

**METRO EAST  
EDUCATION DISTRICT/  
METRO OOS  
ONDERWYSDISTRIK**

**GEMEENSKAPLIKE VRAESTEL/  
COMMON PAPER**

**GRAAD/GRADE 12**

**WISKUNDE V2 / MATHEMATICS P2  
MEMORANDUM**

**SEPTEMBER 2018**

**PUNTE/MARKS: 150**

**NOTE:**

- If a candidate answers a question TWICE, mark only the first one.
- Consistent accuracy applies in ALL aspects of the marking memorandum.

**LET WEL:**

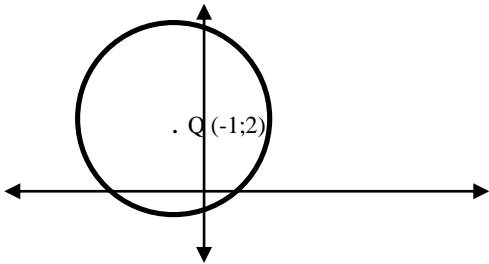
- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die eerste poging.
- Volgehoue akkuraatheid is deurgaans op ALLE aspekte van die memorandum van toepassing.

QUESTION/ VRAAG 1					
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD			DESCRIPTORS/ BESKRYWERS	Marks
1.1	Punte / Marks	Frekwensie / Frequency	Kumulatiewe Frekwensie/ Cumulative Frequency	✓ first 3 values / eerste 3 waardes  ✓ second 3 values / tweede 3 waardes	(2)
	$0 < x \leq 10$	2	2		
	$10 < x \leq 20$	9	11		
	$20 < x \leq 30$	21	32		
	$30 < x \leq 40$	32	64		
	$40 < x \leq 50$	19	83		
	$50 < x \leq 60$	7	90		
1.2				✓ upper boundaries / boonste grense  ✓ cumulative frequency / kumulaiewe frekwensie  ✓ anchor / anker	(3)
1.3	$90 - 74 = 16$			✓ $90 - 74$ ✓ 16 <b>Answer only: full marks</b> <b>Accept from 14 to 18</b> / Aanvaar: vanaf 14 tot 18	(2)
					[7]

QUESTION/VRAAG 2			
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
2.1.1	$a = 122,67$ $b = -10,74$ $y = 122,67 - 10,74x$	✓ $a = 122,67$ ✓ $b = -10,74$  ✓ $y = 122,67 - 0,74x$	(3)
2.1.2	$y = 122,67 - 10,74(2,5)$ $= 95,82$ $= 96$	✓ substitution / substitusie ✓ answer / <i>antwoord</i>	(2)
2.1.3	Dalvon. The gradient is steeper. <i>Dalvon. Die gradient is steiler.</i>	✓ Dalvon ✓ reason / <i>rede</i>	(2)
2.2.1	1,50 kg since the standard deviation is 0	✓ 1,50 kg ✓ reason / <i>rede</i>	(2)
2.2.2	Andrew: $1,06 \times 11 = 11,66$ kg Bongi: $0,77 \times 16 = 12,32$ kg ∴ Bongi won the award	✓ 11,66 kg ✓ 12,32 kg ✓ Bongi	(3)
			<b>[12]</b>

QUESTION/ VRAAG 3			
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
3.1.1	$K\left(\frac{-1+5}{2}; \frac{-3-5}{2}\right)$ $\therefore K(2; -4)$	✓ substitution / <i>substitusie</i> ✓ answer / <i>antwoord</i>	(2)
3.1.2	$\frac{-1+p}{2} = 1 \quad \text{and} \quad \frac{-3+q}{2} = 3$ $\therefore p = 3 \quad \text{and} \quad q = 9$	✓ $\frac{-1+p}{2} = 1$ ✓ $\frac{-3+q}{2} = 3$	(2)
3.1.3	$m_{AB} = \frac{9+5}{3-5} = -7$ $\tan\alpha = -7$ $\therefore \alpha = 98,13^\circ$	✓ $\tan\beta = -7$ ✓ $\beta = 98,13^\circ$ <b>CA 3.1.2</b>	(2)
3.1.4			
	$m_{BC} = \frac{-3+5}{-1-5}$ $= \frac{-1}{-6}$ $= \frac{1}{6}$ $\tan\beta = -\frac{1}{3}$ $\therefore \beta = 180^\circ - 18,43^\circ$ $= 161,57^\circ$ $\therefore \widehat{ABC} = 63,44^\circ$	✓ substitution / <i>substitusie</i>  ✓ $\tan\beta = -\frac{1}{3}$ ✓ $\beta = 161,57^\circ$ ✓ $\widehat{ABC} = 63,44^\circ$ <b>CA 3.1.3</b>	(4)

