



# education

Department:  
Education  
North West Provincial Government  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL SENIOR CERTIFICATE/  
NASIONALE SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**MATHEMATICS P2/WISKUNDE V2**

**SEPTEMBER 2024**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 150**

**These marking guidelines consist of 19 pages and 3 pages containing the cognitive grid./  
Hierdie nasienriglyne bestaan uit 19 bladsye en 3 bladsye wat die kognitiewe tabel bevat.**

**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 in order to solve a problem is NOT acceptable.

**NOTA:**

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte 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.

**QUESTION/VRAAG 1**

1.1	33 players/spelers	✓ 33 (1)																		
1.2	$\bar{x} = \frac{(2 \times 22) + (8 \times 26) + (15 \times 30) + (6 \times 34) + (2 \times 38)}{33}$ $= \frac{982}{33}$ $= 29,76$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 100px;">Answer only: full marks</div>	✓ 982 ✓ answer/antwoord (CA if/as $\div 33$ ) (2)																		
1.3.1	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Age class <i>Ouderdomklas</i></th> <th style="padding: 5px;">Frequency <i>Frekwensie</i></th> <th style="padding: 5px;">Cumulative frequency <i>Kumulatiewe frekwensie</i></th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"><math>20 &lt; x \leq 24</math></td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">2</td> </tr> <tr> <td style="padding: 5px;"><math>24 &lt; x \leq 28</math></td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">10</td> </tr> <tr> <td style="padding: 5px;"><math>28 &lt; x \leq 32</math></td> <td style="padding: 5px;">15</td> <td style="padding: 5px;">25</td> </tr> <tr> <td style="padding: 5px;"><math>32 &lt; x \leq 36</math></td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">31</td> </tr> <tr> <td style="padding: 5px;"><math>36 &lt; x \leq 40</math></td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">33</td> </tr> </tbody> </table>	Age class <i>Ouderdomklas</i>	Frequency <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>	$20 < x \leq 24$	2	2	$24 < x \leq 28$	8	10	$28 < x \leq 32$	15	25	$32 < x \leq 36$	6	31	$36 < x \leq 40$	2	33	✓ 2 & 10  ✓ 33 (2)
Age class <i>Ouderdomklas</i>	Frequency <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>																		
$20 < x \leq 24$	2	2																		
$24 < x \leq 28$	8	10																		
$28 < x \leq 32$	15	25																		
$32 < x \leq 36$	6	31																		
$36 < x \leq 40$	2	33																		

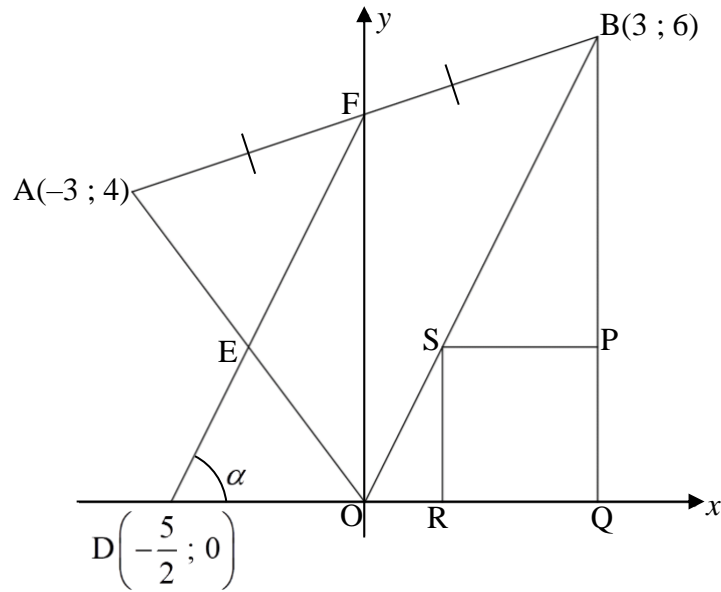
<p>1.3.2</p>	<p style="text-align: center;"><b>Ogive/Ogief</b></p>	<ul style="list-style-type: none"> <li>✓ grounding/anker (20 ; 0)</li> <li>✓ plotting ogive at upper limits correctly/korrekte plot van ogief by boonste limiete</li> <li>✓ shape (smooth)/ vorm (vryhand)</li> </ul> <p style="text-align: right;">(3)</p>
<p>1.4</p>	<p>On graph the y-value at 16,5 / y-waarde van 16,5 op die grafiek.</p> <p>median / mediaan <math>\approx</math> 29,8 years / jare (accept values/aanvaar waardes: <math>29,4 \leq x &lt; 30</math>)</p>	<ul style="list-style-type: none"> <li>✓ graph/grafiek</li> <li>✓ 29,8</li> </ul> <p style="text-align: right;">(2)</p>
<p>1.5</p>	<p>The affected intervals are/ die geaffekteerde intervalle is: <math>24 &lt; x \leq 28</math> and / en <math>32 &lt; x \leq 36</math>.</p> <p>If the frequency of both intervals are increased to 9 players, the data will be symmetrical/as die frekwensie van beide intervalle tot 9 spelers verhoog word, is die data simmetries.</p> <p><math>\therefore k = 4</math></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>Answer only: full marks</p> </div>	<ul style="list-style-type: none"> <li>✓ identify affected intervals/ identifiseer geaffekteerde intervalle</li> <li>✓ increase frequency to 9 players/verhoog frekwensie na 9 spelers</li> <li>✓ <math>k = 4</math></li> </ul> <p style="text-align: right;">(3)</p>
		<p><b>[13]</b></p>

**QUESTION/VRAAG 2**

<b>Preparatory examination (x)/ Voorbereidende eksamen (x)</b>	38	65	78	23	67	93	39	83	51	66
<b>Final examination (y)/ Finale eksamen (y)</b>	57	72	81	27	59	94	41	85	54	79

