



eduresourceza.com



GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION *VOORBEREIDENDE EKSAMEN*

2017

MEMORANDUM /

NASIEN RIGLYNE

**MATHEMATICS (SECOND PAPER) (10612)
*WISKUNDE (TWEEDE VRAESTEL) (10612)***

19 pages / bladsye

GAUTENG DEPARTMENT OF EDUCATION /
GAUTENGSE DEPARTEMENT VAN ONDERWYS
PREPARATORY EXAMINATION /
VOORBEREIDENDE EKSAMEN

MATHEMATICS / WISKUNDE
(Second Paper / Tweede Vraestel)

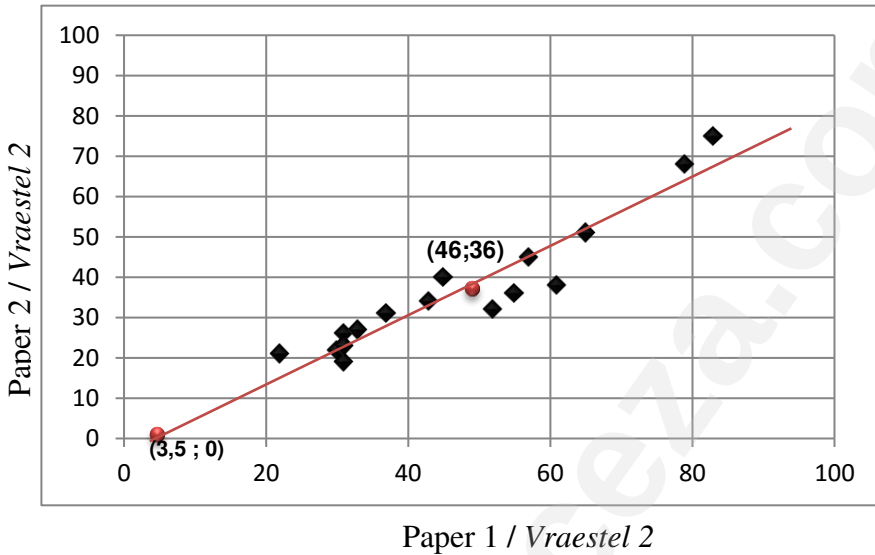
MEMORANDUM

QUESTION/VRAAG 1

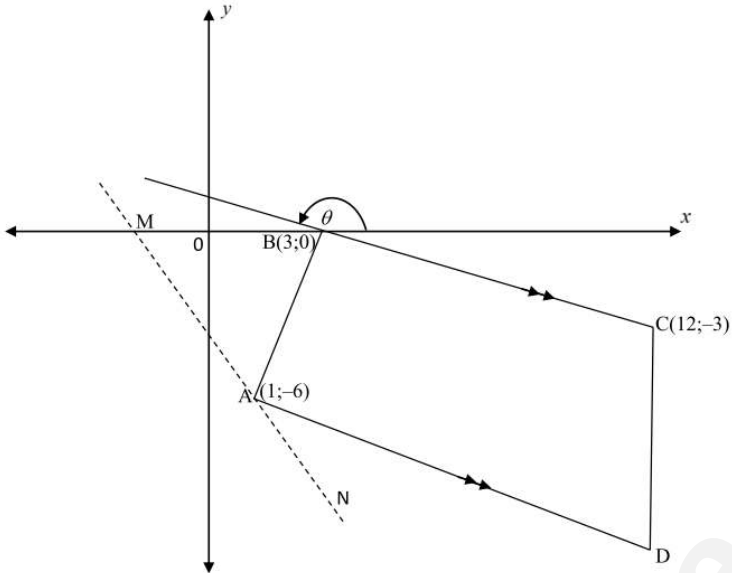
1.1		
1.1.1	median / <i>mediaan</i> = 55	✓ 55 (1)
1.1.2	IQR / <i>IKV</i> = 60 – 40 = 20	✓ 60 – 40 ✓ 20 (2)
1.1.3	15% – 65%	✓ 15% – 65% (1)
1.1.4	Skewed to the left / <i>Skeef na links</i> OR Negatively skewed / <i>Negatief skeef</i>	✓ answer/antwoord (1)

