basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

GRADE/*GRAAD* 11

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2017

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 20 pages.
Hierdie nasienriglyne bestaan uit 20 bladsye.

Goverdel
15/11/2017

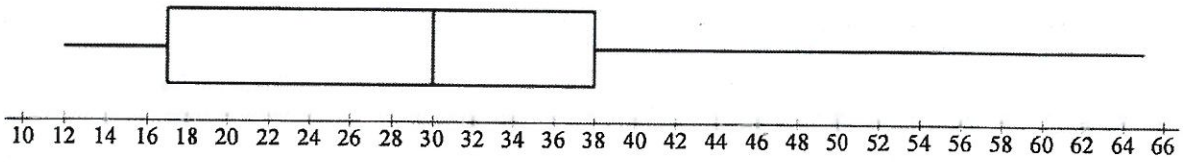
NOTE:

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.*
- *Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.*

QUESTION/*VRAAG* 1



1.1.1	min = 12 Q_1 = 17 Q_2 = median / *mediaan* = 30 Q_3 = 38 max = 65	✓ min + max ✓ median, Q_1 and/en Q_3 (2)
1.1.2	$IQR = Q_3 - Q_1$ = 38 − 17 = 21	✓ answer/*antw* (1)
1.1.3	Skewed to the ~~right~~ left OR ~~positively~~ negatively skewed *Skeef na regs* *OF positief skeef* 30−17 = 13 38−30 = 8 ∴ M − Q_1 > Q_3 − M	✓ answer/*antw* (1)

5	8	10	17	20	29	32	48	50	50	63	y	107

1.2.1	Mean/*Gemiddeld* $= \frac{439+y}{13}$ $41 = \frac{439+y}{13}$ $439 + y = 533$ $y = 94$	✓ $41 = \frac{439+y}{13}$ ✓ answer/*antw* (2)
1.2.2	σ = 30,94	✓ answer/*antw* (1)

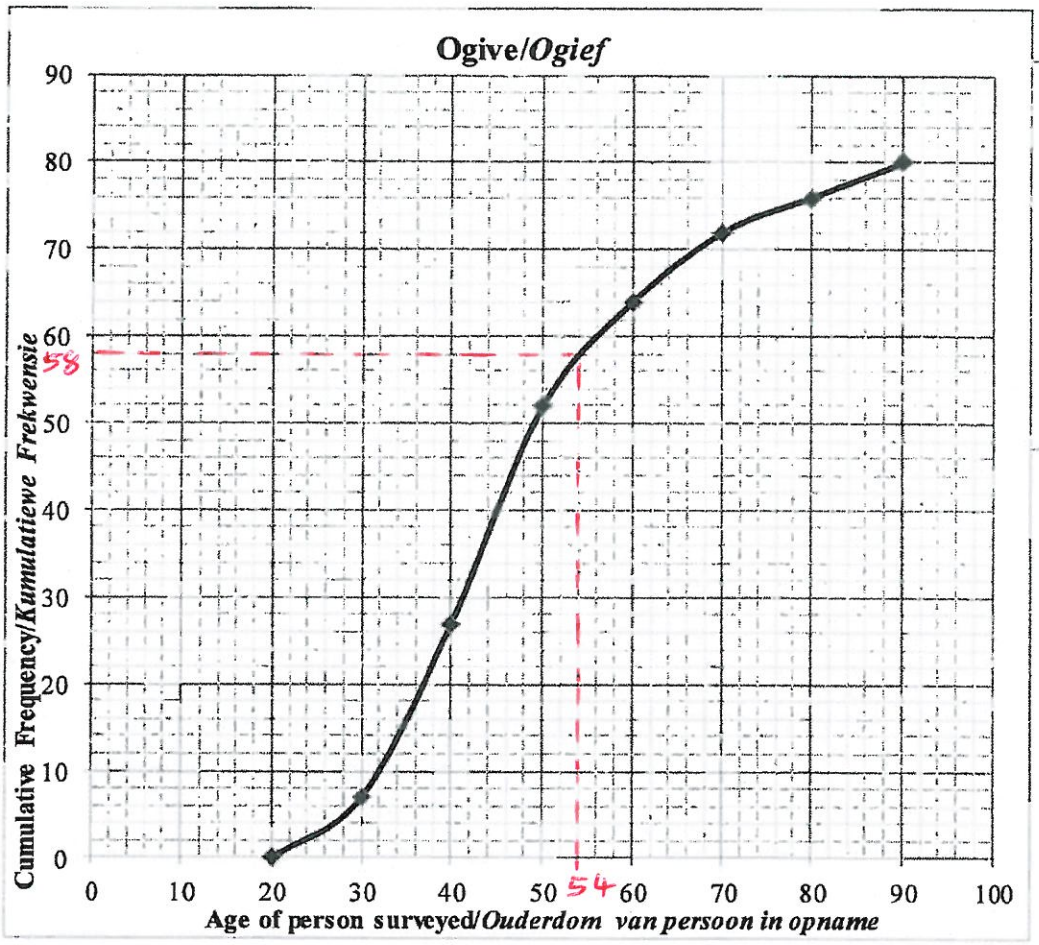
1.2.3	$41 \times 13 = 533$ $18 \times 6 = 108$ Overall mean time : $\frac{533+108}{19} = \frac{641}{19} = 33{,}74$	✓108 ✓ 533 + 108 = 641 ✓ answer/*antw* (3) **[10]**

