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

QUESTION / VRAAG 1

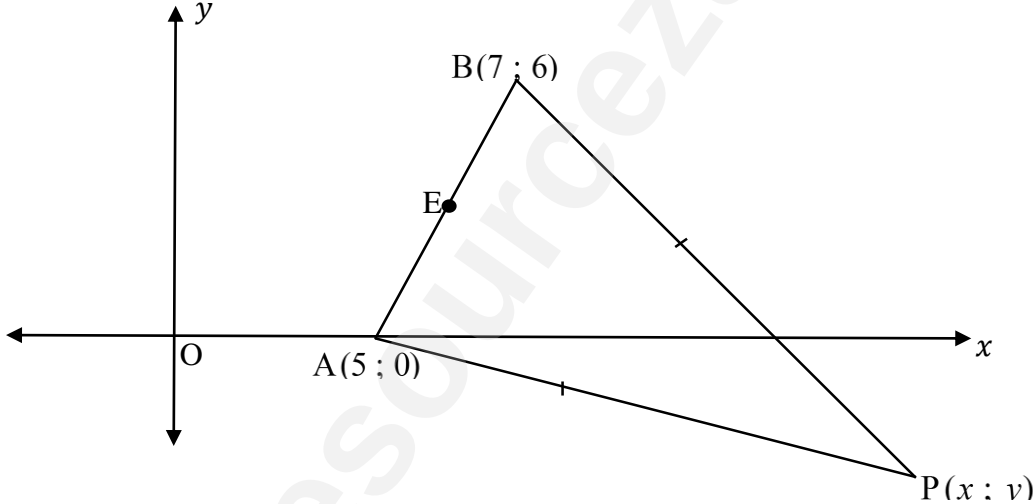
1.1	$\bar{x} = \frac{1\ 581}{31}$ $= 51$ OR / OF $\bar{x} = 51 \text{ (calculator method / sakrekenaar metode)}$	$\checkmark \frac{1\ 581}{31}$ $\checkmark 51$ OR / OF $\checkmark \checkmark 51$ (2)
1.2	$\therefore$ skewed to the right (positively skewed) $\therefore$ skeef na regs (positief skeef)	$\checkmark$ 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. <i>Fisiese Wetenskappe presteer beter.</i> 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.	$\checkmark$ answer / antwoord $\checkmark$ reason / rede (2)
1.4	Accept any mark between 40 – 50. Aanvaar enige punt tussen 40 – 50 .	$\checkmark \checkmark$ 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% .	$\checkmark 87\% - 71\% = 16\%$ $\checkmark$ answer / antwoord answer only full marks / antwoord alleenlik volpunte (2)
		[9]

QUESTION / VRAAG 2

2.1	$a = 12,41$ $b = 0,49$ $\hat{y} = 12,41 + 0,49x$	$\checkmark a = 12,41$ $\checkmark b = 0,49$ $\checkmark \hat{y} = 12,41 + 0,49x$ (3)
2.2	$\hat{y} = 12,41 + 0,49x$ $= 12,41 + 0,49(150)$ $= 85,91 \approx 86\%$ OR/OF $\hat{y} = 85,17$	$\checkmark$ substitution / vervanging $\checkmark$ answer / antwoord OR/OF $\checkmark \checkmark \hat{y} = 85,17$ (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, alreeds 12,41% behaal het. Dit is onmoontlik.	$\checkmark$ conclusion / gevolgtrekking (1)