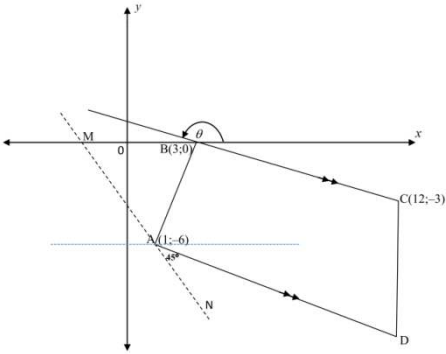
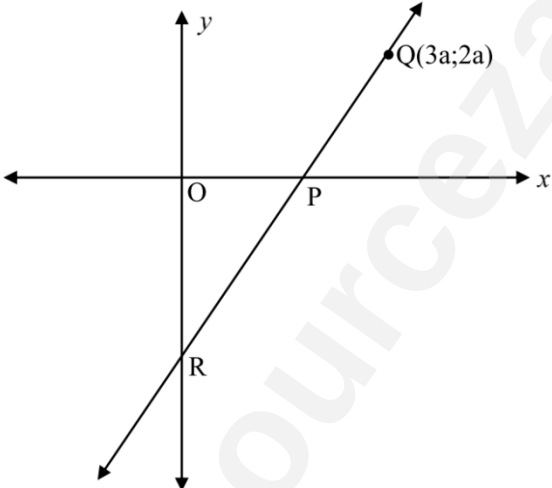
1.2	<table><tr><th>Class interval / <i>Klasinterval</i></th><th>Cumulative Frequency / <i>Kumulatiewe Frekwensie</i></th></tr><tr><td>$10 \leq x \leq 19$</td><td>1</td></tr><tr><td>$20 \leq x \leq 29$</td><td>2</td></tr><tr><td>$30 \leq x \leq 39$</td><td>4</td></tr><tr><td>$40 \leq x \leq 49$</td><td>6</td></tr><tr><td>$50 \leq x \leq 59$</td><td>14</td></tr><tr><td>$60 \leq x \leq 69$</td><td>19</td></tr><tr><td>$70 \leq x \leq 79$</td><td>23</td></tr><tr><td>$80 \leq x \leq 89$</td><td>26</td></tr><tr><td>$90 \leq x \leq 100$</td><td>30</td></tr></table>	Class interval / <i>Klasinterval</i>	Cumulative Frequency / <i>Kumulatiewe Frekwensie</i>	$10 \leq x \leq 19$	1	$20 \leq x \leq 29$	2	$30 \leq x \leq 39$	4	$40 \leq x \leq 49$	6	$50 \leq x \leq 59$	14	$60 \leq x \leq 69$	19	$70 \leq x \leq 79$	23	$80 \leq x \leq 89$	26	$90 \leq x \leq 100$	30	
Class interval / <i>Klasinterval</i>	Cumulative Frequency / <i>Kumulatiewe Frekwensie</i>																					
$10 \leq x \leq 19$	1																					
$20 \leq x \leq 29$	2																					
$30 \leq x \leq 39$	4																					
$40 \leq x \leq 49$	6																					
$50 \leq x \leq 59$	14																					
$60 \leq x \leq 69$	19																					
$70 \leq x \leq 79$	23																					
$80 \leq x \leq 89$	26																					
$90 \leq x \leq 100$	30																					
1.2.1	Ogive / Ogief	✓ top points of interval / <i>hoogte punt van interval</i> ✓ shape / <i>vorm</i> ✓ grounding point / <i>laagste punt</i> (3)																				
1.2.2	$\frac{19}{30} \times 100$ $= 63\%$	✓ 63% (accuracy / akkuraatheid) (1)																				
1.2.3	$26 - 23$ $= 3$ learners/ <i>leerders</i>	✓ 3 (1)																				
1.2.4	Mark between 30 – 39/ <i>Enige punt tussen 30 – 39</i>	✓ 30 – 39 (1)																				
1.2.5	$90 - 19$ $= 71$	✓ 71 (1)																				
		[12]																				