QUESTION/*VRAAG* 2

2.1		✓ 20, 12 ✓ 8, 4 ✓ 52 ✓76 (4)
2.2	$n = 80$	✓answ/*antw* (1)
2.3	$40 < x \leq 50$	✓ answ/*antw* (1)

AGE OF PERSON SURVEYED/*OUDERDOM VAN PERSOON IN OPNAME*	FREQUENCY/*FREKWENSIE*	CUMULATIVE FREQUENCY/ *KUMULATIEWE FREKWENSIE*
$20 < x \leq 30$	7	7
$30 < x \leq 40$	**20**	27
$40 < x \leq 50$	25	**52**
$50 < x \leq 60$	**12**	64
$60 < x \leq 70$	**8**	72
$70 < x \leq 80$	4	**76**
$80 < x \leq 90$	**4**	80

2.4



✓Grounding (20; 0) /*Geanker by (20; 0)*

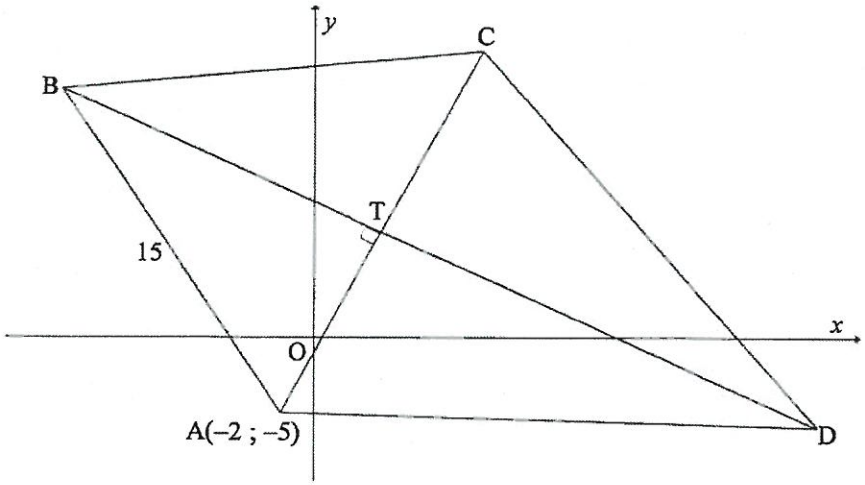
✓upper limits/ *boonste limiete*

✓ shape (smooth curve)/ *vorm (gladde kurwe)*

(3)

2.5	$80 - 58 = 22$ $\frac{22}{80} \times 100 = 27{,}5\%$	**Accept/*aanvaar*:** 56 – 59 calls/*oproepe*	✓58 calls/*oproepe* ✓22 ✓ 27,5% (3)
			[12]

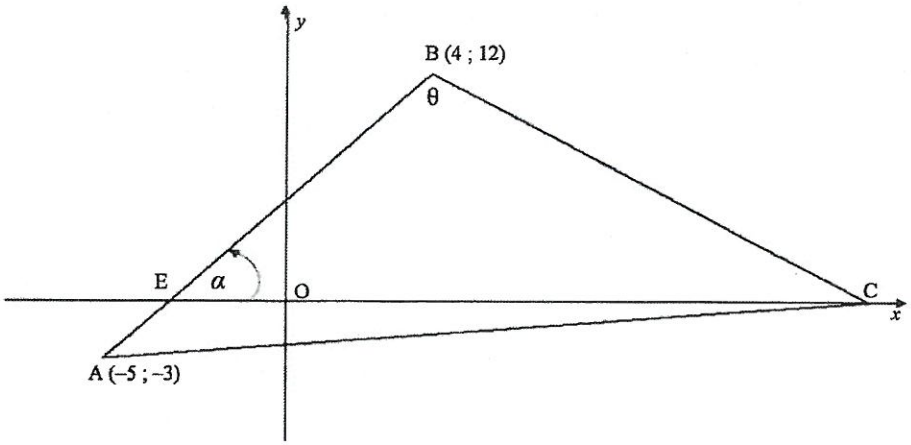
QUESTION/*VRAAG* 3



3.1	$BD \quad y=-\frac{1}{2}x+9$ $\therefore m_{BD}=-\frac{1}{2}$ $\therefore m_{AC}=2$	✓ Standard form/*vorm* ✓ answ/*antw* (2)
3.2	$y-y_1=m(x-x_1)$ $y-(-5)=2(x-(-2))$ $y=2x-1$ $y=2x+c$ sub $A(-2;-5)$ $-5=2(-2)+c$ $-1=c$ $\therefore y=2x-1$	✓ subst (–2 ; –5) ✓ answ/*antw* (2)
3.3	$2x-1=-\frac{1}{2}x+9$ OR/*OF* $\frac{5}{2}x=10$ $x=4$ $y=2(4)-1$ $y=7$ $T(4;7)$ $2y+x=18$ $2(2x-1)+x=18$ $4x-2+x=18$ $5x=20$ $x=4$ $y=2(4)-1$ $y=7$ $T(4;7)$	✓ $2x-1=-\frac{1}{2}x+9$ ✓ $x=4$ ✓ $y=7$ (3) **OR/*OF*** ✓ $2(2x-1)+x=18$ ✓ $x=4$ ✓ $y=7$ (3)

