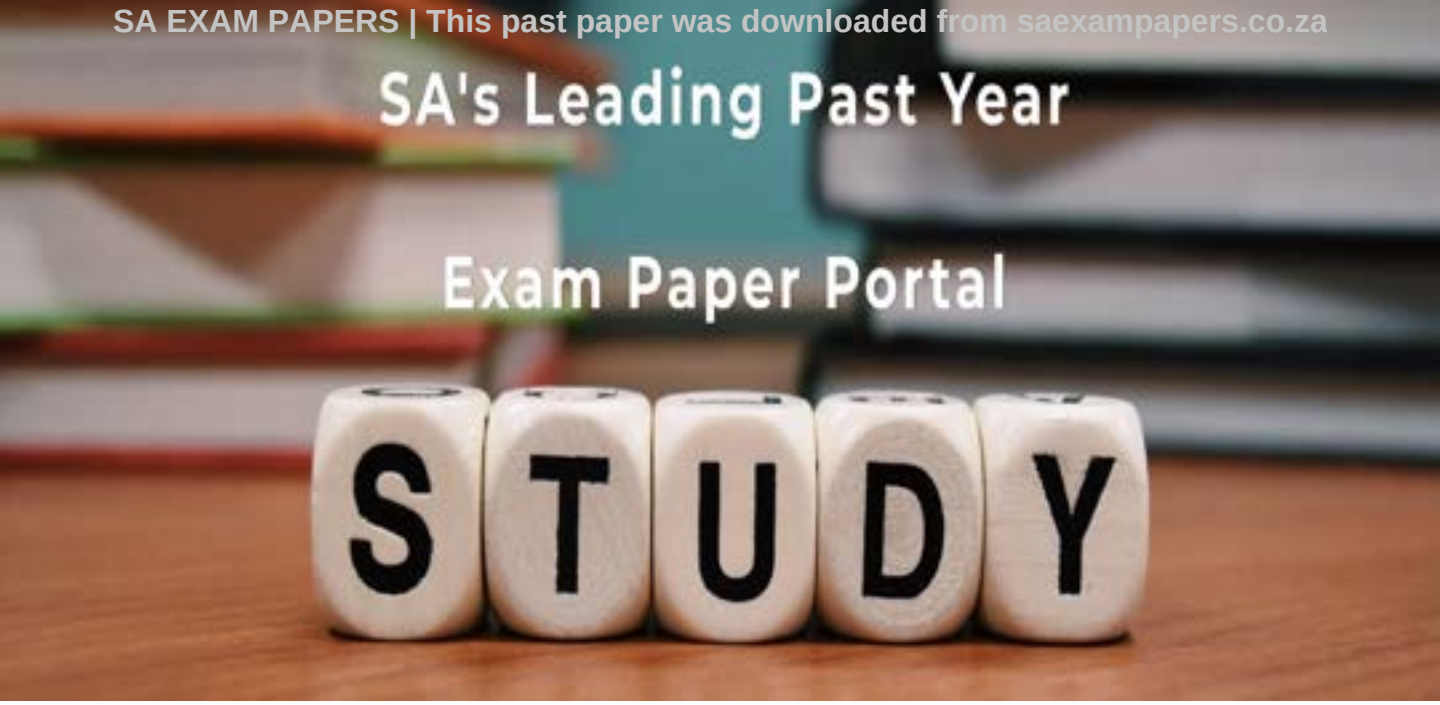

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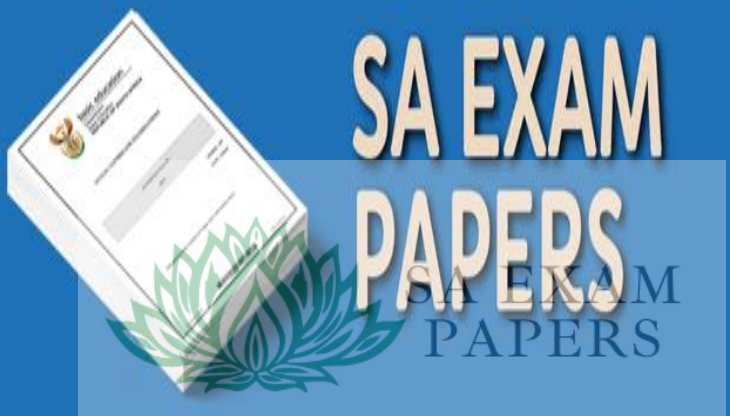


GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
JUNIE EKSAMEN
GRADE/*GRAAD* 12

2024

MARKING GUIDELINES/
NASIENRIGLYNE

MATHEMATICS/
WISKUNDE

(PAPER/*VRAESTEL* 2)

19 pages/*bladsye*

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 guidelines. Stop marking at the second calculation error.
- Assuming answers/values to solve a problem is NOT acceptable.
- Breakdown implies stop marking.

