

Metro North Education District

Grade 12

Mathematics P2-MEMO
 September 2019

 MARKS: 150
 TIME: 3 hours
NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- 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.

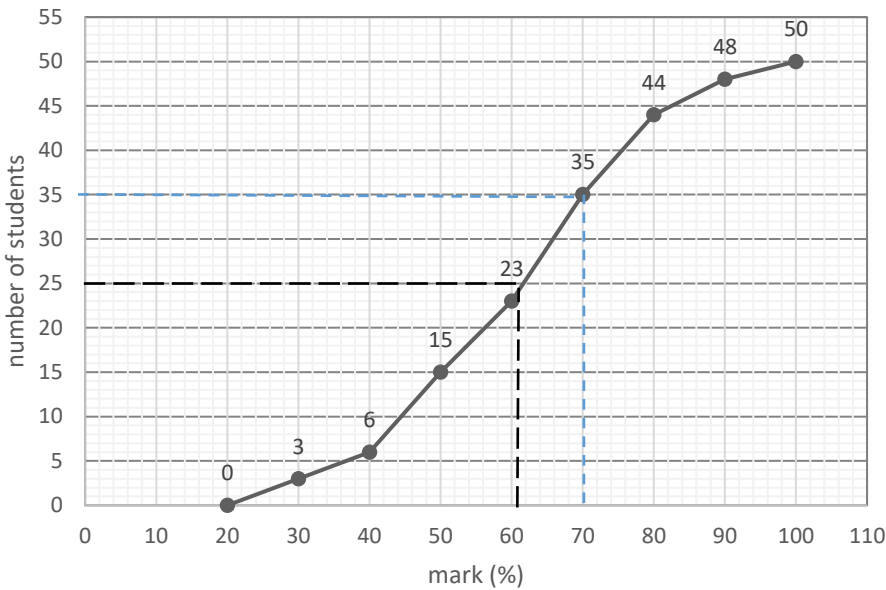
NOTA:

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas.
Hou op nasien by die tweede berekeningsfout.
- Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.

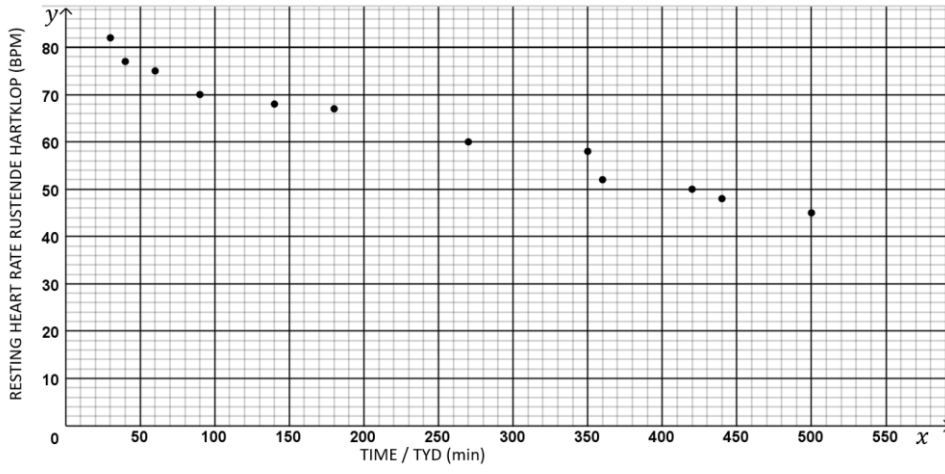
GEOMETRY / MEETKUNDE:

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 'n 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.