QUESTION/VRAAG 2

2.1	$\hat{y} = 0,84x - 2,92$	$\checkmark a = 0,84x$ $\checkmark b = -2,92$ $\checkmark$ equation / vergelyking (3)
2.2	$r = 0,95$	$\checkmark r = 0,95$ (1)
2.3	 Paper 2 / Vraestel 2 Paper 1 / Vraestel 2	line through the point: / lyn deur die punte: $\checkmark (46;36)$ average point / gemiddelde punt $\checkmark (3,5 ; 0)$ x -intercept / x -afsnit (2)
2.4	$y = 0,84(98) - 2,92$ $y = 79,4$ OR / OF calculator / optel masjien Yes / agree The correlation suggests a positive association between variables, therefore predictions using the least squares regression line is valid, reliable and usually accurate. Ja / stem saam Die korrelasie dui op 'n positiewe assosiasie tussen veranderlikes, daarom is voorspellings met behulp van die kleinste kwadrate regressielyn geldig, betroubaar en gewoonlik akkuraat.	$\checkmark$ yes / ja $\checkmark$ reason / rede (2)
		[8]

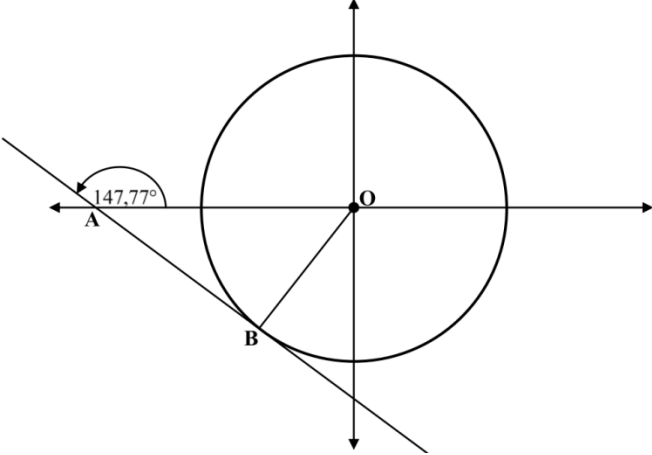
QUESTION/VRAAG 3

3.1		
3.1.1	$m_{BC} = \frac{-3-0}{12-3}$ $= -\frac{1}{3}$ $\tan \theta = m_{BC}$ $= -\frac{1}{3}$ $\theta = 180^\circ - 18,43^\circ$ $= 161,57^\circ$	$\checkmark m_{BC} = -\frac{1}{3}$ $\checkmark \tan \theta = -\frac{1}{3}$ $\checkmark 18,43^\circ$ $\checkmark \theta = 161,57^\circ$ (4)
3.1.2	$m_{AD} = m_{BC} \quad \text{AD parallel BC}$ $= -\frac{1}{3}$ $m_{AB} = \frac{-6-0}{1-3}$ $= 3$ $m_{AB} \cdot m_{AD} = 3 \cdot \left(-\frac{1}{3}\right)$ $= -1$ $\therefore AB \perp AD$	$\checkmark m_{AD} = -\frac{1}{3}$ $\checkmark m_{AB} = 3$ $\checkmark m_{AB} \cdot m_{AD} = 3 \cdot \left(-\frac{1}{3}\right)$ (3)

3.1.3	Inclination of the line / Inklinasie van die lyn $\alpha = 161,6^\circ - 45^\circ$ $= 116,6^\circ$ $\tan \alpha = m_{\text{line}}$ $\tan 116,6^\circ = -2$ $y - y_1 = m(x - x_1)$ OR/OF $y = mx + q$ $y + 6 = -2(x - 1)$ $-6 = -2(1) + q$ $y + 6 = -2x + 2$ $q = -4$ $y = -2x - 4$ 	✓ $\alpha = 116,6^\circ$ ✓ $m = -2$ ✓ substitute / vervang A(1; -6) ✓ $y = -2x - 4$ (4)
3.2		
3.2.1	$y - y_1 = m(x - x_1)$ $y - 2a = 2(x - 3a)$ $y = 2x - 6a + 2a$ $y = 2x - 4a$	✓ substitute / vervang (3a; 2a) and / en $m = 2$ ✓ $y = 2x - 4a$ (2)
3.2.2	P(2a; 0) Q(0; -4a) Area / Oppervlakte $\Delta POQ = \frac{1}{2} b \cdot h$ $= \frac{1}{2} (2a)(4a)$ $= 4a^2$	✓ P(2a; 0) ✓ Q(0; -4a) ✓ correct substitution / korrekte vervanging ✓ $4a^2$ (4)