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 dit 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 'n 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				
	1.1.1	mean/*gemiddeld*= $\frac{982}{16}$ = 61,38 Accept : 61 No penalty for rounding off Answer only: Full marks *Slegs antwoord: Volpunte*	✓ 982 ✓ answer/*antwoord*	(2)
	1.1.2	$\sigma = 19{,}63$	✓ answer/*antwoord*	(1)
	1.1.3	$(\bar{x} - \sigma; \bar{x} + \sigma) = (61{,}38 - 19{,}63; 61{,}38 + 19{,}63)$ $= (41{,}75;\ 81{,}01)$ $\therefore$ 6 learners/*leerders* **ACCEPT/*AANVAAR*:** **(61 – 19,63 ; 61 + 19,63)** **= (41, 37; 80, 63)**	✓ $(41{,}75;\ 81{,}01)$ ✓ 6	(2)
1.2	1.2.1	Negatively skewed/ skewed to the left *Negatief skeef/skeef na links*	✓ answer/*antwoord*	(1)
	1.2.2	**Test 2**, because 50% of the learners got a mark higher than 66, while in test 1,50 % of the learners got a mark less than 62%. ***Toets 2**, omdat 50% van die leerders 'n punt hoër as 66 behaal het, terwyl slegs 50 % van die leerders meer as 62% in toets 1 gekry het.* **OR/*OF*** **Test 2**, because the median mark is higher than that of test 1/***Toets 2**, omdat die mediaan hoër is as in toets 1* **OR/*OF*** **Test 2**, because less than 75% of the learners got a mark less than 76, while in test 1 75% obtained a mark less than 76/***Toets 2**, omdat minder as 75% van die leerders 'n punt minder as 76 behaal het, terwyl in toets 1 75% 'n laer punt as 76 behaal het.*	✓ Test 2/*Toets 2* ✓ reason/*rede*	(2)
	1.2.3	$\frac{25}{100} \times 16$ = 4 learners/*leerders* **OR/*OF*** $\frac{1}{4} \times 16$ = 4 learners/*leerders* Answer only: Full marks *Slegs antwoord: Volpunte*	✓ $\frac{25}{100} \times 16$ ✓ 4 OR/*OF* ✓ $\frac{1}{4} \times 16$ ✓ 4	(2) (2)
				[10]

QUESTION 2/*VRAAG 2*				
2.1	2.1.1	400	✓ 400	(1)
	2.1.2	A = 50 B = 100	✓ A ✓ B	(2)
	2.1.3	$280 - 20 = 260$ Ogive: Accept answer Btw (250 – 280) **OR** Table: 30 + 50 + 100 + 80 = 260 Answer only: Full marks *Slegs antwoord: Volpunte*	✓ 280 – 20 ✓ 260 **OR** ✓ Adding frequencies *Tel frekwensies op* ✓ Answer/*antwoord*	(2)
	2.1.4	The median will decrease./*Die mediaan sal afneem.*	✓ Decrease/*afneem*	(1)
2.2		$\frac{5 \times 13 + 15t + 25 \times 12 + 35 \times 4}{13 + t + 12 + 4} = 16{,}4$ $\frac{505 + 15t}{29 + t} = 16{,}4$ $475{,}6 + 16{,}4\,t = 505 + 15t$ $1{,}4t = 29{,}4$ $t = 21$	✓ equating to 16,4/ *gelykstel aan 16,4* ✓ correct expressions for both numerator & denominator/*korrekte uitdrukking van beide teller en noemer* ✓ simplifying/*vereenvoudig* ✓ answer/*antwoord*	(4)
				[10]

QUESTION/*VRAAG* 3			
3.1	$x_m = \frac{x_1+x_2}{2}$ $y_m = \frac{y_1+y_2}{2}$ $1 = \frac{a+3}{2}$ $-1 = \frac{b+4}{2}$ $a = -1$ $b = -6$ $B(-1;-6)$ Answer only: Full marks *Slegs antwoord: Volpunte.*	✓ correct substitution into correct formula for *a*/*korrekte substitusie in korrekte formule vir a* ✓ correct substitution into formula for *b*/*korrekte substitusie in formule vir b* ✓ answer for both a and b in coordinate form/*antwoord van beide a en b in koördinaat vorm*	(3)
3.2	$m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{4-(-1)}{3-1}$ OR/*OF* $m = \frac{4-(-6)}{3-(-1)}$ $= \frac{5}{2}$	✓ substitution into correct formula/*Substitusie in korrekte formule* ✓ answer/*antwoord*	(2)