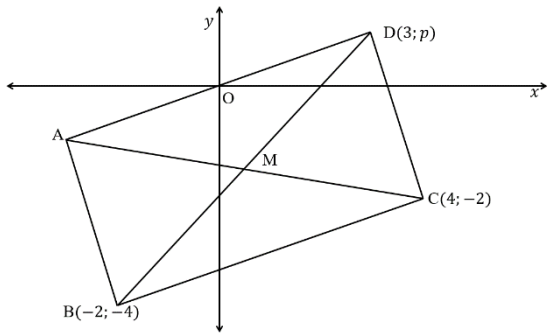
QUESTION 1

1.1	EXAM MARK 																													
1.1.1	50	✓ <i>answer</i>	(1) K																											
1.1.2	<table><thead><tr><th>Interval</th><th>Frequency</th><th>Cumulative frequency</th></tr></thead><tbody><tr><td>$20 \leq x < 30$</td><td>3</td><td>3</td></tr><tr><td>$30 \leq x < 40$</td><td>3</td><td>6</td></tr><tr><td>$40 \leq x < 50$</td><td>9</td><td>15</td></tr><tr><td>$50 \leq x < 60$</td><td>8</td><td>23</td></tr><tr><td>$60 \leq x < 70$</td><td>12</td><td>35</td></tr><tr><td>$70 \leq x < 80$</td><td>9</td><td>44</td></tr><tr><td>$80 \leq x < 90$</td><td>4</td><td>48</td></tr><tr><td>$90 \leq x < 100$</td><td>2</td><td>50</td></tr></tbody></table>	Interval	Frequency	Cumulative frequency	$20 \leq x < 30$	3	3	$30 \leq x < 40$	3	6	$40 \leq x < 50$	9	15	$50 \leq x < 60$	8	23	$60 \leq x < 70$	12	35	$70 \leq x < 80$	9	44	$80 \leq x < 90$	4	48	$90 \leq x < 100$	2	50	✓ <i>first 4 values</i> ✓ <i>last 4 values</i>	(2) K
Interval	Frequency	Cumulative frequency																												
$20 \leq x < 30$	3	3																												
$30 \leq x < 40$	3	6																												
$40 \leq x < 50$	9	15																												
$50 \leq x < 60$	8	23																												
$60 \leq x < 70$	12	35																												
$70 \leq x < 80$	9	44																												
$80 \leq x < 90$	4	48																												
$90 \leq x < 100$	2	50																												
1.1.3	Median = 62 ± 1	✓ 25 on graphs ✓ <i>answer</i> OR ✓✓ Answer only	(2) R																											
1.1.4	$60 \leq x < 70$	✓ <i>answer</i>	(1) K																											
1.1.5	$50 - 35 = 15$ <i>learners</i>	✓ 35 on graph ✓ <i>answer</i> OR ✓✓ Answer only	(2) R																											
1.2.1	$IQR = 20 - 11$ $= 9$	✓ 20-11 ✓ <i>answer</i> OR ✓✓ Answer only	(2) K																											
1.2.2	2000 - the median score of 20 in 2000 is greater in value than the median score of 17 in 2010. - the upper half (50%) of the students in 2000 scored in the same score range as the upper one-fourth (25%) of the students in 2010. By considering the upper quarter, upper half, and upper three-quarters instead of just the lowest and highest scores, we would conclude that the students as a whole did much better in 2000 than in 2010.	✓ 2000 ✓ <i>reason</i>	(2) P																											
			[12]																											

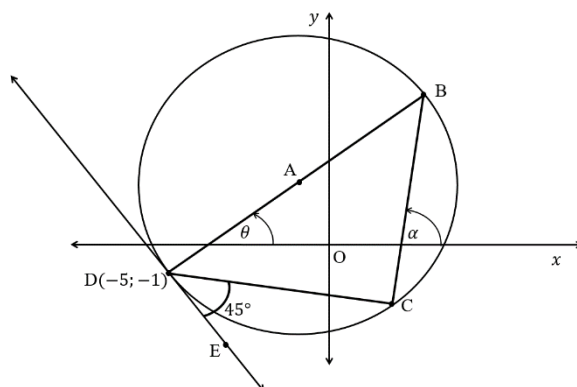
QUESTION 2

2.1	SCATTER PLOT – RESTING HEART RATE (BPM) AND TIME. SPREI- GRAFIEK –RUSTENDE HARTKLOP (BPM) EN TYD. 		
2.2	$r = -0,98$	✓✓ answer -1 rounding	(2) R
2.3	$a = 79,71$ $b = -0,07$ $\hat{y} = 79,71 - 0,07x$	✓ value of a ✓ value of b ✓ equation	(3) R
2.4	$65 = 79,71 - 0,07x$ $-14,71 = -0,07x$ $210,14 \dots min. = x$ 207,14 $\therefore 3,5 \text{ hours per week}$ 3,45 h or 3h 27 min	✓ subst CA from 2.3 ✓ 210,14 min ✓ 3,5 hours	(3) R
			[11]

QUESTION 3

			
3.1	$AC=BD$ $\sqrt{50} = \sqrt{(3 - (-2))^2 + (p - (-4))^2}$ $50 = 25 + p^2 + 8p + 16$ $p^2 + 8p - 9 = 0$ $(p + 9)(p - 1) = 0$ $p \neq -9; p = 1$	$\checkmark$ subst into correct formula $\checkmark p^2 + 8p - 9$ $\checkmark$ factors $\checkmark$ correct p value	(4) C
3.2	$M\left(\frac{3-2}{2}; \frac{1-4}{2}\right)$ $M\left(\frac{1}{2}; -\frac{3}{2}\right)$	$\checkmark$ subst into correct formula $\checkmark \frac{1}{2} \quad \checkmark -\frac{3}{2}$ OR $\checkmark\checkmark$ Answer only	(3) R
3.3	$m_{DC} = \frac{1 - (-2)}{3 - 4}$ $m_{DC} = \frac{3}{-1}$ $m_{DC} = -3$	$\checkmark$ subst into correct formula $\checkmark -3$ OR $\checkmark\checkmark$ Answer only	(2) K
3.4	$y = -3x + c$ $-4 = -3(-2) + c$ $-10 = c$ $y = -3x - 10$	$\checkmark m = -3$ CA from 3.3 $\checkmark c = -10$	(2) R
			[11]