2.1	$a = 10,85$ $b = 0,90$ $\hat{y} = 10,85 + 0,9x$	<div style="border: 1px solid black; padding: 5px;">                     Answer only: full marks, but if <math>a</math> and <math>b</math> are swapped only 1/3 marks/  <i>maar as a en b omgeruil is, slegs 1/3 punte.</i> </div>	✓ $a$ ✓ $b$ ✓ equation/ <i>vergelyking</i> (3)
2.2.1	$\hat{y} = 10,85 + 0,9(46)$ $= 52,25\%$  <b>OR/OF</b>  $46\hat{y} = 52,08\%$ (calculator / <i>sakrekenaar</i> )	<div style="border: 1px solid black; padding: 5px;">                     Answer only: full marks                 </div>	✓ substitute 46 into eq. / <i>vervang 46 in vgl.</i>  ✓ answer/ <i>antwoord</i> (2)  ✓✓ 52,08 % (2)
2.2.2	$r = 0,94$  Yes, because there is a very strong correlation between the data/ <i>Ja, want die korrelasie tussen die data is baie sterk.</i>		✓ yes/ <i>ja</i> ✓ very strong/ <i>baie sterk</i> (2)
2.3	B		✓ B (1)
			<b>[8]</b>

**QUESTION/VRAAG 3**

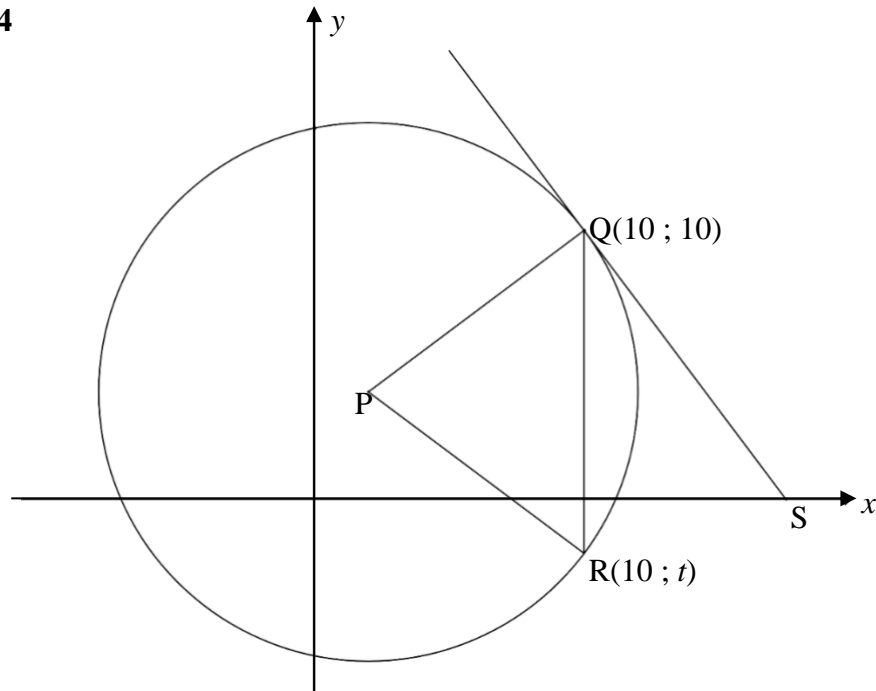


3.1.1	$F\left(\frac{-3 + 3}{2}; \frac{4 + 6}{2}\right)$ $= F(0; 5)$	✓ x-value/waarde ✓ y-value/waarde (2)
3.1.2	$m_{DF} = \frac{5 - 0}{0 - \left(-\frac{5}{2}\right)}$ $= 2$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">                     Answer only: full marks                 </div>	✓ subst./vervang ✓ answer/antwoord (2)
3.1.3	$\tan \alpha = 2$ $\therefore \alpha = 63,43^\circ$	✓ $\tan \alpha = m_{DF}$ ✓ answer/antwoord (2)
3.2	$y = 2x$	✓ answer/antwoord (1)
3.3	$m_{DF} = m_{OB} = 2$ $\therefore$ Lines have the same gradient/lyne het dieselfde gradiënte	✓ answer/antwoord (1)

<p>3.4</p>	<p> <math>QR = PQ = 3x</math>  <math>\therefore R(3 - 3x ; 0)</math>  <math>QP = 3x</math>  <math>\therefore S(3 - 3x ; 3x)</math>                       Equation / vergelyking : OB  <math>y = 2x</math>  <math>3x = 2(3 - 3x)</math>  <math>3x = 6 - 6x</math>  <math>x = \frac{2}{3}</math>                      Substitute/vervang  <math>S\left(3 - 3\left(\frac{2}{3}\right) ; 3\left(\frac{2}{3}\right)\right)</math>  <math>\therefore S(1 ; 2)</math>   <p style="text-align: center;"><b>OR/OF</b></p> <math>SR = 3x</math>  <math>\tan \hat{S}OR = \tan 63,43^\circ = \frac{SR}{OR}</math>  <math>OR = \frac{3x}{2}</math>  <math>OQ = 3 \text{ units / eenhede}</math>  <math>RQ = 3x</math>  <math>\frac{3x}{2} + 3x = 3</math>  <math>x = \frac{2}{3}</math>   <math>S(3 - 3x ; 3x)</math>  <math>S\left(3 - 3\left(\frac{2}{3}\right) ; 3\left(\frac{2}{3}\right)\right)</math>  <math>S(1 ; 2)</math> </p>	<p> <math>\checkmark QR = PQ = 3x</math>  <math>\checkmark</math> coordinates of/  <i>koördinate van R</i>   <math>\checkmark</math> coordinates of/  <i>koördinate van S</i>    <math>\checkmark</math> value of/  <i>waarde van x</i>   <math>\checkmark x_s</math>-value/waarde  <math>\checkmark y_s</math>-value/waarde  <span style="float: right;">(6)</span> </p> <p> <math>\checkmark SR = 3x</math>   <math>\checkmark OR</math>    <math>\checkmark</math> value of/  <i>waarde van x</i>   <math>\checkmark</math> coordinates of/  <i>koördinate van S</i>   <math>\checkmark x_s</math>-value/waarde  <math>\checkmark y_s</math>-value/waarde  <span style="float: right;">(6)</span> </p>
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<p>3.5</p>	<p>E is midpt. of / van <math>\parallel</math> AO <math>\left[ \begin{array}{l} \text{converse midpt.theorem /} \\ \text{omgekeerde midpt. – stelling} \end{array} \right]</math></p> <p><math>E\left(\frac{-3}{2}; 2\right)</math></p> <p>ES <math>\parallel</math> DO (same y – coordinates / <i>dieselfde y – koördinate</i>)</p> <p><math>\therefore</math> EDOS is <math>\parallel^m</math> [both pairs opp. sides <math>\parallel</math> / <i>beide pare teenoorst. sye <math>\parallel</math></i>]</p> <p style="text-align: center;"><b>OR/OF</b></p> <p>E is midpt. of / van <math>\parallel</math> AO <math>\left[ \begin{array}{l} \text{converse midpt.theorem /} \\ \text{omgekeerde midpt. – stelling} \end{array} \right]</math></p> <p><math>E\left(\frac{-3}{2}; 2\right)</math></p> <p>Midpt. EO = <math>\left(\frac{-3}{4}; 1\right)</math> &amp; Midpt. DS = <math>\left(\frac{-3}{4}; 1\right)</math></p> <p><math>\therefore</math> EDOS is <math>\parallel^m</math> [converse diag. of/<i>omgekeerde hoeklyne van <math>\parallel^m</math></i>]</p>	<p>✓S</p> <p>✓coordinates of E/ <i>koördinate van E</i></p> <p>✓S/R</p> <p>✓reason/<i>rede</i></p> <p style="text-align: right;">(4)</p> <p>✓S</p> <p>✓coordinates of E/ <i>koördinate van E</i></p> <p>✓<math>\left(\frac{-3}{4}; 1\right)</math></p> <p>✓reason/<i>rede</i></p> <p style="text-align: right;">(4)</p>
<b>[18]</b>		

