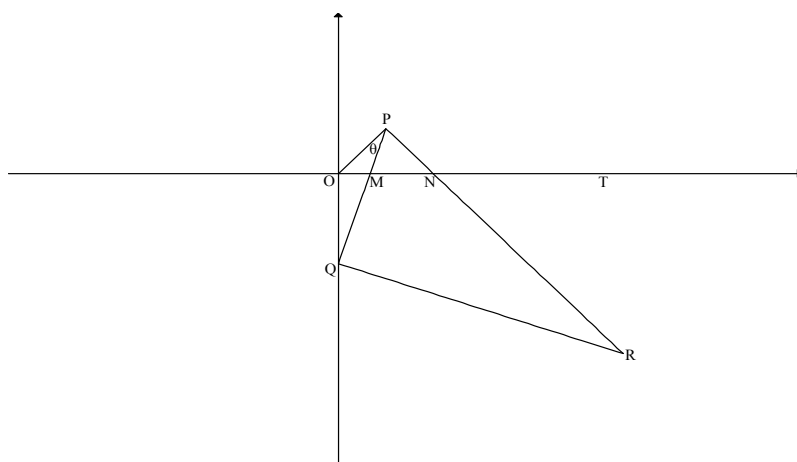
$\checkmark$ correct trig ratio/
korrekte trig vh

$\checkmark$ correct trig eq/
korrekte trig vgl

$\checkmark$ answ/antw

(5)

$$\begin{aligned}\tan \theta &= \frac{m_{RQ} - m_{PR}}{1 + m_{RQ} \cdot m_{PR}} \\ &= \frac{-\frac{1}{3} - (-1)}{1 + (-\frac{1}{3})(-1)} \\ &= \frac{1}{2} \\ \therefore \theta &= 26,57^\circ\end{aligned}$$



tangent OP goes through the origin/*raakl OP gaan deur oorsprong*

$$\hat{POM} = 45^\circ$$

$$\hat{OPM} = \theta = \hat{P} \quad [\text{tan-chord theorem/raakl-kdst}]$$

$$\tan \hat{PMT} = m_{PQ} = 3$$

$$\therefore \hat{PMT} = 71,57^\circ$$

$$\therefore \theta + 45^\circ = 71,57^\circ \quad [\text{ext } \angle \text{ of } \Delta / \text{buite-} \angle \text{ v } \Delta]$$

$$\therefore \theta = 26,57^\circ$$

✓ correct formula/
✓ *korrekte formule*

$$\checkmark m_{RQ} = -\frac{1}{3}$$

✓ correct subst/
✓ *subst korrek*

$$\checkmark \tan \theta = \frac{1}{2}$$

$$\checkmark \theta = 26,57^\circ$$

(5)