3.3	$2y + x = 11$ $y = -\frac{1}{2}x + \frac{11}{2}$ OR $m = \frac{7-4}{-3-3}$ $tan\alpha = -\frac{1}{2}$ $= -\frac{1}{2}$ $\alpha = 180° - 26{,}56°$ $\alpha = 153{,}43°$ $tan\beta = \frac{5}{2}$ $\beta = 68{,}198°$ $\theta = 153{,}43° - 68{,}198°$ $\theta = 85{,}2°$ (–1 Rounding/*–1 Afronding*)	✓ $tan\alpha = -\frac{1}{2}$ ✓ answer α/*antwoord* α ✓ value of β/*waarde van* β ✓ value of θ/*waarde van* θ	(4)
3.4	$m_{BC} = \frac{5}{2}$ $y - y_1 = m(x - x_1)$ **OR/*OF*** $y = mx + c$ $y - 4 = \frac{5}{2}(x - 3)$ $4 = \frac{5}{2}(3) + c$ $y = \frac{5}{2}x - \frac{7}{2}$	✓ Substitute gradiënt and point B or C or M/ *Sustitusie gradient en punt B of C of M* ✓ Equation/Vergelyking	(2)
3.5	$EF = \frac{11}{2} - \left(-\frac{7}{2}\right)$ $EF = 9$ $Area\Delta CEF = \frac{1}{2}EF.\perp h$ $= \frac{1}{2}(9)(3)$ = 13,5 units^2/*eenhede*^{2} **OR/*OF***	✓ value of/*waarde van* y_F ✓ value of/*waarde van EF* ✓ value of/*waarde van* $\perp h$ ✓ answer/*antwoord*	

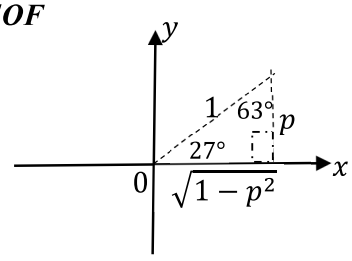
	$E\hat{C}F = 180° - 85{,}2° = 94{,}8°$ $F(0;-\frac{7}{2})$ $E(0;\frac{11}{2})$ $EC = \sqrt{(3-0)^2+(4-\frac{11}{2})^2} = \frac{3\sqrt{5}}{2}$ $FC = \sqrt{(3-0)^2+(4+\frac{7}{2})^2} = \frac{3\sqrt{29}}{2}$ $\text{Area}\Delta CEF = \frac{1}{2}FC \cdot EC sin 94{,}8°$ $= \frac{1}{2}(\frac{3\sqrt{5}}{2}) \cdot (\frac{3\sqrt{29}}{2}) sin 94{,}8°$ $= 13{,}50\ unit^2$	✓ size of/*grootte van* EC ✓ size of/*grootte van* FC ✓ substitution/*subst* ✓ answer/*antwoord*	(4) (4)
			[15]

QUESTION/*VRAAG* 4			
4.1	$x^2 + y^2 - 6x - 4y = 12$ $x^2 - 6x + 3^2 + y^2 - 4y + 2^2 = 12 + 3^2 + 2^2$ $(x-3)^2 + (y-2)^2 = 25$ $P(3;2)$ $r = 5$	✓complete the square LHS/ *voltooi die vierkant LK* ✓ RHS ✓ P(3 ; 2) ✓ r = 5	(4)
4.2	$(0+3)^2 + (y-2)^2 = 25$ $9 + y^2 - 4y + 4 = 25$ $y^2 - 4y - 12 = 0$ $(y-6)(y+2) = 0$ $y = 6$ $y = -2$ $R(0;6)$ **OR** $(0)^2 + y^2 - 6(0) - 4y = 12$ ✓ $y^2 - 4y - 12 = 0$ $(y-6)(y+2) = 0$ ✓ $y = 6$ $y = -2$ R(0; 6)	✓ substitute $x = 0$/ *vervang* $x = 0$ ✓ factors/*faktore* ✓ substitute $x = 0$/ *vervang* $x = 0$ ✓ factors/*faktore*	(2)

