GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

2020

MARKING GUIDELINES /

NASIENRIGLYNE

MATHEMATICS (PAPER 2) (10612)
WISKUNDE (VRAESTEL 2) (10612)

21 pages / *bladsye*

NOTE:

- If a candidate answers a question TWICE, mark only 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 guidelines. 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 doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

GEOMETRY / *MEETKUNDE*	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	'n Punt vir 'n korrekte bewering *('n Punt vir 'n bewering is onafhanklik van die rede.)*
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	'n Punt vir 'n korrekte rede *('n Punt word slegs vir die rede toegeken as die bewering korrek is.)*
S / R	Award a mark if the statement AND reason are both correct.
	(Ken 'n punt toe as beide die bewering EN rede korrek is.)

QUESTION / *VRAAG* 1

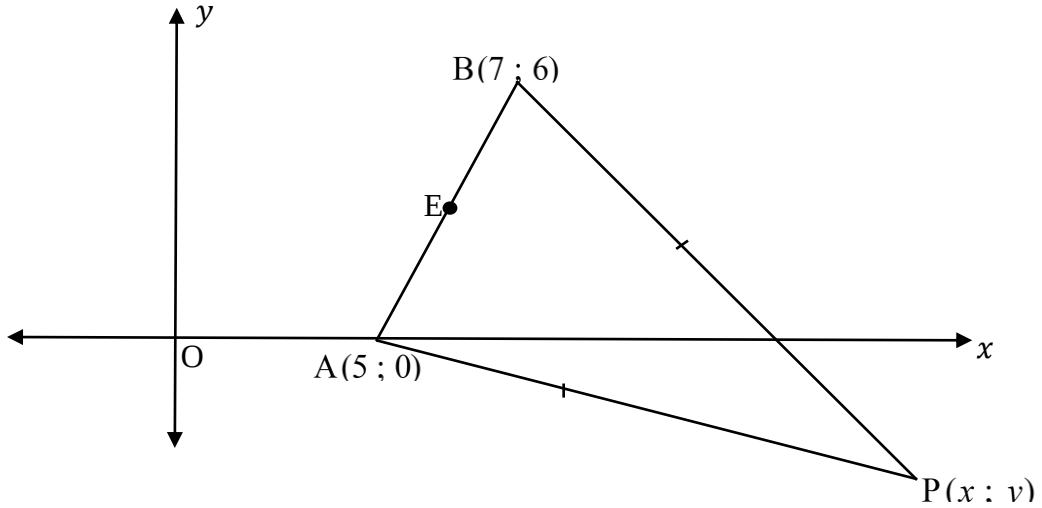
1.1	$\bar{x} = \frac{1\,581}{31}$ $= 51$ **OR / *OF*** $\bar{x} = 51$ (calculator method / *sakrekenaar metode*)	✓$\frac{1\,581}{31}$ ✓ 51 **OR / *OF*** ✓✓51 (2)
1.2	$\therefore$ skewed to the right (positevely skewed) $\therefore$ *skeef na regs (positief skeef)*	✓ answer / *antwoord* (1)
1.3	Physical Sciences performed better. Q_1 is 40% in Physical Sciences and 28% in Mathematics which indicates the lower 25% of the class performed much better in Physical Sciences than in Mathematics. *Fisiese Wetenskappe presteer beter.* *Q_1 is 40% in Fisiese Wetenskappe en 28% in Wiskunde wat aandui dat die onderste 25% van die klas heelwat beter presteer in Fisiese Wetenskappe as in Wiskunde.*	✓ answer / *antwoord* ✓ reason / *rede* (2)
1.4	Accept any mark between 40 – 50. *Aanvaar enige punt tussen 40 – 50 .*	✓✓ answer / *antwoord* (2)
1.5	The greatest difference is $87\%-71\%=16\%$ $\therefore$ the Physical Sciences mark is 71%. *Die grootste verskil is* $87\%-71\%=16\%$ $\therefore$ *die Fisiese Wetenskappe punt is* 71%.	✓ $87\%-71\%=16\%$ ✓ answer / *antwoord* **answer only full marks / *antwoord alleenlik volpunte*** (2)
		[9]

QUESTION / *VRAAG* 2

2.1	$a = 12{,}41$ $b = 0{,}49$ $\hat{y} = 12{,}41 + 0{,}49x$	✓ $a = 12{,}41$ ✓ $b = 0{,}49$ ✓ $\hat{y} = 12{,}41 + 0{,}49x$ (3)
2.2	$\hat{y} = 12{,}41 + 0{,}49x$ $= 12{,}41 + 0{,}49(150)$ $= 85{,}91 \approx 86\%$ **OR/OF** $\hat{y} = 85{,}17$	✓substitution / *vervanging* ✓ answer / *antwoord* **OR/OF** ✓✓ $\hat{y} = 85{,}17$ (2)
2.3	$\hat{y} = 12{,}41 + 0{,}49x$ The y-intercept is 12,41 which means that a learner who did not begin the exam achieved 12,41%. This is clearly impossible. *Die y-afsnit is 12,41 wat beteken dat 'n leerling wat die eksamen nie begin het nie, alreeds12,41% behaal het. Dit is onmoontlik.*	✓conclusion / *gevolgtrekking* (1)

2.4	10,28	✓✓10,28 (2)
2.5	$63{,}9-\sigma=p$ $63{,}9+\sigma=103{,}59$ $127{,}92=p+103{,}59$ $p=24{,}33$ **OR / *OF*** $\sigma=103{,}59-63{,}96$ $=39{,}63$ $p=63{,}96-39{,}63$ $=24{,}33$	✓ $63{,}9-\sigma=p$ ✓ $63{,}9+\sigma=103{,}59$ ✓ $p=24{,}33$ **OR / *OF*** ✓ $\sigma=39{,}63$ ✓ $63{,}96-39{,}63$ ✓ $p=24{,}33$ (3)
		[11]