$$\checkmark \hat{POM} = 45^\circ$$

✓ R

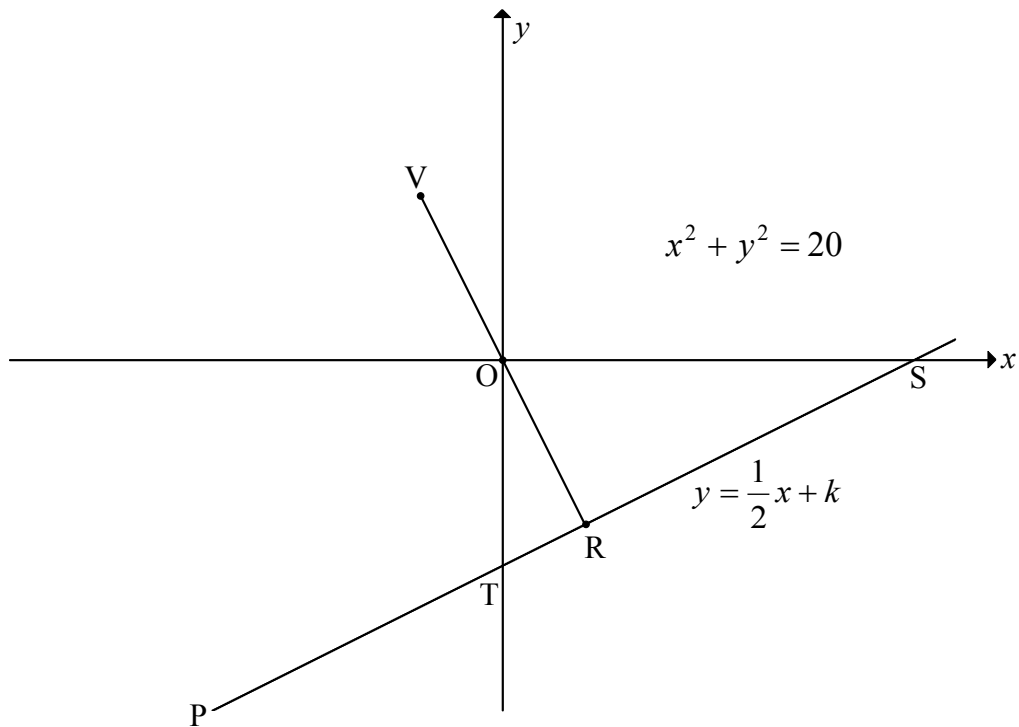
$$\checkmark \hat{PMT} = 71,57^\circ$$

✓ S

$$\checkmark \theta = 26,57^\circ$$

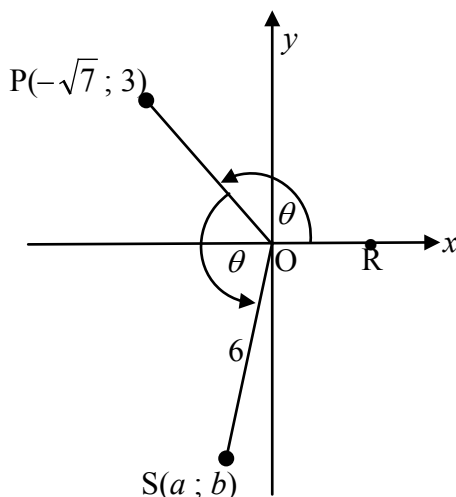
(5)

[23]

QUESTION/VRAAG 4

4.1	$OR \perp TR$ [radius $\perp$ tangent/raakl] $\therefore m_{TR} \times m_{OR} = -1$ $\therefore m_{OR} = -2$ $\therefore y = -2x$	$\checkmark$ S/R $\checkmark$ m of/van OR $\checkmark$ equation/vgl (3)
4.2	$x^2 + (-2x)^2 = 20$ $x^2 + 4x^2 = 20$ $5x^2 - 20 = 0$ $x^2 - 4 = 0$ $(x+2)(x-2) = 0$ $\therefore x = 2$ $y = -2(2) = -4$ $\therefore R(2; -4)$	$\checkmark$ subst eq of OR into circle eq/ subst vgl OR in sirkelvgl $\checkmark$ st. form/st. vorm $\checkmark$ x-value/waarde $\checkmark$ y-value/waarde (4)

4.3	Subst R(2 ; -4) into the equation of/in vgl van PRS: $-4 = \frac{1}{2}(2) + k$ $k = -5$ $\therefore OT = 5$ $0 = \frac{1}{2}x - 5$ $x = 10$ $\therefore OS = 10$ $\text{Area/Oppervlakte} = \frac{1}{2} OS \cdot OT$ $= \frac{1}{2} (10)(5)$ $= 25 \text{ sq units/vk eenh}$	✓ correct subst/ korrekte subst ✓ value of k ✓ $y = 0$ ✓ x-intercept/afsnit ✓ correct subst into area form/ subst korrek in opp-formule ✓ answ/antw (6)
4.4	$0 = \frac{x_v + 2}{2} \quad \text{and/en} \quad 0 = \frac{y_v - 4}{2}$ $\therefore V(-2 ; 4)$ $T(0 ; -5) \quad \dots \text{ from/van 4.3}$ $VT = \sqrt{(-2 - 0)^2 + (4 - (-5))^2}$ $= \sqrt{4 + 81}$ $= \sqrt{85}$	✓ x-value/waardeV ✓ y-value/waardeV ✓ subst of points V and T into distance formula/ subst punte V en T in afst-form ✓ answ/antw (4) [17]