4.3	$m_{RP} = \frac{6-2}{0-3}$ $m_{RP} = \frac{-4}{3}$ $m_{RT} = \frac{3}{4}(Radius \perp \tan)$/ *radius* $\perp$ *raaklyn* $y = \frac{3}{4}x + 6$	✓ $m_{RP} = \frac{-4}{3}$ ✓ $m_{RT} = \frac{3}{4}$ ✓ answer/*antwoord*	(3)
4.4	$tan\hat{RTO} = m_{RT} = \frac{3}{4}$ $\hat{RTO} = 36{,}86°$ $\theta = 90° + 36{,}86°$ $\theta = 126{,}9°$	✓ $tan\hat{RTO} = \frac{3}{4}$ ✓ $\hat{RTO} = 36{,}86°$ ✓ answer/*antwoord*	(3)
4.5	$Q(8;2)$	✓ *x*-coordinate/*x-koördinaat* ✓ *y*-coordinate/*y-koördinaat*	(2)
4.6	Point of contact of tangent with gradient $\frac{3}{4}$: *Kontakpunt van raaklyn met gradiënt* $\frac{3}{4}$: $3 = \frac{0+x}{2}$ $x = 6$ $2 = \frac{6+y}{2}$ $y = -2$ Pt of contact/*kontakpunt*:$(6;-2)$ Equation of the tangent at/*Vergelyking van raaklyn by* $(6;-2)$: $y-(-2) = \frac{3}{4}(x-6)$ $y = \frac{3}{4}x - \frac{13}{2}$ y-intercept/*afsnit* $= -\frac{13}{2}$ $-6{,}5 < k < 6$	point of contact/*kontakpunt*: ✓ *x*-coordinate/*x-koördinaat* ✓ *y*-coordinate/*y-koördinaat* value of k/*waarde van k*: ✓ ✓ $-6{,}5 < k < 6$	(4)

	OR/*OF* Equation of diameter/*vergelyking van middellyn*: $y = -\frac{4}{3}x+6$ $(x-3)^2 + (-\frac{4}{3}x + 6 - 2)^2 = 25$ $x^2 - 6x + 9 + \frac{16}{9}x^2 - \frac{32}{3}x + 16 = 25$ $\frac{25}{9}x^2 - \frac{50}{3}x = 0$ $x^2 - 6x = 0$ $x(x-6) = 0$ $\therefore$ point of contact/*kontakpunt*:$(6;-2)$ Equation of the tangent at/*Vergelyking van raaklyn by*: $(6;-2)$: $-2 = \frac{3}{4}(6) + c$ $y = \frac{3}{4}x - \frac{13}{2}$ $-6{,}5 < k < 6$	**OR/*OF*** point of contact/*kontakpunt*: ✓ *x*-coordinate/*x-koördinaat* ✓ *y*-coordinate/*y-koördinaat* value of k/*waarde van k*: ✓ ✓ $-6{,}5 < k < 6$	(4)
4.7	Centre of circle/*Middelpunt van sirkel* $M(-3;-2)$ Distance/*Afstand* MP: $MP = \sqrt{(3-(-3))^2 + (2-(-2))^2}$ $MP = 2\sqrt{13}$ $= 7{,}21$ $(R - r < MP < R + r)$ $1 < MP < 11$ $\therefore$ Circles will cut twice /*sirkels sal twee keer sny*	✓ $M(-3;-2)$ ✓ $MP = 2\sqrt{13}$ ✓ $R = 6\ and\ r = 5$ ✓ conclusion/*gevolgtrekking*	(4)
			[22]

QUESTION/*VRAAG* 5

5.1		$\tan(-x)\cdot\sin(90°+x)+\dfrac{sin2x}{2\cos(360°+x)}$ $=-tanx\cdot cosx+\dfrac{2sinx\cdot cosx}{2cosx}$ $=-\dfrac{sinx}{cosx}\cdot cosx+sinx$ $=-sinx+sinx$ $=0$	✓ $-tanx$ ✓ $cosx$ ✓ $2sinx\cdot cosx$ ✓ $2cosx$ ✓ $-\dfrac{sinx}{cosx}$ ✓ $=0$	(6)
5.2	5.2.1	$cos27°=\sqrt{1-sin^2 27°}$ $=\sqrt{1-p^2}$ **OR/*OF***  $cos27°=\sqrt{1-p^2}$	✓ $\sqrt{1-sin^2 27°}$ ✓ $\sqrt{1-p^2}$ ✓ diagram ✓ answer/*antwoord*	(2) (2)
	5.2.2	$sin^2 63°=sin^2(90°-27°)$ $=cos^2(27°)$ $=1-sin^2 27°$ $=1-p^2$ **OR** $sin^2 63°=1-p^2$	✓ $cos^2(27°)$ ✓ $1-p^2$ **OR** ✓✓Answer only	(2)
	5.2.3	$cos27°=2cos^2 13{,}5°-1$ $\sqrt{1-p^2}+1=2cos^2 13{,}5°$ $\therefore cos13{,}5°=\sqrt{\dfrac{\sqrt{1-p^2}+1}{2}}$	✓ double ∠ identity/*dubbel ∠ identiteit* ✓ substitution/*substitusie* ✓ answer/*antwoord*	(3)