	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/BESKRYWERS	Marks
3.1.5	$KL = \sqrt{(1-2)^2 + (3+4)^2}$ $KL = \sqrt{50} \text{ or } 5\sqrt{2}$	<ul style="list-style-type: none"> <li>✓ correct substitution / <i>korrekte substitusie</i></li> <li>✓ answer</li> </ul> <p><b>CA 3.1.1</b></p>	(2)
3.1.6	$AB = 2\sqrt{50} \text{ or } 10\sqrt{2}$ <p>midpoint theorem / <i>middelpuntstelling</i></p>	<ul style="list-style-type: none"> <li>✓ <math>AB = 2\sqrt{50} \text{ or } 10\sqrt{2}</math></li> <li>✓ midpoint theorem / <i>Middelpuntstelling</i></li> </ul> <p><b>CA 3.1.5</b></p>	(2)
3.2	$\text{Area} = \frac{1}{2} \times 5 \times h = 10$ $\therefore h = 4$ $\therefore y_P = -4$ $\sqrt{(x-5)^2 + (y-0)^2} = \sqrt{(x-7)^2 + (y-6)^2}$ $x^2 - 10x + 25 + y^2 = x^2 - 14x + 49 + y^2 - 12y + 36$ $4x + 12y = 60$ $x + 3y = 15$ $x + 3(-4) = 15$ $x = 27$ $P(27; -4)$	<ul style="list-style-type: none"> <li>✓ <math>\frac{1}{2} \times 5 \times h = 10</math></li> <li>✓ <math>h = 4</math></li> <li>✓ <math>y_P = -4</math></li> <li>✓ PA = PB; equating distance formulae/ <i>gelyk stel van afstand formules</i></li> <li>✓ expansion / <i>uitbreiding</i></li> <li>✓ simplify / <i>vereenvoudig</i></li> <li>✓ <math>x = 27</math></li> </ul>	(7)
			<b>[21]</b>

QUESTION /VRAAG 4			Marks
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	
4.1.1	$C(0; -4)$ $m_{AC} = \frac{-4-0}{0+2} = -2$  $m_{AC} \times m_{BC} = -2 \times \frac{1}{2} = -1$ $\therefore BC \perp AC$	$\checkmark m_{AC} = \frac{-4-0}{0+2} = -2$  $\checkmark m_{AC} \times m_{BC} = -1$	(2)
4.1.2	AB is a diameter / (converse of angle in semi-circle) <i>AB is 'n middellyn (omgekeerde van hoek in halfsirkel)</i>  $0 = \frac{1}{2}x - 4$ $x = 8$ $B(8; 0)$  $\therefore$ center of circle $(3; 0)$ ; $r = 5$ $\therefore (x - 3)^2 + y^2 = 25$	$\checkmark$ AB is a diameter / <i>AB is 'n middellyn</i>  $\checkmark x = 8$  $\checkmark (x - 3)^2 + y^2$ $\checkmark 25$	(4)
4.1.3	$m_{radius} = \frac{0+4}{3-0} = \frac{4}{3}$ $\therefore m_{tangent} = -\frac{3}{4}$ Equation of tangent: $y = -\frac{3}{4}x - 4$	$\checkmark m_{radius} = \frac{4}{3}$  $\checkmark m_{tangent} = -\frac{3}{4}$  $\checkmark y = -\frac{3}{4}x - 4$	(3)
4.2	$x^2 + 8x + (4)^2 + y^2 + 10y + (5)^2 = -k + (4)^2 + (5)^2$ $\therefore (x + 4)^2 + (y + 5)^2 = -k + 41$ $-k + 41 = 49$ $k = -8$	$\checkmark$ completing square / <i>vierkantsvoltooiing</i> $\checkmark$ equation into k / <i>vergelyking</i> <i>i.t.v k</i> $\checkmark\checkmark -k + 41 = 49$ $\checkmark k = -8$	(5)
4.3.1		$\checkmark$ circle / <i>sirkel</i> $\checkmark$ intersecting all 4 quadrants / <i>sny al 4 kwadrante</i>	(2)
4.3.2	$(x + 1)^2 + (y - 2)^2 = 9$	$\checkmark (x + 1)^2 + (y - 2)^2$ $\checkmark 9$	(2)
			[18]