3.2.3	$m_{DE} = m_{EQ}$ $\frac{-2+14}{3+3} = \frac{2a+2}{3a-3}$ $2(3a-3) = 2a+2$ $6a-6 = 2a+2$ $4a = 8$ $a = 2$ OR / OF $m_{DQ} = m_{DE}$ $\frac{2a+14}{3a+3} = \frac{-2+14}{3+3}$ $2(3a+3) = 2a+14$ $6a+6 = 2a+14$ $4a = 8$ $a = 2$ $m_{DQ} = m_{EQ}$ $\frac{2a+14}{3a+3} = \frac{2a+2}{3a-3}$ $(2a+14)(3a-3) = (2a+2)(3a+3)$ $6a^2 + 36a - 42 = 4a^2 + 12a + 6$ $2a^2 + 24a - 48 = 0$ $a^2 + 12a - 24 = 0$ $(a+12)(a-2) = 0$ $a = -12 \text{ or / of } a = 2$ invalid / ongeldig	$\checkmark \frac{-2+14}{3+3} = \frac{2a+2}{3a-3}$ $\checkmark$ simplification / vereenvoudiging $\checkmark a = 2$ (3) $\checkmark \frac{2a+14}{3a+3} = \frac{-2+14}{3+3}$ $\checkmark$ simplification / vereenvoudiging $\checkmark a = 2$ (3) $\checkmark \frac{2a+14}{3a+3} = \frac{2a+2}{3a-3}$ $\checkmark$ simplification / vereenvoudiging $\checkmark a = 2 \text{ chosen / gekies}$ (3) [20]
-------	---	---

QUESTION/VRAAG 4

4.1		
4.1.1	$x^2 + y^2 = 64$ OR / OF $x^2 + y^2 = 8^2$	$\checkmark x^2 + y^2 = 64$ OR / OF $x^2 + y^2 = 8^2$ (1)
4.1.2	$\hat{OAB} = 32,23^\circ$ ($\angle$ s on a str line / $\angle^e$ op reguit lyn) $\hat{OBA} = 90^\circ$ (tan $\perp$ radius OR tan $\perp$ diameter / raaklyn $\perp$ radius) $\sin 32,23^\circ = \frac{OB}{OA}$ $\sin 32,23^\circ = \frac{8}{OA}$ $OA = \frac{8}{\sin 32,23^\circ}$ $= 15$ $\therefore A(-15;0)$	$\checkmark \hat{OAB} = 32,23^\circ$ $\checkmark \sin 32,23^\circ = \frac{8}{OA}$ $\checkmark OA = 15$ $\checkmark A(-15;0)$ (4)

4.2		
4.2.1	$x^2 - 10x + y^2 + 8y + 31 = 0$ $(x - 5)^2 + (y + 4)^2 = -31 + 25 + 16$ $(x - 5)^2 + (y + 4)^2 = -31 + 25 + 16$ $(x - 5)^2 + (y + 4)^2 = 10$	$\checkmark (x - 5)^2 + (y + 4)^2$ $\checkmark -31 + 25 + 16$ $\checkmark (x - 5)^2 + (y + 4)^2 = 10$ (3)
4.2.2	A(5; -4)	$\checkmark A(5; -4)$ (1)
4.2.3	$r^2 = 10$ $r = \sqrt{10}$	$\checkmark r = \sqrt{10}$ (1)
4.2.4	$\frac{x_B + 5}{2} = 2$ and/en $\frac{y_B - 4}{2} = -3$ $x_B = -1$ $y_B = -2$ $\therefore B(-1; -2)$	$\checkmark \frac{x_B + 5}{2} = 2$ $\checkmark \frac{y_B - 4}{2} = -3$ $\checkmark B(-1; -2)$ (3)
4.2.5	$k = 5 - \sqrt{10}$ or / of $k = 5 + \sqrt{10}$ Any one of the two can be written first and then be allocated the two marks. / Enigeen van die twee kan eerste geskryf word en dan die twee punte toegeken word.	$\checkmark \checkmark k = 5 + \sqrt{10}$ $\checkmark k = 5 - \sqrt{10}$ (3)
4.2.6	$r^2 = AF^2 = 10$ $AD = \sqrt{(11 - 5)^2 + (-6 + 4)^2}$ $= \sqrt{36 + 4}$ $= \sqrt{40}$ $= 2\sqrt{10}$ $\hat{A}FD = 90^\circ$ (radius $\perp$ tangent / raaklyn $\perp$ radius) $FD^2 = AD^2 - AF^2$ Pythagoras $= (\sqrt{40})^2 - (\sqrt{10})^2$ $= 30$ $FD = \sqrt{30}$	$\checkmark AF^2 = 10$ $\checkmark$ substitute in distance formula / vervanging in afstandsformule $\checkmark AD = \sqrt{40}$ or $2\sqrt{10}$ $\checkmark FD = \sqrt{30}$ (4)
		[20]