**QUESTION/VRAAG 4**

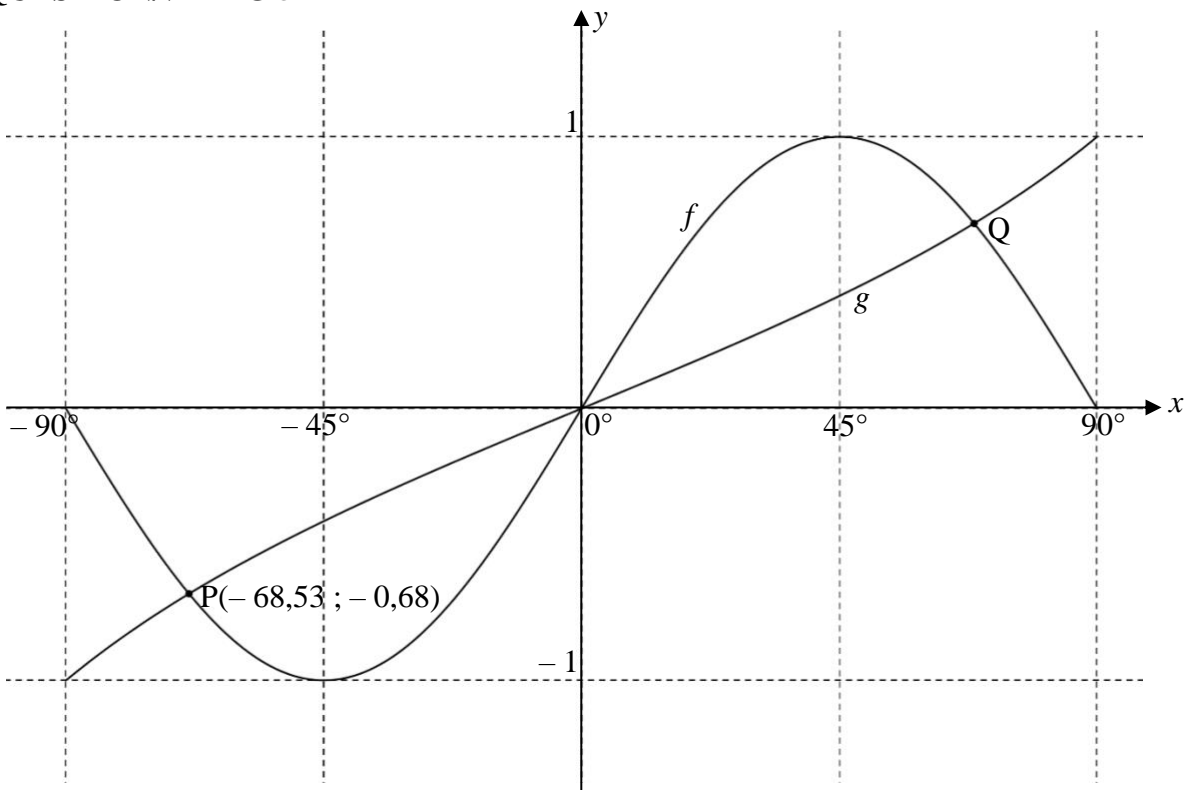


4.1	$x^2 - 4x + (-2)^2 + y^2 - 8y + (-4)^2 = 80 + (-2)^2 + (-4)^2$ $(x - 2)^2 + (y - 4)^2 = 100$	✓LHS/LK    ✓RHS/RK (2)
4.2.1	P(2 ; 4)	✓ $x = 2$ ✓ $y = 4$ (2)
4.2.2	$x = 10$	✓equation/vergelyking (1)
4.3	$m_{QP} = \frac{10-4}{10-2}$ $= \frac{3}{4}$ <p><math>\therefore m_{QS} = -\frac{4}{3}</math> [rad <math>\perp</math> tangent / rad <math>\perp</math> raaklyn]</p> $10 = -\frac{4}{3}(10) + c \quad \text{OR / OF} \quad y - 10 = -\frac{4}{3}(x - 10)$ $c = \frac{70}{3}$ $y = -\frac{4}{3}x + \frac{70}{3}$	✓subst./vervanging ✓ $m_{QP} = \frac{3}{4}$ ✓ $m_{QS} = -\frac{4}{3}$ ✓subst./vervang $m$ & (10 ; 10) ✓equation/vergelyking (5)