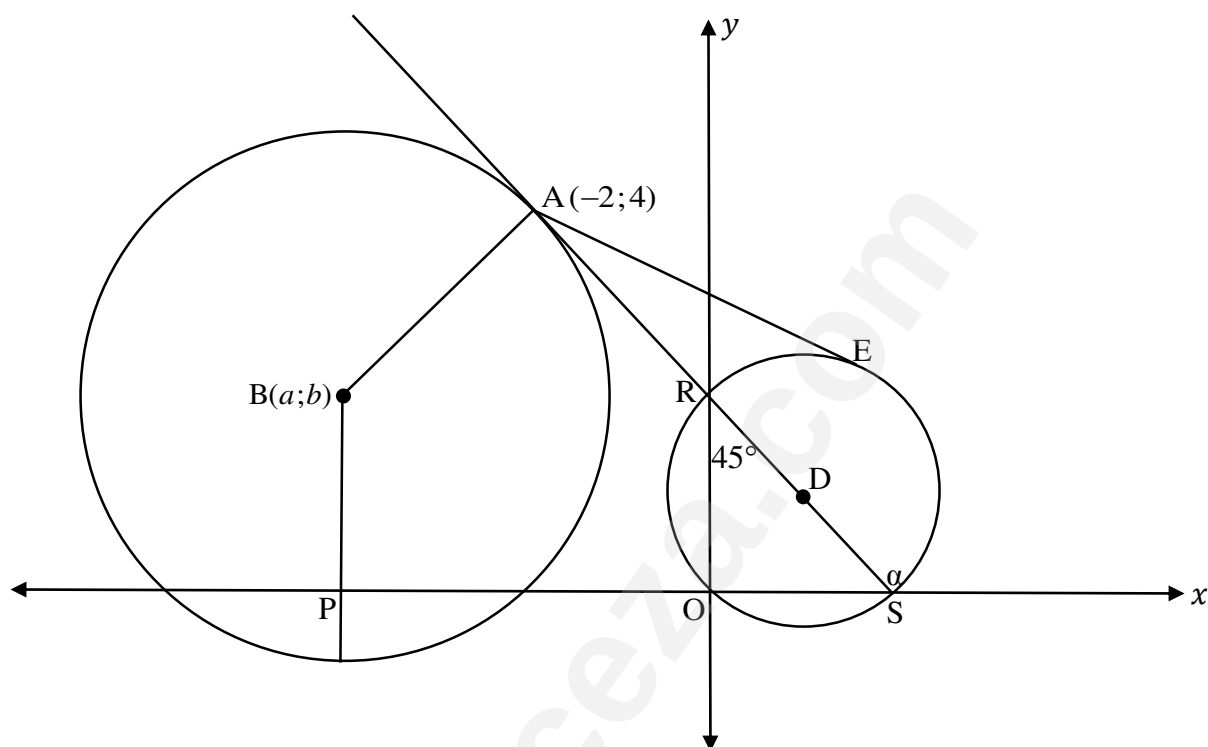
2.4	10,28	✓✓ 10,28 (2)
2.5	$63,9 - \sigma = p$ $63,9 + \sigma = 103,59$ $127,92 = p + 103,59$ $p = 24,33$ OR / OF $\sigma = 103,59 - 63,96$ $= 39,63$ $p = 63,96 - 39,63$ $= 24,33$	$\checkmark 63,9 - \sigma = p$ $\checkmark 63,9 + \sigma = 103,59$ $\checkmark p = 24,33$ OR / OF $\checkmark \sigma = 39,63$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