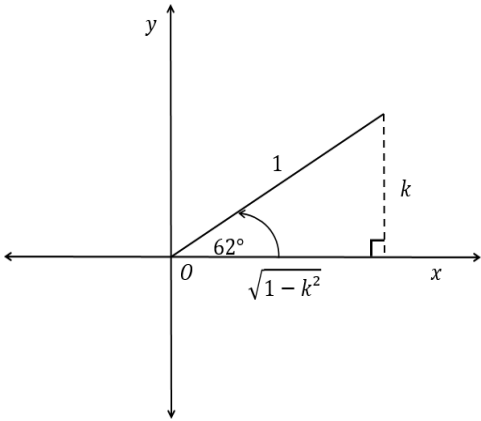
QUESTION 4



4.1.1	$A(-1; 2)$	✓ -1 ✓ 2 A	(2) K
4.1.2	$\frac{x + (-5)}{2} = -1$ $x - 5 = -2$ $x = 3$ $\frac{y + (-1)}{2} = 2$ $y - 1 = 4$ $y = 5$ $B(3; 5)$	✓ both subst into mpt ✓ $x = 3$ ✓ $y = 5$ CA from 4.1.1 OR ✓✓ Answer only	(3) C
4.1.3	$m_{AD} = \frac{2 - (-1)}{-1 - (-5)}$ $= \frac{3}{4}$	✓ subst. CA from 4.1.1 ✓ gradient	(2) K
4.1.4	$\tan \theta = \frac{3}{4}$ $\theta = 36,87^\circ$	✓ $\tan \theta = \frac{3}{4}$ CA from 4.1.3 ✓ answer CA	(2) R
4.1.5	$m_{radius} = \frac{3}{4}$ $m_{tangent} = \frac{-4}{3} \quad \text{radius} \perp \text{tangent}$ $y = -\frac{4}{3}x + c$ $-1 = -\frac{4}{3}(-5) + c$ $-1 = \frac{20}{3} + c$ $c = -\frac{23}{3}$ $\therefore y = -\frac{4}{3}x - \frac{23}{3}$	✓ $\frac{-4}{3}$ CA from 4.1.3 penalise if not neg but CA further. ✓ subst $(-5; -1)$ ✓ $c = -\frac{23}{3}$	(3) R

4.2	$\hat{B} = 45^\circ$ [tan;chord theorem / raaklyn;koord stelling] $\alpha = 45^\circ + 36,87^\circ$ [ext $\angle$ of Δ /buite $\angle$ van Δ] $\alpha = 81,87^\circ$ $m_{BC} = \tan 81,87^\circ$ $m_{BC} = 7$	$\checkmark \hat{B} = 45^\circ$ $\checkmark \alpha = 81,87^\circ$ CA from 4.1.4 $\checkmark m_{BC} = \tan 81,87^\circ$ $\checkmark m_{BC} = 7$	(4) P
4.3.1	$x^2 - 6x + 9 + y^2 + 2y + 1 = 8 + 9 + 1$ $(x - 3)^2 + (y + 1)^2 = 18$ $\therefore M(3; -1)$	$\checkmark +9$ both sides $\checkmark +1$ both sides $\checkmark (x - 3)^2$ $\checkmark (y + 1)^2$ <i>answer given</i>	(4) R
4.3.2	$M(3; -1)$ and $A(-1; 2)$ $MA = \sqrt{(3 - (-1))^2 + (-1 - 2)^2}$ $MA = \sqrt{16 + 9}$ $MA = \sqrt{25}$ $MA = 5$ $r_M + r_A = \sqrt{18} + 5$ or $= 9,24$ $MA < r_M + r_A$ $\therefore$ circles intersect/sirkels sny	$\checkmark$ subst $\checkmark 5$ $\checkmark \sqrt{18} + 5$ $\checkmark$ reason for conclusion	(4) P
			[24]