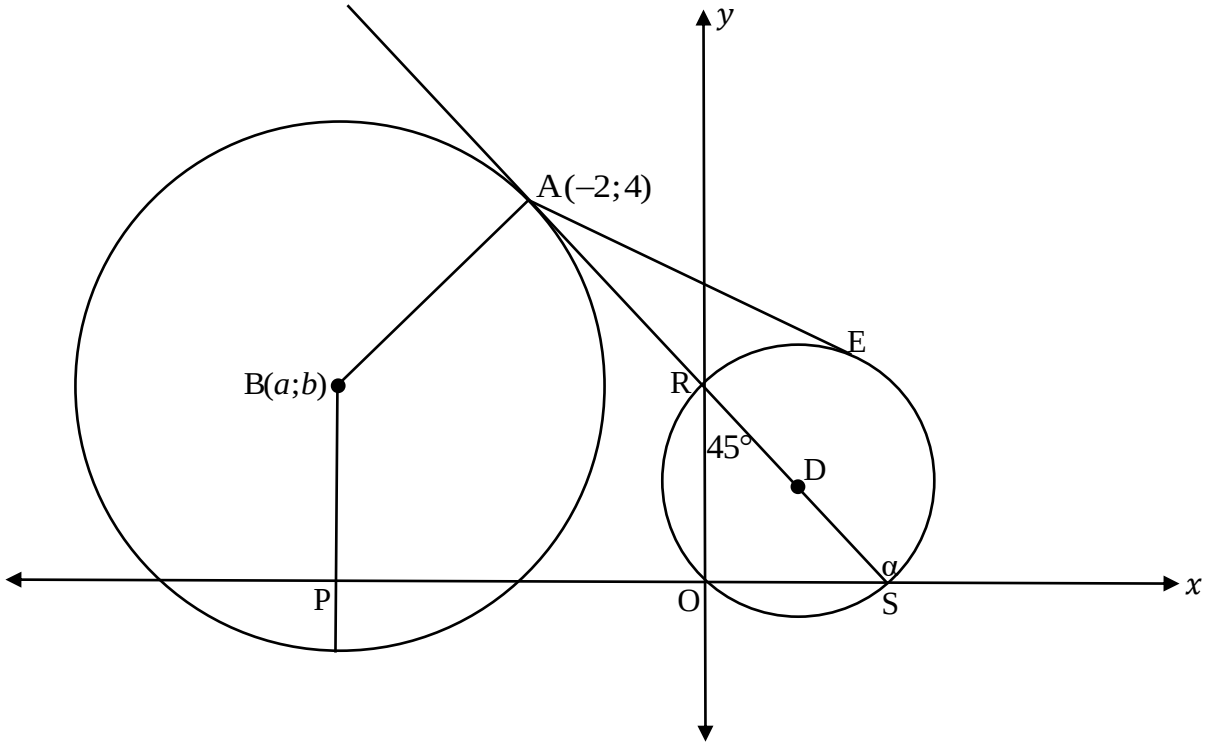
QUESTION / *VRAAG* 3

		
3.1	$E\left(\frac{12}{2};\frac{6}{2}\right)$ $E(6;3)$	✓6 ✓3 (2)
3.2	$m_{BA}=\frac{6-0}{7-5}$ $=3$ $y=mx+c$ $y=3x+c$ $6=3(7)+c$ $c=-15$ $y=3x-15$ **OR / *OF*** **OR / *OF*** $y-y_1=m(x-x_1)$ $y-6=3(x-7)$ $y=3x-21+6$ $y=3x-15$	✓ $m_{BA}=3$ ✓substitution of m and (7 ; 6) / (5 ; 0) *Vervanging van m en* (7 ; 6) / (5 ; 0) ✓ $y=3x-15$

	$y=mx+c$ $y=3x+c$ $0=3(5)+c$ $c=-15$ $y=3x-15$ **OR / *OF*** $y-y_1=m(x-x_1)$ $y-0=3(x-5)$ $y=3x-15$	(3)

3.3	$rx-3y+5=0$ $-3y=-rx-5$ $y=\frac{r}{3}x+\frac{5}{3}$ $3=\frac{r}{3}$ $r=9$	✓standard form / *standaardvorm* ✓ $3=\frac{r}{3}$ ✓ $r=9$ (3)
3.4	Area $\Delta AOP=10$ $\frac{1}{2}\times AO\times \perp h=10$ $\frac{1}{2}\times 5\times \perp h=10$ $\perp h=4$ but / *maar* $y<0$ $\therefore y=-4$ $AP=BP$ $AP^2=BP^2$ $(x-5)^2+(-4-0)^2=(x-7)^2+(-4-6)^2$ $x^2-10x+25+16=x^2-14x+49+100$ $4x=108$ $x=27$ P (27 ; –4)	✓ $\frac{1}{2}\times 5\times \perp h=10$ ✓ $\perp h=4$ ✓ $y=-4$ ✓ $(x-5)^2+(-4-0)^2$ and / *en* $(x-7)^2+(-4-6)^2$ ✓equate the two lengths / *gelykstel van die twee lengtes* ✓ $4x=108$ ✓ $x=27$ (7)
		[15]