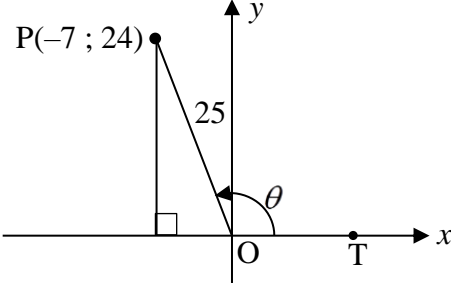
<p>4.4</p>	<p><math>\tan \hat{Q}\hat{S}x = -\frac{4}{3}</math>  <math>\hat{Q}\hat{S}x = 126,87^\circ</math>  <math>126,87^\circ = \hat{R}\hat{Q}\hat{S} + 90^\circ</math> [ext <math>\angle</math> of <math>\Delta</math> / buite <math>\angle</math> van <math>\Delta</math>]  <math>\hat{R}\hat{Q}\hat{S} = 36,87^\circ</math></p>	<p>✓ <math>\hat{Q}\hat{S}x</math>                  ✓ method/metode                  ✓ answer/antwoord                  (3)</p>
<p>4.5</p>	<p><math>\hat{P}\hat{Q}\hat{R} = 53,13^\circ</math> [radius <math>\perp</math> tangent / raaklyn]  <math>\hat{P}\hat{Q}\hat{R} = \hat{Q}\hat{R}\hat{P} = 53,13^\circ</math> [<math>\angle</math>s opp. = radii / <math>\angle</math>e teenoor = radiusse]  <math>\hat{Q}\hat{P}\hat{R} = 73,74^\circ</math> [<math>\angle</math>s of <math>\Delta</math> / <math>\angle</math>e van <math>\Delta</math>]  <math>\text{area } \Delta \text{ PQR} = \frac{1}{2}(\text{PQ})(\text{PR})\sin \hat{Q}\hat{P}\hat{R}</math>  <math>= \frac{1}{2}(10)(10)\sin 73,74^\circ</math>  <math>= 48 \text{ units}^2 / \text{eenhede}^2</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p><math>\hat{P}\hat{Q}\hat{R} = 53,13^\circ</math> [radius <math>\perp</math> tangent / raaklyn]                  Q and R are symmetrical about the line <math>y = 4</math>/  <i>Q en R is simmetries rondom die lyn <math>y = 4</math></i>  <math>\therefore t = -2</math> &amp; <math>\text{QR} = 12</math></p> <p><math>\text{area } \Delta \text{ PQR} = \frac{1}{2}(\text{PQ})(\text{QR})\sin \hat{P}\hat{Q}\hat{R}</math>  <math>= \frac{1}{2}(10)(12)\sin 53,13^\circ</math>  <math>= 48 \text{ units}^2 / \text{eenhede}^2</math></p>	<p>✓ <math>\hat{P}\hat{Q}\hat{R}</math>                  ✓ <math>\hat{Q}\hat{P}\hat{R}</math>                  ✓ subst. in area rule correctly/vervang korrek in oppv.-reël                  ✓ answer/antwoord                  (4)</p> <p>✓ <math>\hat{P}\hat{Q}\hat{R}</math>                  ✓ QR                  ✓ subst. in area rule correctly/vervang korrek in oppv.-reël                  ✓ answer/antwoord                  (4)</p>
<p>4.6</p>	<p><math>\sum_{x=-8}^2 h(x) = \sum_{x=2}^{12} h(x) = k</math>  <math>h(2) = 14</math>  <math>\sum_{x=3}^{12} h(x) = \sum_{x=2}^{12} h(x) - h(2)</math>  <math>\therefore \sum_{x=3}^{12} h(x) = k - 14</math></p>	<p>✓ <math>\sum_{x=-8}^2 h(x) = \sum_{x=2}^{12} h(x) = k</math>                  ✓ <math>h(2) = 14</math>                  ✓  <math>\sum_{x=3}^{12} h(x) = \sum_{x=2}^{12} h(x) - h(2)</math>                  ✓ answer/antwoord                  (4)</p>
		<p><b>[21]</b></p>

**QUESTION/VRAAG 5**



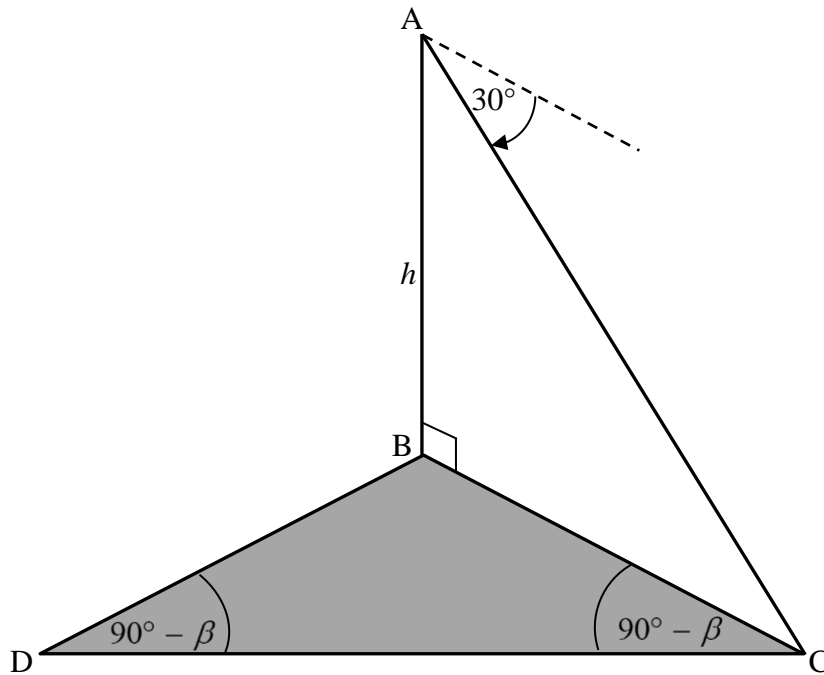
5.1.1	$a = 1$	✓ answer/antwoord (1)
5.1.2	$Q(68,53^\circ ; 0,68)$	✓ $x$ -value/waarde ✓ $y$ -value/waarde (2)
5.1.3	$x = -75^\circ$ or / of $x = 15^\circ$	✓ $-75^\circ$ ✓ $15^\circ$ (2)
5.1.4	$x \in (-68,53^\circ ; 90^\circ]$ <b>OR / OF</b> $-68,53^\circ < x \leq 90^\circ$	✓ $-68,53^\circ$ & $90^\circ$ ✓ notation/notasie (2)
5.1.5	$f(x - 45^\circ)$ $m = -45^\circ$	✓ $f(x - 45^\circ)$ ✓ $-45^\circ$ (2)
5.1.6	$b = \frac{1}{2}$	✓ $\frac{1}{2}$ (1)
5.2	$x \in (68,53^\circ ; 90^\circ]$ <b>OR / OF</b> $68,53^\circ < x \leq 90^\circ$	✓ ✓ accuracy/akkuraatheid (2)
		<b>[12]</b>