QUESTION / VRAAG 3

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

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

QUESTION / VRAAG 4



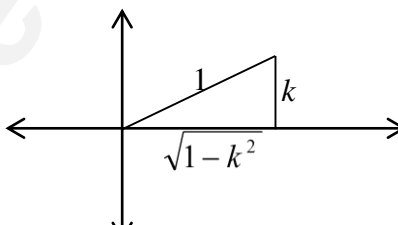
4.1	$\alpha = 135^\circ$ ext $\angle$ of Δ / buite $\angle$ van Δ $\tan(135^\circ) = m$ $m = -1$ $y = mx + c$ $y = -1x + c$ $4 = -1(-2) + c$ OR / OF $y - y_1 = m(x - x_1)$ $c = 2$ $y - 4 = -1(x + 2)$ $y = -x + 2$ $y = -1x - 2 + 4$ $y = -x + 2$ $y = -x + 2$	$\checkmark \tan(135^\circ) = m$ $\checkmark m = -1$ $\checkmark$ substitute m and $(-2; 4)$ / $\checkmark$ vervang m en $(-2; 4)$ $\checkmark$ equation / vergelyking (4)
4.2	$P(-4; 0)$ $a = -4$ $m_{BA} \cdot m_{AS} = -1$ $m_{BA} = 1$ $m_{BA} = \frac{4 - b}{-2 + 4}$ $1 = \frac{4 - b}{2}$ $2 = 4 - b$ $b = 2$	$\checkmark a = -4$ $\checkmark m_{BA} = 1$ $\checkmark$ substitute / vervang $\checkmark b = 2$ (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	$x^2 - 2x + y^2 - 2y = 0$ $(x^2 - 2x + 1) + (y^2 - 2y + 1) = 1 + 1$ $(x-1)^2 + (y-1)^2 = 2$	✓ $(x-1)^2$ ✓ $(y-1)^2$ ✓ 2 (3)
4.5	D (1 ; 1)	✓ answer / antwoord (1)
4.6	$DE = \sqrt{2}$ $DA = \sqrt{(-2-1)^2 + (4-1)^2}$ $= \sqrt{9+9}$ $= \sqrt{18} \quad \text{OR/OF} \quad = 3\sqrt{2}$ $\hat{DEA} = 90^\circ$ radius $\perp$ tangent / radius $\perp$ raaklyn pythagoras $(\sqrt{18})^2 = (\sqrt{2})^2 + AE^2$ $18 - 2 = AE^2$ $AE = 4$	✓ $DE = \sqrt{2}$ ✓ correct substitution in correct formula / korrekte vervanging in korrekte formule ✓ $DA = \sqrt{18} \quad \text{OR/OF} \quad 3\sqrt{2}$ ✓ $\hat{DEA} = 90^\circ$ ✓ $(\sqrt{18})^2 = (\sqrt{2})^2 + AE^2$ ✓ $AE = 4$ (6)
		[21]