QUESTION 5

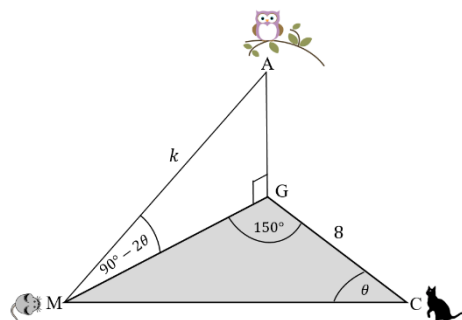
5.1	If $\sin 40^\circ \cdot \cos 22^\circ + \cos 40^\circ \cdot \sin 22^\circ = k$, then without the use of a calculator, determine the value of the following in terms of k .		
5.1.1	$\sin 40^\circ \cdot \cos 22^\circ + \cos 40^\circ \cdot \sin 22^\circ = k$ $\sin(40^\circ + 22^\circ)$ $\sin 62^\circ = k$	$\checkmark \sin(40^\circ + 22^\circ)$ $\checkmark \text{ answer A}$	(2) K
5.1.2	 $\tan(118^\circ)$ $= \tan(180^\circ - 62^\circ)$ $= -\tan 62^\circ$ $= -\frac{k}{\sqrt{1 - k^2}}$	$\checkmark y = k ; r = 1$ $\checkmark x = \sqrt{1 - k^2}$ $\checkmark -\tan 62^\circ \text{ A}$ $\checkmark \text{ answer CA}$	(4) R
5.1.3	$\frac{\sin 14^\circ \cdot \cos 14^\circ}{2 \sin 14^\circ \cos 14^\circ}$ $= \frac{1}{2}$ $= \frac{1}{2} \sin 28^\circ$ $= \frac{1}{2} \cos 62^\circ$ $= \frac{\sqrt{1 - k^2}}{2}$	$\checkmark \frac{1}{2} \sin 28^\circ$ $\checkmark \frac{1}{2} \cos 62^\circ$ (do not have to show give 2 marks for answer) $\checkmark \text{ answer CA}$	(3) C

5.2	$LHS = \frac{1 - \cos 2\theta}{\sin 2\theta \times \tan \theta}$ $LHS = \frac{1 - (1 - 2\sin^2 \theta)}{2\sin \theta \cos \theta \times \frac{\sin \theta}{\cos \theta}}$ $LHS = \frac{2\sin^2 \theta}{2\sin \theta \times \frac{\sin \theta}{1}}$ $LHS = 1$ $LHS = RHS$	$\checkmark 1 - 2\sin^2 \theta$ $\checkmark 2\sin \theta \cos \theta$ $\checkmark \frac{\sin \theta}{\cos \theta}$ $\checkmark \frac{\sin^2 \theta}{\sin^2 \theta}$	(4) C
5.3	$\sqrt{\sin(180^\circ + A) \cdot \cos(90^\circ + A) - \tan 45}$ $= \sqrt{-\sin A \cdot -\sin A - 1}$ $= \sqrt{\sin A \cdot \sin A - 1}$ $= \sqrt{-(1 - \sin^2 A)}$ $= \sqrt{-\cos^2 A}$ $\therefore \cos^2 A = 0$ $A = 90^\circ \pm 180^\circ n ; n \in \mathbb{Z}$ OR $A = 90^\circ + 360^\circ n \text{ or } A = 270^\circ + 360^\circ n$	$\checkmark -\sin A$ $\checkmark -\sin A$ $\checkmark -1$ $\checkmark -\cos^2 A$ $\checkmark \cos^2 A = 0 \text{ or } \sin = 1$ $\text{or } \cos A = 0$ $\checkmark \text{ answer}$	(6) C [19]

