



Province of the  
**EASTERN CAPE**  
EDUCATION

LEARNER'S NAME:  
LEERDERNAAM: *SUT - Selno*

GRADE 12  
GRAAD 12

**NATIONAL/NASIONALE  
SENIOR  
CERTIFICATE/SERTIFIKAAT**

**GRADE 12/GRAAD 12**



**SEPTEMBER 2017**

**MATHEMATICS P2/WISKUNDE V2  
SPECIAL ANSWER BOOK/  
SPESIALE ANTWOORDEBOEK**

QUESTION/VRAAG	MARK/PUNT	INITIAL/PARAAF	MOD.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
<b>TOTAL/TOTAL</b>			

This SPECIAL ANSWER BOOK consists of 24 pages. /  
Hierdie SPESIALE ANTWOORDEBOEK bestaan uit 24 bladsye.

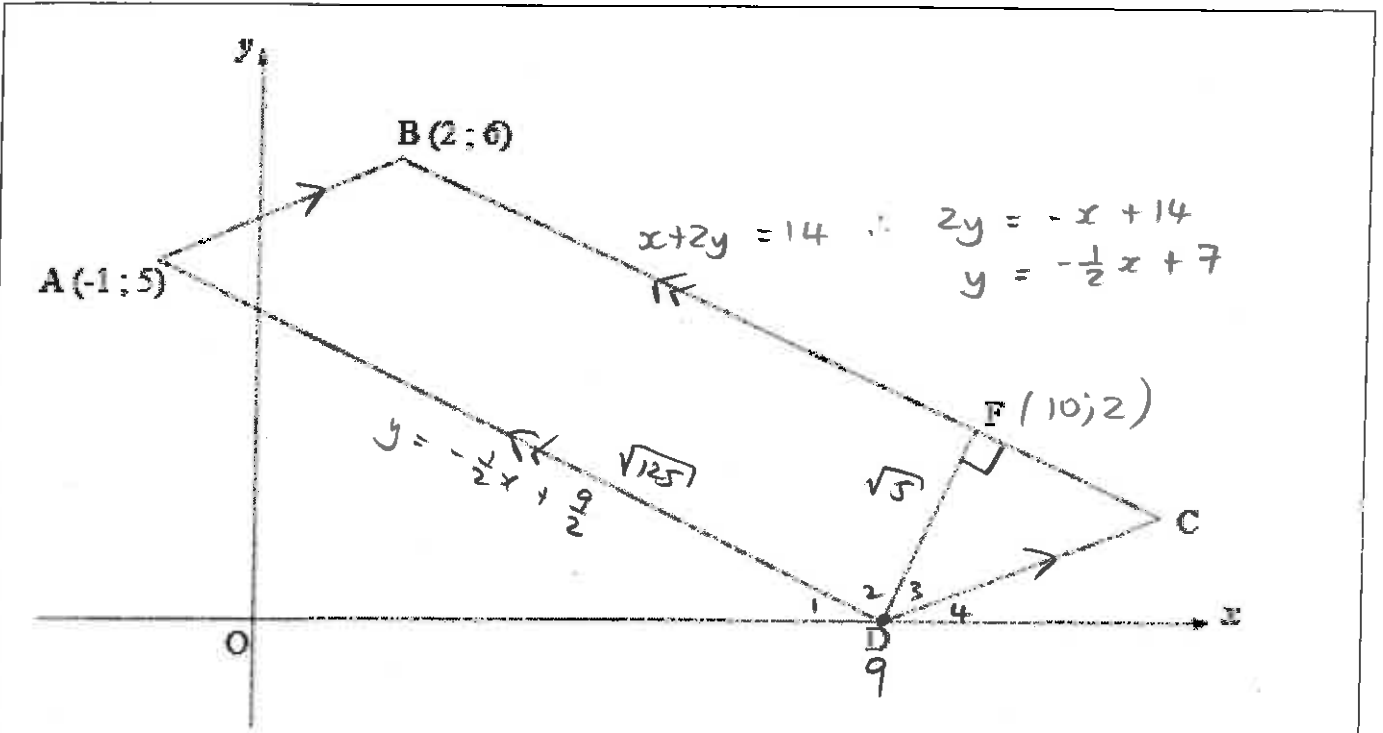




QUESTION/VRAAG 2

2.1	$\frac{140}{\rightarrow}$ ✓ learners	1 (1)
2.2	$\frac{60-69}{\rightarrow}$ % ✓	1 (1)
2.3	<p style="text-align: center;">Marks for Mathematics Test / Punte vir Wiskunde-toets</p> <p style="text-align: right;">✓ ground pt ✓ cum freq ✓ upper limit ✓ shape</p> <p style="text-align: right; font-size: 2em;">4</p>	(4)
2.4	$T_1; \dots; T_{140} \quad M = T_{\frac{1}{2}(1+140)} = T_{70,5}$ $\therefore T_1; \dots; T_{70} \quad T_{71}; \dots; T_{140} \quad IQR \quad \checkmark^{Q_1, Q_3}$ $Q_1 = T_{\frac{1}{2}(1+70)} \quad Q_3 = T_{\frac{1}{2}(71+140)}$ $= T_{35,5} \quad = T_{105,5}$ $= 54 \quad = 71$ $= 71 - 54 = 17 \rightarrow \checkmark$	2 (2) (8)

QUESTION/VRAAG 3



3.1

$m_{AD} = -\frac{1}{2} \checkmark S$

opp sides  $\parallel$  gm  $\parallel$

$\therefore y = -\frac{1}{2}x + c$

sub  $A(-1; 5)$

$5 = -\frac{1}{2}(-1) + c \checkmark$

$\frac{9}{2} = c$

$\therefore y = -\frac{1}{2}x + \frac{9}{2} \checkmark$

3

(3)

3.2

x int:  $0 = -\frac{1}{2}x + \frac{9}{2}$

$\frac{1}{2}x = \frac{9}{2}$

$x = 9$

$\therefore D(9; 0) \checkmark \checkmark$

2

(2)



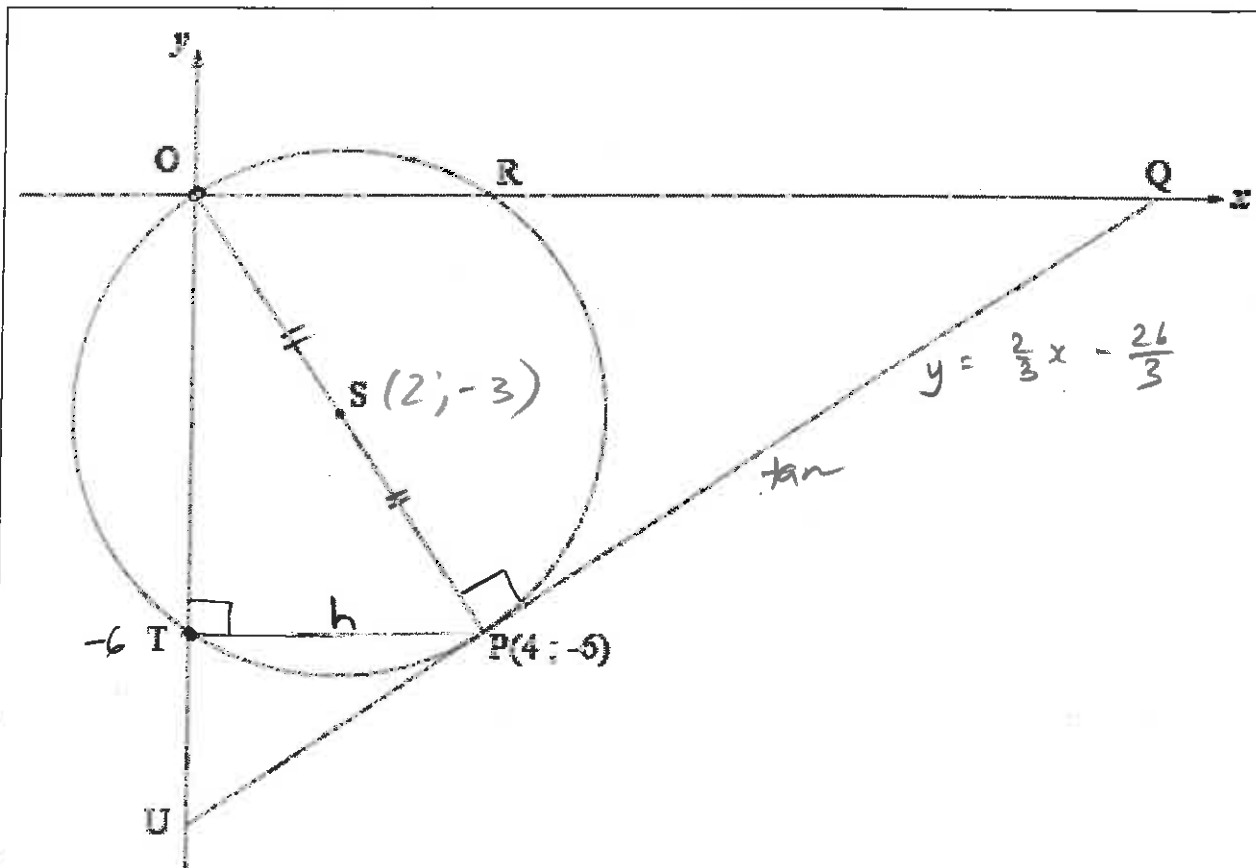
3.6	$m_{AD} = -\frac{1}{2}$
	$\therefore \tan(\hat{AD}x) = -\frac{1}{2}$
	$\text{ref} = 26,56\dots^\circ$
	$\tan - \text{in}$
	II: $\hat{AD}x = 153,43\dots^\circ \checkmark$
	$m_{AB} = \frac{6-5}{2-(-1)} \checkmark$
	$= \frac{1}{3} \checkmark$
	$= m_{CD}$ opp sides $\parallel$ gm $\parallel$
	$\therefore \tan \hat{D}_4 = \frac{1}{3}$
	$\text{ref}^\wedge = 18,43\dots^\circ$
	$\tan + \text{in}$
	I: $\hat{D}_4 = 18,43\dots^\circ \checkmark$