QUESTION / *VRAAG* 4



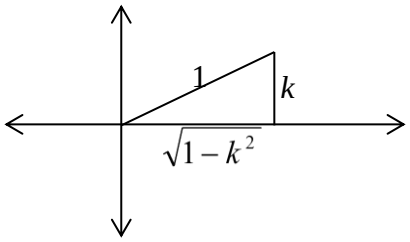
4.1	$\alpha = 135°$ ext $\angle$of Δ / *buite* $\angle$*van* Δ $\tan(135°) = m$ $m = -1$ $y = mx + c$ $y = -1x + c$ $4 = -1(-2) + c$ **OR / *OF*** $y - y_1 = m(x - x_1)$ $c = 2$ $y - 4 = -1(x + 2)$ $y = -x + 2$ $y = -1x - 2 + 4$ $y = -x + 2$	✓ $\tan(135°) = m$ ✓ $m = -1$ ✓substitute m and $(-2;4)$ / *vervang m en* $(-2;4)$ ✓ equation / *vergelyking* (4)
4.2	$P(-4;0)$ $a = -4$ $m_{BA}.m_{AS} = -1$ $m_{BA} = 1$ $m_{BA} = \frac{4-b}{-2+4}$ $1 = \frac{4-b}{2}$ $2 = 4 - b$ $b = 2$	✓ $a = -4$ ✓ $m_{BA} = 1$ ✓substitute / *vervang* ✓ $b = 2$ (4)

4.3	$(x-a)^2+(y-b)^2=r^2$ $(x+4)^2+(y-2)^2=r^2$ $(-2+4)^2+(4-2)^2=r^2$ $4+4=r^2$ $(x+4)^2+(y-2)^2=8$	✓substitute midpoint in correct formula / *vervang middelpunt in korrekte formule* ✓substitute / *vervang* $(-2;4)$ ✓$(x+4)^2+(y-2)^2=8$ (3)
4.4	$x^2-2x+y^2-2y=0$ $(x^2-2x+1)+(y^2-2y+1)=1+1$ $(x-1)^2+(y-1)=2$	✓$(x-1)^2$ ✓$(y-1)^2$ ✓2 (3)
4.5	D (1 ; 1)	✓answer / *antwoord* (1)
4.6	DE = $\sqrt{2}$ DA = $\sqrt{(-2-1)^2+(4-1)^2}$ $=\sqrt{9+9}$ $=\sqrt{18}$ **OR/*OF*** $=3\sqrt{2}$ $D\hat{E}A=90°$ radius $\perp$ tangent / *radius* $\perp$ *raaklyn* $AD^2=DE^2+AE^2$ pythagoras $\left(\sqrt{18}\right)^2=\left(\sqrt{2}\right)^2+AE^2$ $18-2=AE^2$ $AE=4$	✓DE = $\sqrt{2}$ ✓correct substitution in correct formula / *korrekte vervanging in korrekte formule* ✓DA = $\sqrt{18}$ **OR/*OF*** $3\sqrt{2}$ ✓$D\hat{E}A=90°$ ✓$\left(\sqrt{18}\right)^2=\left(\sqrt{2}\right)^2+AE^2$ ✓$AE=4$ (6)
		[21]

QUESTION / *VRAAG* 5

5.1	$1-4\sin^2 15°$	
	$=1-4\sin^2(45°-30°)$	✓ $1-4\sin^2(45°-30°)$
	$=1-4\left[\sin 45°\cos 30°-\cos 45°\sin 30°\right]^2$	✓ $\sin 45°\cos 30°-\cos 45°\sin 30°$
	$=1-4\left[\frac{\sqrt{2}}{2}.\frac{\sqrt{3}}{2}-\frac{\sqrt{2}}{2}.\frac{1}{2}\right]^2$	✓ $\frac{\sqrt{2}}{2}.\frac{\sqrt{3}}{2}-\frac{\sqrt{2}}{2}.\frac{1}{2}$
	$=1-4\left[\frac{\sqrt{6}-\sqrt{2}}{4}\right]^2$	
	$=1-4\left[\frac{6-4\sqrt{3}+2}{16}\right]$	✓ $1-4\left[\frac{6-4\sqrt{3}+2}{16}\right]$
	$=1-4\left[\frac{8-4\sqrt{3}}{16}\right]$	
	$=1-\left[\frac{8-4\sqrt{3}}{4}\right]$	
	$=\sqrt{3}-1$	✓ $\sqrt{3}-1$
	OR/*OF*	**OR/*OF***
	$1-4\sin^2 15°$	
	$=1-4\sin^2(60°-45°)$	✓ $1-4\sin^2(60°-45°)$
	$=1-4\left[\sin 60°\cos 45°-\cos 60°\sin 45°\right]^2$	✓ $\sin 60°\cos 45°-\cos 60°\sin 45°$
	$=1-4\left[\frac{\sqrt{3}}{2}.\frac{\sqrt{2}}{2}-\frac{1}{2}.\frac{\sqrt{2}}{2}\right]^2$	✓ $\frac{\sqrt{3}}{2}.\frac{\sqrt{2}}{2}-\frac{1}{2}.\frac{\sqrt{2}}{2}$
	$=1-4\left[\frac{\sqrt{6}-\sqrt{2}}{4}\right]^2$	
	$=1-4\left[\frac{6-4\sqrt{3}+2}{16}\right]$	✓ $1-4\left[\frac{6-4\sqrt{3}+2}{16}\right]$
	$=1-4\left[\frac{8-4\sqrt{3}}{16}\right]$	
	$=1-\left[\frac{8-4\sqrt{3}}{4}\right]$	
	$=\sqrt{3}-1$	✓ $\sqrt{3}-1$
		(5)