QUESTION/VRAAG 5

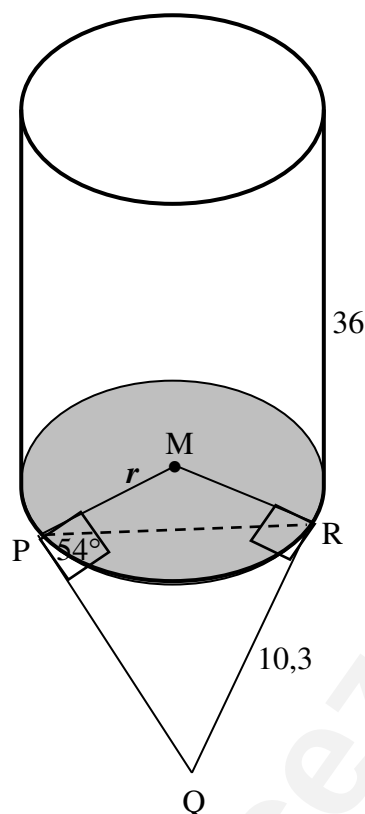
5.1	$\tan \theta = -\frac{1}{4}$ $\hat{O}_1 = 14,04^\circ$ $\theta = 360^\circ - 14,04^\circ$ $= 345,96^\circ$	$\checkmark \tan \theta = -\frac{1}{4}$ $\checkmark \hat{O}_1 = 14,04^\circ$ $\checkmark 345,96^\circ$ (3)
5.2	$\frac{2 \cos(90^\circ - x)}{\sin(180^\circ - 2x)} \times \frac{\cos(60^\circ - x) \cos x - \sin(60^\circ - x) \sin x}{\tan(-x)}$ $= \frac{2 \sin x}{\sin 2x} \times \frac{\cos(60^\circ - x + x)}{-\tan x}$ $= \frac{2 \sin x}{2 \sin x \cos x} \times \frac{\cos 60^\circ}{-\frac{\sin x}{\cos x}}$ $= \frac{1}{\cos x} \times \frac{1}{2} \times -\frac{\cos x}{\sin x}$ $= -\frac{1}{2 \sin x}$	$\checkmark 2 \sin x$ $\checkmark \cos(60^\circ - x + x)$ $\checkmark \sin 2x$ $\checkmark -\tan x$ $\checkmark 2 \sin x \cos x$ $\checkmark \frac{\sin x}{\cos x}$ $\checkmark -\frac{1}{2 \sin x}$ (7)
5.3.1	$\sin 108^\circ = \sin(90^\circ + 18^\circ)$ $= \cos 18^\circ$ $= k$	$\checkmark$ reduction/ <i>herleiding</i> $\checkmark k$ (2)
5.3.2	$\cos(-36^\circ) = \cos 36^\circ$ $= \cos 2(18^\circ)$ $= 2 \cos^2 18^\circ - 1$ $= 2k^2 - 1$	$\checkmark \cos 36^\circ$ $\checkmark 2 \cos^2 18^\circ - 1$ $\checkmark 2k^2 - 1$ (3)
5.4	$2 \sin x \cos x + 2 \sin x + \cos^2 x + \cos x = 0$ $2 \sin x(\cos x + 1) + \cos x(\cos x + 1) = 0$ $(\cos x + 1)(2 \sin x + \cos x) = 0$ $\cos x = -1$ or / of $2 \sin x = -\cos x$ $x = 180^\circ + k \cdot 360^\circ$ or / of $2 \tan x = -1$ $\tan x = -\frac{1}{2}$ $x = -26,57^\circ + k \cdot 180^\circ \quad k \in \mathbb{Z}$ OR / OF $\text{ref} \angle = 26,57^\circ$ $x = 153,43^\circ + k \cdot 180^\circ \quad k \in \mathbb{Z}$ $x = \{-26,57^\circ ; 153,43^\circ ; 180^\circ\}$	$\checkmark$ common factor/ <i>gemeenskaplike faktor</i> $\checkmark \cos x = -1$ $\checkmark \tan x = -\frac{1}{2}$ $\checkmark 153,4^\circ$ $\checkmark -26,57^\circ$ $\checkmark 180^\circ$ (6)