QUESTION / VRAAG 5

5.1	$ \begin{aligned} &1 - 4\sin^2 15^\circ \\ &= 1 - 4\sin^2 (45^\circ - 30^\circ) \\ &= 1 - 4[\sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ]^2 \\ &= 1 - 4\left[\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2}\right]^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{8 - 4\sqrt{3}}{16}\right] \\ &= 1 - \left[\frac{8 - 4\sqrt{3}}{4}\right] \\ &= \sqrt{3} - 1 \end{aligned} $ OR/OF $ \begin{aligned} &1 - 4\sin^2 15^\circ \\ &= 1 - 4\sin^2 (60^\circ - 45^\circ) \\ &= 1 - 4[\sin 60^\circ \cos 45^\circ - \cos 60^\circ \sin 45^\circ]^2 \\ &= 1 - 4\left[\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2}\right]^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{8 - 4\sqrt{3}}{16}\right] \\ &= 1 - \left[\frac{8 - 4\sqrt{3}}{4}\right] \\ &= \sqrt{3} - 1 \end{aligned} $	$ \begin{aligned} &\checkmark 1 - 4\sin^2 (45^\circ - 30^\circ) \\ &\checkmark \sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ \\ &\checkmark \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ &\checkmark 1 - 4\left[\frac{6 - 4\sqrt{3} + 2}{16}\right] \\ &\checkmark \sqrt{3} - 1 \end{aligned} $ OR/OF $ \begin{aligned} &\checkmark 1 - 4\sin^2 (60^\circ - 45^\circ) \\ &\checkmark \sin 60^\circ \cos 45^\circ - \cos 60^\circ \sin 45^\circ \\ &\checkmark \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2} \\ &\checkmark 1 - 4\left[\frac{6 - 4\sqrt{3} + 2}{16}\right] \\ &\checkmark \sqrt{3} - 1 \end{aligned} $ (5)
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5.2	$\frac{\sqrt{3} \sin x \cdot \sin^2 72^\circ + \sin^2 198^\circ \cdot \sqrt{3} \cos(x-90^\circ)}{\tan 120^\circ \cdot \sin x}$ $= \frac{\sqrt{3} \sin x \cdot \sin^2 (90^\circ - 18^\circ) + \sin^2 (180^\circ + 18^\circ) \cdot \sqrt{3} \sin x}{\tan (180^\circ - 60^\circ) \cdot \sin x}$ $= \frac{\sqrt{3} \sin x \cdot \cos^2 18^\circ + \sin^2 18^\circ \cdot \sqrt{3} \sin x}{-\tan 60^\circ \cdot \sin x}$ $= \frac{\sqrt{3} \sin x (\cos^2 18^\circ + \sin^2 18^\circ)}{-\sqrt{3} \cdot \sin x}$ $= -1$ OR/OF $\frac{\sqrt{3} \sin x \cdot \sin^2 72^\circ + \sin^2 18^\circ \cdot \sqrt{3} \sin x}{-\tan 60^\circ \cdot \sin x}$ $= \frac{\sqrt{3} \sin x (\sin^2 72^\circ + \cos^2 72^\circ)}{-\sqrt{3} \cdot \sin x}$ $= \frac{\sqrt{3} \sin x (1)}{-\sqrt{3} \cdot \sin x}$ $= -1$	$\checkmark \sin x$ $\checkmark \cos^2 18^\circ$ $\checkmark \sin^2 18^\circ$ $\checkmark -\tan 60^\circ$ $\checkmark \text{factorise / faktoriseer}$ $\checkmark -1$ OR/OF $\checkmark \sin^2 18^\circ$ $\checkmark \sin x$ $\checkmark -\tan 60^\circ$ $\checkmark \text{factorise / faktoriseer}$ $\checkmark \cos^2 72^\circ$ $\checkmark -1$ (6)
5.3	$6 \sin x \cdot \cos x + 3 \cos x - 4 \sin^2 x - 2 \sin x = 0$ $3 \cos x (2 \sin x + 1) - 2 \sin x (2 \sin x + 1) = 0$ $(2 \sin x + 1)(3 \cos x - 2 \sin x) = 0$ $\sin x = -\frac{1}{2} \quad \text{OR/OF} \quad 3 \cos x = 2 \sin x$ $\tan x = \frac{3}{2}$ $\text{RA} = 30^\circ \qquad \text{RA} = 56,31^\circ$ $x = 210^\circ + k \cdot 360^\circ \qquad x = 56,31^\circ + k \cdot 180^\circ$ $x = 330^\circ + k \cdot 360^\circ \qquad x = 236,31^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ OR/OF	$\checkmark \text{grouping / groepeer}$ $\checkmark \text{factorise / faktoriseer}$ $\checkmark \sin x = -\frac{1}{2}$ $\checkmark \tan x = \frac{3}{2}$ $\checkmark 210^\circ + k \cdot 360^\circ$ $\checkmark 330^\circ + k \cdot 360^\circ$ $\checkmark 56,31^\circ + k \cdot 180^\circ, k \in \mathbb{Z}$ OR/OF