3.4.1	$4=\frac{-2+x}{2}$ $8=-2+x$ $x=10$ $7=\frac{-5+y}{2}$ $14=-5+y$ $y=19$ $C(10;19)$	✓ $x=10$ ✓ $y=19$ (2)
3.4.2	$AT=\sqrt{(4-(-2))^2+(7-(-5))^2}$ $=\sqrt{180}$ $=6\sqrt{5}\ =13{,}42$ $BT^2+AT^2=AB^2$ *(Pythagoras)* $BT=\sqrt{15^2-\left(\sqrt{180}\right)^2}$ $=\sqrt{45}$ $=3\sqrt{5}=6{,}71$	✓ subst. in distance/*afstand* form. ✓ answer/*antw in any form* ✓ subst. in pyth ✓ answer/*antw* (4)
3.4.3	BC is the diameter/ *middellyn* [subt. right / *ondersp. reg ∠*] or/*of* [conv.∠^{s} in semi - circle/ *omgk. ∠^{s} in halfsirkel*] Radius $=\frac{15}{2}=7{,}5$ units/ *eenh.*	✓✓ answ/*antw* (2) **[15]**

QUESTION/*VRAAG* 4



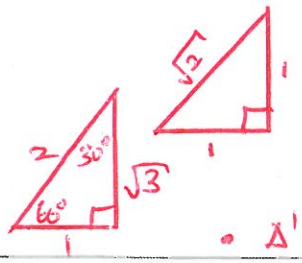
4.1	$m_{AB}=\frac{12-(-3)}{4-(-5)}=\frac{5}{3}$ **OR/*OF*** $m_{AB}=\frac{-3-12}{-5-4}=\frac{5}{3}$	✓ subst. in gradient form. ✓ answ/*antw* (2)
4.2	$y-12=\frac{5}{3}(x-4)$ $0-12=\frac{5}{3}(x-4)$ $x=-\frac{16}{5}$ $E\left(-\frac{16}{5};0\right)$ **OR/*OF*** $\frac{0-12}{x-4}=\frac{5}{3}$ $-36=5x-20$ $-16=5x$ $x=\frac{-16}{5}$ $E\left(-\frac{16}{5};0\right)$	✓equation/*verg.* ✓ $y=0$ ✓ answ/*antw* (3) ✓equating/*verg.* ✓ $y=0$ ✓ answ/*antw* (3)

$y=\frac{5}{3}x+c$ sub $B(4;12)$ $12=\frac{5}{3}(4)+c$ $\frac{16}{3}=c$ $y=\frac{5}{3}x+\frac{16}{3}$ x in: $0=\frac{5}{3}x+\frac{16}{3}$ $-\frac{16}{3}=\frac{5}{3}x$ $\therefore x=-\frac{16}{5}$ $\therefore E(-\frac{16}{5};0)$

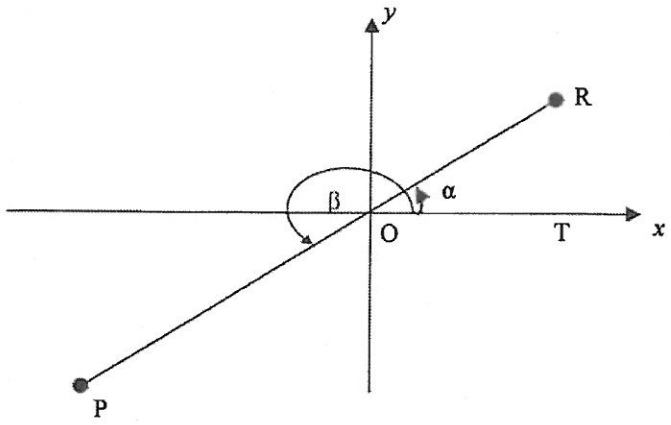
4.3	$\tan\alpha = m_{AB}$ $\tan\alpha = \frac{5}{3}$ $\alpha = 59°$ **NOTE/*LET WEL.*** Penalty 1 mark for incorrect rounding *Penalisering 1 punt vir verkeerde afronding*	✓ $\tan\alpha = \frac{5}{3}$ ✓ $\alpha = 59°$ (2)
4.4	$B\hat{C}X = 76° + 59° = 135°$ [ext ∠of Δ] $\tan 135° = m_{BC}$ $m_{BC} = -1 = m_{II}$ $y-(-3) = -1(x-(-5))$ $y = -x-8$	✓ 135° ✓ $\tan 135° = m_{BC}$ ✓ answer/*antw* ✓ subst (–3 ; –5) ✓ answer/*antw* (5) **[12]**

