



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

JUNE/JUNIE 2018

**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS /PUNTE: 150

This marking guideline consists of 20 pages./
Hierdie nasienriglyn bestaan uit 20 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 guideline.
- Assuming answers/ values in order to solve a problem is **NOT** acceptable.

NEEM KENNIS:

- As 'n kandidaat 'n vraag **TWEEKEER** beantwoord, merk slegs die **EERSTE** poging
- As 'n kandidaat 'n poging om 'n vraag te beantwoord deurgehaal het en nie weer probeer het nie, merk die deurgehaalde poging.
- Volgehoue akkuraatheid is van toepassing op **ALLE** aspekte van die nasienriglyn.
- Aanvaarding van antwoorde/waardes om sodoende probleme op te los is **NIE** aanvaarbaar **NIE**.

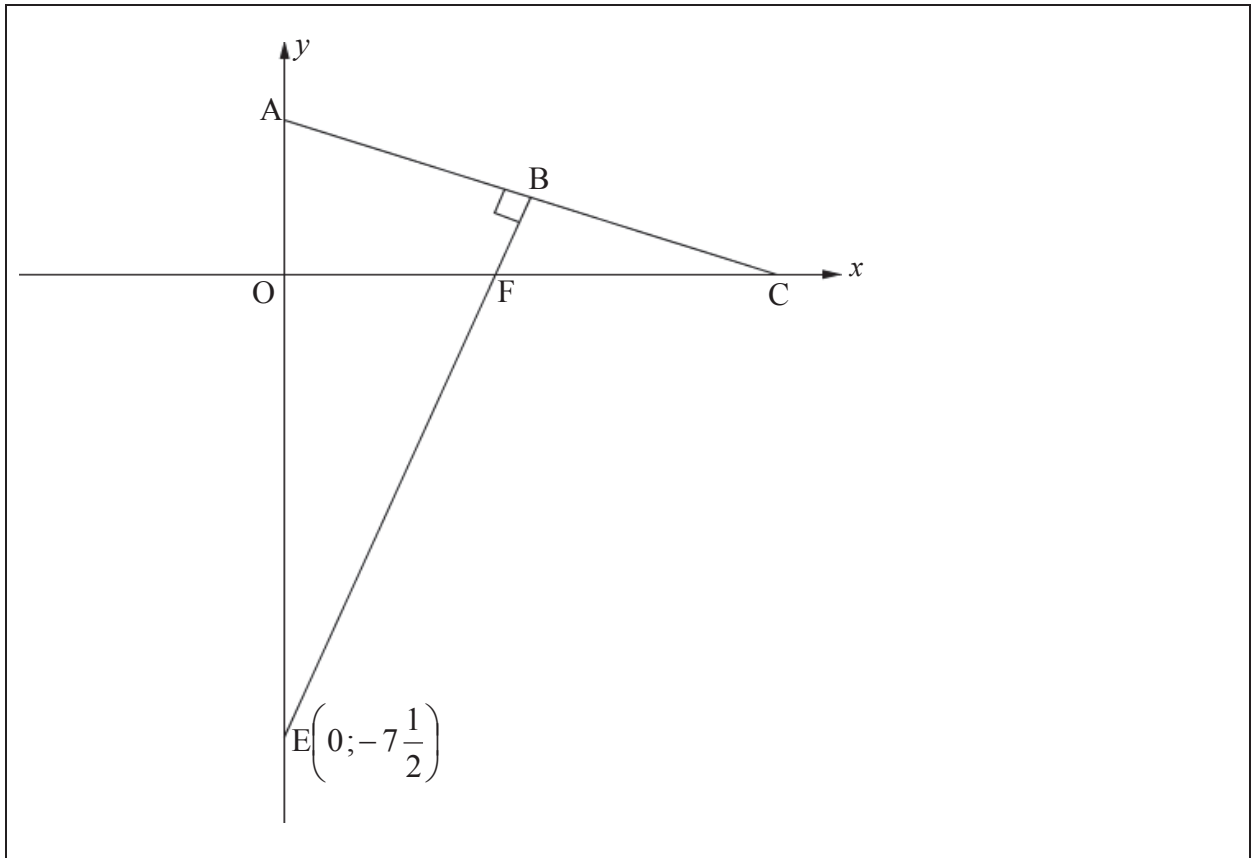
GEOMETRY/MEETKUNDE	
S	A mark for a correct statement. (A statement mark is independent of a reason.)
	<i>'n Punt vir korrekte stelling/bewering. ('n Stelling/bewering punt is onafhanklik van die rede.)</i>
R	A mark for a correct reason. (A reason mark may only be awarded if the statement is correct.)
	<i>'n Punt vir korrekte rede. ('n Rede punt mag slegs toegeken word indien die stelling/bewering korrek is.)</i>
S/R	Award a mark if statement and reason are both correct.
	<i>Ken 'n punt toe indien die stelling/bewering sowel as die rede korrek is.</i>

QUESTION/VRAAG 1			
1.1	$\bar{x} = \frac{\sum x}{n}$ $= \frac{619}{15}$ $= 41,27$	Answer only full marks/ Slegs antwoord volpunte	✓ 619 ✓ 41,27 (2)
1.2	$\sigma = 10,63$		✓✓ Answer / antwoord (2)
1.3	$41,27 - 10,63 \leq x \leq 41,27 + 10,63$ $30,64 \leq x \leq 51,90$ ∴ 8 learners/leerders		✓ both c.v ^s / beide k.w ^s ✓ notation / notasie ✓ 8 learners/leerders (3)
1.4	$Q_1 = 29$ $Q_3 = 49$ $\therefore \text{Semi - IQR/IKW} = \frac{49 - 29}{2}$ $= 10$		✓ Q_1 ✓ Q_3 ✓ answer/antwoord (3)
			[10]