(6)  
[20]

**Additional Space/Addisionele Ruimte**

3.6. cont	$\therefore \hat{D}_2 + \hat{D}_3 = 153,43\dots^\circ - 18,43\dots^\circ$	
	$= 135^\circ \checkmark$	
	$\therefore \hat{ABC} = 135^\circ \checkmark$ opp sides $\parallel$ gm $=$	<b>6</b>

## QUESTION/VRAAG 4



4.1	$x = \frac{0+4}{2} \quad y = \frac{0+(-6)}{2}$ $= 2 \quad = -3$ $\therefore S(2; -3)$	$O(0;0) \quad P(4; -6)$ $OS = SP \text{ radius}$	2
4.2	$OS = \sqrt{(-3-0)^2 + (2-0)^2}$ $= \sqrt{13}$	$O(0;0) \quad S(2; -3)$	2
4.3	$(x-2)^2 + (y+3)^2 = (\sqrt{13})^2$ $(x-2)^2 + (y+3)^2 = 13$	$S(2; -3) \quad r = \sqrt{13}$	2
4.4	$\tan \perp \text{rad}$		1



<p>4.5</p>	$M_{OP} = \frac{-6 - 0}{4 - 0} \checkmark$ $= -\frac{2}{3} \checkmark$ $\therefore m_{\perp} = \frac{2}{3} \checkmark \perp \quad (4.4.)$ $y = \frac{2}{3}x + c$ <p>sub <math>P(4; -6)</math></p> $-6 = \frac{2}{3}(4) + c \checkmark$ $-\frac{26}{3} = c$ $\therefore y = \frac{2}{3}x - \frac{26}{3} \rightarrow$	<p>4</p> <p>(4)</p>
<p>4.6</p>	<p>int <math>(0-2)^2 + (y+3)^2 = 13 \checkmark</math></p> $4 + (y+3)^2 = 13$ $(y+3)^2 = 9 \checkmark$ $y+3 = \pm 3 \checkmark$ $y = -3 \pm 3$ $= \emptyset \text{ or } -6 \quad \text{reject } 0$ $\therefore T(0; -6) \checkmark \rightarrow$	<p>4</p> <p>(4)</p>
<p>4.7</p>	<p>PT <math>\perp</math> OU <math>\hat{\text{in semi}} \angle O = 90^\circ</math></p> <p>let PT = h</p> $OT = 6 \quad \checkmark \quad T(0; -6)$ $OU = \frac{26}{3} \quad \checkmark \quad U(0; -\frac{26}{3})$ $\therefore TU = \frac{8}{3} \quad \checkmark \quad \frac{26}{3} - 6$ $\therefore \frac{\text{area } \triangle OTP}{\text{area } \triangle PTU} = \frac{\frac{1}{2} \cdot 6 \cdot h}{\frac{1}{2} \cdot \frac{8}{3} \cdot h} \quad \checkmark \text{ sub}$ $= \frac{9}{4} \checkmark \rightarrow$	<p>5</p> <p>(5)</p>