QUESTION/*VRAAG* 5

5.1	$\sin(90°-x).\cos(180°+x)+\tan x.\cos x.\sin(x-180°)$ $= \cos x.(-\cos x)+\frac{\sin x}{\cos x}.\cos x.(-\sin x)$ $= -\cos^2 x - \sin^2 x$ $= -(\cos^2 x + \sin^2 x)$ $= -1$	✓ $\cos x$ ✓ $-\cos x$ ✓ $\frac{\sin x}{\cos x}$ ✓ $-\sin x$ ✓common factor/*gemene fakt.* ✓ identity/*identiteit* (6)
5.2	$LHS = \frac{\sin 315°.\tan 210°.\sin 190°}{\cos 100°.\sin 120°}$ $= \frac{(-\sin 45°).(\tan 30°).(-\sin 10°)}{(-\sin 10°).(\sin 60°)}$ $= \frac{-\frac{1}{\sqrt{2}}.\frac{1}{\sqrt{3}}}{\frac{\sqrt{3}}{2}}$ $= -\frac{\sqrt{2}}{3}$	✓ $-\sin 45°$ ✓ $\tan 30°$ ✓ $-\sin 10°$ ✓ $-\sin 10°$ ✓ $\sin 60°$ ✓ subst. of special angles/*inverv. van sp hoeke* (6)



• Δ'S MUST BE SHOWN



5.3.1	$x^2 + y^2 = r^2$ [Pythagoras] $(x)^2 + (3)^2 = 5^2$ $x^2 = 16$ $x = 4$ $\tan\alpha = \frac{3}{4}$	✓ subst in pyth ✓ $x = 4$ ✓ answer/*antw* (3)
5.3.2	$\sin\beta$ $= \sin(180° + \alpha)$ $= -\sin\alpha$ $= \frac{-3}{5}$	✓ $\beta = 180° + \alpha$ ✓ $-\sin\alpha$ ✓ answer/*antw* (3)

5.3.3	$\frac{y}{10k}=\frac{-3k}{5k}$ $y=-6k$ $\therefore x=-8k$ $P(-8k;-6k)$	✓ $\frac{y}{10}$ **OR/*OF*** ✓ $\frac{y}{10k}$ ✓ $\frac{-3}{5}$ ✓ $\frac{-3k}{5k}$ ✓ $y=-6$ ✓ $y=-6k$ ✓ $x=-8$ ✓ $x=-8k$ (4)
5.4.	$\text{LHS}=\frac{\sin\theta-\tan\theta.\cos^2\theta}{\cos\theta-(1-\sin^2\theta)}$ $=\frac{\sin\theta-\frac{\sin\theta}{\cos\theta}.\cos^2\theta}{\cos\theta-\cos^2\theta}$ $=\frac{\sin\theta(1-\cos\theta)}{\cos\theta(1-\cos\theta)}$ $=\tan\theta$ $=\text{RHS}$ **OR/*OF*** $\text{LHS}=\frac{\sin\theta-\tan\theta.\cos^2\theta}{\cos\theta-1+(1-\cos^2\theta)}$ $=\frac{\sin\theta-\frac{\sin\theta}{\cos\theta}.\cos^2\theta}{\cos\theta-\cos^2\theta}$ $=\frac{\sin\theta(1-\cos\theta)}{\cos\theta(1-\cos\theta)}$ $=\tan\theta$ $=\text{RHS}$	✓ $\frac{\sin\theta}{\cos\theta}$ ✓ $\cos^2\theta$ ✓ common fact/ *gemene fakt.* ✓ common fact/ *gemene fakt.* (4) ✓ $\frac{\sin\theta}{\cos\theta}$ ✓ $1-\cos^2\theta$ ✓ common fact/ *gemene fakt.* ✓ common fact/ *gemene fakt.* (4) **[26]**

QUESTION/*VRAAG* 6

6.1	$\sin(x-30°)=\cos 2x$ $\sin(x-30°)=\sin(90°-2x)$ $x-30°=90°-2x+360°k$ *or* $x-30°=180°-(90°-2x)+360k$ $3x=120°+360°k$ $\quad -x=120°+360°k$ $x=40°+120°k$ $\quad x=-120°+360°k, k\in Z$ **NOTE/LET WEL:** $x=-120°+k.360°$ is equivalent to/*ekwivalent aan* $x=240°+k.360°$ **OR/*OF*** $\cos(90°-(x-30°))=\cos 2x$ $\cos(120°-x)=\cos 2x$ $120°-x=2x+360°k$ *or* $120°-x=-2x+360°k$ $-3x=-120°+360°k$ $\quad x=-120°+360°k$ $x=40°+120°k,\ k\in Z$	✓ $\sin(90°-2x)$ ✓ $x-30°=90°-2x+360°k$ ✓ $x=40°+120°k$ ✓ $x-30°=180°-(90°-2x)+360k$ ✓ $x=-120°+360°k$ (5) ✓ $\cos(90°-(x-30°))$ ✓ $120°-x=2x+360°k$ ✓ $x=40°+120°k$ ✓ $120°-x=-2x+360°k$ ✓ $x=240°+360°k$ (5)
6.2.1	$180°$	✓ answer/*antw* (1)
6.2.2	$-1\le y\le 1$ **OR/*OF*** $y\in[-1;1]$	✓ values/*waardes* ✓ notation/*notasie* (2) ✓ values/*waardes* ✓ notation/*notasie* (2)

see below

(*)