	$6 \sin x \cdot \cos x + 3 \cos x - 4 \sin^2 x - 2 \sin x = 0$ $(6 \sin x \cdot \cos x + 3 \cos x) - (4 \sin^2 x + 2 \sin x) = 0$ $3 \cos x(2 \sin x + 1) - 2 \sin x(2 \sin x + 1) = 0$ $(2 \sin x + 1)(3 \cos x - 2 \sin x) = 0$ $\sin x = -\frac{1}{2} \quad \text{OR/OR} \quad 3 \cos x = 2 \sin x$ $\tan x = \frac{3}{2}$ $x = -30^\circ + k \cdot 360^\circ \quad x = 56,31^\circ + k \cdot 180^\circ \quad ; k \in \mathbb{Z}$ $x = 210^\circ + k \cdot 360^\circ$	$\checkmark$ grouping / groepeer $\checkmark$ factorise / faktoriiseer $\checkmark \sin x = -\frac{1}{2}$ $\checkmark \tan x = \frac{3}{2}$ $\checkmark -30^\circ + k \cdot 360^\circ$ $\checkmark 210^\circ + k \cdot 360^\circ$ $\checkmark 56,31^\circ + k \cdot 180^\circ ; k \in \mathbb{Z}$ (7)
5.4	$(1 - \tan A) \left(\frac{\cos A}{\cos 2A} \right) = \frac{1}{\cos A + \sin A}$ $\text{LHS/LK} = (1 - \tan A) \left(\frac{\cos A}{\cos 2A} \right)$ $= \left(1 - \frac{\sin A}{\cos A} \right) \left(\frac{\cos A}{\cos^2 A - \sin^2 A} \right)$ $= \left(\frac{\cos A - \sin A}{\cos A} \right) \left(\frac{\cos A}{(\cos A - \sin A)(\cos A + \sin A)} \right)$ $= \frac{1}{\cos A + \sin A}$ $\text{LHS / LK} = \text{RHS / RK}$	$\checkmark \frac{\sin A}{\cos A}$ $\checkmark \cos^2 A - \sin^2 A$ $\checkmark \frac{\cos A - \sin A}{\cos A}$ $\checkmark (\cos A - \sin A)(\cos A + \sin A)$ (4)
5.5.1	$\cos 2\theta$ $= \sqrt{1 - k^2}$  OR/OR $\cos^2 2\theta = 1 - \sin^2 2\theta$ $= 1 - k^2$ $\cos 2\theta = \sqrt{1 - k^2}$	$\checkmark \checkmark \sqrt{1 - k^2}$ OR/OR $\checkmark \cos^2 2\theta = 1 - \sin^2 2\theta$ $\checkmark \sqrt{1 - k^2}$ (2)

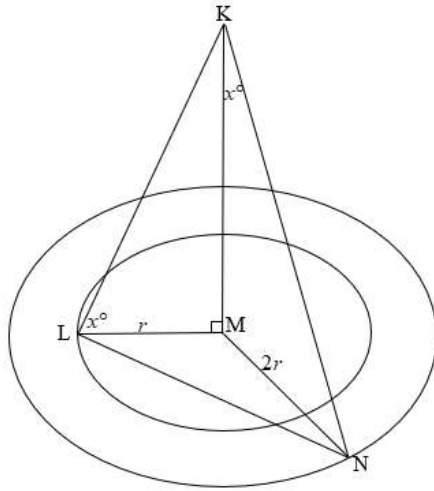
5.5.2	$\frac{\sin 2\theta}{\tan \theta}$ $= \frac{2 \sin \theta \cdot \cos \theta}{\frac{\sin \theta}{\cos \theta}}$ $= 2 \sin \theta \cdot \cos \theta \cdot \frac{\cos \theta}{\sin \theta}$ $= 2 \cos^2 \theta$ But/maar $\cos 2\theta = \sqrt{1-k^2}$ $2 \cos^2 \theta - 1 = \sqrt{1-k^2}$ $2 \cos^2 \theta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