5.2	$\dfrac{\sqrt{3}\sin x.\sin^2 72° + \sin^2 198°.\sqrt{3}\cos(x-90°)}{\tan 120°.\sin x}$ $= \dfrac{\sqrt{3}\sin x.\sin^2(90°-18°) + \sin^2(180°+18°).\sqrt{3}\sin x}{\tan(180°-60°).\sin x}$ $= \dfrac{\sqrt{3}\sin x.\cos^2 18° + \sin^2 18°.\sqrt{3}\sin x}{-\tan 60°.\sin x}$ $= \dfrac{\sqrt{3}\sin x(\cos^2 18° + \sin^2 18°)}{-\sqrt{3}.\sin x}$ $= -1$ **OR/*OF*** $\dfrac{\sqrt{3}\sin x.\sin^2 72° + \sin^2 18°.\sqrt{3}\sin x}{-\tan 60°.\sin x}$ $= \dfrac{\sqrt{3}\sin x(\sin^2 72° + \cos^2 72°)}{-\sqrt{3}.\sin x}$ $= \dfrac{\sqrt{3}\sin x(1)}{-\sqrt{3}.\sin x}$ $= -1$	✓ $\sin x$ ✓ $\cos^2 18°$ ✓ $\sin^2 18°$ ✓ $-\tan 60°$ ✓factorise / *faktoriseer* ✓ -1 **OR/*OF*** ✓ $\sin^2 18°$ ✓ $\sin x$ ✓ $-\tan 60°$ ✓ factorise / *faktoriseer* ✓ $\cos^2 72°$ ✓ -1 (6)
5.3	$6\sin x.\cos x + 3\cos x - 4\sin^2 x - 2\sin x = 0$ $3\cos x(2\sin x + 1) - 2\sin x(2\sin x + 1) = 0$ $(2\sin x + 1)(3\cos x - 2\sin x) = 0$ $\sin x = -\dfrac{1}{2}$ **OR/*OF*** $3\cos x = 2\sin x$ $\tan x = \dfrac{3}{2}$ RA $= 30°$ RA $= 56{,}31°$ $x = 210° + k.360°$ $x = 56{,}31° + k.180°$ $x = 330° + k.360°$ $x = 236{,}31° + k.180°; k \in Z$ **OR/*OF***	✓grouping / *groepeer* ✓ factorise / *faktoriseer* ✓ $\sin x = -\dfrac{1}{2}$ ✓ $\tan x = \dfrac{3}{2}$ ✓ $210° + k.360°$ ✓ $330° + k.360°$, ✓ $56{,}31° + k.180°, k \in Z$ **OR/*OF***

	$6\sin x.\cos x+3\cos x-4\sin^2 x-2\sin x=0$ $(6\sin x.\cos x+3\cos x)-(4\sin^2 x+2\sin x)=0$ $3\cos x(2\sin x+1)-2\sin x(2\sin x+1)=0$ $(2\sin x+1)(3\cos x-2\sin x)=0$ $\sin x=-\frac{1}{2}$ **OR/*OF*** $3\cos x=2\sin x$ $\tan x=\frac{3}{2}$ $x=-30°+k.360°$ $x=56{,}31°+k.180°$ $;k\in Z$ $x=210°+k.360°$	✓grouping / *groepeer* ✓ factorise / *faktoriseer* ✓ $\sin x=-\frac{1}{2}$ ✓ $\tan x=\frac{3}{2}$ ✓ $-30°+k.360°$ ✓ $210°+k.360°$ ✓ $56{,}31°+k.180°;k\in Z$ (7)
5.4	$(1-\tan A)\left(\frac{\cos A}{\cos 2A}\right)=\frac{1}{\cos A+\sin A}$ LHS/*LK* $=(1-\tan A)\left(\frac{\cos A}{\cos 2A}\right)$ $=\left(1-\frac{\sin A}{\cos A}\right)\left(\frac{\cos A}{\cos^2 A-\sin^2 A}\right)$ $=\left(\frac{\cos A-\sin A}{\cos A}\right)\left(\frac{\cos A}{(\cos A-\sin A)(\cos A+\sin A)}\right)$ $=\frac{1}{\cos A+\sin A}$ LHS / *LK* = RHS / *RK*	✓ $\frac{\sin A}{\cos A}$ ✓ $\cos^2 A-\sin^2 A$ ✓ $\frac{\cos A-\sin A}{\cos A}$ ✓ $(\cos A-\sin A)(\cos A+\sin A)$ (4)
5.5.1	$\cos 2\theta$ $=\sqrt{1-k^2}$  **OR/*OF*** $\cos^2 2\theta=1-\sin^2 2\theta$ $=1-k^2$ $\cos 2\theta=\sqrt{1-k^2}$	✓✓ $\sqrt{1-k^2}$ **OR/*OF*** ✓ $\cos^2 2\theta=1-\sin^2 2\theta$ ✓ $\sqrt{1-k^2}$ (2)

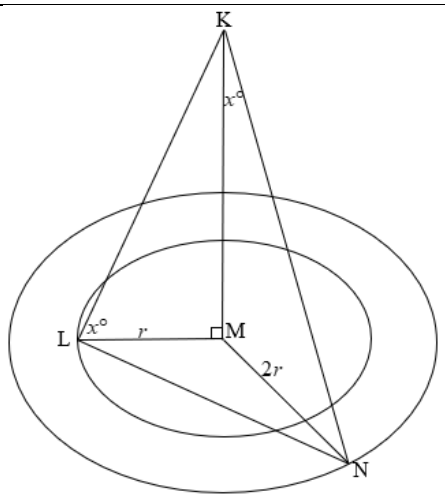
5.5.2	$\frac{\sin 2\theta}{\tan\theta}$	
	$=\frac{2\sin\theta.\cos\theta}{\frac{\sin\theta}{\cos\theta}}$	✓ $2\sin\theta.\cos\theta$ ✓ $\frac{\sin\theta}{\cos\theta}$
	$=2\sin\theta.\cos\theta.\frac{\cos\theta}{\sin\theta}$	
	$=2\cos^2\theta$	✓ $2\cos^2\theta$
	But/*maar* $\cos 2\theta=\sqrt{1-k^2}$	
	$2\cos^2\theta-1=\sqrt{1-k^2}$	✓ $2\cos^2\theta-1$
	$2\cos^2\theta=\sqrt{1-k^2}+1$	✓ $\sqrt{1-k^2}+1$
	$\frac{\sin 2\theta}{\tan\theta}=\sqrt{1-k^2}+1$	(5)
		[29]