QUESTION/VRAAG 5

5.1.1	$\tan \theta = -\frac{3}{\sqrt{7}}$	✓ answ/antw (1)
5.1.2	$\sin(-\theta) = -\sin \theta$ $OP^2 = (-\sqrt{7})^2 + 3^2$ $OP^2 = 16$ $OP = 4$ $\sin(-\theta) = -\frac{3}{4}$	✓ reduction/ reduksie ✓ $OP = 4$ ✓ answ/antw (3)
5.1.3	$\frac{a}{6} = \cos 2\theta$ $a = 6(1 - 2\sin^2 \theta)$ $= 6 - 12\left(\frac{3}{4}\right)^2$ $= \frac{24}{4} - \frac{27}{4}$ $= -\frac{3}{4}$ OR/OF $\frac{a}{6} = \cos 2\theta$ $a = 6(2\cos^2 \theta - 1)$ $= 12\left(\frac{-\sqrt{7}}{4}\right)^2 - 6$ $= \frac{21}{4} - \frac{24}{4}$ $= -\frac{3}{4}$ OR/OF	✓ trig ratio/verh ✓ expansion/ uitbreiding ✓ $\sin \theta = \frac{3}{4}$ ✓ answ/antw (4) ✓ trig ratio/verh ✓ expansion/ uitbreiding ✓ $\cos \theta = \frac{-\sqrt{7}}{4}$ ✓ answ/antw (4)

	$\frac{a}{6} = \cos 2\theta$ $a = 6(\cos^2 \theta - \sin^2 \theta)$ $= 6 \left[\left(\frac{-\sqrt{7}}{4} \right)^2 - \left(\frac{3}{4} \right)^2 \right]$ $= 6 \left(-\frac{2}{16} \right)$ $= -\frac{3}{4}$	✓ trig ratio/verh ✓ expansion/ uitbreiding ✓ $\cos \theta = \frac{-\sqrt{7}}{4}$ & $\sin \theta = \frac{3}{4}$ ✓ answ/antw (4)
5.2.1	$\frac{4 \sin x \cdot \cos x}{2 \sin^2 x - 1} = \frac{2(2 \sin x \cdot \cos x)}{-(1 - 2 \sin^2 x)}$ $= \frac{2 \sin 2x}{-\cos 2x}$ $= -2 \tan 2x$	✓ $2 \sin 2x$ ✓ $-\cos 2x$ ✓ answ/antw (3)
5.2.2	$\frac{4 \sin 15^\circ \cos 15^\circ}{2 \sin^2 15^\circ - 1} = -2 \tan 2(15^\circ)$ $= -2 \tan 30^\circ$ $= -2 \left(\frac{1}{\sqrt{3}} \right)$ $= -\frac{2}{\sqrt{3}} \text{ OR/OR } -\frac{2\sqrt{3}}{3}$	✓ $-2 \tan 2(15^\circ)$ ✓ answ/antw (2) [13]

QUESTION/VRAAG 6

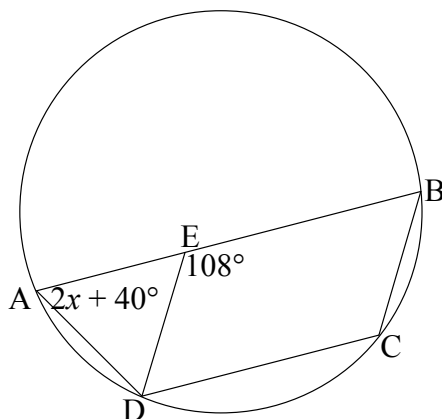
6.1	$\sin(x + 60^\circ) + 2\cos x = 0$ $\sin x \cos 60^\circ + \cos x \sin 60^\circ + 2\cos x = 0$ $\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x + 2\cos x = 0$ $\frac{1}{2}\sin x = -2\cos x - \frac{\sqrt{3}}{2}\cos x$ $\sin x = -4\cos x - \sqrt{3}\cos x$ $\sin x = \cos x(-4 - \sqrt{3})$ $\frac{\sin x}{\cos x} = \frac{\cos x(-4 - \sqrt{3})}{\cos x}$ $\therefore \tan x = -4 - \sqrt{3}$	✓ expansion/uitbreiding ✓ special angle values/ spesiale $\angle$ -waardes ✓ simpl/vereenv ✓ $\sin x = \cos x(-4 - \sqrt{3})$ (4)
6.2	$\tan x = -4 - \sqrt{3}$ $\tan x = -(4 + \sqrt{3})$ $ref \angle = 80,10^\circ$ $x = -80,1^\circ$ or/of $99,9^\circ$	✓ $80,10^\circ$ ✓ $99,90^\circ$ ✓ $-80,1^\circ$ (3)
6.3.1		✓ $(30^\circ; 1)$ ✓ $(-60^\circ; 0)$ ✓ shape/vorm (3)
6.3.2	$\therefore \sin(x + 60^\circ) > -2\cos x$ $x \in (-80,10^\circ; 99,90^\circ)$ OR/OF $-80,10^\circ < x < 99,90^\circ$	✓ ✓ critical values/ kritiese waardes ✓ notation/notasie (3) [13]