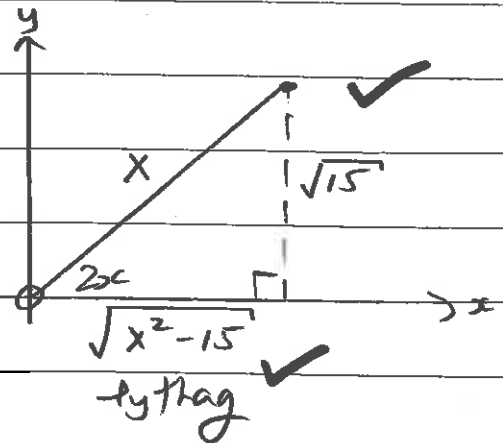
## QUESTION/VRAAG 5

5.1

$$\sin 2x = \frac{\sqrt{15}}{x} = \frac{y}{r}$$

$$\cos 2x = 2\cos^2 x - 1 \quad \checkmark$$

$$\checkmark \frac{\sqrt{x^2 - 15}}{x} = 2\cos^2 x - 1$$



$$\therefore \frac{\sqrt{x^2 - 15}}{x} + 1 = 2\cos^2 x$$

$$\frac{\sqrt{x^2 - 15}}{2x} + \frac{1}{2} = \cos^2 x \quad \times 2$$

$$\frac{\sqrt{x^2 - 15}}{2x} + \frac{1}{2} = \cos x \quad \checkmark$$

reject -

5

5.2

$$\bullet \sin(180^\circ - \theta) = \sin \theta$$

$$\bullet \tan(-\theta) = -\tan \theta$$

$$\bullet \sin(540^\circ - \theta) = \sin(180^\circ - \theta)$$

$$\bullet \sin^2(360^\circ - \theta) = (\sin(360^\circ - \theta))^2$$

$$= \sin \theta$$

$$= (-\sin \theta)^2$$

$$\bullet \cos(\theta - 90^\circ) = \cos(\theta + 270^\circ)$$

$$= \sin^2 \theta$$

$$= \cos(270^\circ + \theta)$$

$$= \sin \theta$$

$$\therefore \frac{(\sin \theta)(\sin \theta)(\sin \theta)}{(-\tan \theta)(\sin^2 \theta)} = - \frac{\sin \theta}{\frac{\sin \theta}{\cos \theta}} \quad \checkmark$$

$$= -\sin \theta \times \frac{\cos \theta}{\sin \theta}$$

$$= -\cos \theta \quad \checkmark$$

7

(7)

5.3	5.3.1	$\text{LHS} = \frac{\sin 5x \cos 3x - \cos 5x \sin 3x}{\tan 2x} - 1$	4
		$= \frac{\sin(5x - 3x)}{\tan 2x} - 1$	
		$= \frac{\sin 2x}{\frac{\sin 2x}{\cos 2x}} - 1$	
		$= \sin 2x \times \frac{\cos 2x}{\sin 2x} - 1$	
		$= \cos 2x - 1 \checkmark$	
		$= \sqrt{1 - 2\sin^2 x} - 1 \quad \text{see below}$	
	5.3.2	ID is UD for: $(k \in \mathbb{Z})$	4
		$\bullet \tan 2x = \text{UD} \quad \bullet \tan 2x = 0$	
		let $A = 2x$	
		$\tan A = \text{UD} \quad \tan A = 0$	
		$\frac{\sin A}{\cos A} = \text{UD} \quad \frac{\sin A}{\cos A} = 0$	
		$\cos A = 0 \quad \sin A = 0$	
$A = 90^\circ + k180^\circ \quad A = k180^\circ$			
$2x = 90^\circ + k180^\circ \quad 2x = k180^\circ$			
$x = 45^\circ + k90^\circ \quad x = k \cdot 90^\circ$			
$\therefore x = 45^\circ; 135^\circ; 0^\circ; 90^\circ; 180^\circ$			