QUESTION /VRAAG 5			
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
5.1.1	$\sin(90^\circ - \theta)$ $= \cos \theta$ $= \frac{5}{\sqrt{41}}$	✓ length of OP = $\sqrt{41}$ ✓ $\cos \theta$ ✓ $\frac{5}{\sqrt{41}}$	(3)
5.1.2	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>In <math>\Delta OPR</math>; <math>\tan \theta = \frac{4}{5}</math></p> <p>In <math>\Delta OQT</math>; <math>\tan \theta = \frac{5}{a}</math></p> <p><math>\therefore \frac{4}{5} = \frac{5}{a}</math></p> <p><math>4a = 25</math></p> <p><math>a = -\frac{25}{4} = -6\frac{1}{4}</math></p> </div> <div style="width: 45%; border: 1px solid black; padding: 5px;"> <p><b>OR</b></p> <p><math>\tan(180^\circ - \theta) = \frac{5}{a}</math></p> <p><math>-\tan \theta = \frac{5}{a}</math></p> <p><math>-\frac{4}{5} = \frac{5}{a}</math></p> <p><math>\therefore 4a = -25</math></p> <p><math>a = -\frac{25}{4} = -6\frac{1}{4}</math></p> </div> </div>	✓ equate $\frac{4}{5} = \frac{5}{a}$  ✓ answer / <i>antwoord</i>	(2)
5.2.1	$\frac{\cos(\theta - 180^\circ) \cdot \cos(90^\circ + \theta)}{2 \tan(180 - \theta)}$ $= \frac{-\cos \theta \cdot -\sin \theta}{-2 \tan \theta}$ $= \frac{\sin \theta \cos \theta}{-2 \tan \theta}$ $= \frac{\sin \theta \cos \theta}{-2} \times \frac{\cos \theta}{\sin \theta}$ $= \frac{\cos^2 \theta}{-2}$	✓ $-\cos \theta$ ✓ $-\sin \theta$ ✓ $-2 \tan \theta$  ✓ $\times \frac{\sin \theta}{\cos \theta}$ <b>or</b> $\div \frac{\cos \theta}{\sin \theta}$ ✓ answer / <i>antwoord</i>	(5)
5.2.2	$\tan \theta = 0$ or / of $\tan \theta$ undefined $\therefore \theta = 0^\circ$ or / of $\theta = 180^\circ$ or / of $\theta = 90^\circ$	✓ $\theta = 0^\circ$ ✓ $\theta = 180^\circ$ ✓ $\theta = 90^\circ$	(3)