5.5.1	$\tan \theta = \frac{p}{1}$ $p^2 + y^2 = r^2$ $p^2 + 1 = r^2$ $r = \sqrt{p^2 + 1}$ $\sin 2\theta = 2 \sin \theta \cos \theta$ $= 2 \left(\frac{p}{\sqrt{p^2 + 1}} \right) \left(\frac{1}{\sqrt{p^2 + 1}} \right)$ $= \frac{2p}{p^2 + 1}$	$\checkmark r = \sqrt{p^2 + 1}$ $\checkmark 2 \left(\frac{p}{\sqrt{p^2 + 1}} \right) \left(\frac{1}{\sqrt{p^2 + 1}} \right)$ (2)
5.5.2	$\frac{(p+1)^2}{p^2 + 1}$ $= \frac{p^2 + 2p + 1}{p^2 + 1}$ $= \frac{2p}{p^2 + 1} + \frac{p^2 + 1}{p^2 + 1}$ $= \sin 2\theta + 1$ Maximum of / <i>Maksimum van</i> $\sin 2\theta$ is 1 Maximum of / <i>Maksimum van</i> $\frac{(p+1)^2}{p^2 + 1}$ will be 2	$\checkmark \frac{p^2 + 2p + 1}{p^2 + 1}$ $\checkmark \frac{2p}{p^2 + 1} + \frac{p^2 + 1}{p^2 + 1}$ OR/OF $\sin 2\theta + 1$ $\checkmark 2$ (3) [26]

QUESTION/VRAAG 6

6.1	$a = 1$ $b = 2$	$\checkmark a = 1$ $\checkmark\checkmark b = 2$ (3)
6.2		$\checkmark x$ -intercepts/ -afsnit $\checkmark$ T/P $\checkmark$ shape/vorm (3)
6.3	$x \in (45^\circ ; 135^\circ)$ OR/OF $45^\circ < x < 135^\circ$	$\checkmark$ critical values / kritiese waardes $\checkmark$ correct interval / korrekte interval (2) [8]