QUESTION/VRAAG 7

7.1.1	$\begin{aligned} \text{Area of/Oppervlakte van } \triangle PQR &= \frac{1}{2} PQ \cdot QR \cdot \sin \hat{Q} \\ &= \frac{1}{2} x(20 - 4x)(\sin 60^\circ) \\ &= 10x - 2x^2 \left(\frac{\sqrt{3}}{2} \right) \\ &= 5\sqrt{3}x - \sqrt{3}x^2 \end{aligned}$	✓ subst into area rule/ <i>subst in opp-reël</i> ✓ subst & simpl/ <i>subst en vereenv</i> (2)
7.1.2	For maximum area/<i>Vir maksimum opp:</i> $(\text{Area } \triangle PQR)' = 0$ $5\sqrt{3} - 2\sqrt{3}x = 0$ $2\sqrt{3}x = 5\sqrt{3}$ $\therefore x_{\max} = \frac{5}{2} \text{ or } 2\frac{1}{2} \text{ or/of } 2,5$ OR/OF $x_{\max} = -\frac{b}{2a}$ $= -\frac{5\sqrt{3}}{2(-\sqrt{3})} = \frac{5}{2} \text{ or } 2\frac{1}{2} \text{ or } 2,5$ OR/OF $5\sqrt{3}x - \sqrt{3}x^2 = 0$ $\sqrt{3}x(5 - x) = 0$ $\therefore x = 0 \text{ or } 5$ $\therefore x_{\max} = \frac{0+5}{2} = \frac{5}{2} \text{ or/of } 2,5$	$\checkmark (\text{Area } \triangle PQR)' = 0$ $\checkmark 5\sqrt{3} - 2\sqrt{3}x$ $\checkmark \text{answ/antw}$ (3) $\checkmark \text{formula/e}$ $\checkmark \text{subst}$ $\checkmark \text{answ/antw}$ (3) $\checkmark x\text{-intercepts/}$ $x\text{-afsnitte}$ $\checkmark \text{subst}$ $\checkmark \text{answ/antw}$ (3)
7.1.3	$\begin{aligned} RP^2 &= QP^2 + QR^2 - 2 \cdot QP \cdot QR \cdot \cos Q \\ &= 10^2 + 2,5^2 - 2(10)(2,5)\cos 60^\circ \\ &= 81,25 \\ \therefore RP &= 9,01 \end{aligned}$	$\checkmark \text{subst into cosine}$ <i>rule/in cos-reël</i> $\checkmark \text{simpl/vereenv}$ $\checkmark \text{answ/antw}$ (3)