QUESTION / VRAAG 6

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

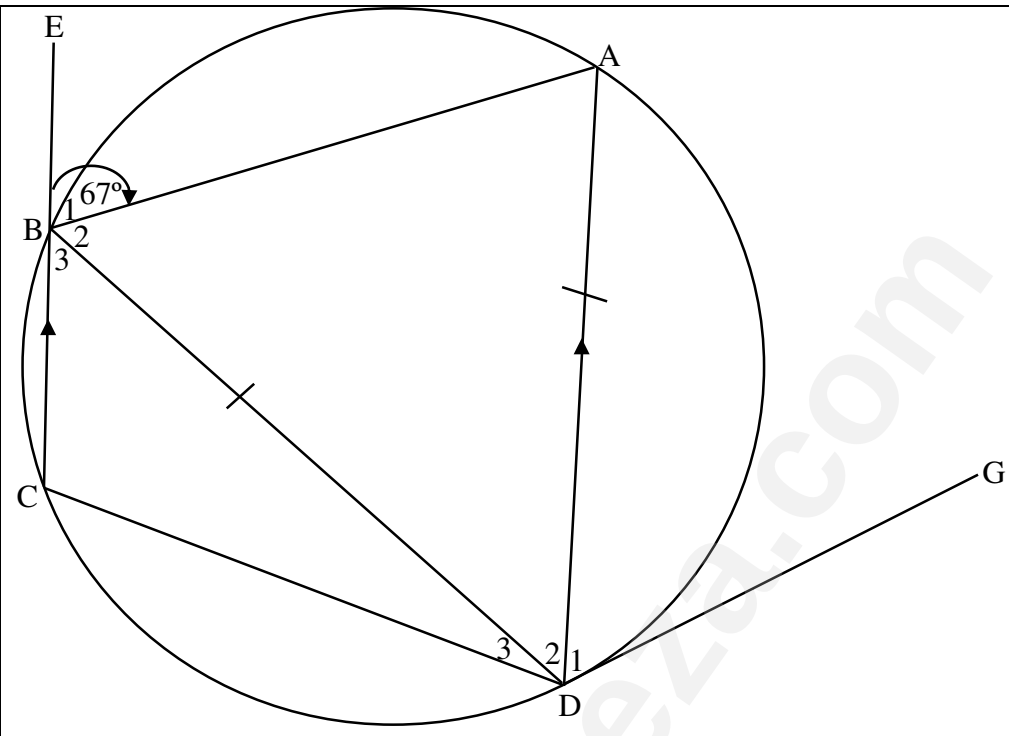
If learner gives all three answers, then
maximum 1/2 / Indien 'n leerling al drie die
antwoorde gee, dan maksimum 1/2
 $x \in (-135^\circ; -45^\circ)$ or/of $(0^\circ; 45^\circ)$ or/of $(135^\circ; 180^\circ)$

QUESTION / VRAAG 7



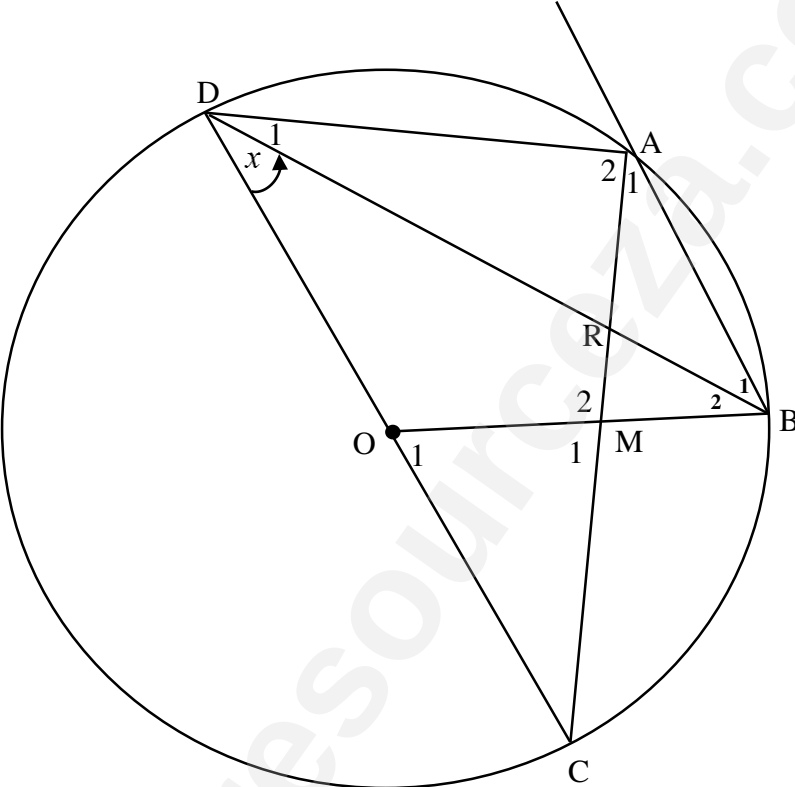
7.1	In $\triangle KLM$ $\frac{KM}{LM} = \tan x$ $\frac{KM}{r} = \tan x$ $KM = r \tan x$ In $\triangle KMN$ $\frac{MN}{KM} = \tan x$ $\frac{2r}{KM} = \tan x$ $\frac{2r}{r \tan x} = \tan x$ $2 = \tan^2 x$ $\sqrt{2} = \tan x$ $x = 54,74^\circ$ OR/OF $KM = \frac{2r}{\tan x}$ $r \tan x = \frac{2r}{\tan x}$	✓ correct trig ratio / korrekte trig verhouding ✓ $KM = r \tan x$ (simplification / vereenvoudiging) ✓ $\frac{2r}{KM} = \tan x$ ✓ $\frac{2r}{r \tan x}$ ✓ $\sqrt{2} = \tan x$ ✓ $x = 54,74^\circ$ (6)
7.2	$LN^2 = LM^2 + MN^2 - 2LM \cdot MN \cos M$ $LN^2 = (5)^2 + (10)^2 - 2(5) \cdot (10) \cos 110^\circ$ $LN^2 = 159,20$ $LN = \sqrt{159,20}$ $LN = 12,62m$	✓ correct substitution in cos-rule / korrekte vervanging in cos-reël ✓ 12,62m (2)
		[8]