QUESTION 6

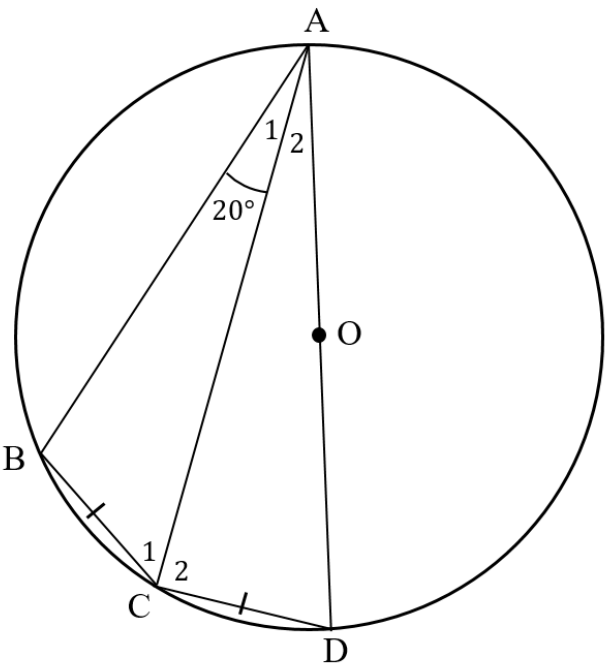
6.1	$f(x) = \sin(x + a)$		
6.1	$a = 30^\circ$	✓ answer	(1) K
6.2	Sketch	✓ x – intercepts ✓ y – intercept ✓ Turning points ✓ end points	(4) R
6.3	$f(x) = g(x)$ $\sin(x + 30^\circ) = \cos(3x)$ $\sin(x + 30^\circ) = \sin(90^\circ - 3x)$ $x + 30^\circ = 90^\circ - 3x + 360^\circ n \quad n \in \mathbb{Z}$ $4x = 60^\circ + 360^\circ n$ $x = 15^\circ + 90^\circ n$ <i>or</i> $x + 30^\circ = 180^\circ - (90^\circ - 3x) + 360^\circ n$ $x + 30^\circ = 90^\circ + 3x + 360^\circ n$ $-2x = 60^\circ + 360^\circ n$ $x = -30^\circ - 180^\circ n$	CA from 6.1.1 ✓ $\sin(90^\circ - 3x)$ ✓ method in 1st quadrant ✓ answer ✓ method in 2nd quadrant ✓ answer	(5) C
6.4	$15^\circ < x < 105^\circ$ or $x \in (15^\circ; 105^\circ)$	✓ critical values ✓ notation CA from 6.3	(2) C
6.1.5	$g(x) = \cos(3x)$ $k(x) = \cos(60^\circ - 3x)$ $k(x) = \cos(3x - 60^\circ)$ $k(x) = \cos 3(x - 20^\circ)$ $\therefore$ translated 20° to the right. / transleer 20° na regs	✓✓ answer A	(2) P
			[14]

QUESTION 7

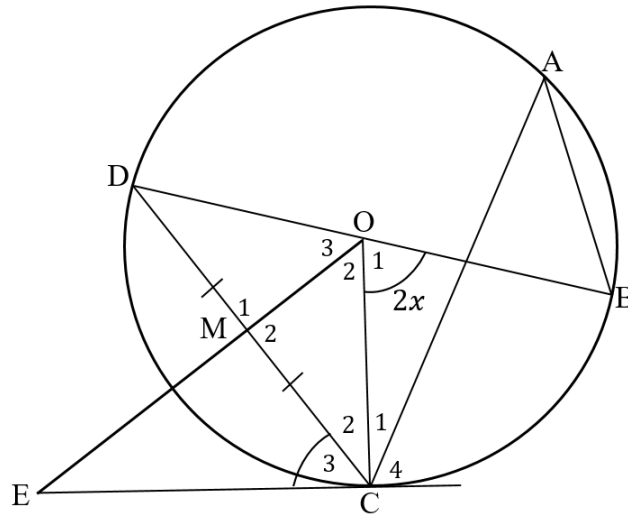


7.1	$\hat{MAG} = 2\theta$	✓ answer	(1) K
7.2	$\frac{MG}{\sin 2\theta} = \frac{k}{\sin 90^\circ}$ $MG = \frac{k \sin 2\theta}{1} \dots \dots \dots (1)$	$\checkmark \frac{MG}{\sin 2\theta} = \frac{k}{\sin 90^\circ} \text{ or } \frac{MG}{k} = \sin 2\theta$ $\checkmark MG = \frac{k \sin 2\theta}{1}$	(2) C
7.3	$\frac{MC}{\sin 150^\circ} = \frac{MG}{\sin \theta}$ $\frac{MC}{\frac{1}{2}} = \frac{MG}{\sin \theta}$ $MC = \frac{\frac{1}{2}MG}{\sin \theta} \dots \dots \dots (1)$ Subst. (2) in (1) $MC = \frac{k \sin 2\theta}{2 \sin \theta}$ $MC = \frac{k 2 \sin \theta \cdot \cos \theta}{2 \sin \theta}$ $MC = k \cos \theta$	$\checkmark \frac{MC}{\sin 150^\circ} = \frac{MG}{\sin \theta}$ $\checkmark \frac{1}{2}$ $\checkmark MC = \frac{\frac{1}{2}MG}{\sin \theta}$ $\checkmark 2 \sin \theta \cdot \cos \theta$ answer given	(4) C
7.4	$\Delta MGC = \frac{1}{2} MG \cdot CG \sin 150^\circ$ $\Delta MGC = \frac{1}{2} k \sin 2\theta \cdot 8 \cdot \frac{1}{2}$ $\Delta MGC = 2k \sin 2\theta$ OR $\Delta MGC = \frac{1}{2} MC \cdot CG \sin \theta$ $\Delta MGC = \frac{1}{2} k \cos \theta \cdot 8 \sin \theta$ $\Delta MGC = 4k \cos \theta \sin \theta$ $\Delta MGC = 2k(2 \cos \theta \sin \theta)$ $\Delta MGC = 2k \sin 2\theta$	$\checkmark \text{subst.}$ $\checkmark \text{method}$ answer given OR $\checkmark \text{subst.}$ $\checkmark \text{method}$ answer given	(2) C
			[9]