5.3	$\cos(x-45°) = cosx \cdot cos45° + sinx \cdot sin45°$ $= \frac{\sqrt{2}}{2}cosx + \frac{\sqrt{2}}{2}sinx$ $= \frac{\sqrt{2}}{2}(cosx + sinx)$ $= \frac{\sqrt{2}}{2}k$	✓ expansion/*uitbreiding* ✓ special ∠s/*spesiale* ∠ *e* ✓ factorise/*faktoriseer* ✓ answer/*antwoord*	(4)
5.4	L. H. S/LK $= \frac{cos2\theta + 1}{sin2\theta} + tan\theta$ $= \frac{COS2\theta+1}{2sin\theta \cdot cos\theta} + \frac{sin\theta}{cos\theta}$ $= \frac{COS2\theta+1+2sin^2\theta}{2sin\theta \cdot cos\theta}$ $= \frac{1-2sin^2\theta+1+2sin^2\theta}{2sin\theta \cdot cos\theta}$ $= \frac{2}{2sin\theta \cdot cos\theta}$ $= \frac{1}{sin\theta \cdot cos\theta} = R.H.S/RK$	✓ $\frac{sin\theta}{cos\theta}$ ✓ $2sin\theta \cdot cos\theta$ ✓ L.C.D/ K.G.V. ✓ $1 - 2sin^2\theta$ ✓ $\frac{2}{2sin\theta \cdot cos\theta}$	(5)
5.5	$4sin^2\theta = \cos(90° - 2\theta)$ $4sin^2\theta = sin2\theta$ $4sin^2\theta - 2sin\theta \cdot cos\theta = 0$ $2sin\theta(2sin\theta - cos\theta) = 0$ $sin\theta = 0 \ or/of \ tan\theta = \frac{1}{2}$ $\theta = 0° + k \cdot 360°; k\epsilon\mathbb{Z}$ or/*of* $\theta = 26{,}57° + k \cdot 180°; k\epsilon\mathbb{Z}$ **or/*of*** $\theta = 180° + k \cdot 360°; k\epsilon\mathbb{Z}$ **OR/*OF*** $\theta = k \cdot 180°; k\epsilon\mathbb{Z}$	✓ $sin2\theta$ ✓ $2sin\theta \cdot cos\theta$ ✓ factors/*faktore* ✓ $sin\theta = 0$ & $tan\theta = \frac{1}{2}$ ✓ $0° + k \cdot 360°$ & $180° + k \cdot 360°/k \cdot 180°; k\epsilon\mathbb{Z}$ ✓ $\theta = 26{,}57° + k \cdot 180°; k\epsilon\mathbb{Z}$	(6)

Breakdown if divided by $sin\theta$(2/6)

N.B: If/indien $k\epsilon\mathbb{Z}$ is omitted/weggelaat – penalize/*penaliseer*. 1mark/*punt*.

	OR $4sin^2\theta = sin2\theta$ $\frac{4sin^2\theta}{cos^2\theta} = \frac{2sin\theta cos\theta}{cos^2\theta}$ $4tan^2\theta - 2tan\theta = 0$ $2tan\theta(tan\theta - 1) = 0$ $tan\theta = 0 \quad or\ tan\theta = \frac{1}{2}$ for $tan\theta = 0$ $\theta = 0° + k.180° \ ; k\epsilon\mathbb{Z}$ for $tan\theta = \frac{1}{2}$ $\theta = 26.57° + k.180° \ ; k\epsilon\mathbb{Z}$ N.B: If/indien $k\epsilon\mathbb{Z}$ is omitted/weggelaat – penalize/*penaliseer* 1 mark/*punt*.	✓ $sin2\theta$ ✓ $2sin\theta cos\theta$ ✓ factors/*faktore* ✓ $tan\theta = 0 \ or\ tan\theta = \frac{1}{2}$ ✓ $\theta = 0° + k.180° \ ; k\epsilon\mathbb{Z}$ ✓ $\theta = 26.57° + k.180° \ ; k\epsilon\mathbb{Z}$	(6)
			[28]