	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks	
5.3	$\text{LHS} = \frac{\sin 2\theta}{\sin \theta}$ $= \frac{2\sin \theta \cdot \cos \theta}{\sin \theta}$ $= 2\cos \theta$ $\text{RHS} = 4\cos \theta - \frac{\cos 2\theta + 1}{\cos \theta}$ $= 4\cos \theta - \frac{2\cos^2 \theta - 1 + 1}{\cos \theta}$ $= 4\cos \theta - 2\cos \theta = 2\cos \theta$ $\therefore \text{LHS} = \text{RHS}$	<p style="text-align: center;"><b>OR</b></p> $\text{RHS} = \frac{4\cos^2 \theta - [(2\cos^2 \theta - 1) + 1]}{\cos \theta}$ $= \frac{4\cos^2 \theta - 2\cos^2 \theta + 1 - 1}{\cos \theta}$ $= \frac{4\cos^2 \theta - 2\cos^2 \theta}{\cos \theta}$ $= \frac{2\cos^2 \theta}{\cos \theta} = 2\cos \theta$	<p>✓ <math>2\cos \theta \sin \theta</math></p> <p>✓ <math>2\cos \theta</math></p> <p>✓ <math>2\cos^2 \theta - 1</math></p> <p>✓ <math>2\cos \theta</math></p>	(4)
5.4.1	$5 \sin(A - B) = 3 \sin(A + B)$ $5 (\sin A \cos B - \cos A \sin B) = 3(\sin A \cos B + \cos A \sin B)$ $5 \sin A \cos B - 5 \cos A \sin B = 3 \sin A \cos B + 3 \cos A \sin B$ $2 \sin A \cos B = 8 \cos A \sin B$ $\therefore \sin A \cos B = 4 \cos A \sin B$	<p>✓ expand <math>\sin(A - B)</math></p> <p>✓ expand <math>\sin(A + B)</math></p> <p>✓ simplify / vereenvoudig</p>	(3)	
5.4.2	$\sin A \cos B = 4 \cos A \sin B$ $\sin A = 4 \cos A \tan B$ $\tan A = 4 \tan B$ <p><b>but</b> <math>\tan B = \frac{1}{2} \quad \therefore \tan A = 4 \left(\frac{1}{2}\right) = 2</math></p>	<p>✓ <math>\sin A = 4 \cos A \tan B</math></p> <p>✓ <math>\tan A = 4 \tan B</math></p> <p>✓ 2</p>	(3)	
			<b>[23]</b>	



QUESTION /VRAAG 6			
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
6.1	$a = 2$	✓ 2	(1)
6.2	<p><b>Mark <math>f</math> only / Merk slegs vir <math>f</math></b></p>	<ul style="list-style-type: none"> <li>✓ shape / vorm</li> <li>✓ turning points / draaipunte</li> <li>✓ <math>x</math> &amp; <math>y</math> intercepts / <math>x</math> &amp; <math>y</math> afsnitte</li> </ul>	(3)
6.3	$2 \cos(x - 30^\circ) = 2 \sin x$ $\cos(x - 30^\circ) = \sin x$ $\sin [90 - (x - 30^\circ)] = \sin x$ $(-x + 120^\circ) = x$ $120^\circ - x = x \quad \text{of/or} \quad 120^\circ - x = 180^\circ - x$ $2x = 120^\circ + k360^\circ$ $x = 60^\circ + k180^\circ$ $\therefore x = -120^\circ; 60^\circ$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>OR</b></p> <math display="block">\cos(x - 30^\circ) = \sin x</math> <math display="block">\cos(x - 30^\circ) = \cos(90^\circ - x)</math> <math display="block">x - 30^\circ = 90^\circ - x</math> <math display="block">2x = 120^\circ + k360^\circ</math> <math display="block">x = 60^\circ + k180^\circ</math> <math display="block">\therefore x = -120^\circ, 60^\circ</math> </div>	<ul style="list-style-type: none"> <li>✓ co-function</li> <li>✓ <math>x = (-x + 120^\circ)</math></li> <li>✓ <math>2x = 120^\circ + k360^\circ</math> or/of <math>x = 60^\circ + k180^\circ</math></li> <li>✓✓ <math>x = -120^\circ, 60^\circ</math></li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>✓ co-function</li> <li>✓ <math>x - 30^\circ = 90^\circ - x</math></li> <li>✓ <math>2x = 120^\circ + k360^\circ</math> or/of <math>x = 60^\circ + k180^\circ</math></li> <li>✓✓ <math>x = -120^\circ, 60^\circ</math></li> </ul>	(5)
6.4	$k = 3$	✓ 3	(1)
6.5	$f$ shifted $60^\circ$ to the right	<ul style="list-style-type: none"> <li>✓ <math>60^\circ</math></li> <li>✓ to the right</li> </ul>	(2)
			<b>[12]</b>