QUESTION 8

8.1			
8.1.1	$\hat{A}_2 = 20^\circ$ [equal chords; equal angles / <i>gelyke koorde; gelyke hoeke</i>]	✓ S ✓ R	(2) K
8.1.2	$\hat{C}_2 = 90^\circ$ [∠ in semi-circle / ∠ in semi-sirkel]	✓ S ✓ R	(2) K
8.1.3	$\hat{D} = 70^\circ$ [sum ∠s Δ / som ∠e Δ]	✓ S & R	
	$\hat{ABC} = 110^\circ$ [opp ∠ cyclic quad / <i>teenoorst. ∠ v kvh</i>]	✓ S ✓ R	(3) R

8.2



8.2.1

$$\hat{A} = x$$

$[\angle \text{ at centre} = 2 \angle \text{ at circumf/midpts} \angle = 2 \text{ omtreks} \angle]$

✓	S	✓	R
---	-----	---	-----

$$\hat{D} = x$$

[$\angle$ s in same segment/ $\angle$ e in *dieselfde* segment]

✓ S ✓ R

$$\widehat{C}_2 = x$$

[$\angle$ s opp = radii/ $\angle$ e teenoor = *radiusse*]

✓ S ✓ R

(6) R

8.2.2

$$\widehat{M}_2 = 90^\circ$$

[Line from centre to midpoint of chord/
lyn vanaf midpt na midpt van koord]

$\checkmark$	S	$\checkmark$	R
--------------	-----	--------------	-----

$$\widehat{O}_2 = 90^\circ - x$$

$$[\text{sum } \angle s \Delta / \text{som } \angle e \Delta]$$

✓ R

(3) C

8.2.3

$$\widehat{\theta}_2 = 90^\circ - x$$

[proven/ *reeds bewys*]

$$O\hat{C}E = 90^\circ$$

[radius $\perp$ tangent/*raaklyn*]

✓ S ✓ R

$$\hat{E} = x$$

$$[\text{sum } \angle s \Delta / \text{som } \angle e \Delta]$$

$$\therefore \hat{E} = \hat{D} = x$$

✓ $S \& R$

$\therefore$ DOCE is a cyclic quadrilateral. [converse theorem: angles in the same segment]

✓ R

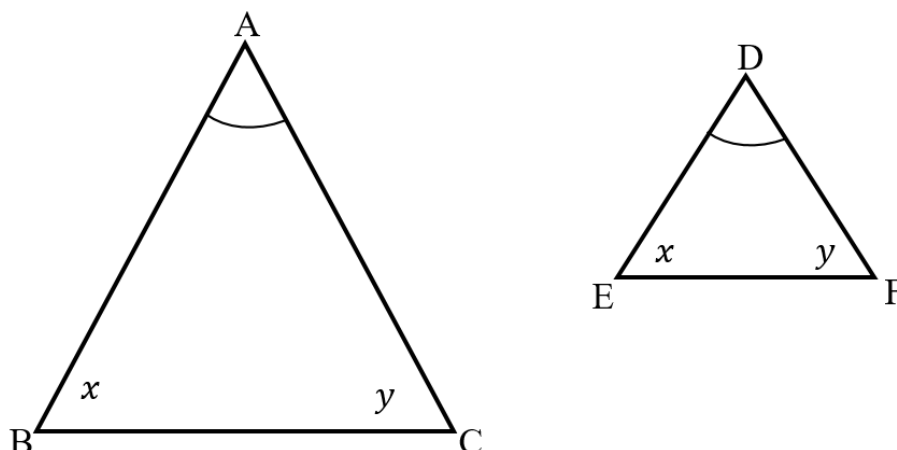
DOCE is 'n kvh [omgekeede stelling: hoeke in dies segment.]

(4) C

[20]

QUESTION 9

9.1



Constr: On sides AB and AC of $\triangle ABC$, mark points G and H respectively such that $AG = DE$ and $AH = DF$. Draw GH/Merk punt G en H op sy AB en AC van $\triangle ABC$ onderskeidelik af sodanig dat $AG = DE$ en $AH = DF$. Trek GH.