QUESTION/VRAAG 7



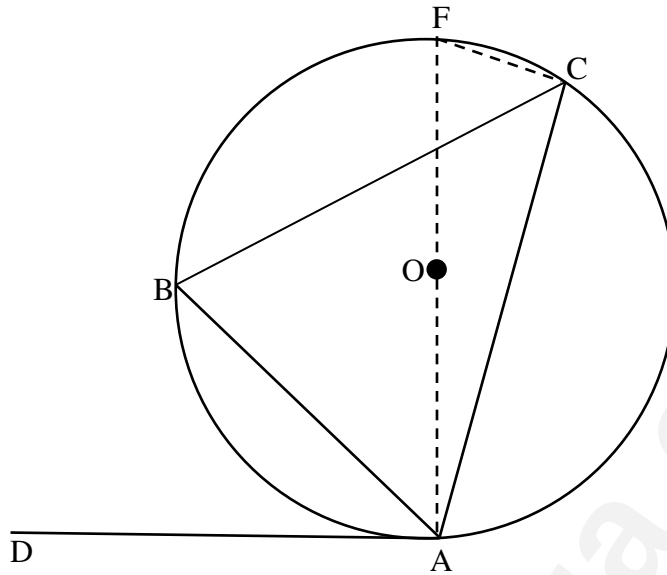
7.1	PQ = PR (tangents from the same point / raaklyne vanuit dies. punt) $\hat{P}RQ = 54^\circ$ ($\angle$'s opp. equal sides / $\angle^e$ teenoorgelykesye) $\hat{Q} = 180^\circ - (54^\circ + 54^\circ)$ ($\angle$'s of a Δ / $\angle^e$ van Δ) $= 72^\circ$	✓ $\hat{P}RQ = 54^\circ$ ✓ answer / antwoord (2)
7.2	$PR^2 = (10,3)^2 + (10,3)^2 - 2(10,3)(10,3)\cos 72^\circ$ $= 12,11$	✓ substitution into correct cos rule / vervanging na korrekte cos reël ✓ answer / antwoord (2)
7.3	MPQR is a cyclic quad. / MPQR is 'n koordevierhoek (opp. $\angle$'s sup) $\therefore \hat{M} = 108^\circ$ $(12,11)^2 = r^2 + r^2 - 2(r)(r)\cos 108^\circ$ $146,6521 = 2r^2 - 2r^2 \cos 108^\circ$ $= 2r^2(1 - \cos 108^\circ)$ $r^2 = \frac{146,6521}{2(1 - \cos 108^\circ)}$ $= 56,02$ Volume of/van silo = $\pi r^2 h$ $= \pi(56,02)(36)$ $= 6335,71\text{m}^3$	✓ $\hat{M} = 108^\circ$ ✓ substitution into correct cos rule / vervanging na korrekte cos reël ✓ answer / antwoord ✓ substitution into correct volume formula/vervanging na korrekte volume formule ✓ answer / antwoord (5)

[9]

Downloaded from eduresourceza.com

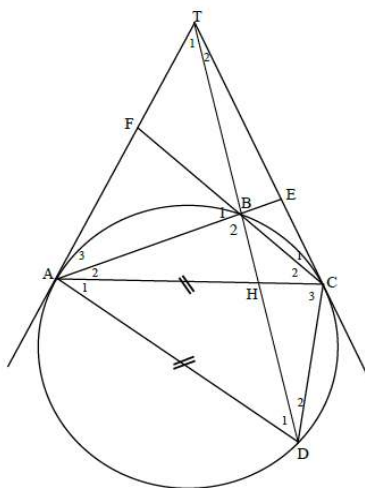
Downloaded from eduresourceza.com

QUESTION/VRAAG 10



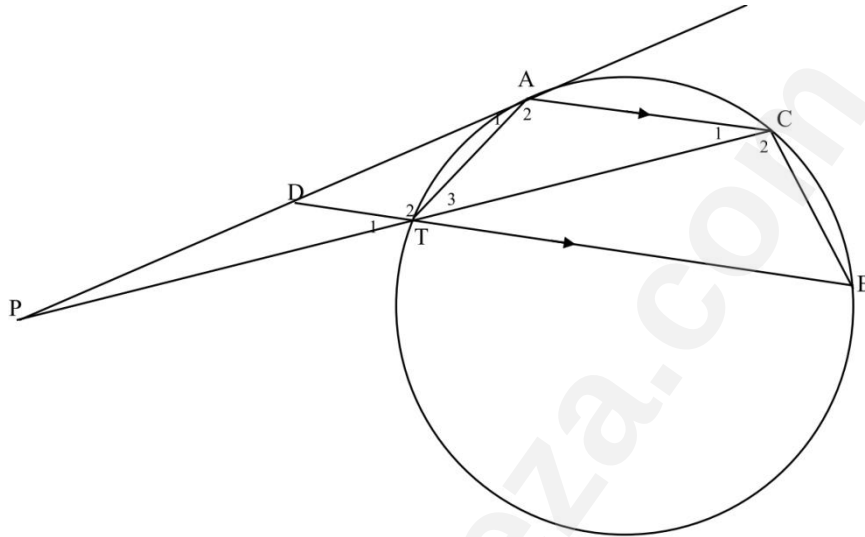
NB No construction: Breakdown 0/5

10. 1	Construction: Draw diameter AOF and join FC Konstruksie: Teken middellyn AOF en verbind FC $\hat{D}AF = 90^\circ$ $\hat{F}CA = 90^\circ$ $\hat{F}AB = \hat{F}CB$ $\hat{D}AB = \hat{B}CA$	✓ Construction on sketch/ Konstruksie op skets ✓ S ✓ R ✓ R ✓ R (5)
-------	--	---