QUESTION/*VRAAG* 6				
6.1	$a = 5$ $b = 1$		✓ $a = 5$ ✓ $b = 1$	(2)
6.2	$h(x) = 4\cos(x - 30°) - 2$		✓ $x - 30°$ ✓ -2	(2)
6.3	Minimum value/*minimum waarde* $= \frac{8}{4} = 2$		✓ answer/*answer*	(1)
6.4	$B(38{,}66°; 3{,}12)$	Accept $38{,}61°$ or $38{,}73°$	✓ $38{,}66°$ ✓ $3{,}12$	(2)
6.5	$k < -5\ or/of\ k > 5$		✓ $k < -5$ ✓ $k > 5$	(2)
6.6	6.6.1	$x \in (-141{,}34°; 38{,}66°)$ OR/*OF* $-141{,}34° < x < 38{,}66°$	✓ end points/*eindpunte* ✓ correct notation/*korrekte notasie*	(2)
	6.6.2	$x \in [-180°; 180°]$ OR/*OF* $-180° \leq x \leq 180°$	✓ end points/*eindpunte* ✓ correct notation/*korrekte notasie*	(2)
				[13]

QUESTION/*VRAAG* 7			
7.1	$\theta = 180^0 - 2\alpha$ $\therefore sin\theta = \sin(180^0 - 2\alpha)$ $sin\theta = sin2\alpha$	✓ *sum of* $\angle'$ s in $a\Delta$ / *som van* $\angle'$ e in $'n\Delta$ ✓ Introducing sin both sides/*gebruik sin beide kante*	(2)
7.2	$x = PR.cos\theta$ $\frac{x}{sin\theta} = \frac{y}{sin\alpha}$ $\therefore x = \frac{ysin\theta}{sin\alpha}$ $\therefore\ PR.cos\theta = \frac{ysin\theta}{sin\alpha} = \frac{ysin2\alpha}{sin\alpha}$ $PR.cos\theta = \frac{2ysin\alpha cos\alpha}{sin\alpha} = 2ycos\alpha$ $\therefore PR = \frac{2ycos\alpha}{cos\theta}$	✓ $cos\theta = \frac{x}{PR}$ ✓ use of sine rule/*gebruik van sin-reël* ✓ $2ysin\alpha cos\alpha$ ✓ simplifying/*vereenvoudiging*	(4)
7.3	Area $= \frac{1}{2}$QT · QRsinα $= \frac{1}{2}x\ y$ sinα $= \frac{1}{2}(20)(15)\sin 49°$ = 113,21 m^2	✓✓substitution into correct formula/*vervanging van korrekte formule* ✓ answer/*antwoord*	(3)
			[9]

QUESTION 8/*VRAAG 8*				
8.1	8.1.1	$\hat{A}_1 = 22{,}5°$ tan-chord theorem/ *raaklyn-koord stelling*	✓ *S* ✓ *R*	(2)
			✓	
	8.1.2	$\hat{C} = 22{,}5°$ *∠'s opp equal sides/ ∠'e teenoor gelyke sye* $\hat{D}_1 = 45°$ ext ∠ of a Δ/ *buite ∠ van 'n Δ*	✓ S/R ✓ S	(2)
	8.1.3	$O\hat{B}C = 90°$ *tan ⊥ rad/raaklyn ⊥ radius* $\hat{B}_2 = 90° - 22{,}5°$ $= 67{,}5°$	✓ R ✓ answer/*antwoord*	(2)
	8.1.4	$\hat{O}_1 = 2\hat{D}_1$ ∠ at centre = 2 x ∠ at circ/ *middelpunt ∠ = 2 × omtreks ∠* $\hat{O}_1 = 2 \times 45^0$ $\hat{O}_1 = 90^0$	✓ S/R ✓ answer/*antwoord*	(2)
8.2	$\hat{O}_1 = 90^0$ already proven/*reeds bewys* $O\hat{B}C = 90°$ *tan ⊥ rad/raaklyn ⊥ radius* or/*of* already proven/*reeds bewys* $\therefore \hat{O}_1 = O\hat{B}C$ $CB \parallel OA$ *alt ∠s equal/verwisselende ∠e gelyk* **OR/*OF*** $\hat{A}_2 = 22{,}5°$ *∠'s opp equal radii/ ∠'e teenoor gelyke radiusse* $\hat{C} = 22{,}5°$ $\therefore \hat{A}_2 = \hat{C}$ $CB \parallel OA$ *alt ∠s equal/verwisselende ∠e gelyk*	✓ $\hat{O}_1 = O\hat{B}C$ ✓ R **OR/*OF*** ✓ $\hat{A}_2 = 22{,}5°$ ✓ R	(2)