Proof/Bewys:

$$\triangle AGH \equiv \triangle DEF \quad [s, \angle, s]$$

$$\therefore \hat{A}GH = \hat{E}$$

$$= \hat{B} \quad [\hat{B} = \hat{E}, \text{given/gegee}]$$

$$\therefore GH \parallel BC \quad [\text{corresp/ooreenk } \angle^s =]$$

$$\therefore \frac{AG}{AB} = \frac{AH}{AC} \quad \begin{array}{l} [\text{line } \parallel \text{ one side of } \triangle] \text{ or } [\text{prop theorem; } GH \parallel BC] \\ [\text{lyn } \parallel \text{ een sy van } \triangle] \text{ of } [\text{eweredighst; } GH \parallel BC] \end{array}$$

$$\therefore \frac{DE}{AB} = \frac{DF}{AC} \quad [\text{constr/konstruksie}]$$

✓ construction/
konstruksie

B/D if no
construction

✓ S/R

✓ S

✓ S /R

✓ S ✓ R

(6)K

9.2.2	$\frac{AP}{AB} = \frac{AC}{AP}$ $\Delta APC \parallel \Delta ABP$ $\therefore AP^2 = AB \cdot AC$	✓ S	(1) K
9.2.3	In $\Delta APC \parallel \Delta CDP$ 1) $\widehat{P}_1 = y$ [alt. $\angle$ s/ verwis. $\angle$ e; CB $\parallel$ DP] 2) $\widehat{D} = \widehat{CPA} = x$ [tangent chord theorem/ <i>raaklyn koord stelling</i>] 3) $\widehat{A} = \widehat{C}_1$ [sum $\angle$ s Δ /som $\angle$ e Δ] $\therefore \Delta APC \parallel \Delta CDP$ OR In $\Delta APC \parallel \Delta CDP$ 1) $\widehat{P}_1 = y$ [alt. $\angle$ s/ verwis. $\angle$ e; CB $\parallel$ DP] 2) $\widehat{D} = \widehat{CPA} = x$ [tangent chord theorem/ <i>raaklyn koord stelling</i>] $\therefore \Delta APC \parallel \Delta CDP (\angle; \angle; \angle)$	✓ S & R ✓ S ✓ R ✓ S & R ✓ S & R ✓ S ✓ R ✓ R ($\angle; \angle; \angle$)	(4) R
9.2.4	$\frac{AC}{CP} = \frac{PC}{DP}$ [$\Delta APC \parallel \Delta CDP$] $\therefore PC^2 = DP \cdot AC$ $AP^2 + PC^2 = AB \cdot AC + AC \cdot DP$ $= AC(AB + DP)$ $= AC(AB + BC)$ [$DP = BC$] $= AC \cdot AC$ $= AC^2$	✓ S ✓ S ✓ common factor ✓ = $AC(AB + BC)$ <i>answer given</i>	(4) P
			[19]

10.1.1	$\frac{AD}{DB} = \frac{AE}{EC}$ [line one side of Δ] or [prop theorem; DE BC] $\frac{5}{4} = \frac{x}{12}$ $4x = 60$ $x = 15 \text{ units}$	$\checkmark$ S $\checkmark$ R $\checkmark$ answer	(3) R
10.1.2	$\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{\frac{1}{2}AEh_B}{\frac{1}{2}EC h_B}$ [Same height B / <i>dieselfde hoogtepunt B</i>] $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{AE}{EC}$ $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{15}{12}$ $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{5}{4}$	$\checkmark$ S $\checkmark$ answer CA from 10.1.1	(2) R
	OR		
	$\hat{B} = 60^\circ$ [co-interior $\angle$ s DE BC] / [<i>ko – binne $\angle$e DE BC</i>] $\hat{C} = 60^\circ$ [opp. $\angle$ s cyclic quad/ <i>teenoorst $\angle$e kdvh</i>] $\hat{A} = 60^\circ$ [$\angle$ s of Δ ; $\angle$ e v. Δ] $\therefore AB = BC = AC = 27$		
	$\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{\frac{1}{2}AB \cdot AE \sin 60^\circ}{\frac{1}{2}EC \cdot BC \sin 60^\circ}$ $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{27 \times 27}{12 \times 18}$ or $\frac{27 \times 27}{12 \times 27}$ $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{27}{8}$ or $\frac{27}{12}$	$\checkmark$ S $\checkmark$ answer	(2) R