QUESTION /VRAAG 7			
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
7.1	AC: $\sin 43^{\circ} = \frac{45}{AC}$ $AC \sin 43^{\circ} = 45$ $AC = \frac{45}{\sin 43^{\circ}}$ $AC = 65,98 \text{ m}$  AD: $\sin 50^{\circ} = \frac{45}{AD}$ $AD \sin 50^{\circ} = 45$ $AD = \frac{45}{\sin 50^{\circ}}$ $AD = 58,74 \text{ m}$	$\checkmark \sin 43^{\circ} = \frac{45}{AC}$  $\checkmark$ Answer  $\checkmark \sin 50^{\circ} = \frac{45}{AD}$  $\checkmark$ Answer	(4)
7.2	$CD^2 = AC^2 + AD^2 - 2(AC)(AD)\cos A$ $CD^2 = 65,98^2 + 58,74^2 - 2(65,98)(58,74)\cos 69^{\circ}$ $CD = \sqrt{5025,919618}$ $CD = 70,89 \text{ units}$	$\checkmark$ using cos rule / gebruik van <i>cos-reël</i>  $\checkmark$ substitution / <i>substitusie</i>  $\checkmark$ Answer	(3)
			[7]

**GEOMETRY/ MEETKUNDE**

**S:** Statement/ *Bewering*

**R:** Reason/ *Rede*

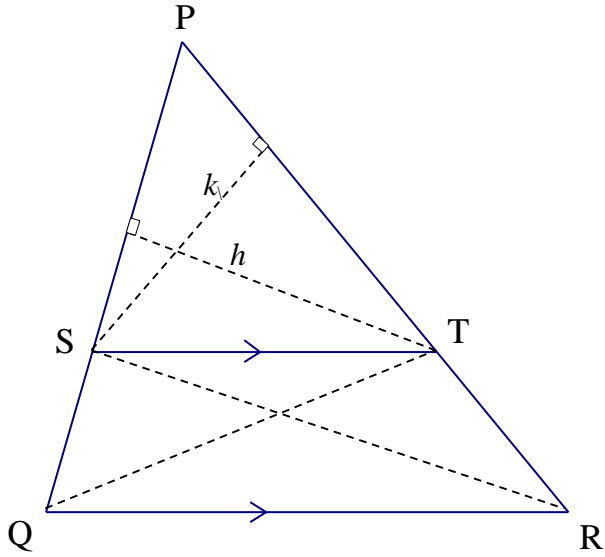
**S/R:** Both Statement and Reason/ *Beide Bewering en Rede*

Allow for alternative methods/ *Maak voorsiening vir alternatiewe metodes*

<b>QUESTION /VRAAG 8</b>			
	<b>SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD</b>	<b>DESCRIPTORS/ BESKRYWERS</b>	<b>Marks</b>
8.1.1	$\hat{C} \hat{A} B = x$ [ $\angle$ s opp = sides / $\angle$ e teenoor = sye.]	✓ S / R	(1)
8.1.2	$\hat{A} \hat{O} B = 2x$ [ $\angle$ at centre = $2\angle$ at circumf / midpts $\angle$ = $2$ omtreks $\angle$ ]	✓ S ✓ R	(2)
8.2	$\hat{B}_1 = \frac{180^\circ - 2x}{2}$ [sum $\angle$ s $\triangle AOB$ & $\angle$ s opp = sides / som $\angle$ e $\triangle AOB$ & $\angle$ e teenoor = sye.]  $\hat{B}_1 = 90^\circ - x$  $\hat{A} \hat{M} B = 90^\circ$ [sum $\angle$ s $\triangle AMB$ / som $\angle$ e $\triangle AMB$ ]	✓ R  ✓ $90^\circ - x$  ✓ R	(3)
8.3	$AM = 6 \text{ units}$ [line from centre $\perp$ chord/ lyn vanaf midpt $\perp$ koord]	✓ S ✓ R	(2)
			<b>[8]</b>