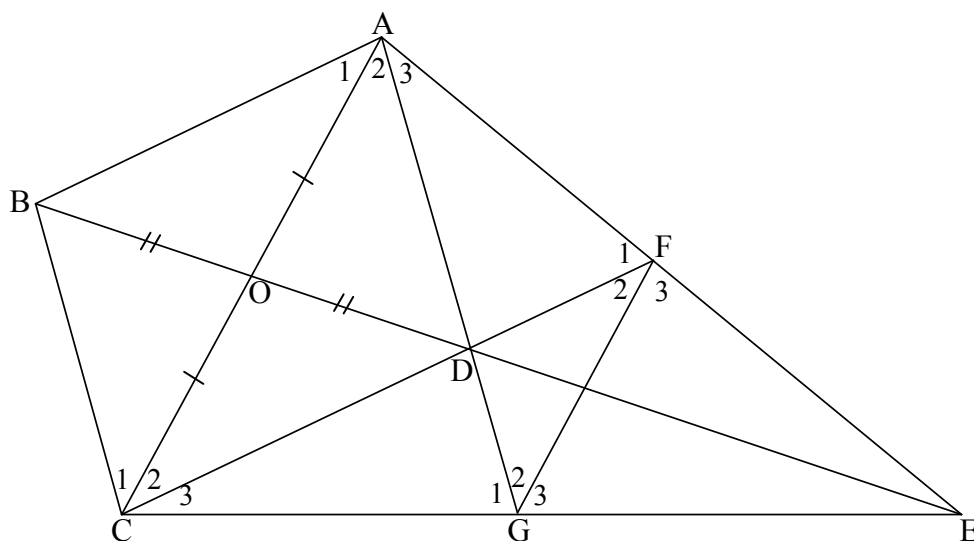
7.2	In $\triangle ABC$: $\sin \beta = \frac{h}{AB}$ $\therefore AB = \frac{h}{\sin \beta}$ In $\triangle ABD$: $AB = BD$ and/en $\hat{A}DB = 90^\circ - \beta$ [$\angle$s of $\triangle = 180^\circ$] $\frac{\sin 2\beta}{AD} = \frac{\sin(90^\circ - \beta)}{AB}$ $AD = \frac{AB \cdot \sin 2\beta}{\sin(90^\circ - \beta)}$ $= \frac{h}{\sin \beta} \times \frac{2 \sin \beta \cdot \cos \beta}{\cos \beta}$ $= 2h$ OR/OF In $\triangle ABC$: $\sin \beta = \frac{h}{AB}$ $\therefore AB = \frac{h}{\sin \beta}$ In $\triangle ABD$: $AB = BD$ $AD^2 = AB^2 + AB^2 - 2AB \cdot AB \cdot \cos 2\beta$ $= \left(\frac{h}{\sin \beta}\right)^2 + \left(\frac{h}{\sin \beta}\right)^2 - 2\left(\frac{h}{\sin \beta}\right)^2 \cdot \cos 2\beta$ $= \left(\frac{h}{\sin \beta}\right)^2 + \left(\frac{h}{\sin \beta}\right)^2 - 2\left(\frac{h}{\sin \beta}\right)^2 (1 - 2 \sin^2 \beta)$ $= \left(\frac{h}{\sin \beta}\right)^2 + \left(\frac{h}{\sin \beta}\right)^2 - 2\left(\frac{h}{\sin \beta}\right)^2 + 4h^2$ $= 4h^2$ $\therefore AD = 2h$ OR/OF Split isosceles triangle ABQ into two congruent triangles AEB and DEB. Then $\triangle ABC \equiv \triangle BAE$ ($AB = AC$, $\hat{A}BE = \hat{B}AC = \beta$, h) $\therefore AE = ED = BC = h$ $\therefore AD = 2h$	✓ AB ito h and/en β ✓ $\hat{A}DB = 90^\circ - \beta$ ✓ correct subst into cosine rule/subst <i>korrek in cos-reël</i> ✓ AD as subject/ <i>onderwerp</i> ✓ expansion/uitbrei $\sin(90^\circ - \beta)$ $= \cos \beta$ ✓ answer ito h (7) ✓ AB ito h and/en β ✓ correct subst into cosine rule/subst <i>korrek in cos-reël</i> ✓ expansion/uitbrei ✓ multiplication/ <i>vermenigv</i> ✓ simpl/vereenv ✓ answer ito h (7) (7)
		[15]

8.2



8.2	$\hat{C} = 108^\circ$ $2x + 40^\circ + 108^\circ = 180^\circ$ $2x = 32^\circ$ $x = 16^\circ$ OR/OF $\hat{C} = 180^\circ - (2x + 40^\circ)$ $180^\circ - (2x + 40^\circ) = 108^\circ$ $2x = 32^\circ$ $x = 16^\circ$	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ answ/antw (5) $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ answ/antw (5)
[15]		