QUESTION / *VRAAG* 6

6.1	$a=-1$ $d=2$	✓ $a=-1$ ✓ $d=2$ (2)
6.2	D$\left(-150°;\frac{1}{2}\right)$	✓$\left(-150°;\frac{1}{2}\right)$ (1)
6.3.1	$-90°<x<90°$ **OR / *OF*** $x\in(-90°;90°)$	✓ $-90°$ and / *en* $90°$ ✓correct inequality / *korrekte ongelykheid* (2)
6.3.2	$-135°<x<-45°$ **OR / *OF*** $x\in(-135°;-45°)$	✓ $-135°$ and / *en* $-45°$ ✓ correct inequality / *korrekte ongelykheid* (2)
		[7]

If learner gives all three answers, then maximum 1/2 / *Indien 'n leerling al drie die antwoorde gee, dan maksimum 1/2*
$x\in(-135°;-45°)$ or/*of* $(0°;45°)$ or/*of* $(135°;180°)$

QUESTION / *VRAAG* 7



7.1

In Δ KLM

$\frac{KM}{LM} = \tan x$ ✓correct trig ratio / *korrekte trig verhouding*

$\frac{KM}{r} = \tan x$

$KM = r \tan x$ ✓ $KM = r\tan x$ (simplification / *vereenvoudiging*)

In Δ KMN

$\frac{MN}{KM} = \tan x$

$\frac{2r}{KM} = \tan x$ **OR/*OF*** $KM = \frac{2r}{\tan x}$ ✓ $\frac{2r}{KM} = \tan x$

$r \tan x = \frac{2r}{\tan x}$

$\frac{2r}{r\tan x} = \tan x$ ✓ $\frac{2r}{r\tan x}$

$2 = \tan^2 x$

$\sqrt{2} = \tan x$ ✓ $\sqrt{2} = \tan x$

$x = 54{,}74°$ ✓ $x = 54,74°$

(6)

7.2

$LN^2 = LM^2 + MN^2 - 2LM.MN\cos M$

$LN^2 = (5)^2 + (10)^2 - 2(5).(10)\cos 110°$ ✓correct substitution in cos-rule / *korrekte vervanging in cos-reël*

$LN^2 = 159,20$

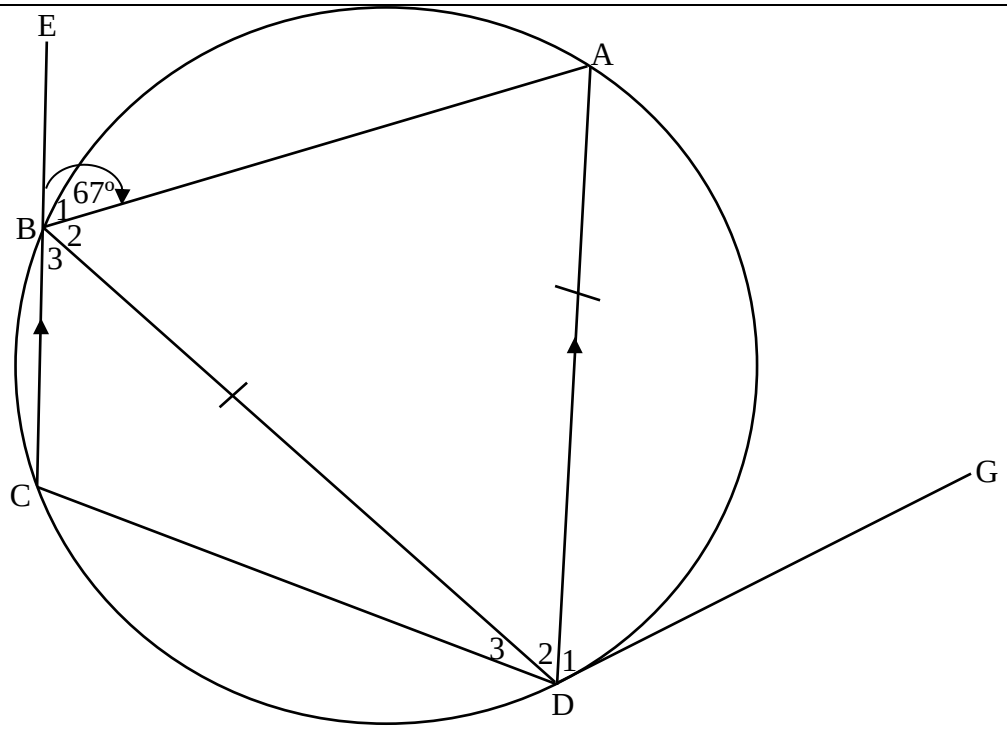
$LN = \sqrt{159,20}$

$LN = 12,62\,m$ ✓ $12,62m$

(2)

[8]