QUESTION / VRAAG 8

			
8.1.1	$\hat{A}DC = 67^\circ$ OR / OF $\hat{B}_2 + \hat{B}_3 = 113^\circ$ $\hat{A}DC = 67^\circ$	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	$\checkmark S \checkmark R$ OR / OF $\checkmark S \checkmark R$ (2)
8.1.2	$\hat{C} = 180^\circ - 67^\circ$ $= 113^\circ$	co-int $\angle^s BC \parallel AD$ / ko-binne $\angle^e BC \parallel AD$	$\checkmark S/R$ (1)
8.1.3	$\hat{A} = 67^\circ$	opp $\angle^s$ of cyclic quad / alt $\angle^s BC \parallel AD$ / alt $\angle^s EC \parallel AD$ oorst $\angle^e$ van kvh / verwisselende $\angle^e$ $BC \parallel AD$ / verwis $\angle^e EC \parallel AD$	$\checkmark S/R$ (1)
8.1.4	$\hat{B}_2 = 67^\circ$ $\hat{D}_2 = 180^\circ - 67^\circ - 67^\circ$ $= 46^\circ$	$\angle^s$ opposite = sides / $\angle^e$ teenoor = sye sum of $\angle^s$ in Δ / som vd $\angle^e$ v Δ	$\checkmark S \checkmark R$ $\checkmark S$ (3)
8.1.5	$\hat{B}DG = 113^\circ$ OR / OF $\hat{D}_1 = 67^\circ$ $\hat{B}DG = 113^\circ$	tan chord theorem / raaklyn koordstelling tan chord theorem / raaklyn koordstelling	$\checkmark S \checkmark R$ OR / OF $\checkmark R$ $\checkmark S$ (2)