QUESTION/VRAAG 2																											
2.1	$56 + 2y = 64$ $2y = 8$ $y = 4$	Answer only 1 mark Slegs antwoord 1 punt	✓ correct equation korrekte vergelyking ✓ y-value/waarde (2)																								
2.2	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Time (in minutes) <i>Tyd (in minute)</i></th> <th style="text-align: center;">Frequency / <i>Frekwensie</i></th> <th style="text-align: center;">Cumulative frequency/ <i>Kumulatiewe frekwensie</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$5 \leq t < 10$</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">$10 \leq t < 15$</td> <td style="text-align: center;">5</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: center;">$15 \leq t < 20$</td> <td style="text-align: center;">4</td> <td style="text-align: center;">12</td> </tr> <tr> <td style="text-align: center;">$20 \leq t < 25$</td> <td style="text-align: center;">16</td> <td style="text-align: center;">28</td> </tr> <tr> <td style="text-align: center;">$25 \leq t < 30$</td> <td style="text-align: center;">15</td> <td style="text-align: center;">43</td> </tr> <tr> <td style="text-align: center;">$30 \leq t < 35$</td> <td style="text-align: center;">17</td> <td style="text-align: center;">60</td> </tr> <tr> <td style="text-align: center;">$35 \leq t < 40$</td> <td style="text-align: center;">4</td> <td style="text-align: center;">64</td> </tr> </tbody> </table>	Time (in minutes) <i>Tyd (in minute)</i>	Frequency / <i>Frekwensie</i>	Cumulative frequency/ <i>Kumulatiewe frekwensie</i>	$5 \leq t < 10$	3	3	$10 \leq t < 15$	5	8	$15 \leq t < 20$	4	12	$20 \leq t < 25$	16	28	$25 \leq t < 30$	15	43	$30 \leq t < 35$	17	60	$35 \leq t < 40$	4	64		✓ 8, 12 and/en 28 ✓ 43, 60 and/en 64 (2)
Time (in minutes) <i>Tyd (in minute)</i>	Frequency / <i>Frekwensie</i>	Cumulative frequency/ <i>Kumulatiewe frekwensie</i>																									
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$35 \leq t < 40$	4	64																									

<p>2.3</p>	<p style="text-align: center;">Ogive/Ogief</p>	<ul style="list-style-type: none"> ✓ grounding/anker ✓ plotting against the upper limit/ afsteek teen die boonste limiet ✓ shape / vorm <p style="text-align: right;">(3)</p>
<p>2.4</p>	<p>Number of learners / <i>Aantal leerders</i> $\approx 64 - 54 \approx 10$ Accept/ <i>Aanvaar</i> [9 – 11]</p>	<ul style="list-style-type: none"> ✓ method/metode ✓ 54 ✓ answer/antwoord <p style="text-align: right;">(3)</p>
<p>[10]</p>		