8.3	$AB^2 = OB^2 + OA^2$ $AB^2 = 12^2 + 12^2$ Pythagoras $AB = 12\sqrt{2}$ = 16,97 units/*eenhede* But/*Maar* $\hat{C} = \hat{A}_1 = 22{,}5°$ already proven/*reeds bewys* ∴ BC = AB sides opp equal ∠*s*/*sye teenoor gelyke ∠e* ∴ $BC = 12\sqrt{2}$ = 16,97units/*eenhede* **OR/*OF***	✓ S/R ✓ answer/*antwoord* ✓ S/R ✓ answer/*antwoord* **OR/*OF***	(4)

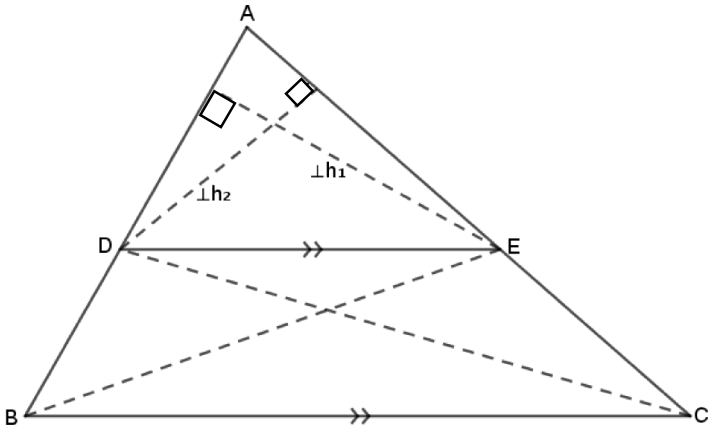
	AB $= \sqrt{12^2 + 12^2} = 12\sqrt{2}$ Pythagoras $\frac{\text{BC}}{\text{sn}22{,}5°} = \frac{\text{AB}}{\text{sn}22{,}5°}$ ∴ BC = AB $= 12\sqrt{2}$ = 16,97 units/*eenhede*	✓ S/R ✓ formula/*formule* ✓ substitution/*substitusie* ✓ answer/*antwoord*	(4)
			[14]

QUESTION/*VRAAG* 9			
9.1	$\hat{A}_2 = 90^0$ ∠ in a semi-circle/∠ in halwe sirkel $\hat{D}_2 = 90^0$ given/*gegee* ∴ $\hat{A}_2 = \hat{D}_2$ ∴ ABCD is a cyclic quad/*is 'n koordevierhoek* converse angles in the same segment/*omgekeerde hoeke in dieslfde* segment line subtends equal angles/*lyn onderspan gelyke hoeke*	✓ S/R ✓ $\hat{A}_2 = \hat{D}_2$ ✓ reason/*rede*	(3)
9.2	$\hat{A}_3 = \hat{B}_1$ tan-chord theorem/*raaklyn-koord stelling* $\hat{A}_3 = \hat{B}_2$ ∠'s in the same segment/∠'*e in dieselfde segment* ∴ $\hat{B}_1 = \hat{B}_2$ ∴ BD bisect A$\hat{B}$C/*BD halveer* $A\hat{B}C$	✓S ✓R ✓ S	(3)

9.3	$\hat{O}_1 = 2\hat{B}_2$ ∠ at centre = 2 × ∠ at circ/*middelpunt*= = 2 × *omtreks* ∠ $\hat{E}_3 = \hat{B}_1 + \hat{B}_2$ ext ∠ of cyclic quad/*buite* ∠ *van koordevierhoek* But/*Maar* $\hat{B}_1 = \hat{B}_2$ already proven/*reeds bewys* ∴ $\hat{E}_3 = 2\hat{B}_2$ ∴ $\hat{E}_3 = \hat{O}_1$ ∴ EC is tangent to circle DEF/*EC is 'n raaklyn aan sirkel DEF/converse tan-chord th/omgekeerde rlyn-koordstelling* or/*of* ∠ between line and chord/∠ *tussen lyn en koord*	✓ S/R ✓ S ✓ $\hat{E}_3 = \hat{O}_1$ ✓ reason/*rede*	(4)
			[10]