**Additional Space/Addisionele Ruimte**

5.3	1.	$= -2\sin^2 x$	
cont		$= \text{RHS}$	
		$\underline{\hspace{2cm}}$	
		$\hspace{1.5cm}0$	

QUESTION/VRAAG 6

$f: y = \tan \frac{1}{2}x$

$g: y = \sin(x - 30^\circ)$

f  
asymptote

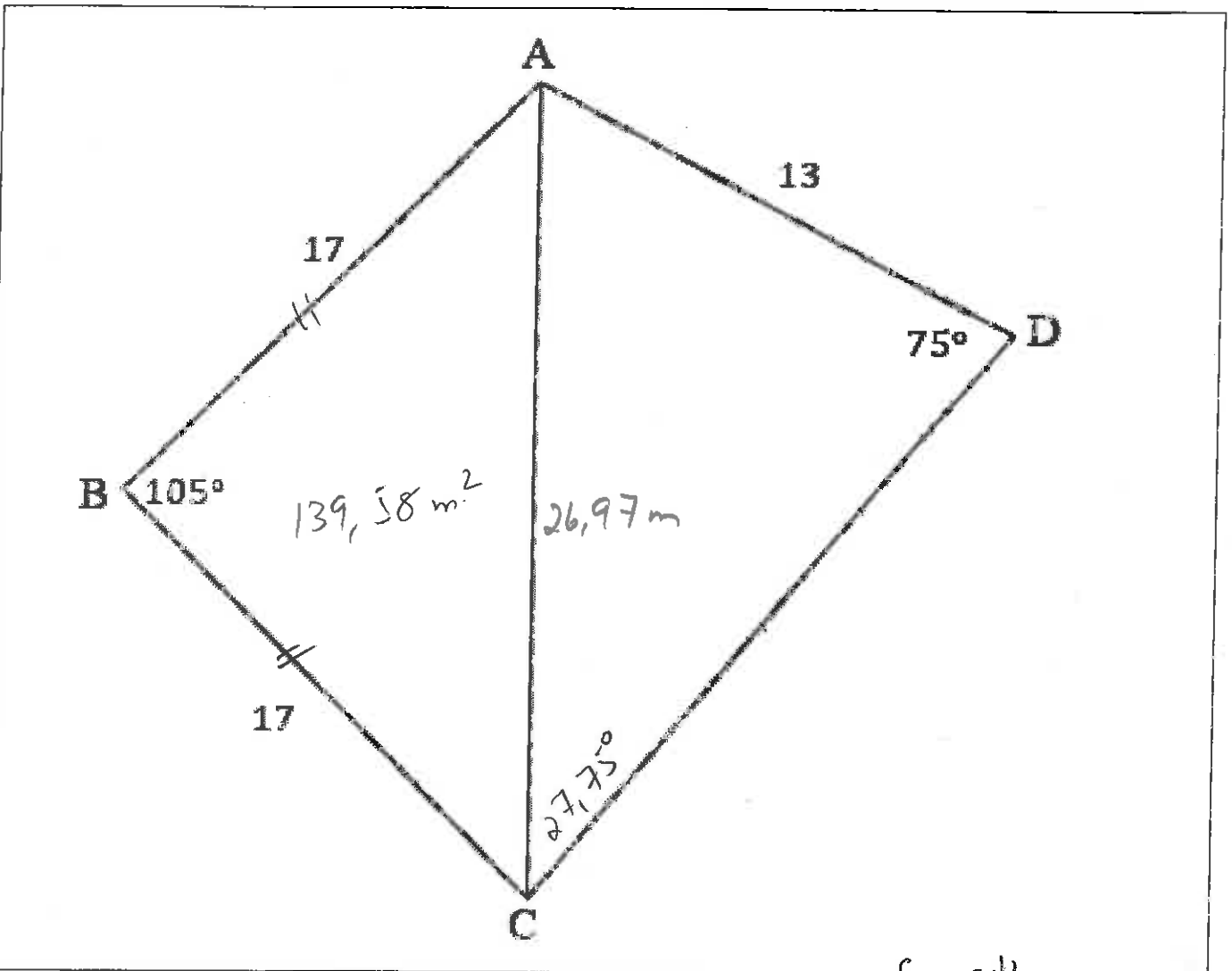
6.1	<p> <math>f</math> <math>\tan</math>  <math>\checkmark (0;0)</math>  <math>\checkmark</math> asym  <math>\checkmark</math> shape                 </p> <p> <math>\checkmark</math> int's <math>30^\circ -0,5</math>  <math>\checkmark (-60^\circ; -1) (120^\circ; 1)</math>  <math>\checkmark</math> shape                 </p>	6
6.2	<p> <math>f: n_p = \frac{180^\circ}{\frac{1}{2}} \checkmark = 360^\circ \checkmark</math> a.o 2/2                 </p>	2 (2)
6.3	<p> <math>x \in (0^\circ; 30^\circ)</math> <math>\checkmark \checkmark</math> cv not^n                 </p>	2 (2)
6.4	<p> <math>h: x = 170^\circ</math> <math>\checkmark</math> NB <math>\underline{x =}</math> </p>	1 (1)