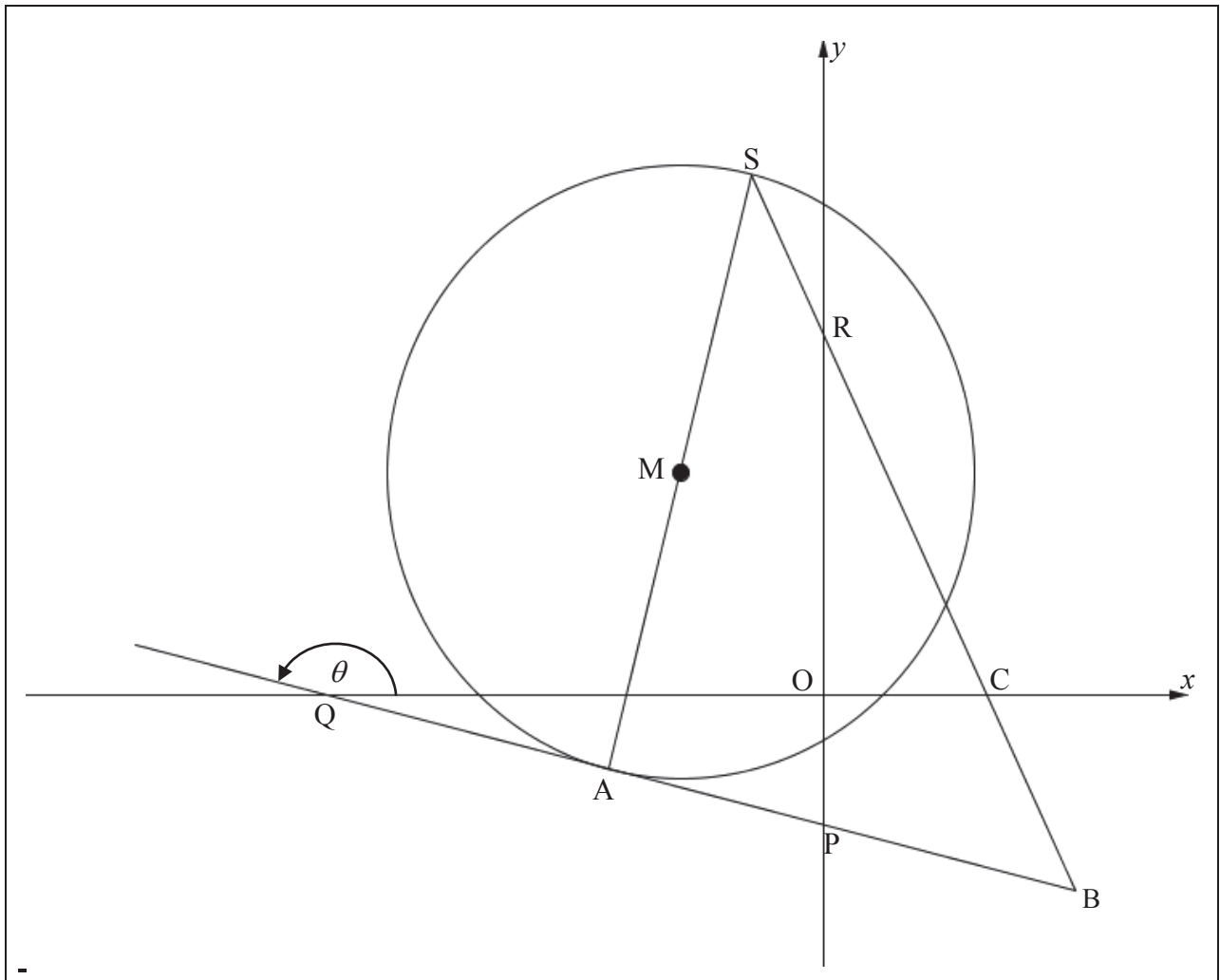
QUESTION/VRAAG 3



<p>3.1</p>	$x + py = p$ $y = -\frac{x}{p} + 1$ $\therefore A(0;1)$	<p>✓ y-subject of formula y-onderwerp van formule</p> <p>✓ coordinates of A koördinate van A</p> <p style="text-align: right;">(2)</p>
<p>3.2</p>	$OA = 1$ $\therefore OC = 4(1) = 4$ $\therefore C(4;0)$ $m_{AC} = -\frac{1}{p} = \frac{1-0}{0-4}$ $p = 4$	<p>✓ OC</p> $\checkmark -\frac{1}{p} = \frac{1-0}{0-4}$ <p>✓ simplification/vereenvoudiging</p> <p>✓ p-value/waarde</p> <p style="text-align: right;">(4)</p>
<p>3.3</p>	$m_{EB} = 4$ $y = 4x - 7\frac{1}{2}$ <p style="text-align: center;">$EB \perp AC$</p>	<p>✓ $m_{EB} = 4$</p> <p>✓ equation/vergelyking</p> <p style="text-align: right;">(2)</p>

3.4	$-\frac{x}{4} + 1 = 4x - 7\frac{1}{2}$ $-x + 4 = 16x - 30$ $17x = 34$ $x = 2$ $y = \frac{1}{2}$	✓ equating / gelykstel ✓ simplification / vereenvoudiging ✓ x-value/waarde ✓ y-value/waarde (4)
3.5	$4x - 7\frac{1}{2} = 0$ $4x = \frac{15}{2}$ $x = \frac{15}{8}$ $F\left(\frac{15}{8}; 0\right)$	✓ $y = 0$ ✓ x-value/waarde (2)
3.6	$BF = \sqrt{\left(\frac{15}{8} - 2\right)^2 + \left(0 - \frac{1}{2}\right)^2}$ $= \frac{\sqrt{17}}{8}$ <p>∴ Area FOAB = Area ΔAOC – Area ΔBFC</p> $= \frac{1}{2} \times 4 \times 1 - \frac{1}{2} \left(\frac{\sqrt{17}}{2}\right) \frac{\sqrt{17}}{8}$ $= 1,47$ <p style="text-align: center;">OR/OF</p> $BF = \sqrt{\left(\frac{15}{8} - 2\right)^2 + \left(0 - \frac{1}{2}\right)^2}$ $= \frac{\sqrt{17}}{8}$ <p>Area FOAB = Area ΔAOF + Area ΔABF</p> $= \frac{1}{2} \times 1 \times \frac{15}{8} + \frac{1}{2} \times \frac{\sqrt{17}}{2} \times \frac{\sqrt{17}}{8}$ $= 1,47$	✓ substitution / vervanging ✓ BF ✓ BC ✓ substitution / vervanging ✓ answer / antwoord ✓ substitution / vervanging ✓ BF ✓ OF ✓ substitution / vervanging ✓ answer / antwoord (5)
3.7	$r = \frac{17}{16}$	✓ answer / antwoord (1)
3.8	$\left(x - \frac{47}{16}\right)^2 + y^2 = \frac{289}{256}$	✓ r^2 ✓ equation / vergelyking (2)
		[22]

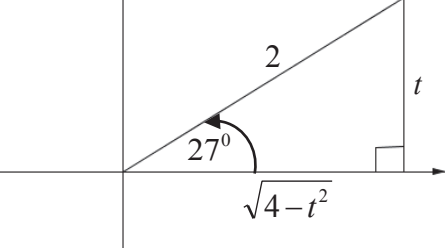
QUESTION/VRAAG 4



4.1	$x^2 + 6x + 9 + y^2 - 8y + 16 = -5 + 9 + 16$ $(x + 3)^2 + (y - 4)^2 = 26$ $\therefore M(-3; 4)$	✓ completing the square <i>kwadraatsvoltooiing</i> ✓ x-value/waarde ✓ y-value/waarde (3)
4.2	$r = \sqrt{26}$	✓ answer/antwoord (1)
4.3	$m_{AS} = 5 \quad [SA \perp QB]$ $y - 4 = 5(x + 3)$ $y = 5x + 19$	✓ $m_{AS} = 5$ ✓ subst. /verv. m_{AS} & $(-3; 4)$ ✓ equation/vergelijking (3)