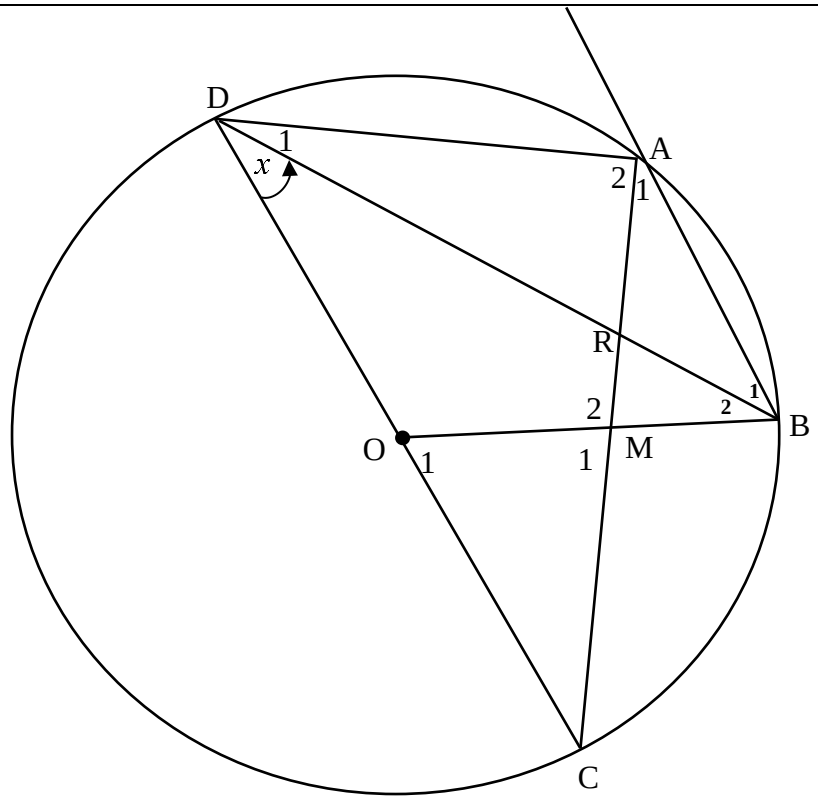
QUESTION / *VRAAG* 8



8.1.1	$A\hat{D}C = 67°$ **OR / *OF*** $\hat{B}_2 + \hat{B}_3 = 113°$ $A\hat{D}C = 67°$	ext. $\angle$ of cyclic quad / *buite* $\angle$ *van kvh* $\angle^s$ straight line / $\angle^e$ *op reguit lyn* opp $\angle^s$ of cyclic quad / *oorst* $\angle^e$ *van kvh*	✓S ✓R **OR / *OF*** ✓S ✓R (2)
8.1.2	$\hat{C} = 180° - 67°$ $= 113°$	co-int $\angle^s$ BC || AD / *ko-binne* $\angle^e$ *BC || AD*	✓S/R (1)
8.1.3	$\hat{A} = 67°$	opp $\angle^s$ of cyclic quad / alt $\angle^s$ BC||AD / alt $\angle^s$ EC || AD *oorst* $\angle^e$ *van kvh / verwisselende* $\angle^e$ *BC||AD / verwis* $\angle^e$ *EC || AD*	✓S/R (1)
8.1.4	$\hat{B}_2 = 67°$ $\hat{D}_2 = 180° - 67° - 67°$ $= 46°$	$\angle^s$ opposite = sides / $\angle^e$ *teenoor = sye* sum of $\angle^s$ in Δ / *som vd* $\angle^e$ *v* Δ	✓S ✓R ✓S (3)
8.1.5	$B\hat{D}G = 113°$ **OR / *OF*** $\hat{D}_1 = 67°$ $B\hat{D}G = 113°$	tan chord theorem / *raaklyn koordstelling* tan chord theorem / *raaklyn koordstelling*	✓S ✓R **OR / *OF*** ✓R ✓S (2)

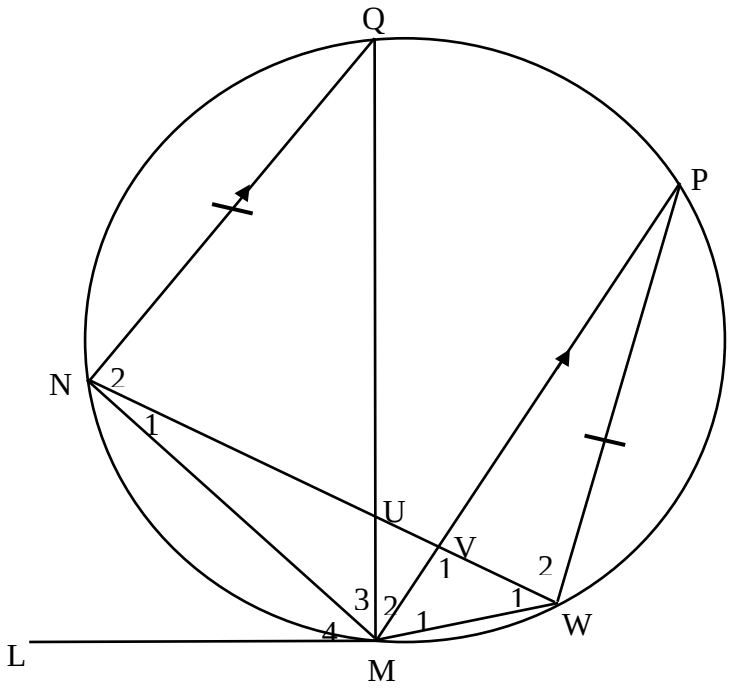
8.2	$\hat{B}_3 = \hat{D}_2 = 46°$ $AB = CD$ **OR/*OF*** $A\hat{D}C = \hat{A}$ $AB = CD$	alt $\angle^s$ BC||AD / *verwisselende* $\angle^e$ BC||AD $\angle^s$ subtend = chords / $\angle^e$ *onderspan* = *koorde* both $= 67°$ sides opp equal angles in trapezium ABCD /*sye teenoor gelyke hoeke in trapesium* ABCD	✓S ✓R **OR/*OF*** ✓S ✓R (2)
			[11]

QUESTION / *VRAAG* 9

9.1			
9.1.1(a)	$\hat{O}_1 = 2x$	$\angle$ centre = $2 \times \angle$ circumference / *middelpunts* $\angle = 2 \times$ *omtreks* $\angle$	✓S/R (1)