[11]

Additional Space/Addisionele Ruimte

6.3	<p> <math>f(x) g(x) &lt; 0</math> <math>[-90^\circ; 120^\circ]</math>  <math>y_f \cdot y_g -</math> </p>	
6.4	<p> <math>f \leftarrow 10^\circ</math> <math>h</math> <math>x \in [-90^\circ; 180^\circ]</math>  <math>180^\circ - 10^\circ = 170^\circ</math> </p>	

QUESTION/VRAAG 7

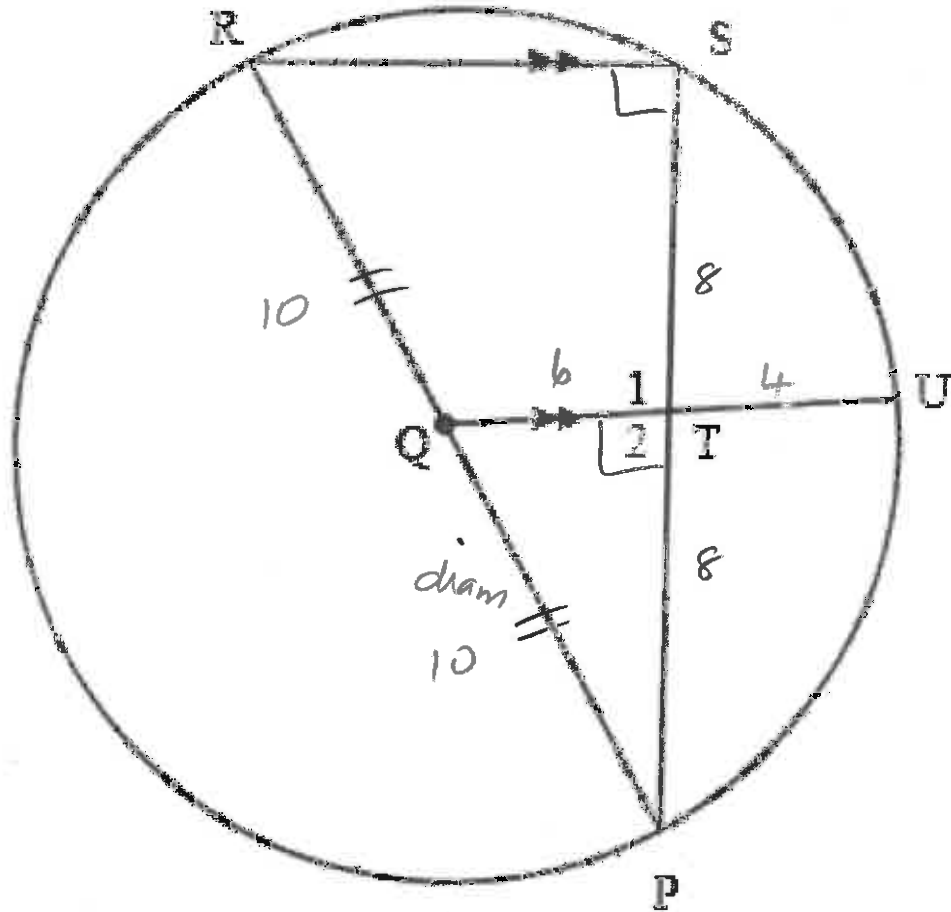


7.1	$\text{area } \triangle ABC = \frac{1}{2} (17)(17) \sin 105^\circ$	
	$= 139,58 \text{ m}^2$	3
7.2	$AC^2 = 17^2 + 17^2 - 2 \cdot 17 \cdot 17 \cos 105^\circ$	(3)
	$= 727,59 \dots$	
	$AC = \sqrt{727,59 \dots}$	
	$= 26,97 \text{ m}$	3
		(3)