**QUESTION/VRAAG 6**

<p>6.1.1</p>	$x^2 + 24^2 = 25^2$ $x^2 = 49$ $x = -7$ 	<p>✓ <math>x^2 + y^2 = r^2</math></p> <p>✓ <math>x = -7</math></p> <p>(2)</p>
<p>6.1.2</p>	$\tan(360^\circ - \theta)$ $= -\tan \theta$ $= -\left(-\frac{24}{7}\right)$ $= \frac{24}{7}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin: 10px auto;">                 Answer only: full marks             </div>	<p>✓ <math>-\tan \theta</math></p> <p>✓ answer/antwoord</p> <p>(2)</p>
<p>6.1.3</p>	$\tan \theta = \frac{24}{7}$ $\theta = 73,74^\circ$ $\hat{POT} = 180^\circ - 73,74^\circ$ $= 106,26^\circ$	<p>✓ size of/grootte van <math>\theta</math></p> <p>✓ answer/antwoord</p> <p>(2)</p>
<p>6.2.1</p>	$\sin 20^\circ + \cos 120^\circ \cdot \tan 405^\circ + \cos 110^\circ$ $= \sin 20^\circ + \cos(180^\circ - 60^\circ) \cdot \tan(360^\circ + 45^\circ) + \cos(90^\circ + 20^\circ)$ $= \sin 20^\circ - \cos 60^\circ \cdot \tan 45^\circ - \sin 20^\circ$ $= -\frac{1}{2}$	<p>✓ <math>-\cos 60^\circ</math> ✓ <math>\tan 45^\circ</math></p> <p>✓ <math>-\sin 20^\circ</math></p> <p>✓ answer/antwoord</p> <p>(4)</p>
<p>6.2.2</p>	$\frac{(\sqrt{2} \cos 15^\circ + 1)(\sqrt{2} \cos 15^\circ - 1) \sin(-2x)}{4 \sin x \cos x}$ $= \frac{(2 \cos^2 15^\circ - 1) \cdot (-\sin 2x)}{4 \sin x \cos x}$ $= \frac{(\cos 30^\circ) \cdot (-2 \sin x \cos x)}{4 \sin x \cos x}$ $= -\frac{\sqrt{3}}{4}$	<p>✓ <math>2 \cos^2 15^\circ - 1</math></p> <p>✓ <math>-2 \sin x \cos x</math></p> <p>✓ <math>\cos 30^\circ</math></p> <p>✓ answer/antwoord</p> <p>(4)</p>

6.3	$4 \cos(90^\circ - 2y) \cdot \cos 2x + 4 \sin 2x \cdot \cos(360^\circ + 2y)$ $= 4 \sin 2y \cdot \cos 2x + 4 \sin 2x \cdot \cos 2y$ $= 4 [\sin(2y + 2x)]$ $= 4 [\sin 2(y + x)]$ $= 4 \cdot 2 \sin(y + x) \cdot \cos(y + x)$ $= 8t$	<p>✓ <math>\sin 2y</math>      ✓ <math>\cos 2y</math></p> <p>✓ compound angle/ <i>saamgestelde hoek</i></p> <p>✓ double angle/<i>dubbelhoek</i></p> <p>✓ answer/<i>antwoord</i></p> <p style="text-align: right;">(5)</p>
6.4.1	$\text{LHS} / \text{LK} = \sin^2 x + \cos^2 x + \tan^2 x$ $= 1 + \tan^2 x$ $= 1 + \frac{\sin^2 x}{\cos^2 x}$ $= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$ $= \frac{1}{\cos^2 x}$	<p>✓ <math>\sin^2 x + \cos^2 x = 1</math></p> <p>✓ <math>\frac{\sin^2 x}{\cos^2 x}</math></p> <p>✓ <math>\frac{\cos^2 x + \sin^2 x}{\cos^2 x}</math></p> <p style="text-align: right;">(3)</p>
6.4.2	<p>If/as <math>x \in (180^\circ ; 270^\circ)</math>, then/<i>dan is</i> <math>\cos x &lt; 0</math></p> <p><math>\sqrt{\sin^2 x + \cos^2 x + \tan^2 x} \neq</math> negative / <i>negatief</i></p> <p><math>\therefore</math> Attie is correct / <i>korrek</i></p>	<p>✓ statement/<i>bewering</i></p> <p>✓ answer/<i>antwoord</i></p> <p style="text-align: right;">(2)</p>
6.5	$2^{2\sin^2 x} - 5 \cdot 2^{\cos 2x} = -3$ $2^{2\sin^2 x} - 5 \cdot 2^{1-2\sin^2 x} = -3$ $2^{2\sin^2 x} - 5 \cdot 2 \cdot 2^{-2\sin^2 x} = -3$ $2^{2\sin^2 x} - \frac{10}{2^{2\sin^2 x}} + 3 = 0$ $2^{2\sin^2 x} \cdot 2^{2\sin^2 x} + 3 \cdot 2^{2\sin^2 x} - 10 = 0$ $(2^{2\sin^2 x} + 5)(2^{2\sin^2 x} - 2) = 0$ $2^{2\sin^2 x} \neq -5 \text{ or / of } 2^{2\sin^2 x} = 2^1$ $2 \sin^2 x = 1$ $\sin^2 x = \frac{1}{2}$ $\sin x = \pm \frac{1}{\sqrt{2}}$	<p>✓ <math>1 - 2 \sin^2 x</math></p> <p>✓ <math>\frac{10}{2^{2\sin^2 x}}</math></p> <p>✓ standard form/<i>standaardvorm</i></p> <p>✓ factors/<i>faktore</i></p> <p>✓ <math>2^{2\sin^2 x} \neq -5</math></p> <p>✓ <math>\sin^2 x = \frac{1}{2}</math></p> <p style="text-align: right;">(6)</p>
		<b>[30]</b>