4.4	$x^2 + 6x + 9 + (5x + 19 - 4)^2 = 26$ $x^2 + 6x + 9 + 25x^2 + 150x + 225 - 26 = 0$ $26x^2 + 156x + 208 = 0$ $x^2 + 6x + 8 = 0$ $(x + 4)(x + 2) = 0$ $x = -4 \text{ or } x = -2$ $\therefore y = 5(-4) + 19$ $= -1$ $Q(-4; -1)$	<ul style="list-style-type: none"> ✓ substitution/<i>vervanging</i> ✓ simplification / <i>vereenvoudiging</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ choosing correct <i>x</i>-value / <i>korrekte keuse van x-waarde</i> ✓ <i>y</i>-value/<i>waarde</i> (6)
4.5	$-1 = -\frac{1}{5}(-4) + k$ $\therefore k = -\frac{9}{5}$	<ul style="list-style-type: none"> ✓ substitute/<i>vervang</i> (-4; -1) ✓ answer / <i>antwoord</i> (2)
4.6	$\tan \theta = -\frac{1}{5}$ $\therefore \theta = 169^\circ$ $\widehat{OQP} = 11^\circ \text{ [}\angle\text{s on a str line] / [}\angle\text{op'n reguitlyn]}$ $\therefore \widehat{OQP} = \widehat{ORC}$ $\therefore \text{RCPQ is a cyclic quad [converse } \angle\text{s same seg]}$ $\text{RCPQ is 'n koordevierhoek [omgekeerde } \angle\text{e in dieselfde seg]}$	<ul style="list-style-type: none"> ✓ $\tan \theta = -\frac{1}{5}$ ✓ size of θ / <i>grootte van</i> θ ✓ size of \widehat{OQP} / <i>grootte van</i> \widehat{OQP} ✓ R (4)
		[19]

QUESTION/VRAAG 5

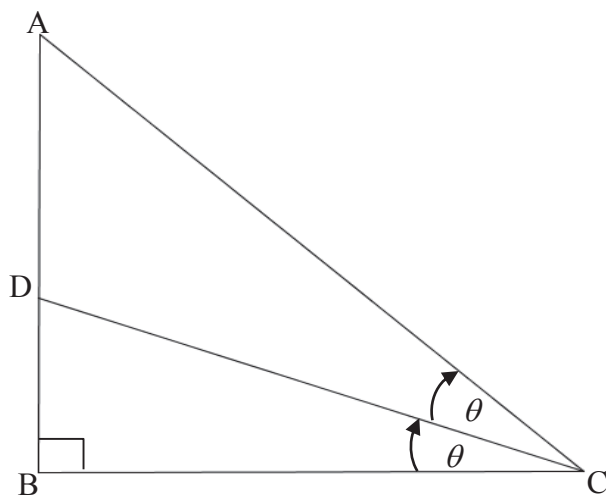
5.1.1	$2 \sin 27^\circ = t$ $\sin 27^\circ = \frac{t}{2}$  $x = \sqrt{4-t^2}$ $\sin 54^\circ = 2 \sin 27^\circ \cos 27^\circ$ $= 2 \times \frac{t}{2} \times \frac{\sqrt{4-t^2}}{2}$ $= \frac{t\sqrt{4-t^2}}{2}$	$\checkmark \sin 27^\circ = \frac{t}{2}$ $\checkmark x = \sqrt{4-t^2}$ $\checkmark 2 \sin 27^\circ \cos 27^\circ$ $\checkmark \text{substitution/vervanging}$ (4)
5.1.2	$\tan 513^\circ \cdot \cos 27^\circ = (-\tan 27^\circ) \cos 27^\circ$ $= -\frac{\sin 27^\circ}{\cos 27^\circ} \cdot \cos 27^\circ$ $= -\frac{t}{2}$	$\checkmark (-\tan 27^\circ)$ $\checkmark -\frac{\sin 27^\circ}{\cos 27^\circ}$ $\checkmark -\frac{t}{2}$ (3)
5.1.3	$\cos 87^\circ = \cos(60^\circ + 27^\circ)$ $= \cos 60^\circ \cdot \cos 27^\circ - \sin 60^\circ \cdot \sin 27^\circ$ $= \frac{1}{2} \cdot \frac{\sqrt{4-t^2}}{2} - \frac{\sqrt{3}}{2} \cdot \frac{t}{2}$ $= \frac{\sqrt{4-t^2} - t\sqrt{3}}{4}$	$\checkmark 60^\circ + 27^\circ$ $\checkmark \text{expansion / uitbreiding}$ $\checkmark \text{subst./verv. } \frac{\sqrt{4-t^2}}{2} \& \frac{t}{2}$ $\checkmark \text{subst. / verv. } \frac{1}{2} \& \frac{\sqrt{3}}{2}$ (4)