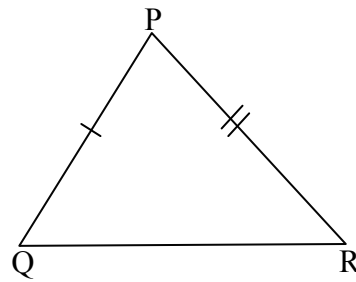
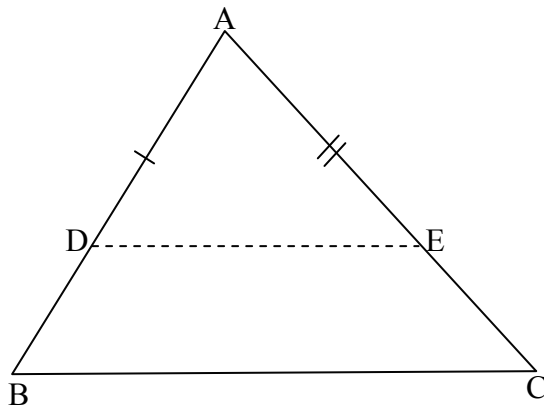
QUESTION/VRAG 9



9.1	ABCD is a m [diags of quad bisect each other/ hoekl v vh halveer mekaar]	✓ R (1)
9.2	$\frac{ED}{DB} = \frac{FE}{AF}$ [Prop Th/Eweredigh st; DF BA] $\frac{ED}{DB} = \frac{GE}{CG}$ [Prop Th/Eweredigh st; DG BC]	✓ S ✓ R ✓ S ✓ R (4)
9.3	$\frac{FE}{AF} = \frac{GE}{CG}$ [proved/bewys] $\therefore AC \parallel FG$ [line divides two sides of Δ in prop/ lyn verdeel 2 sye van Δ eweredig] $\hat{C}_2 = \hat{F}_2$ [alt/verw $\angle$ s/e; AC FG] $\hat{A}_1 = \hat{C}_2$ [alt/verw $\angle$ s/e; AB CD] $\therefore \hat{A}_1 = \hat{F}_2$	✓ S ✓ S ✓ R ✓ S ✓ S (5)
9.4	$\hat{A}_1 = \hat{A}_2$ [diags of rhombus/hoekl v ruit] $\hat{A}_2 = \hat{F}_2$ [$\hat{A}_1 = \hat{F}_2$] $\therefore ACGF = \text{cyc quad/kdvh}$ [$\angle$ s in the same seg =/ $\angle$ e in dies segm =] OR/OF $\hat{C}_2 = \hat{A}_2$ [$\angle$ s opp equal sides of rhombus/ $\angle$ e to gelyke sye v ruit] $\hat{A}_2 = \hat{G}_2$ [alt/verw- $\angle$ s/e; AC FG] $\therefore \hat{C}_2 = \hat{G}_2$ $\therefore ACGF$ is a cyc quad/kdvh [$\angle$ s in the same seg =/ $\angle$ e in dies segm =]	✓ S ✓ S ✓ R (3) ✓ S ✓ S ✓ R (3) [13]