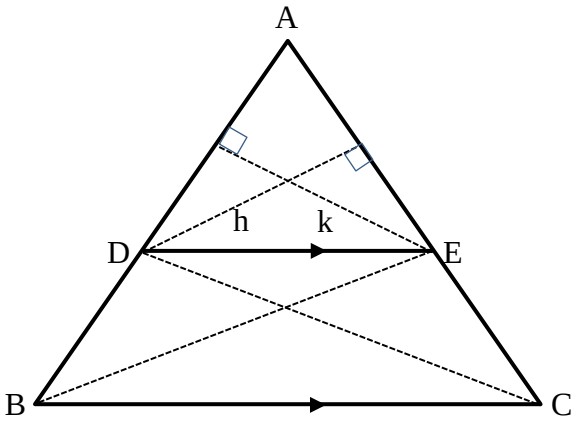
9.1.1(b)	$\hat{A}_1 = C\hat{D}B = x$	$\angle^s$ in the same segment / $\angle^e$ *in dies. segment*	✓S/R
	$\hat{M}_2 = 90°$	line from centre to midpoint of chord / *lyn van middelpunt van sirkel na middelpunt van koord*	✓S ✓R
	$\therefore A\hat{B}O = 90° - x$	sum of $\angle^s$ in Δ / ext $\angle$ of a Δ / *som vd* $\angle^e$ *v* Δ / *buite* $\angle$ *v* Δ	✓S
	OR/*OF*		**OR/*OF***
	$\hat{O}_1 = 2x$	proved/*reeds bewys*	✓S
	$\hat{M}_1 = 90°$	line from centre to midpoint of chord / *lyn van middelpunt van sirkel na middelpunt van koord*	✓R
	$\hat{C} = 90° - 2x$	sum of $\angle^s$ in Δ / *som vd* $\angle^e$ *v* Δ	✓S
	$\hat{B}_1 = 90° - 2x$ $A\hat{B}O = 90° - x$	$\angle^s$ in the same segment / $\angle^e$ *in dies. segment*	✓S/R (4)

9.1.2	AD||OB $\hat{O}_1 = A\hat{D}C = 2x$ $\therefore \hat{D}_1 = x$ $\hat{A}_1 = x$ $\therefore \hat{D}_1 = \hat{A}_1$ AB is a tangent / *is 'n raaklyn* **OR / *OF*** $\hat{A}_2 = 90°$ $\therefore$ AD||OB $C\hat{D}A = \hat{O}_1 = 2x$ $\therefore \hat{D}_1 = x$ $\hat{D}_1 = \hat{A}_1$ AB is a tangent / *is 'n raaklyn*	midpoint theorem / *middelpunt stelling* corresponding $\angle^s$ AD || OB / *ooreenkom* $\angle^e$ *AD || OB* proved / *reeds bewys* converse tan chord theorem / *omgekeerde raaklyn koordstelling* **OR / *OF*** $\angle$ in a semi-circle / $\angle$ *in halwe sirkel* corr $\angle^s$ are equal / *ooreenk* $\angle^e$ *gelyk* corr $\angle^s$ DA || OB / *ooreenk* $\angle^e$ DA || OB converse tan chord theorem / *omgekeerde raaklyn koord*	✓S ✓R ✓S ✓S ✓S ✓R **OR / *OF*** ✓S ✓R ✓R ✓S ✓S ✓R (6)
9.1.3	$DC^2 = AD^2 + AC^2$ but / *maar* $AC = 2AM$ and / *en* $DC = 2DO$ $(2DO)^2 = AD^2 + (2AM)^2$ $4DO^2 = AD^2 + 4AM^2$ but / *maar* In ΔABM $AM^2 = AB^2 - MB^2$ $\therefore 4DO^2 = AD^2 + 4(AB^2 - MB^2)$ $AD^2 = 4DO^2 - 4AB^2 + 4MB^2$	Pythagoras Pythagoras	✓S ✓S ✓S ✓substitution / *vervanging* (4)

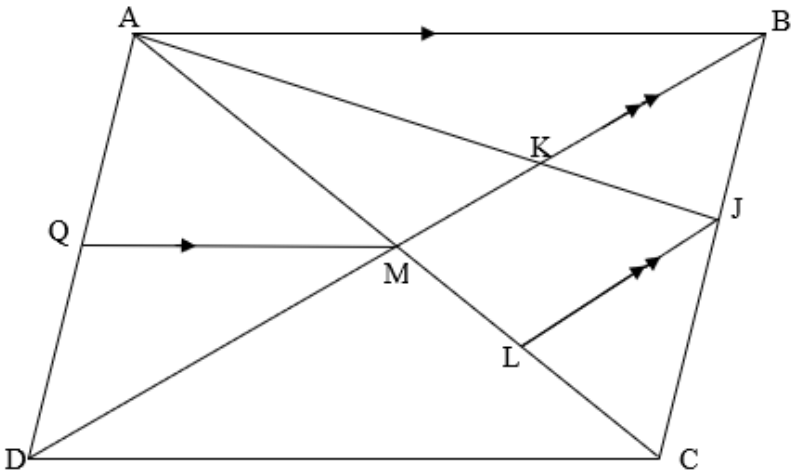
9.2			
9.2.1	$\hat{M}_2 = \hat{Q}$	alternate $\angle^s$ NQ || MP / *verwissel* $\angle^e$ *NQ* ||*MP*	✓S
	$\hat{M}_4 = \hat{Q} = \hat{M}_2$	tan chord theorem / *raaklyn koordstelling*	✓S/R
	$\hat{W}_1 = \hat{Q} = \hat{M}_2$	$\angle^s$ in the same segment / tan chord theorem / $\angle^e$ *dieselfde sirkel segment / raaklyn koord stelling*	✓S/R
	OR/*OF*		
	$\hat{W}_1 = \hat{M}_4 = \hat{M}_2$	tan chord theorem / *raaklyn koordstelling*	(3)
9.2.2	In ΔWMV and/*en* ΔQMN		
	$\hat{W}_1 = \hat{Q}$	proved / *reeds bewys*	✓S
	$\hat{M}_1 = \hat{M}_3$	equal chords subtend equal $\angle^s$ / *gelyke koorde onderspan gelyke* $\angle^e$	✓S/R
	$\hat{V}_1 = \hat{N}_1 + \hat{N}_2$	sum of $\angle^s$ in Δ / *som vd* $\angle^e$ *v* Δ	✓S
	$\therefore \Delta WMV \| \| \Delta QMN$	$\angle\angle\angle$	
	OR / *OF*		**OR / *OF***
	In ΔWMV and/*en* ΔQMN		
	$\hat{W}_1 = \hat{Q}$	proved/*reeds bewys*	✓S
	$\hat{M}_1 = \hat{M}_3$	equal chords subtend equal $\angle^s$ / *gelyke koorde onderspan gelyke* $\angle^e$	✓S/R
	$\therefore \Delta WMV \| \| \Delta QMN$	$\angle\angle\angle$	✓R (3)