QUESTION/VRAAG 8

8.1



8.1.1

$\hat{S} = 90^\circ$  ✓<sup>S</sup> ✓<sup>R</sup> in semi  $\odot = 90^\circ$

2

8.1.2

ASSUMING Q IS CENTRE OF  $\odot$

$\hat{T}_2 = 90^\circ$  ✓<sup>SR</sup> Cor<sup>n</sup>s =,  $RS \parallel QU$

$TP = 8$  ✓<sup>SR</sup> line from centre  $\odot$   
 $\perp$  to chord

$QT = 6$  ✓<sup>S</sup> ✓<sup>S</sup> Pythag

$QU = 10$  ✓<sup>SR</sup> radii

$\therefore TU = 4$  ✓<sup>S</sup>  $10 - 6$

(2)

6

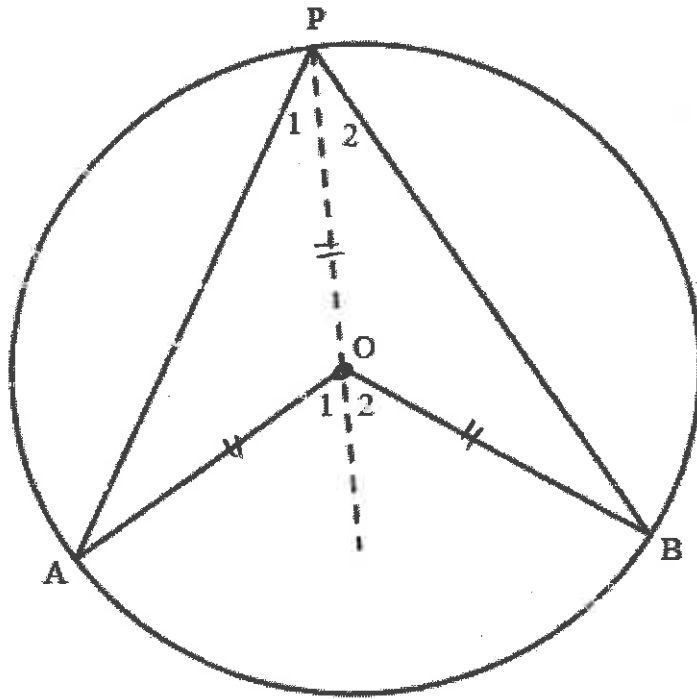
(6)