$\sin(x-30°)=\cos 2x$ $\quad A=x-30°$ $\quad B=2x$

$\sin A=\cos B$

$k\in Z$

$\sin(90°-B)$ (I) $\quad \sin(90°+B)$ (II)

$\sin A=\sin(90°-B)$ or $\sin A=\sin(90°+B)$

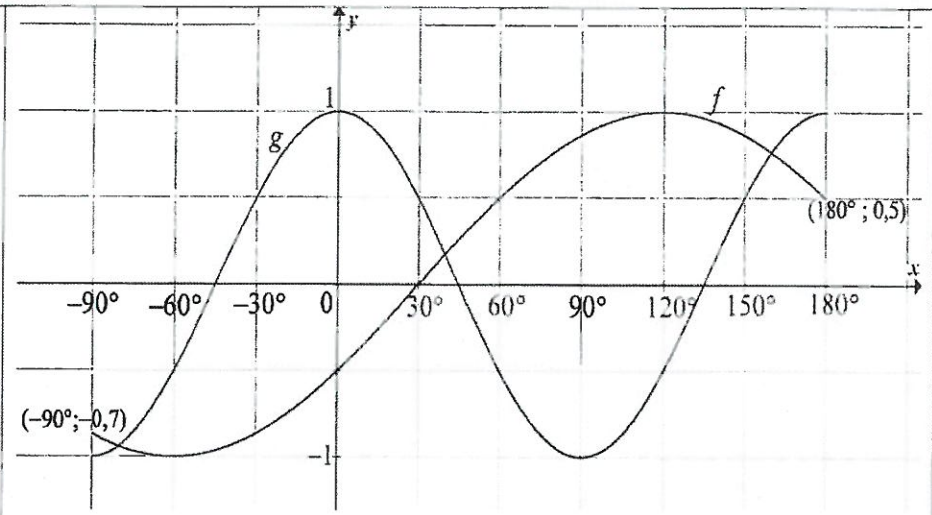
$A=90°-B+k360°$ $\quad A=90°+B+k360°$

$x-30°=90°-2x+k360°$ $\quad x-30°=90°+2x+k360°$

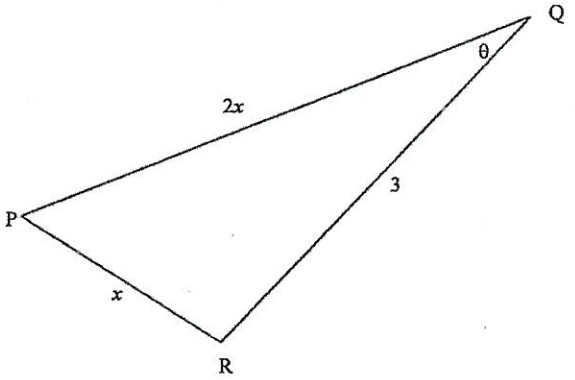
$3x=120°+k360°$ $\quad -x=120°+k360°$

$x=40°+k.120°$ $\quad x=-120°-k360°$

(If split up LHS ... $x=240°+k.360°$ which generates the same solutions!)

6.2.3		*f* ✓ *x*- intercept at/*afsnit by* 30° ✓ shape of/ *vorm van f* ✓TP /*DP* *g* ✓ shape of/*vorm van g* ✓ TP /*DP* (5)
6.2.4	$x=-80°\ ;\ x=40°\ ;\ x=160°$ using (6.1.) $x = 40° + k.120°$ → $x = -120° - k360°$ → doesn't generate any solutions for $x \in [-90°; 180°]$	✓✓✓one mark per answer/*een punt per antw.*(3)
		[16]

QUESTION/*VRAAG 7*



7.1	$x^2 = (2x)^2 + (3)^2 - 2(2x)(3)\cos\theta$ $12x\cos\theta = 3x^2 + 9$ $\cos\theta = \frac{3x^2+9}{12x}$ $\cos\theta = \frac{3(x^2+3)}{12x}$ $\cos\theta = \frac{x^2+3}{4x}$	✓ cos rule ✓ subst ✓ simplify/*vereenv* (3)

7.2.1	$\cos\theta = \frac{(2,4)^2+3}{4(2,4)}$ $\cos\theta = \frac{73}{80} = 0,9125$ $\theta = 24,15°$		✓ subst ✓ $\cos\theta = 0,9125$ $= \frac{73}{80}$ ✓ answer/*antw.* (3)
7.2.2	Area of/*van* $\Delta PQR = \frac{1}{2}\times PQ\times QR\times\sin\hat{Q}$ $= \frac{1}{2}\times 4,8\times 3\times\sin 24,15$ $= 2,95$ units/*eenh*^{2}		✓ subst ✓ answer/*antw.* (2)
7.3	$2x+x>3$ and $x+3>2x$ $x>1$ and $x<3$ **OR/*OF*** For/*vir* $x>0$, $\cos\theta>0$ $0°<\theta<90°$ $0<\frac{x^2+3}{4x}<1$ $x^2+3x<4x$ $x^2-4x+3<0$ $(x-1)(x-3)<0$ $1<x<3$	$\theta \in (0°;180°)$ $\therefore \cos\theta \in (-1;1)$ $\therefore -1<\frac{x^2+3}{4x}<1$ but $x>0$ $\therefore 0<\frac{x^2+3}{4x}<1$ since $x>0$ $4x>0$ $\therefore$ x thru : $0<x^2+3<4x$	✓✓ $2x+x>3$ and $x+3>2x$ ✓✓ $x>1$ and $x<3$ ✓✓ $0<\frac{x^2+3}{4x}<1$ ✓✓ $1<x<3$ (4)
			[12]