QUESTION /VRAAG 9			
	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
9.1.1	tan-chord theorem/ raaklyn-koordstelling	✓ R	(1)
9.1.2	angles opposite equal radii/sides / hoeke teenoor gelyke radii/ sye	✓ R	(1)
9.2	$\widehat{ACB} = 90^\circ$ [ $\angle$ in semi-circle/ $\angle$ in halwe sirkel] $\therefore \widehat{ACB} = \widehat{TOA}$ $\therefore$ CTOB is a cyclic quad/ is 'n koordevierhoek [ext $\angle$ = opp int $\angle$ / <i>buite <math>\angle</math> = teenoorst. binne <math>\angle</math></i> ] <b>OR/ OF</b> $\widehat{ACB} = 90^\circ$ [ $\angle$ in semi-circle/ $\angle$ in halwe sirkel] $\therefore \widehat{ACB} = \widehat{TOB}$ $\therefore$ CTOB is a cyclic quad/ is 'n koordevierhoek [opp $\angle$ s supplementary/ <i>teenoorst. <math>\angle</math>e supplementêr</i> ] <b>OR/ OF</b> $\widehat{ACB} = 90^\circ$ [ $\angle$ in semi-circle/ $\angle$ in halwe sirkel] $\widehat{OTA} = 65^\circ$ and/ en $\widehat{OBC} = 65^\circ$ [ $\angle$ s in $\Delta ABC$ ] } $\therefore$ CTOB is a cyclic quad/ is 'n koordevierhoek [opp $\angle$ s supplementary/ <i>teenoorst. <math>\angle</math>e supplementêr</i> ] <b>OR/ OF</b> $\widehat{ACB} = 90^\circ$ [ $\angle$ in semi-circle/ $\angle$ in halwe sirkel] $\widehat{OTC} = 115^\circ$ [ext $\angle$ of $\Delta$ / $\angle$ buite van $\Delta$ ] } and/ en $\widehat{OBC} = 65^\circ$ [ $\angle$ s in $\Delta ABC$ ] } $\therefore$ CTOB is a cyclic quad/ is 'n koordevierhoek [ext $\angle$ = opp int $\angle$ / <i>buite <math>\angle</math> = teenoorst. binne <math>\angle</math></i> ]  <b>Can also use <math>\widehat{CBK}</math> as ext <math>\angle</math> / Kan ook <math>\widehat{CBK}</math> as buite <math>\angle</math> gebruik</b>	✓ S/R ✓ S ✓ R  ✓ S/R ✓ S ✓ R  ✓ S/R  ✓ S  ✓ R  ✓ S/R  ✓ S  ✓ R	(3)
9.3	$\widehat{COB} = 50^\circ$ [ $\angle$ at centre = $2 \times \angle$ at circumf./ <i>middelpts <math>\angle</math> = <math>2 \times</math> omtr. <math>\angle</math></i> ] <b>OR</b> [ exterior $\angle$ of $\Delta$ / <i>buite <math>\angle</math> van <math>\Delta</math></i> ]	✓ S ✓ R	(2)
9.4	$\widehat{K} = 40^\circ$ [ $\angle$ s in $\Delta ACK$ ] $\therefore \widehat{S} = 50^\circ$ [ $\angle$ s in $\Delta SOK$ ] $\therefore \widehat{S} = \widehat{COB}$ $\therefore$ OK is a tangent / is 'n raaklyn [conv. tan-chord thm/ <i>omg. raakl- koordst</i> ]	✓ S  ✓ S  ✓ S  ✓ R	(4)
			<b>[11]</b>

**QUESTION /VRAAG 10**

	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
10.1	<div style="text-align: center;">  </div> <p>Constr/ Konstr: Draw SR and TQ/ <i>Trek SR en TQ</i></p> <p>Proof/ Bewys:</p> $\frac{\text{Area } \Delta PST}{\text{Area } \Delta QST} = \frac{\frac{1}{2} PS \times h}{\frac{1}{2} SQ \times h} = \frac{PS}{SQ} \text{ [equal altitudes ; } gelyke \text{ hoogtes]}$ $\frac{\text{Area } \Delta PST}{\text{Area } \Delta STR} = \frac{\frac{1}{2} PT \times k}{\frac{1}{2} TR \times k} = \frac{PT}{TR} \text{ [equal altitudes ; } gelyke \text{ hoogtes]}$ <p>Area <math>\Delta QST</math> = Area <math>\Delta STR</math> [ same base, height;/ <i>dieselfde basis, hoogte;</i> ST  QR]</p> $\therefore \frac{\text{Area } \Delta PST}{\text{Area } \Delta QST} = \frac{\text{Area } \Delta PST}{\text{Area } \Delta STR}$ $\therefore \frac{PS}{SQ} = \frac{PT}{TR}$	<p>✓ Constr/ Konstr</p> $\checkmark \frac{\text{Area } \Delta PST}{\text{Area } \Delta QST} = \frac{\frac{1}{2} PS \times h}{\frac{1}{2} SQ \times h}$ $\checkmark \frac{\text{Area } \Delta PST}{\text{Area } \Delta STR} = \frac{PS}{SQ}$ <p>✓ S ✓ R</p> <p>✓ S</p>	(6)