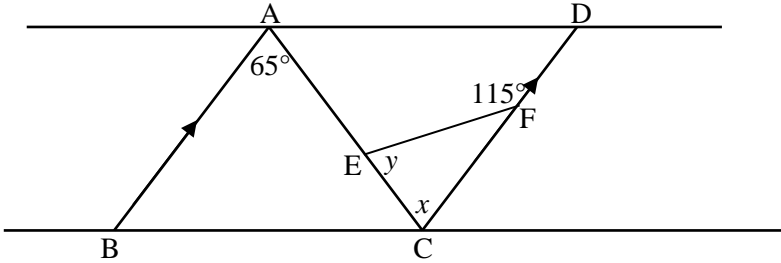
**QUESTION/VRAAG 7**



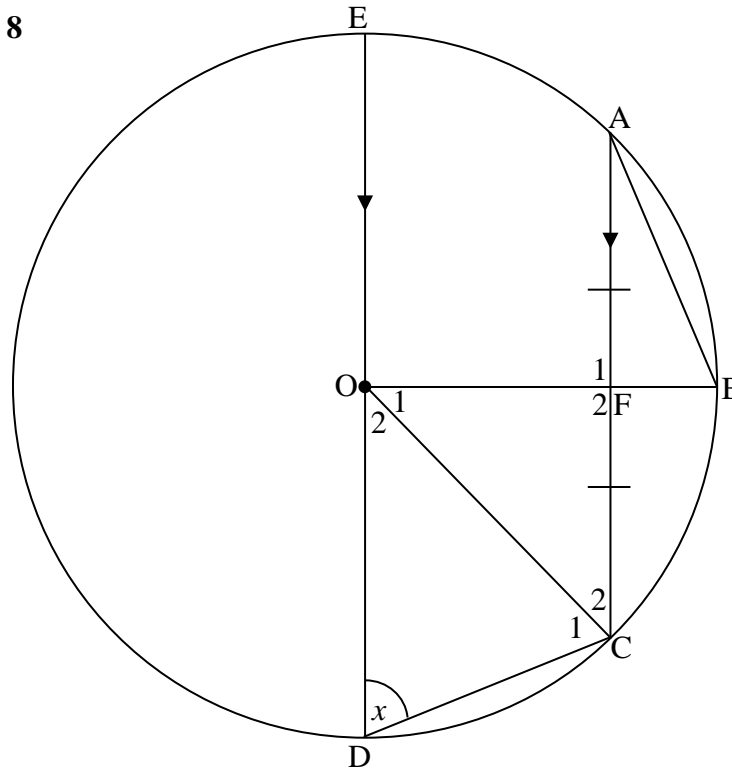
7.1	$\tan 30^\circ = \frac{h}{BC}$ $BC = \frac{h}{\tan 30^\circ}$ $= \frac{h}{\frac{1}{\sqrt{3}}} = \sqrt{3}h$	<ul style="list-style-type: none"> <li>✓ correct trig ratio/ <i>korrekte trig verhouding</i></li> <li>✓ BC as the subject/ <i>as die onderwerp</i></li> </ul> <p style="text-align: right;">(2)</p>
7.2	$\widehat{DBC} = 2\beta$	<ul style="list-style-type: none"> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(1)</p>
7.3	$\frac{DC}{\sin B} = \frac{BC}{\sin D}$ $\frac{DC}{\sin 2\beta} = \frac{BC}{\sin(90^\circ - \beta)}$ $DC \cdot \cos \beta = BC \cdot 2 \sin \beta \cos \beta$ $DC = \frac{\sqrt{3}h \cdot 2 \sin \beta \cos \beta}{\cos \beta}$ $= 2\sqrt{3}h \sin \beta$ $= \sqrt{12}h \sin \beta$	<ul style="list-style-type: none"> <li>✓ correct use of sine-rule/ <i>korrekte gebruik van sinus-reël</i></li> <li>✓ correct substitution into the formula/ <i>korrekte vervanging in die formule</i></li> <li>✓ <math>\sin 2\beta = 2 \sin \beta \cos \beta</math></li> <li>✓ co-ratio/ko-verhouding</li> <li>✓ <math>2\sqrt{3}h \sin \beta</math></li> </ul> <p style="text-align: right;">(5)</p>
		<b>[8]</b>

**GEOMETRY/MEETKUNDE**

Please read carefully through the following table before marking **QUESTION 8–10** /  
*Lees asseblief sorgvuldig deur die volgende tabel alvorens **VRAE 8–10** nagesien word.*

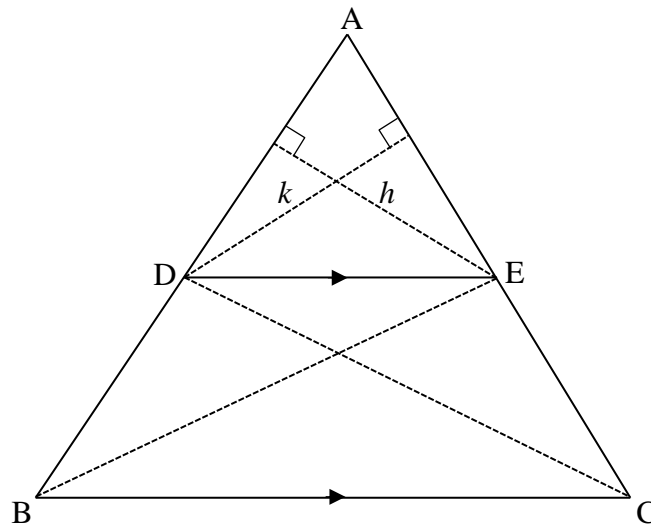
	<p>The order in which the candidate answers a geometry question must follow logically/ <i>Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.</i></p> <p><b>Example/Voorbeeld</b></p> <p>Given/Gegee <math>AB \parallel CD</math> and/en <math>\hat{EFD} = 115^\circ</math></p>  <p>The candidate first needs to calculate <math>x</math> BEFORE he/she can calculate <math>y</math>/Die kandidaat moet eerste vir <math>x</math> bereken <b>VOORDAT</b> hy/sy vir <math>y</math> kan bereken.</p>
S	<p>A mark for a correct statement                  (A statement mark is independent of a reason)  <i>'n Punt vir 'n korrekte bewering                  ('n Punt vir 'n bewering is onafhanklik van die rede)</i></p>
R	<p>A mark for the correct reason                  (A reason mark may only be awarded if the statement is correct)  <i>'n Punt vir 'n korrekte rede                  ('n Punt word slegs vir die rede toegeken as die bewering korrek is)</i></p>
S/R	<p>Award a mark if the statement AND reason are both correct                  (Both <b>MUST</b> be correct to get one mark)  <i>Ken 'n punt toe as die bewering EN rede beide korrek is                  (Beide <b>MOET</b> korrek wees om een punt te kry)</i></p>