5.2	$\frac{\sin(-2\alpha)\cos(90^\circ + \alpha)}{\sin(-\alpha + 360^\circ)\cos(-\alpha - 180^\circ)}$ $= \frac{(-\sin 2\alpha)(-\sin \alpha)}{(\sin \alpha)(-\cos \alpha)}$ $= -\frac{2\sin \alpha \cos \alpha}{\cos \alpha}$ $= -2\sin \alpha$	<ul style="list-style-type: none"> ✓ $(-\sin 2\alpha)$ ✓ $(-\sin \alpha)$ ✓ $\sin \alpha$ ✓ $(-\cos \alpha)$ ✓ $2\sin \alpha \cos \alpha$ ✓ $-2\sin \alpha$ <p style="text-align: right;">(6)</p>
5.3	$9\sin^2 x - 4\cos^2 x = 0$ $(3\sin x - 2\cos x)(3\sin x + 2\cos x) = 0$ $\therefore 3\sin x = \pm 2\cos x$ $\tan x = \pm \frac{2}{3}$ $x = 33,69^\circ + 180^\circ.k \text{ or/of } x = 146,31^\circ + 180^\circ.k \quad k \in Z$	<ul style="list-style-type: none"> ✓ factors/<i>faktore</i> ✓ both equations <i>beide vergelykings</i> ✓ $\tan x = \pm \frac{2}{3}$ ✓ both / <i>beide</i> $33,69^\circ$ & $146,31^\circ / -33,69^\circ$ ✓ $180^\circ.k$ & $k \in Z$ <p style="text-align: right;">(5)</p>
[22]		

QUESTION/VRAAG 6

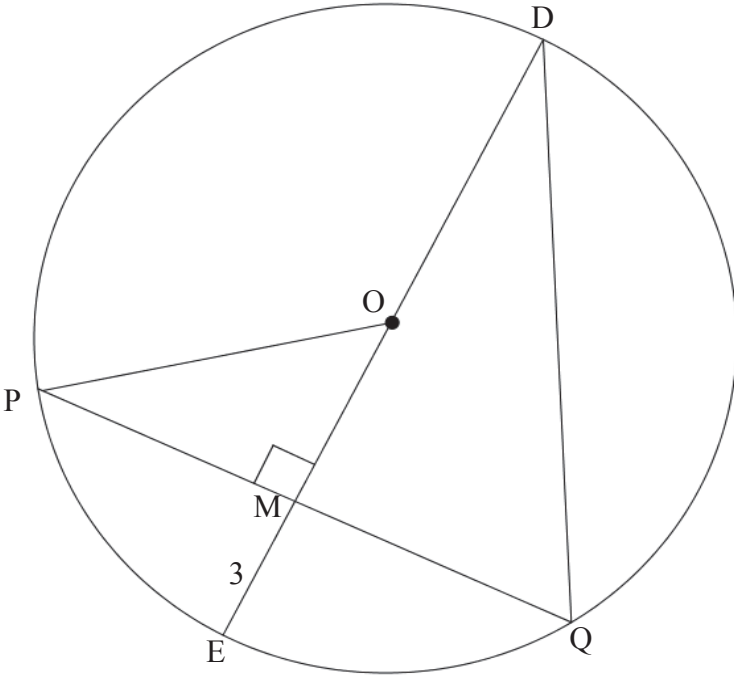
6.1	Amplitude = 2	✓ answer/antwoord	(1)
6.2	$1 \leq y \leq 5$	✓ min & max/maks ✓ notation/notasie	(2)
6.3		✓ both x-intercepts <i>beide x-afsnitte</i> -30° & 150° ✓ max TP & y-intercept ✓ shape / vorm	(3)
6.4	$-30^\circ < x < 0^\circ$	✓ both c.v. ^s / <i>beide k.w^s</i> ✓ notation/notasie	(2)
6.5	$h(x) = \sin(x + 90^\circ) - 2$ $= \cos x - 2$	✓✓ $\sin(x + 90^\circ) - 2$ ✓ $\cos x$	(3)
			[11]