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

QUESTION / VRAAG 9

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

9.1.1(b)	$\hat{A}_1 = \hat{CDB} = x$ $\hat{M}_2 = 90^\circ$ $\therefore \hat{ABO} = 90^\circ - x$ OR/OF $\hat{O}_1 = 2x$ $\hat{M}_1 = 90^\circ$ $\hat{C} = 90^\circ - 2x$ $\hat{B}_1 = 90^\circ - 2x$ $\hat{ABO} = 90^\circ - x$	$\angle^s$ in the same segment / $\angle^e$ in dies. segment line from centre to midpoint of chord / <i>lyn van middelpunt van sirkel na middelpunt van koord</i> sum of $\angle^s$ in Δ / ext $\angle$ of a Δ / <i>som vd $\angle^e$ v Δ / buite $\angle$ v Δ</i> proved/ <i>reeds bewys</i> line from centre to midpoint of chord / <i>lyn van middelpunt van sirkel na middelpunt van koord</i> sum of $\angle^s$ in Δ / <i>som vd $\angle^e$ v Δ</i> $\angle^s$ in the same segment / $\angle^e$ in dies. segment	✓S/R ✓S ✓R ✓S OR/OF ✓S ✓R ✓S ✓S/R (4)
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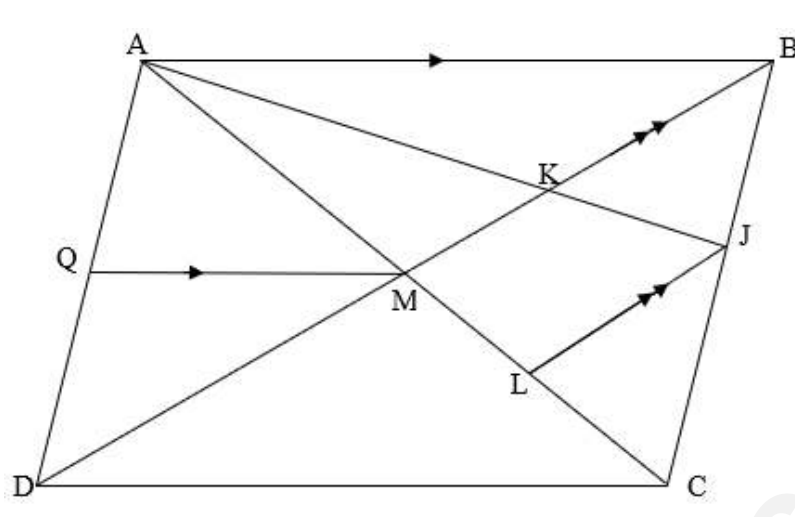
9.1.2	AD OB $\hat{O}_1 = \hat{ADC} = 2x$ $\therefore \hat{D}_1 = x$ $\hat{A}_1 = x$ $\therefore \hat{D}_1 = \hat{A}_1$ AB is a tangent / is 'n raaklyn OR / OF $\hat{A}_2 = 90^\circ$ $\therefore AD OB$ $\hat{CDA} = \hat{O}_1 = 2x$ $\therefore \hat{D}_1 = x$ $\hat{D}_1 = \hat{A}_1$ AB is a tangent / is 'n raaklyn	midpoint theorem / <i>middelpunt stelling</i> corresponding $\angle^s$ AD OB / <i>ooreenkom $\angle^e$ AD OB</i> proved / <i>reeds bewys</i> converse tan chord theorem / <i>omgekeerde raaklyn koordstelling</i> $\angle$ in a semi-circle / $\angle$ in <i>halwe sirkel</i> corr $\angle^s$ are equal / <i>ooreenk $\angle^e$ gelyk</i> corr $\angle^s$ DA OB / <i>ooreenk $\angle^e$ DA OB</i> converse tan chord theorem / <i>omgekeerde raaklyn koord</i>	✓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 / <i>maar</i> AC = 2AM and / <i>en</i> DC = 2DO $(2DO)^2 = AD^2 + (2AM)^2$ $4DO^2 = AD^2 + 4AM^2$ but / <i>maar</i> In $\triangle ABM$ $AM^2 = AB^2 - MB^2$ $\therefore 4DO^2 = AD^2 + 4(AB^2 - MB^2)$ $AD^2 = 4DO^2 - 4AB^2 + 4MB^2$	Pythagoras Pythagoras	✓S ✓S ✓S ✓substitution / <i>vervanging</i> (4)

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

9.2.3	$\frac{MV}{MN} = \frac{WV}{QN}$ $\frac{MV}{WV} = \frac{MN}{QN}$ $MV \times QN = MN \times WV$ but / maar $QN = PW$ $MV \times PW = MN \times WV$ $\frac{MV}{WV} = \frac{MN}{PW}$ $\Delta WMV \parallel \Delta QMN \parallel \Delta^s$ given / gegee	✓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 $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\frac{1}{2} \times AD \times k}{\frac{1}{2} \times DB \times k} = \frac{AD}{DB}$ $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC} = \frac{\frac{1}{2} \times AE \times h}{\frac{1}{2} \times EC \times h} = \frac{AE}{EC}$ but / maar $\text{Area } \triangle DEB = \text{Area } \triangle DEC$ same base, same height / gelyke hoogte, dieselfde basis $\therefore \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$ $\therefore \frac{AD}{DB} = \frac{AE}{EC}$	✓construction / konstruksie ✓S ✓S ✓S ✓R ✓S	(6)

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

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

TOTAL / TOTAAL: [150]