10.2.1	$\hat{D} = \hat{C}_3$ $\hat{D} = \hat{B}_1$ $\hat{C}_3 = \hat{B}_2$ $\hat{B}_1 = \hat{B}_2$	[$\angle$s opp equal sides $\angle^e$ teenoor gelyke sye] [exterior angle of a cyclic quad/ buite $\angle$ van kvh] [$\angle$s in the same segment $\angle^e$ in dies. $\odot$ segm.]	✓ S/R ✓ S ✓ R ✓ S R (5)
10.2.2	$\hat{C}_1 + \hat{C}_2 = \hat{D}$ but $\hat{D} = \hat{B}_2$ $\therefore \hat{B}_2 = \hat{C}_1 + \hat{C}_2$ $\therefore$ BECH is a cyclic quad is 'n koordevierh	[tan chord theorem / $\angle$tussen raaklyn en koord] [proved] [exterior $\angle$ = int opp $\angle$ OR converse of ext $\angle$ of cyclic quad / buite $\angle$ van vierhoek = teenoorst. binne $\angle$]	✓ S/R ✓ S ✓ S ✓ R (4)
10.2.3	$\hat{B}_2 = \hat{A}_3 + \hat{T}_1$ but $\hat{B}_2 = \hat{C}_1 + \hat{C}_2$ and $AT = CT$ $\therefore \hat{C}_1 + \hat{C}_2 = \hat{A}_2 + \hat{A}_3$ $\hat{A}_2 + \hat{A}_3 = \hat{A}_3 + \hat{T}_1$ $\therefore \hat{A}_2 = \hat{T}_1$ $\therefore$ CA is a tangent to circle ABT	[exterior $\angle$ of a triangle/ buite $\angle$ van Δ] [proved/ bewys] [tangents from the same point / raaklyne vanuit dies. punt] [$\angle$s opp equal sides / $\angle^e$ teenoor gelyke sye] [$\angle$ between line & chord OR converse of tan chord theorem / $\angle$ tussen lyn en koord = $\angle$ in teenoorst. $\odot$ segm.]	✓ S/R ✓ S/R ✓ S ✓ S ✓ R (5) [19]

QUESTION/VRAAG 11



11.1	In $\triangle PAT$ and $\triangle PCA$ $\hat{P} = \hat{P}$ $\hat{A}_1 = \hat{C}_1$ $\hat{T}_1 + \hat{T}_2 = \hat{A}_1 + \hat{A}_2$ $\therefore \triangle PAT \parallel \triangle PCA$	[common / <i>gemeenskaplik</i>] [tan chord theorem / <i>∠ tussen raaklyn en koord</i>] [$\angle$ sum in $\triangle$ OR sum of $\angle$s in $\triangle$ OR Int $\angle$s $\triangle$ / <i>∠^e van $\triangle$</i>] [$\angle\angle\angle$ OR/ OF equiangular / <i>gelykhoekig</i> / $\angle\angle\angle$]	✓ S/R ✓ S/R ✓ R
------	--	---	--------------------------------------

(3)

11.2.1	$\frac{PA}{PC} = \frac{AT}{CA} = \frac{PT}{PA}$ $PA^2 = PT \cdot PC$ $6^2 = x(x+5)$ $36 = x^2 + 5x$ $x^2 + 5x - 36 = 0$ $(x+9)(x-4) = 0$ $\therefore x = -9 \text{ or / of } x = 4$ $\therefore PT = 4$	$\Delta PAT \parallel \Delta PCA$	✓ S/R ✓ S ✓ substitution / vervanging ✓ factors / faktore (4)
11.2.2	In ΔAPC $\frac{PD}{PA} = \frac{PT}{PC}$ $\frac{PD}{6} = \frac{4}{9}$ $PD = \frac{(6)(4)}{9}$ $= \frac{8}{3} / 2,67$	[line $\parallel$ one side of Δ OR/OF prop theorem; $DT \parallel AC$ / lyn $\parallel$ een sy van Δ]	✓ S ✓ R ✓ $\frac{PD}{6} = \frac{4}{9}$ ✓ answer /antwoord (4) [11]

TOTAL/TOTAAL [150]