QUESTION/VRAAG 7



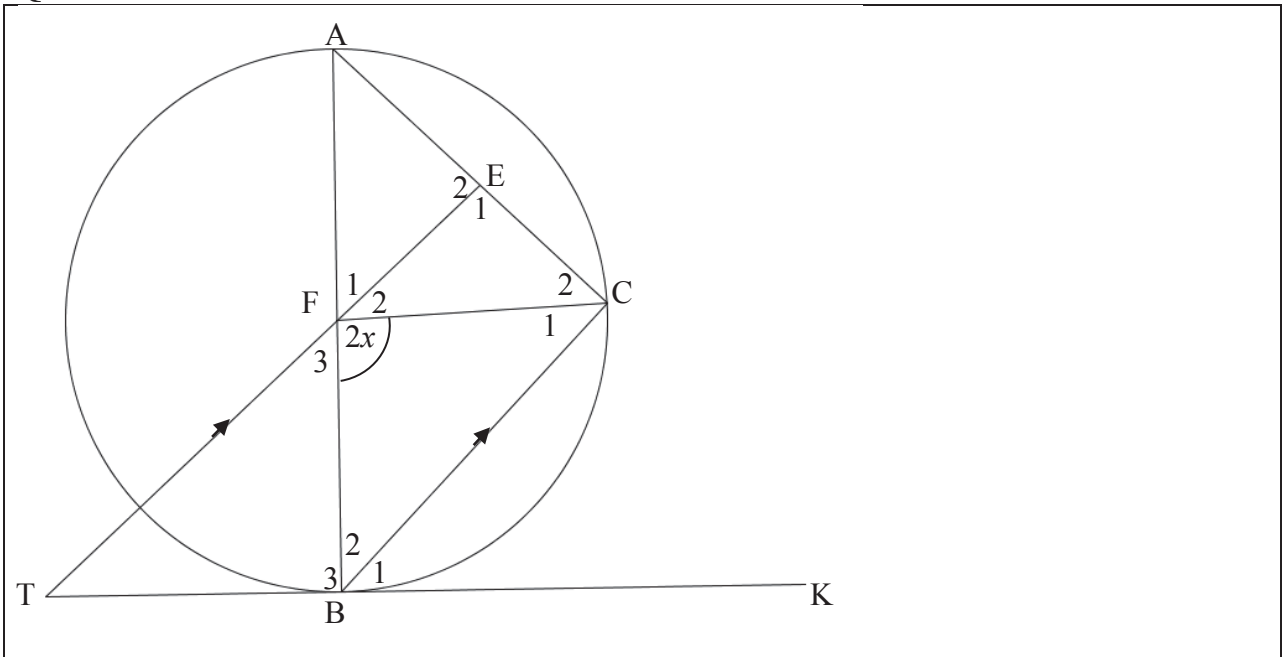
7.1	$\hat{A} = 90^\circ - 2\theta$	✓ answer / antwoord	(1)
7.2	$\sin \theta = \frac{DB}{DC}$	✓ answer / antwoord	(1)
7.3	$DC = \frac{DB}{\sin \theta}$ <p>and/en $AD = 2DB = 2DB$</p> $\frac{DC}{\sin(90^\circ - 2\theta)} = \frac{AD}{\sin \theta} \text{ in } \triangle ADC$ $\frac{DB}{\sin \theta} = \frac{2DB}{\cos 2\theta}$ $\frac{DB}{\sin \theta \cdot \cos 2\theta} = \frac{2DB}{\sin \theta}$ $DB \cdot \sin \theta = 2DB \cdot \sin \theta \cdot \cos 2\theta$ $2 \cos 2\theta = 1$ $2 \cos 2\theta - 1 = 0$	✓ $AD = 2DB$ ✓ sine rule/sinusreël in $\triangle ADC$ ✓ subst. in sine rule / verv. in sinusreël ✓ $\cos 2\theta$ ✓ equation / vergelyking	(5)
			[7]

QUESTION/VRAAG 8

8.1	Perpendicular to the chord / Loodreg op die koord	✓ answer/antwoord	(1)
8.2			
8.2.1	$OM = \frac{2x+3}{2} - 3$ OR $OM = \frac{2x-3}{2}$	✓ answer/antwoord OR/OF ✓ answer/antwoord	(1)
8.2.2	$OQ^2 = OM^2 + QM^2$ $\left(\frac{2x+3}{2}\right)^2 = \left(\frac{2x-3}{2}\right)^2 + 6^2$ $\frac{4x^2 + 12x + 9}{4} = \frac{4x^2 - 12x + 9}{4} + 36$ $24x = 144$ $x = 6$	✓ susbt. in Pyth / verv. in Pyth. ✓ simplification / vereenvoudiging ✓ standard form linear equation <i>Standaardvorm van lineêre vergelyking</i> ✓ x-value/waarde	(4)

8.2.3	$DM = 12$ $DQ = \sqrt{12^2 + 6^2}$ $= \sqrt{180}$ $= 6\sqrt{5}$	✓ DM ✓ subst. in Pyth / <i>verv. in Pyth</i> ✓ answer / <i>antwoord</i>	(3)
			[9]

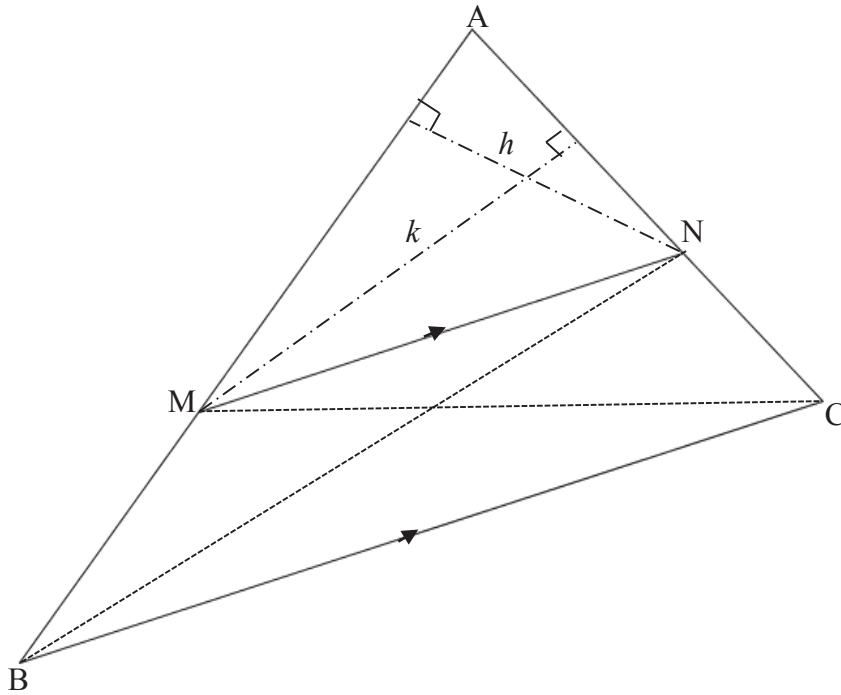
QUESTION/VRAAG 9



9.1	$\hat{A} = x$ [\angle at centre = $2\angle$ at circumf. / <i>Middelpunts $\angle = 2 \times$ Omtreks \angle</i>]	✓ S	✓ R	
	$\hat{C}_2 = x$ [\angle s opp. = sides / \angle e teenoor gelyke sye]	✓ S	✓ R	
	$\hat{B}_1 = x$ [tan chord theorem / raaklyn-koord-stelling]	✓ S	✓ R	
	$\hat{T} = x$ [corresp. \angle s, / ooreenk. \angle e : $TF \parallel BC$]	✓ S	✓ R	(8)
9.2	$\hat{T} = \hat{A} = x$	✓ S		
	\therefore ATBE is a cyclic quad [converse \angle s same segment] ATBE is 'n koordevierhoek [omgeeerde \angle e in dieselfde seg]	✓ R		(2)
				[10]