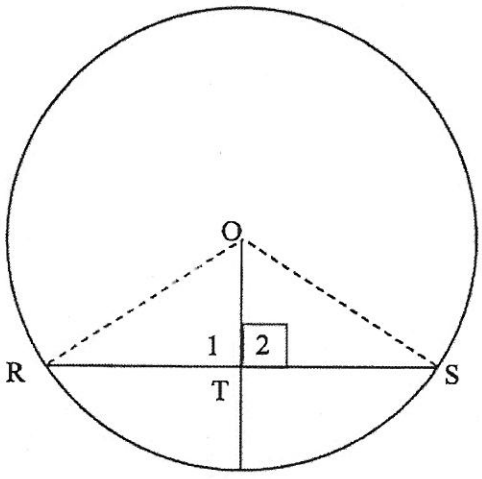
$\therefore 0<x^2+3$ AND $x^2+3<4x$
$x \in \mathbb{R}$
$x^2-4x+3<0$
$(x-1)(x-3)<0$
+ 0 − 0 +
1 3
$1<x<3$

$\therefore$ ⟷
AND
1 3
1 3
$\therefore x \in (1;3)$

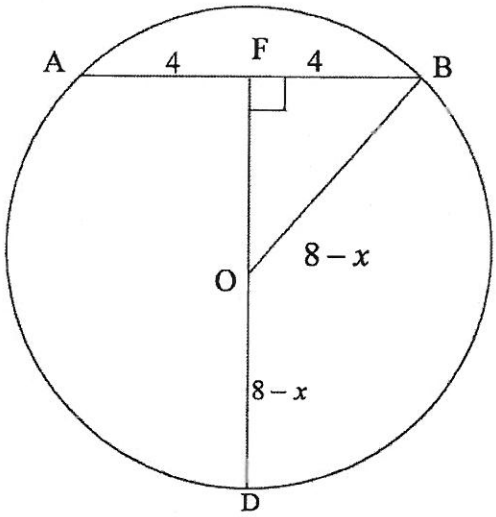
QUESTION 8/*VRAAG* 8

8.1	$V = \frac{1}{3}Ah$ $640 = \frac{1}{3} \times (16 \times 16) \times h$ $h = 7{,}5cm$	✓ Area of square/*van vierk.* $= (16 \times 16)$ ✓ Subst in volume form (2)
8.2	slant height / *skuinshoogte* $= s = \sqrt{7{,}5^2 + 8^2} = 10{,}9658....$ Total surface / *Totale buite area* $= (side \times side) + 4\left(\frac{1}{2} b \times s\right)$ $= (16 \times 16) + 4\left(\frac{1}{2} \times 16 \times 10{,}9658....\right)$ $= 606{,}91 cm^2$	✓ Subst in pyth ✓ answer/*antw* ✓ Subst in SA/ *BO* form. ✓ answer/*antw* (4) **[6]**

QUESTION 9/*VRAAG* 9

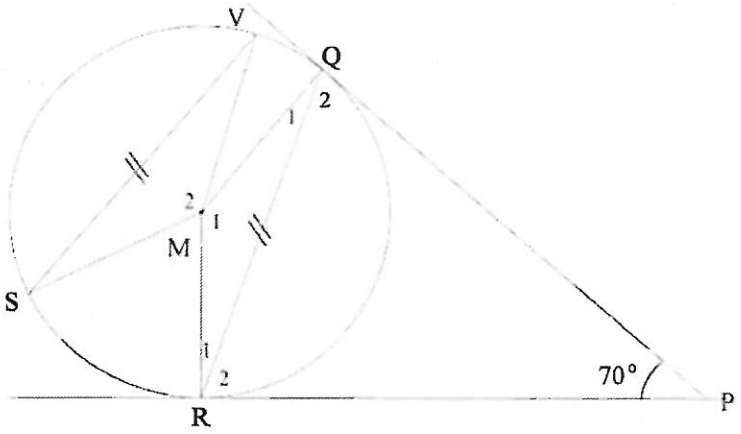


9.1	Construction/*Konstr*: Draw/*trek* radii OR and/*en* OS In ΔOTR and/ *en* ΔOTS $OR = OS$ (radii) $OT = OT$ (common side/ *gemene sy*) $\hat{T}_1 = \hat{T}_2 = 90°$ ($\angle^s$ on straight line/ *op 'n reguit lyn*) $\Delta OTR \equiv \Delta OTS$ ($90°$ HS) $\therefore RT = TS$	✓ Constr/*Konstr* ✓ S (OT is common/*gemeen*) ✓ S/R ✓ R ✓ S (5)