**QUESTION/VRAAG 8**



8.1	$\hat{F}_2 = 90^\circ$ [line from centre to midpt.chord/midpt.sirkel, midpt.koord]	✓S✓R (2)
8.2.1	$\hat{C}_1 = x$ [ $\angle$ s opp. = radii/ $\angle$ e teenoor = radiusse] $\hat{O}_2 = 180^\circ - 2x$ [sum of $\angle$ s of / som van $\angle$ e van $\triangle DOC$ ]	✓S ✓S (2)
8.2.2	$D\hat{O}F = 90^\circ$ [co-int. $\angle$ s / ko-binne $\angle$ e; $AC \parallel ED$ ] $\hat{O}_1 = 90^\circ - (180^\circ - 2x) = 2x - 90^\circ$ $C\hat{A}B = x - 45^\circ$ [ $\angle$ at centre = $2 \times \angle$ at circ. / midpts $\angle = 2 \times$ omtreks $\angle$ ] $\hat{B} + x - 45^\circ + 90^\circ = 180^\circ$ [sum of $\angle$ s of / som van $\angle$ e van $\triangle FAB$ ] $\hat{B} = 135^\circ - x$	✓S/R ✓S ✓S✓R ✓S/R ✓S (6)
		[10]

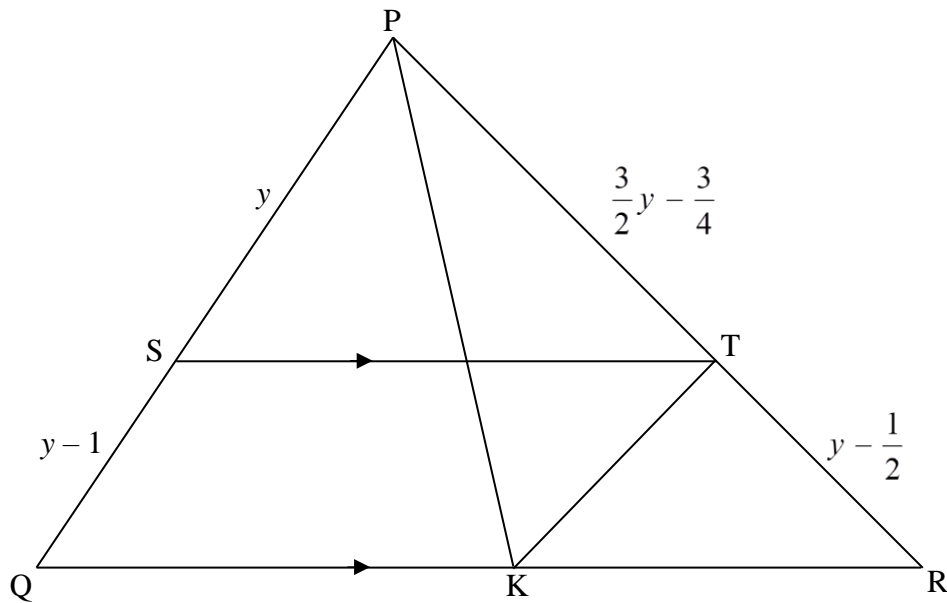
**QUESTION/VRAAG 9**



<p>9.1</p>	<p>Construction: draw altitudes <math>h</math> and <math>k</math>; join B with E and D with C/                  Konstruksie: trek hoogtelyne <math>h</math> en <math>k</math>; verbind B met E en D met C.</p> $\frac{\text{area } \triangle ADE}{\text{area } \triangle DEB} = \frac{\frac{1}{2} AD \times h}{\frac{1}{2} DB \times h} = \frac{AD}{DB}$ $\frac{\text{area } \triangle ADE}{\text{area } \triangle DEC} = \frac{\frac{1}{2} AE \times k}{\frac{1}{2} EC \times k} = \frac{AE}{EC}$ <p>area <math>\triangle DEB</math> = area <math>\triangle DEC</math> [same base; same  ; <i>dieselfde basisse; dieselfde   </i>]</p> $\therefore \frac{\text{area } \triangle ADE}{\text{area } \triangle DEB} = \frac{\text{area } \triangle ADE}{\text{area } \triangle DEC}$ $\therefore \frac{AD}{DB} = \frac{AE}{EC}$	<p>✓ construction/                  konstruksie</p> <p>✓S</p> <p>✓S</p> <p>✓S/R</p> <p>✓S</p> <p>(5)</p>
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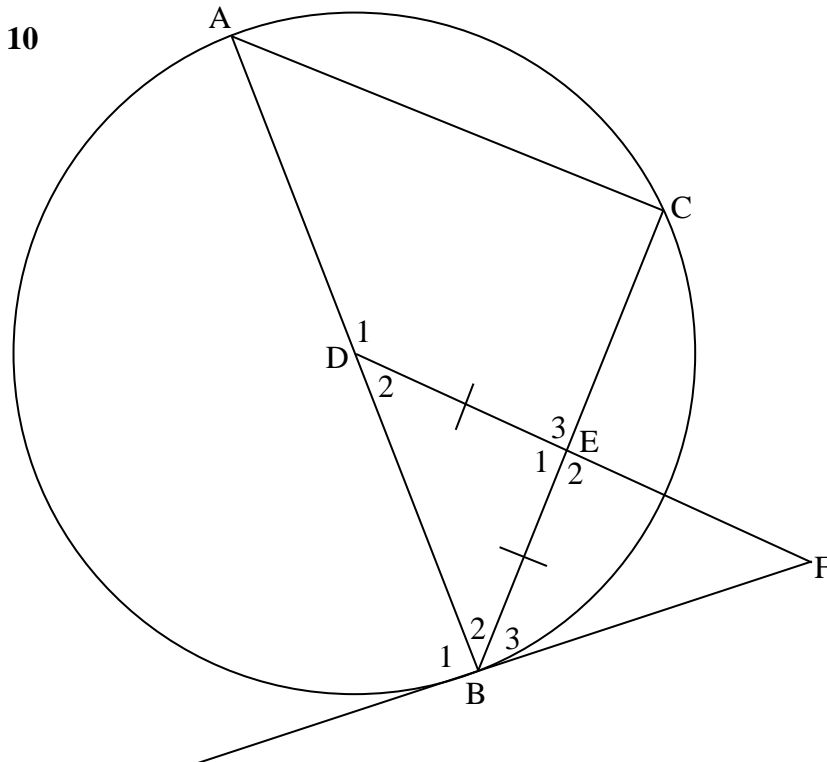