QUESTION/VRAAG 10

10.1



Construction: Join BN and height h from $N \perp AM$ and height k from $M \perp AN$

Konstruksie: Verbind BN en hoogte, h vanaf $N \perp AM$
 CM en hoogte, k vanaf $M \perp AN$

$$\frac{\text{Area } \triangle AMN}{\text{Area } \triangle BMN} = \frac{\frac{1}{2} \times AM \times h}{\frac{1}{2} \times BM \times h} \quad [\text{same height/dieselfde hoogte}]$$

$$= \frac{AM}{BM}$$

$$\frac{\text{Area } \triangle AMN}{\text{Area } \triangle CMN} = \frac{\frac{1}{2} \times AN \times k}{\frac{1}{2} \times NC \times k} \quad [\text{same height / dieselfde hoogte}]$$

$$= \frac{AN}{NC}$$

$$\text{Area } \triangle BMN = \text{Area } \triangle CMN \quad \left[\begin{array}{l} \text{same height, same} \\ \text{base } MN \parallel BC \end{array} \right] / \left[\begin{array}{l} \text{dieselfde hoogte, dieselfde} \\ \text{basis } MN \parallel BC \end{array} \right]$$

$$\therefore \frac{AM}{BM} = \frac{AN}{NC}$$

✓ constr /
konstr.

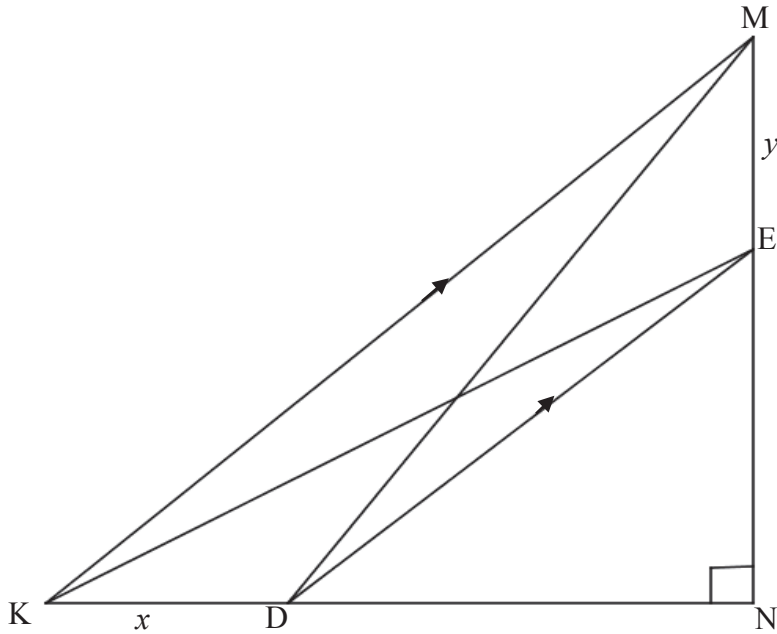
✓ S ✓ R

✓ S

✓ R

(5)