10.2	$\hat{C} = 60^\circ$ [opp. $\angle$ s cyclic quad/ <i>teenoorst $\angle$e kdvh</i>] $BE^2 = 12^2 + 18^2 - 2(12)(18)\cos 60^\circ$ $BE^2 = 144 + 324 - 432(\frac{1}{2})$ $BE^2 = 252$ $BE = \sqrt{252}$ $BE = 6\sqrt{7}$ $\frac{AD}{AB} = \frac{DP}{BE}$ [$\triangle ADP \parallel \triangle ABE$] $\frac{5}{9} = \frac{y}{6\sqrt{7}}$ $9y = 5 \times 6\sqrt{7}$ $y = \frac{10\sqrt{7}}{3}$ or 8,82	$\checkmark$ S $\checkmark$ Subst $\checkmark \sqrt{252}$ $\checkmark$ S $\checkmark$ R $\checkmark$ answer	(6) P
	OR		
	$\hat{C} = 60^\circ$ [opp. $\angle$ s cyclic quad/ <i>teenoorst $\angle$e kdvh</i>] $BE^2 = 12^2 + 27^2 - 2(12)(27)\cos 60^\circ$ $BE^2 = 144 + 324 - 648(\frac{1}{2})$ $BE^2 = 792$ $BE = \sqrt{792}$ $BE = 6\sqrt{22}$ $\frac{AD}{AB} = \frac{DP}{BE}$ [$\triangle ADP \parallel \triangle ABE$] $\frac{5}{9} = \frac{y}{6\sqrt{22}}$ $9y = 5 \times 6\sqrt{22}$ $y = \frac{10\sqrt{22}}{3}$ or 15,63	$\checkmark$ S $\checkmark$ Subst $\checkmark \sqrt{729}$ $\checkmark$ S $\checkmark$ R $\checkmark$ answer	[11]

TOTAL: 150

QUESTIONS	MARK DISTRIBUTION(Sept 2019)							TOTAL	COGNITIVE LEVELS				TOTAL
	PAPER 2(150 MARKS)								PAPER 2(150 MARKS)				
	Statistics	Analytical Geometry	Trigonometry	Euclidean Geometry and measurement				150	Knowledge(20%)	Routine procedures(35%)	Complex procedures(30%)	Problem Solving(15%)	150
	(20±3)	(40±3)	(40±3)	(50±3)									
1	12							12	6	4		2	12
2	11							11	3	8			11
3		11						11	2	5	4		11
4		24						24	4	9	3	8	24
5			19					19	2	4	13		19
6			14					14	1	4	9		14
7			9					9	1		8		9
8				20				20	4	9	7		20
9				19				19	7	8		4	19
10				11				11		5		6	11
11								0					0
12								0					0
TOTAL	23	35	42	50		0	0	150	30	56	44	20	150
%	15	23	28	33		0	0	100	20	37	29	13	100

K	R	C	P
20%	35%	30%	15%
30	56	44	20
20%	37%	29%	13%

STAT	ANAL	TRIG	GEOMETRY
20 ± 3	40 ± 3	40 ± 3	50 ± 3
23	35	42	50

VRAESTEL 2: Graad 11 en 12: stellings en/of trigonometriese bewyse: maksimum 12 punte

Beskrywing	Graad 10	Graad 11	Graad 12
Statistiek	15 ± 3	20 ± 3	20 ± 3
Analitiese Meetkunde	15 ± 3	30 ± 3	40 ± 3
Trigonometrie	40 ± 3	50 ± 3	40 ± 3
Euklidiese Meetkunde en Meting	30 ± 3	50 ± 3	50 ± 3
TOTAAL	100	150	150

QUESTION 10 ALTERNATIVE ANSWER

10.1.2	$\hat{B} = 60^\circ$ [co-interior $\angle$ s $DE \parallel BC$] / [ko – binne $\angle$ e $DE \parallel BC$] $\hat{C} = 60^\circ$ [opp. $\angle$ s cyclic quad/ teenoorst $\angle$ e kdvh] $\hat{A} = 60^\circ$ [$\angle$ s of Δ ; $\angle$ e v. Δ] $\therefore AB = BC = AC = 27$		
	$\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{\frac{1}{2}AB \cdot AE \sin 60^\circ}{\frac{1}{2}EC \cdot BC \sin 60^\circ}$ $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{27 \times 27}{12 \times 18} \quad \text{or} \quad \frac{27 \times 27}{12 \times 27}$ $\frac{\text{area of } \Delta AEB}{\text{area of } \Delta ECB} = \frac{27}{8} \quad \text{or} \quad \frac{27}{12}$	$\checkmark$ S $\checkmark$ answer CA from (a)	(2) R

10.2	$\hat{C} = 60^\circ$ [opp. $\angle$ s cyclic quad/ teenoorst $\angle$ e kdvh] $BE^2 = 12^2 + 27^2 - 2(12)(27)\cos 60^\circ$ $BE^2 = 144 + 324 - 648(\frac{1}{2})$ $BE^2 = 792$ $BE = \sqrt{792}$ $BE = 6\sqrt{22}$ $\frac{AD}{AB} = \frac{DP}{BE}$ [$\Delta ADP \parallel \Delta ABE$] $\frac{5}{9} = \frac{y}{6\sqrt{22}}$ $9y = 5 \times 6\sqrt{22}$ $y = \frac{10\sqrt{22}}{3} \text{ or } 15,63$	$\checkmark$ S $\checkmark$ Subst $\checkmark \sqrt{792}$ $\checkmark$ S $\checkmark$ R $\checkmark$ answer
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