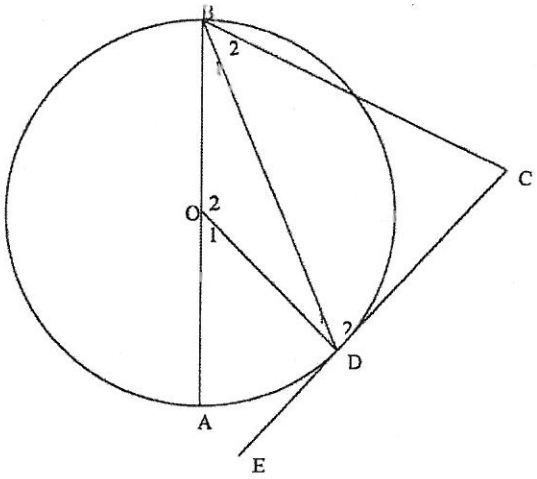
9.2	$AF = FB = 4cm$ [line from centre ⊥ to chord/ *lyn van mdpt ⊥ aan koord*] OD $= OB = 8 - x (radii)$ $OB^2 = OF^2 + FB^2$ *(Pythagoras)* $(8-x)^2 = x^2 + 4^2$ $64 - 16x + x^2 = x^2 + 4^2$ $48 = 16x$ $x = 3$ length of/ *lengte van radius* $= 8 - x$ $= 8 - 3$ $= 5\ units / eenh$	✓S/R ✓$8-x$ ✓$(8-x)^2 = x^2 + 4^2$ ✓$x = 3$ ✓Answer/*antw* (5) **[10]**

QUESTION/*VRAAG* 10



10.1	$\hat{Q}_2 = \hat{R}_2$ [tangents from common point/ *rk lne van selfde punt* $\hat{Q}_2 + \hat{R}_2 + 70° = 180°$ [sum $\angle\Delta$] $2\hat{R}_2 = 110°$ $\hat{R}_2 = 55°$	✓ S ✓R ✓ S ✓ $\hat{R}_2 = 55°$ (4)
10.2	$\hat{Q}_2 + \hat{Q}_1 = 90°$ [tan/*rkl* ⊥ rad] $\hat{Q}_1 = 35°$ **OR/*OF*** $\hat{R}_1 + \hat{R}_2 = 90°$ [tan/*rkl* ⊥ rad] $\hat{R}_1 = 35°$ $\hat{Q}_1 = \hat{R}_1 = 35°$ [$OR = OQ$]	✓ R ✓ $\hat{Q}_1 = 35°$ (2) ✓ R ✓ $\hat{Q}_1 = 35°$ (2)
10.3	$\hat{M}_1 + \hat{R}_1 + \hat{Q}_1 = 180°$ [sum $\angle\Delta$] $\hat{M}_1 = 180° - 70° = 110°$ $\hat{M}_2 = 110°$ [equal chords subtend = ∠ at the centre/ *gelyke koorde onrsp. = ∠ by mdpt*]	✓S ✓ $\hat{M}_1 = 110°$ ✓ S / R (3) **[9]**