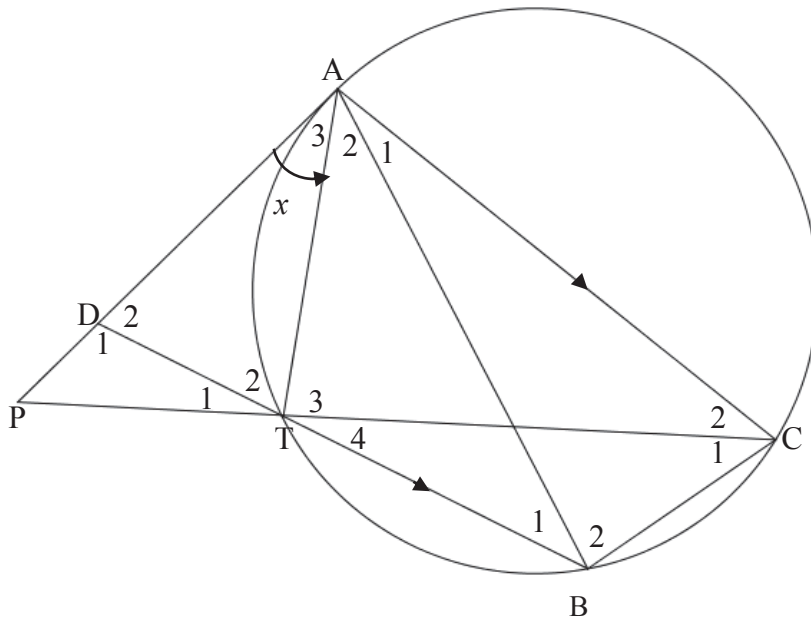
10.2



<p>10.2.1</p>	<p> $\frac{ND}{x} = \frac{2}{1}$ [given/gegee] $ND = 2x$ and/en $\frac{NE}{y} = \frac{2}{1}$ [prop theorem DE KM or line drawn to one side of a Δ] / [verhouding stelling DE KM of lyn getrek aan een sy van 'n Δ] $\therefore NE = 2y$ $KM^2 = KN^2 + MN^2$ [Pyth theorem/stelling] $= (3x)^2 + (3y)^2$ $= 9x^2 + 9y^2$ </p>	<p> \checkmarkS \checkmarkR \checkmarksubst in Pyth theo <i>verv. in Pyth stel</i> \checkmarksimplification/ <i>vereenvoudiging</i> (4) </p>
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10.2.2	$DM^2 = DN^2 + MN^2$ $= (2x)^2 + (3y)^2$ $KE^2 = KN^2 + NE^2$ $= (3x)^2 + (2y)^2$ $DM^2 + KE^2 = 4x^2 + 9y^2 + 9x^2 + 4y^2$ $= 13(x^2 + y^2)$ $\frac{DM^2 + KE^2}{KM^2} = \frac{13(x^2 + y^2)}{9(x^2 + y^2)}$ $= \frac{13}{9}$	<p>[Pyth]</p> <p>[Pyth]</p>	<p>✓ subst in Pyth / <i>verv. in Pyth</i></p> <p>✓ subst in Pyth / <i>verv. in Pyth</i></p> <p>✓ value of / <i>waarde van</i> $DM^2 + KE^2$</p> <p>✓ $\frac{13(x^2 + y^2)}{9(x^2 + y^2)}$</p> <p style="text-align: right;">(4)</p>
			[13]

QUESTION/VRAAG 11



11.1	$\hat{A}_1 = \hat{B}_1$ $\hat{A}_3 = \hat{B}_1$ $\therefore \hat{A}_1 = \hat{A}_3$ $\hat{T}_2 = \hat{A}\hat{C}\hat{B}$ $\hat{D}_2 = \hat{B}_2$	$[\text{alt } \angle\text{s, } AC \parallel DB] / [\text{verw. } \angle\text{e, } AC \parallel DB]$ $[\text{tan chord}] / [\text{Raaklyn} - \text{koord}]$ $[\text{ext } \angle \text{ of a cyclic quad}] / [\text{buite } \angle \text{ van koordev}]$ $[\text{3rd } \angle\text{s}] / [\text{3de } \angle\text{e}]$	\checkmark S/R \checkmark S \checkmark R \checkmark S \checkmark R \checkmark S
	OR/OF $\hat{A}_1 = \hat{B}_1$ $\hat{A}_3 = \hat{B}_1$ $\therefore \hat{A}_1 = \hat{A}_3$ $\hat{T}_2 = \hat{A}\hat{C}\hat{B}$ $\therefore \Delta ABC \parallel \Delta ADT$	$[\text{alt } \angle\text{s, } AC \parallel DB] / [\text{verw. } \angle\text{e, } AC \parallel DB]$ $[\text{tan chord}] / [\text{Raaklyn} - \text{koord}]$ $[\text{ext } \angle \text{ of a cyclic quad}] / [\text{buite } \angle \text{ van koordev}]$ $[\angle\angle\angle]$	OR/OF \checkmark S/R \checkmark S \checkmark R \checkmark S \checkmark R \checkmark R

11.2	$\hat{T}_4 = \hat{T}_1$ [vert opp $\angle s$] / [<i>regoorst. $\angle e$</i>] $\hat{A}_1 = \hat{T}_4$ [$\angle s$ in same seg] / [<i>$\angle e$ in dieselfde segment</i>] $A_1 = \hat{A}_3$ [proven] / [<i>Bewys</i>] $\therefore \hat{T}_1 = \hat{A}_3$ \therefore PT is a tangent to circle ADT [converse tan chord] <i>PT is 'n raaklyn aan sirkel ADT [omgekeerde raaklyn – koord]</i>	\checkmark S/R \checkmark S \checkmark R \checkmark R	(4)
11.3	$\hat{A}_3 = \hat{T}_1$ [proven] / [<i>bewys</i>] $\hat{P} = \hat{P}$ [common] / [<i>gemeen</i>] $P\hat{T}A = \hat{D}_1$ [3rd $\angle s$] / [<i>3de $\angle e$</i>] $\triangle APT \parallel \triangle TPD$ [$\angle \angle \angle$]	\checkmark S \checkmark S \checkmark R	
	OR/OF $\hat{A}_3 = \hat{T}_1$ [proven] / [<i>Bewys</i>] $\hat{P} = \hat{P}$ [common] / [<i>gemeen</i>] $P\hat{T}A = \hat{D}_1$ [3rd $\angle s$] / [<i>3de $\angle e$</i>]	\checkmark S \checkmark S \checkmark S	(3)
11.4	$\frac{AP}{TP} = \frac{PT}{PD} \quad [\parallel \Delta s]$ $AP \cdot PD = PT^2$ $AP(AP - AD) = PT^2$ $AP \left(AP - \frac{2}{3} AP \right) = PT^2$ $AP \cdot \frac{AP}{3} = PT^2$ $AP^2 = 3PT^2$	\checkmark S/R \checkmark simplification <i>vereenvoudiging</i> \checkmark PD i.t.o AP and AD <i>PD i.t.v AP en AD</i> \checkmark subst in AD <i>verv. in AD</i>	(4)

[17]

TOTAL/TOTAAL: 150