QUESTION 10/*VRAAG 10*

10.1



✓ Construction/ *konstruksie*

Construction/*konstruksie*:
$\perp h_1$ on AD and $\perp h_2$ on AE/
$\perp h_1$ *op AD en* $\perp h_2$ op *AE*

No construction
No marks

Join DC and BE/*verbind DC en BE*

$\frac{area\ \Delta ADE}{area\ \Delta DBE} / \frac{opp\ \Delta ADE}{opp\ \Delta DBE}$ ✓ S

$= \frac{\frac{1}{2} AD \perp h_1}{\frac{1}{2} DB \perp h_1} = \frac{AD}{DB}$ same height/*dieselfde hoogte* ✓ S/R

$\frac{area\ \Delta ADE}{area\ \Delta EDC} / \frac{opp\ \Delta ADE}{opp\ \Delta EDC}$

$= \frac{\frac{1}{2} AE \perp h_2}{\frac{1}{2} EC \perp h_2}$

$= \frac{AE}{EC}$ same height/*dieselfde hoogte*

But/*Maar* $Area\Delta ADE = Area\Delta ADE$ / $opp\Delta ADE = opp\Delta ADE$ ✓ S

and/*en* $Area\Delta DBE = Area\Delta ECD$
$opp\Delta DBE = opp\Delta ECD$
same base, same height/*dieselfde basis, dieselfde hoogte* ✓ R

$\therefore \frac{Area\Delta ADE}{Area\Delta DBE} = \frac{Area\Delta ADE}{Area\Delta ECD} / \therefore \frac{opp\Delta ADE}{opp\Delta DBE} = \frac{opp\Delta ADE}{opp\Delta ECD}$

$\therefore \frac{AD}{DB} = \frac{AE}{EC}$ (5)

10.2	10.2.1	$DB = DG$ *In* ΔABC: $DF \parallel AB$ $\frac{AC}{FC} = \frac{BC}{DC} = \frac{3}{2}$ line ∥ to one side of Δ/(Prop theorem,DF∥AB) *aan een sy van* Δ*/Eweredigheid stelling* (DF∥AB)	✓ radii/*radiusse* ✓ $\frac{AC}{FC} = \frac{BC}{DC} = \frac{3}{2}$ ✓ R	(3)
	10.2.2	In ΔABC and/*en* ΔDEC: 1) $\hat{B} = 90°$ tan ⊥ rad/*rlyn* ⊥ *radius* $D\hat{E}C = 90°$ tan ⊥ rad/*rlyn* ⊥ *radius* $\therefore \hat{B} = D\hat{E}C$ 2) $\hat{C} = \hat{C}$ common ∠/*gemeenskaplike* ∠ 3) $\hat{A} = E\hat{D}C$ $\angle's$ of a Δ/$\angle'e$ *van* Δ $\therefore \Delta ABC /// \Delta DEC$ ∠∠∠	✓ $\hat{B} = D\hat{E}C$ S/R ✓ $\hat{C} = \hat{C}$ ✓ $\hat{A} = E\hat{D}C$ **OR** ✓ $\hat{B} = D\hat{E}C$ S/R ✓ $\hat{C} = \hat{C}$ ✓ R ∠∠∠	(3)
	10.2.3	$\frac{AB}{DE} = \frac{BC}{EC}$ $\Delta ABC /// \Delta DEC$ but/*maar* $AB = AE$ tans from same point/*rlyne vanaf dies. punt* and/*en* $BC = 3 \times$ radius = 3DE $\therefore \frac{AE}{DE} = \frac{3DE}{EC}$ $AE.EC = 3DE.DE$ $AE.EC = 3\,DE^2$ $DE^2 = \frac{AE.EC}{3}$	✓ S/R ✓ S/R ✓ substitute AB with AE/*vervang AB met AE* ✓ substitute BC with 3DE/*vervang BC met 3DE* ✓ $AE.EC = 3\,DE^2$	(5)
	10.2.4	$\frac{Area\Delta FDC}{Area\Delta ABC} = \frac{opp\Delta FDC}{opp\Delta ABC}$ $= \frac{\frac{1}{2}FC.DC.\sin\hat{C}}{\frac{1}{2}AC.BC.\sin\hat{C}}$ $= \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)$ $= \frac{4}{9}$	✓ using area rule correctly/*gebruik opp reël korrek* ✓ $\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)$ ✓ answer/*antwoord*	(3)
				[19]
			TOTAL/*TOTAAL*	**[150]**