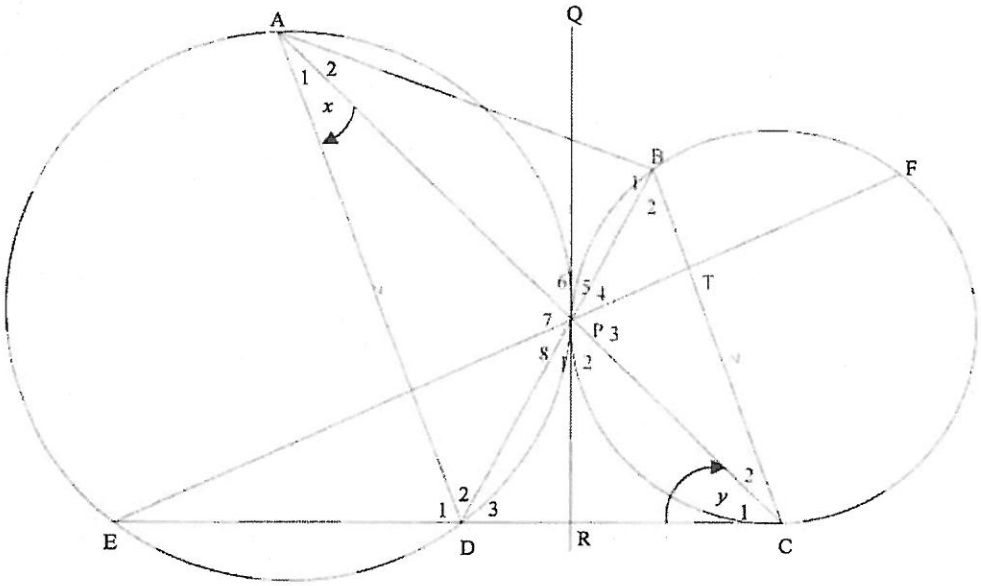
QUESTION/*VRAAG* 11



11.1	$\hat{B}_1 = \hat{B}_2 = x$ [BD bisect/*halveer* $\angle$ A$\hat{B}$C] $A\hat{B}C = 2x$ $\hat{O}_1 = 2x$ [$\angle$ at centre = 2 times $\angle$ at circumference/] [*midpts*$\angle$ = 2 × *omtreks*$\angle$] $\therefore$ BC || OD [corresponding $\angle$ are equal/*ooreenk.* $\angle$*is gelyk*] **OR/*OF*** $\hat{B}_1 = \hat{B}_2 = x$ [BD bisect/*halveer* $\angle$ A$\hat{B}$C] $\hat{D}_1 = x$ [angle opp = sides/$\angle$*e to gelyke sye*] $\hat{D}_1 = \hat{B}_2 = x$ $\therefore$ BC || OD [alternate angles are equal/*verw* $\angle$*e gelyk*] **OR/*OF*** $\hat{B}_1 = \hat{B}_2 = x$ [BD bisect/*halveer* $\angle$ A$\hat{B}$C] $A\hat{B}C = 2x$ $\hat{O}_1 = 2x$ [angle at centre = 2 times angle at circumference] [*midpts*$\angle$ = 2 × *omtreks*$\angle$] $\hat{O}_2 = 180° - 2x$ [$\angle$ on a straight line/$\angle$*op reguit lyn*] $\hat{O}_2 + A\hat{B}C = 180° - 2x + 2x = 180°$ $\therefore$ BC || OD [co-int angles are suppl/*ko-binne* $\angle$*is suppl*]	✓ S ✓ S ✓ R ✓ R (4) **OR/*OF*** ✓ S ✓ S ✓ R ✓ R (4) **OR/*OF*** ✓ S ✓ S ✓ R ✓ R (4)

11.2	$O\hat{D}C = 90°$ [tan/*rkl* ⊥ rad] $\hat{C} = 90°$ [co – int / *ko-binne* ∠'s OD ∥ BC] **OR/*OF*** $\hat{D}_1 = x$ $\hat{D}_2 = 90° - x$ [tan/*rkl* ⊥ rad] $\hat{C} = 180° - (90° - x) - x$ [int ∠'s of / *van* Δ] $= 90°$ **OR/*OF*** $E\hat{D}O = 90°$ [tan/*rkl* ⊥ rad] $\hat{C} = 90°$ [*corresp.* / *ooreenk.* ∠'s OD ∥ BC]	✓ S/R ✓ S ✓R (3) **OR/*OF*** ✓ S/R ✓ S ✓R (3) ✓ S/R ✓ S ✓R (3) [7]

QUESTION/*VRAAG* 12



12.1	$\hat{P}_1 = \hat{A}_1 = x$ [tan – ch th/ *rkl-kdst*] $\hat{C}_2 = \hat{A}_1 = x$ [alt/ *verw.*$\angle^s$ AD $\parallel$ BC] $\hat{E} = x$ [$\angle^s$ in the same segment/*dieselfde segment*] $\hat{P}_5 = \hat{P}_1 = x$ [vert opp/ *reg oorst*]	✓S ✓R ✓S ✓R ✓S ✓R ✓S/R (7)
12.2	$\hat{P}_7 = \hat{E} + \hat{C}_1$ [*ext* $\angle$ *of* Δ] $= x + y$ **OR/*OF*** $D\hat{C}B = x + y$ $\hat{D}_1 = D\hat{C}B = x + y$ [corresp/ *ooreenk.* $\angle^s$ = ,AD $\parallel$ BC] $\therefore E\hat{P}A = x + y$ [$\angle^s$ in the same segment/*dieselfde segment*]	✓✓S ✓✓R (4) ✓S ✓R ✓S ✓R (4)

12.3	$\hat{P}_2 = y$ [tan from a commom point/ *rklyne v dieselfde p*	✓ S/R
	$D\hat{P}T = \hat{P}_1 + \hat{P}_2 + \hat{P}_3$	
	$= x + y + (x + y)$	
	$= 2x + 2y$	
	$\hat{C} = x + y$	✓ $\hat{C} = x + y$
	$D\hat{P}T + \hat{C} = 180°$ [opp $\angle^s$ of a cyclic quad/ *teenoorst.* $\angle^s$ *van kv*	✓ S/R
	$2x + 2y + x + y = 180°$	
	$3x + 3y = 180°$	
	$\therefore x + y = 60$ [ext $\angle$ of cyclic quad DCTP]	✓ Answ/*antw*
		(4)
	OR / *OF*	
	$\hat{P}_8 = \hat{C}_1 + \hat{C}_2 = x + y$ [ext $\angle$ of cyclic quad DCTP]	✓S ✓R
	$\hat{P}_1 + \hat{P}_2 + \hat{P}_7 + \hat{P}_8 = 180°$ [$\angle$'s on a straight line]	✓S /R
	$x + y + x + y + x + y = 180°$	
	$3x + 3y = 180°$	
	$3(x + y) = 180°$	
	$x + y = 60°$	✓ Answ/*antw*
		(4) **[15]**

TOTAL/*TOTAAL*: 150