	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
10.2			
10.2.1	$\hat{C}_2 = x$ [alternate/ verw. $\angle$ s; EC    AD] $\hat{E}_1 = x$ [corresp./ ooreenk. $\angle$ s; EC  AD]	$\checkmark$ S $\checkmark$ S $\checkmark$ any 1 correct R	(3)
10.2.2	$\frac{BD}{DC} = \frac{BA}{AE}$ [line    to 1 side of $\Delta$ / lyn    aan 1 sy van $\Delta$ ] OR/ OF [Proportional Theorem/ Eweredigheidsstelling; EC  AD] $\therefore \frac{BD}{DC} = \frac{BA}{AC}$ [EA = AC; sides opp. equal $\angle$ s/ sye teenoor gelyke $\angle$ e]	$\checkmark$ S $\checkmark$ R $\checkmark$ EA = AC $\checkmark$ R	(4)
			[13]

**QUESTION /VRAAG 11**

	SUGGESTED ANSWER/ VOORGESTELDE ANTWOORD	DESCRIPTORS/ BESKRYWERS	Marks
11.1	$\widehat{D}_1 = x$ [tan-chord theorem/ <i>raakl-koord stelling</i> ] $\widehat{D}_3 = x$ [alt. $\angle$ s; $AB \parallel ED$ / <i>verwis. <math>\angle</math>e ; <math>AB \parallel ED</math></i> ] $\widehat{D}_2 = x$ [equal chords, equal angles / <i>gelyke koorde, gelyke hoeke.</i> ]	✓ S ✓ R ✓ S ✓ R ✓ S ✓ R	(6)
11.2	In $\triangle DEA$ and $\triangle DBC$ 1) $\widehat{D}_1 = \widehat{D}_3 = x$ [proven / <i>reeds bewys</i> ] 2) $B_2 = \widehat{E}$ [ext. $\angle$ of cycl.quad / <i>buitehoek v kvh.</i> ] 3) $\widehat{C}_1 = \widehat{A}_1$ [ $\angle$ s of $\Delta$ / <i><math>\angle</math>e van <math>\Delta</math></i> ] $\therefore \triangle DEA \parallel \triangle DBC$ [ $\angle, \angle, \angle$ ]  <b>OR</b> In $\triangle DEA$ and $\triangle DBC$ 1) $\widehat{D}_1 = \widehat{D}_3 = x$ [proven / <i>reeds bewys</i> ] 2) $B_2 = \widehat{E}$ [ext. $\angle$ of cycl.quad / <i>buitehoek v kvh.</i> ] $\therefore \triangle DEA \parallel \triangle DBC$ [ $\angle, \angle, \angle$ ]	✓ S ✓ S ✓ R ✓ S & R  ✓ S ✓ S ✓ R ✓ S & R	(4)
11.3	$\frac{DE}{DB} = \frac{EA}{BC}$ [ $\triangle DEA \parallel \triangle DBC$ ]  $\therefore DE \cdot BC = EA \cdot DB$  $AB = BD$ [equal sides opp equal $\angle$ s ; / <i>gelyke sye teenoor gelyke <math>\angle</math>e</i> ] $AB = AE$ [given / <i>gegee</i> ] $\therefore BD = AE$ $\therefore DE \cdot BC = EA \cdot EA$	✓ S ✓ R  ✓ S ✓ R ✓ S	(5)
11.4	$\widehat{A}_1 + 3x = 180^\circ$ [opp $\angle$ s of cycl quad. / <i>teenoorst. <math>\angle</math>e van kvh</i> ] $75^\circ + 3x = 180^\circ$ $3x = 105^\circ$ $x = 35^\circ$	✓ S ✓ R  ✓ Answer/ Antw	(3)
			<b>[18]</b>

**Total/Totaal: 150**