9.2.3	$\frac{MV}{MN} = \frac{WV}{QN}$ $\Delta WMV \|\|\| \Delta QMN / \|\|\| \Delta^s$ $\frac{MV}{WV} = \frac{MN}{QN}$ $MV \times QN = MN \times WV$ given / *gegee* but / *maar* $QN = PW$ $MV \times PW = MN \times WV$ $\frac{MV}{WV} = \frac{MN}{PW}$	✓S ✓R ✓S (3)
		[24]

QUESTION / *VRAAG* 10



10.1	Construction: Join DC and BE and altitudes *k* and *h* *Konstruksie: Verbind DC en BE asook die hoogtelyne k en h*	✓construction / *konstruksie*
	$\frac{\text{Area } \Delta ADE}{\text{Area } \Delta DEB} = \frac{\frac{1}{2} \times AD \times k}{\frac{1}{2} \times DB \times k} = \frac{AD}{DB}$	✓S
	$\frac{\text{Area } \Delta ADE}{\text{Area } \Delta DEC} = \frac{\frac{1}{2} \times AE \times h}{\frac{1}{2} \times EC \times h} = \frac{AE}{EC}$	✓S
	but / *maar* $\text{Area } \Delta DEB = \text{Area } \Delta DEC$ same base, same height / *gelyke hoogte, dieselfde basis*	✓S ✓R
	$\therefore \frac{\text{Area } \Delta ADE}{\text{Area } \Delta DEB} = \frac{\text{Area } \Delta ADE}{\text{Area } \Delta DEC}$	✓S
	$\therefore \frac{AD}{DB} = \frac{AE}{EC}$	(6)

10.2			
10.2.1 (a)	$\frac{ML}{LC} = \frac{BJ}{JC} = \frac{2}{3}$	line || one side ΔBCM **OR** prop theorem MB||JL / *lyn* || *aan een sy van* ΔBCM ***OF*** *eweredigheidsstelling MB||JL*	✓S ✓R (2)
10.2.1 (b)	$\frac{MC}{ML} = \frac{BC}{BJ} = \frac{5}{2}$ $AM = MC$ $\frac{AM}{ML} = \frac{5}{2}$ $\frac{AK}{KJ} = \frac{AM}{ML} = \frac{5}{2}$	line || one side ΔBMC **OR** prop theorem MB||JL / *lyn* || *aan een sy van* ΔBMC ***OF*** *eweredigheidsstelling MB || JL* diagonals of a parm bisect / *hoeklyne van parm halveer* line || one side ΔAJL **OR** prop theorem MK||JL / *lyn* || *aan een sy van* ΔAJL ***OF*** *eweredigheidsstellina MK || JL*	✓S ✓S/R ✓S (3)
10.2.2	AB || CD AB || QM In ΔADC $\therefore QM \parallel CD$ $AM = MC$ $\therefore AQ = QD$ *but* $AD = BC$ $AQ = \frac{1}{2}AD$ $= \frac{1}{2}\left(\frac{2\sqrt{10}}{3}\right)$ $\therefore AQ = QD = \frac{2}{3}\sqrt{10} \div 2$ $= \frac{\sqrt{10}}{3}$ units	opposite sides of parm / *oorst sye van parm* proved / *reeds bewys* line passing through the midpoint of 1 side || to second side / *lyn sny die middelpunt van 1 sy || aan tweede sy* opposite sides of parm / *oorst sye van parm*	✓S ✓S / R ✓S ✓S

	OR / *OF*		**OR / *OF***
	In ΔABD BM = MD QM || AB	diag of a parm / *hoeklyne van parm* given / *gegee*	✓S
	$\therefore AQ=QD$	Line passing through the midpoint of 1 side || 2nd side / *lyn deur middelpunt aan een sy || tweede sy* **OR/*OF***	✓S/R
	$\therefore QM = \frac{1}{2} AB$ AQ = QD $AQ = \frac{1}{2}\left(\frac{2}{3}\sqrt{10}\right)$	midpoint theorem / *middelpunt stelling*	✓S/R
	$= \frac{\sqrt{10}}{3}$ units/*eenhede*		✓S
	OR / *OF*		**OR / *OF***
	Let/stel BC = 2k en/and AB = 3k $3k = \sqrt{10}$ $k = \frac{\sqrt{10}}{3}$ $BC = \frac{2\sqrt{10}}{3}$		✓S
	$\frac{AQ}{AD} = \frac{AM}{AC} = \frac{5}{10}$ $AQ = \frac{1}{2} AD$	line || one side ΔADC **OR** prop theorem QM||DC / *lyn || aan een sy van* ΔADC ***OF*** *eweredigheidsstelling* QM||DC	✓S/R
	$AD = BC = \frac{2\sqrt{10}}{3}$	opposite sides of parm / *oorst sye van parm*	✓R
	$AQ = \frac{\sqrt{10}}{3}$		✓S (4)
			[15]

TOTAL / *TOTAAL*: [150]