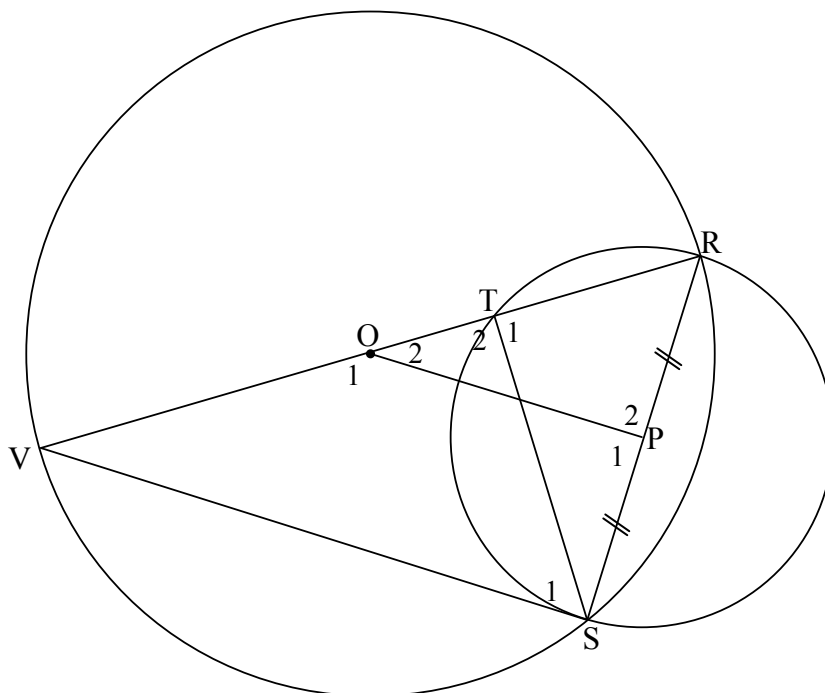
QUESTION/VRAAG 10

10.1



10.1.1	In $\triangle ADE$ and/en $\triangle PQR$: $AD = PQ$ [construction/konstr] $\hat{A} = \hat{P}$ [given/gegee] $AE = PR$ [construction/konstr] $\therefore \triangle ADE \equiv \triangle PQR$ [SAS]	✓ all/al 3 S's/e ✓ reason/rede (2)
10.1.2	$\hat{ADE} = \hat{Q}$ [$\Delta s \equiv \therefore$ corres/ooreenk $\angle s/e =$] But $\hat{B} = \hat{Q}$ [given/gegee] $\therefore \hat{ADE} = \hat{B}$ $\therefore DE \parallel BC$ [corres/ooreenk $\angle s/e =$]	✓ $\hat{ADE} = \hat{Q}$ ✓ $\hat{ADE} = \hat{B}$ ✓ reason/rede (3)
10.1.3	$\frac{AB}{AD} = \frac{AC}{AE}$ [Prop Th/Ewaredigh st; $DE \parallel BC$] But/Maar $AD = PQ$ and/en $AE = PR$ [construction/konstr] $\therefore \frac{AB}{PQ} = \frac{AC}{PR}$	✓ S/R ✓ S (2)

10.2



10.2.1	line from centre to midpt of chord/ <i>lyn van midpt na midpt van koord</i>	✓ answ/antw (1)
10.2.2	OP VS [Midpt Theorem/Midpt-stelling] In $\triangle ROP$ and/en $\triangle RVS$: $\hat{R} = \hat{R}$ [common/<i>gemeen</i>] $\hat{O}_2 = \hat{V}$ [corresp/<i>ooreenk</i> $\angle$s/e; OP VS] $\therefore \triangle ROP \equiv \triangle RVS$ [$\angle, \angle, \angle$] OR/OF In $\triangle ROP$ and/en $\triangle RVS$: $\hat{P}_2 = \hat{S}_2$ [corresponding $\angle$s/ <i>ooreenkomstige</i> $\angle$'e] $\hat{R} = \hat{R}$ [common/<i>gemeen</i>] $\therefore \triangle ROP \equiv \triangle RVS$ [$\angle, \angle, \angle$]	✓ S ✓ R ✓ S ✓ S & $\angle; \angle; \angle$ OR/OF 3 angles/<i>hoeke</i> (4) ✓ S ✓ R ✓ S ✓ S & $\angle; \angle; \angle$ OR/OF 3 angles/<i>hoeke</i> (4)

10.2.3	In $\triangle RVS$ and/en $\triangle RST$: $\hat{VSR} = \hat{STR} = 90^\circ$ [$\angle$ in semi-circle/$\angle$ in halfsirkel] $\hat{R}$ is common/<i>gemeen</i> $\hat{V} = \hat{TSR}$ $\therefore \triangle RVS \parallel \triangle RST$ [$\angle, \angle, \angle$]	✓ S ✓ R ✓ S & $\angle; \angle; \angle$ OR/OF 3 angles/<i>hoeke</i> (3)
10.2.4	In $\triangle RTS$ and/en $\triangle STV$: $\hat{RTS} = \hat{VTS} = 90^\circ$ [$\angle$ s on straight line/$\angle$ e op <i>rt lyn</i>] $\hat{R} = 90^\circ - \hat{TSR}$ $= \hat{TSV}$ $\hat{TSR} = \hat{V}$ $\therefore \triangle RTS \parallel \triangle STV$ [$\angle, \angle, \angle$] $\therefore \frac{RT}{ST} = \frac{TS}{VT}$ $\therefore ST^2 = VT \cdot TR$	✓ $\triangle RTS$ & $\triangle STV$ ✓ S ✓ S ✓ S (with justification/<i>met motivering</i>) ✓ $\triangle RTS \parallel \triangle STV$ ✓ ratio/<i>verh</i> (6)
		[21]

TOTAL/TOTAAL: 150