9.2



<p>9.2.1</p>	$\frac{y}{y-1} = \frac{\frac{3}{2}y - \frac{3}{4}}{y - \frac{1}{2}} \text{ [prop.th / eweredigheidst.; ST    QR]}$ $y\left(y - \frac{1}{2}\right) = (y - 1)\left(\frac{3}{2}y - \frac{3}{4}\right)$ $y^2 - \frac{1}{2}y = \frac{3}{2}y^2 - \frac{9}{4}y + \frac{3}{4}$ $4y^2 - 2y = 6y^2 - 9y + 3$ $0 = 2y^2 - 7y + 3$ $0 = (y - 3)(2y - 1)$ $y = 3 \text{ or / of } y \neq \frac{1}{2}$	<p>✓S/R</p> <p>✓simplification/ vereenvoudiging</p> <p>✓standard form/ standaardvorm</p> <p>✓factors/faktore</p> <p>✓only/slegs y = 3</p> <p>(5)</p>
<p>9.2.2</p>	<p><math>\hat{P}\hat{S}\hat{T} = \hat{Q}</math> [corresp ∠s/ooreenk. ∠e; ST    QR]</p> <p><math>\hat{P}\hat{S}\hat{T} = \hat{P}\hat{K}\hat{T} = \hat{Q}</math></p> <p>P, S, K and/en T are / is consyclic/konsiklies</p> <p>[converse ∠s in same segment / omgekeerde ∠e in dies. segment]</p> <p>∴ PSKT is a / is 'n cyclic quadrilateral / koordevierhoek</p>	<p>✓S/R</p> <p>✓R</p> <p>(2)</p>
		<p>[12]</p>

**QUESTION/VRAAG 10**



<p>10.1.1</p>	<p><math>\hat{C} = 90^\circ</math> [<math>\angle</math> in semi circle./<math>\angle</math> in halfsirkel]  <math>\hat{A}BF = 90^\circ</math> [radius <math>\perp</math> tangent / raaklyn]  <math>\therefore \hat{C} = \hat{A}BF = 90^\circ</math></p>	<p><math>\checkmark</math>S <math>\checkmark</math>R  <math>\checkmark</math>S <math>\checkmark</math>R                    (4)</p>
<p>10.1.2</p>	<p>In <math>\triangle DBF</math> and / en <math>\triangle BCA</math>  <math>\hat{D}_2 = \hat{B}_2</math> [<math>\angle</math>s opp. equal sides/<math>\angle</math>e teenoor gelyke sye]  <math>\hat{D}BF = \hat{C}</math> [from / vanuit 10.1.1]  <math>\triangle DFB \parallel \triangle BAC</math> [<math>\angle \angle \angle</math>]  <math>\frac{DF}{BA} = \frac{DB}{BC}</math> [from / vanuit <math>\parallel \triangle</math>s]  <math>\therefore DF \cdot BC = AB \cdot BD</math></p> <p><b>OR / OF</b></p> <p>In <math>\triangle DBF</math> and / en <math>\triangle BCA</math>  <math>\hat{D}_2 = \hat{B}_2</math> [<math>\angle</math>s opp. equal sides/<math>\angle</math>e teenoor gelyke sye]  <math>\hat{D}BF = \hat{C}</math> [from / vanuit 10.1.1]  <math>\hat{F} = \hat{A}</math> [sum of <math>\angle</math>s of <math>\triangle</math> /binne<math>\angle</math>e van <math>\triangle</math>]  <math>\triangle DFB \parallel \triangle BAC</math> [<math>\angle \angle \angle</math>]  <math>\frac{DF}{BA} = \frac{DB}{BC}</math> [from / vanuit <math>\parallel \triangle</math>s]  <math>\therefore DF \cdot BC = AB \cdot BD</math></p>	<p><math>\checkmark</math>S/R  <math>\checkmark</math>S  <math>\checkmark</math>R  <math>\checkmark</math>S/R                    (4)</p> <p><math>\checkmark</math>S/R  <math>\checkmark</math>S  <math>\checkmark</math>S  <math>\checkmark</math>S/R                    (4)</p>

10.1.3	$\hat{B}_3 = \hat{A}$ [tan chord theorem / raaklyn – koordst.] $\hat{B}_3 = \hat{F} = \hat{A}$ $BE = EF$ [sides opp. = $\angle$ s/sye teenoor = $\angle$ e] $\therefore BE = EF = DE$ $\therefore E$ is the midpt. of circle through $D, B$ and $F$ / <i>E is die midpt. van sirkel deur <math>D, B</math> en <math>F</math></i>	$\checkmark$ S $\checkmark$ R  $\checkmark$ S/R  $\checkmark$ S  (4)
10.2	$\frac{AC}{BF} = \frac{AB}{DF}$ [from / vanuit $\Delta$ s] $= \frac{2AD}{2EF}$ $= \frac{AD}{EF}$ $\frac{1}{AC^3} \times \frac{AC}{BF} = \frac{1}{AC^3} \times \frac{AD}{EF}$ $\frac{1}{AC^2} = \frac{AD \cdot BF}{EF \cdot AC^3}$ $\frac{1}{AB^2 - BC^2} = \frac{AD \cdot BF}{EF \cdot AC^3}$ $-\frac{1}{BC^2 - AB^2} = \frac{AD \cdot BF}{EF \cdot AC^3}$ $\frac{1}{BC^2 - AB^2} = -\frac{AD \cdot BF}{EF \cdot AC^3}$	$\checkmark$ S  $\checkmark$ S  $\checkmark \times \frac{1}{AC^3}$ both sides/beide kante  $\checkmark$ S  $\checkmark$ Pythagoras  $\checkmark - \frac{1}{BC^2 - AB^2}$  (6)
<b>[18]</b>		

**TOTAL/TOTAAL: 150**