QUESTION/VRAAG 9

9.1



$\hat{O}_1 = \hat{A} + \hat{P}_1$  ✓<sub>SR</sub> Ext  $\hat{\Delta}$

but  $\hat{A} = \hat{P}_1$  ✓<sub>SR</sub>  $\hat{\Delta}$ 's opp = sides

✓<sub>R</sub> radii

$\therefore \hat{O}_1 = 2 \cdot \hat{P}_1$  ] ✓<sub>S</sub>

Similarly  $\hat{O}_2 = 2 \hat{P}_2$

$\hat{AOB} = \hat{O}_1 + \hat{O}_2$

$= 2 \hat{P}_1 + 2 \hat{P}_2$

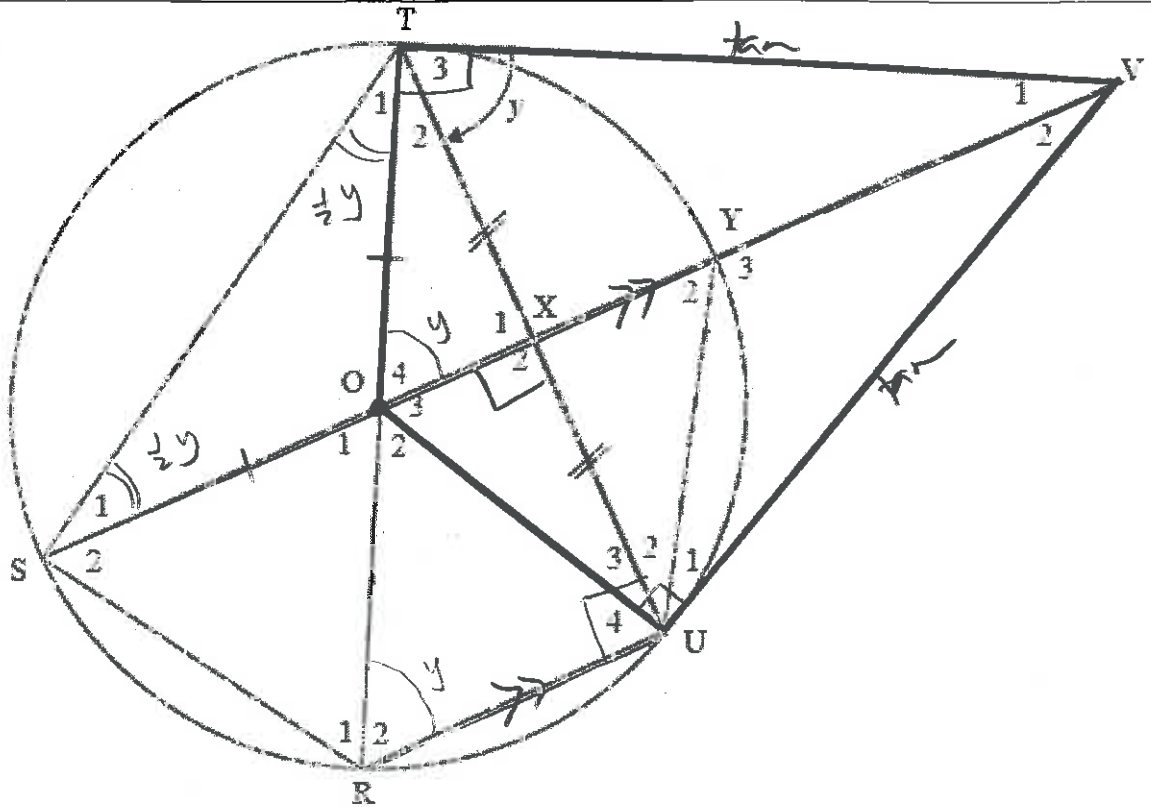
$= 2 (\hat{P}_1 + \hat{P}_2)$

$= 2 \cdot \hat{APB}$  →

4

(4)

9.2



9.2.1

$\hat{U}_3 + \hat{U}_4 = 90^\circ$  ✓ ✓ in semi  $\odot = 90^\circ$   
 $\hat{X}_2 = 90^\circ$  ✓ ✓ line from centre  $\odot$   
 to midpt chord  
 $\therefore \hat{X}_2 + \hat{U}_3 + \hat{U}_4 = 90^\circ + 90^\circ$   
 $= 180^\circ$

$\therefore \underline{RU \parallel SY}$  ✓  $\hat{R}$  corr  $\hat{S} = 180^\circ$

5

(5)

9.2.2

$\hat{R}_2 = y$  ✓  $\hat{S}$  ✓  $\hat{R}$   $\wedge$  tan chord  
 $\hat{O}_4 = y$  ✓  $\hat{SR}$  corr  $\hat{S} =$ ,  $RU \parallel SY$   
 $\hat{T}_1 = \hat{S}_1$  ✓  $\hat{SR}$   $\hat{S}$  opp = sides, radii  
 $\therefore 2\hat{T}_1 = y$  ✓  $\hat{SR}$  ext  $\wedge$   $\Delta$   
 $\therefore \underline{\hat{T}_1 = \frac{1}{2}y}$

5

(5)

9.2.3  $\hat{T}_2 + \hat{T}_3 = 90^\circ$  ✓✓  $\tan \perp$  rad

Similarly,

$\hat{U}_1 + \hat{U}_2 + \hat{U}_3 = 90^\circ$  ✓✓

$\therefore \hat{T}_2 + \hat{T}_3 + \hat{U}_1 + \hat{U}_2 + \hat{U}_3$

$= 90^\circ + 90^\circ$

$= 180^\circ$

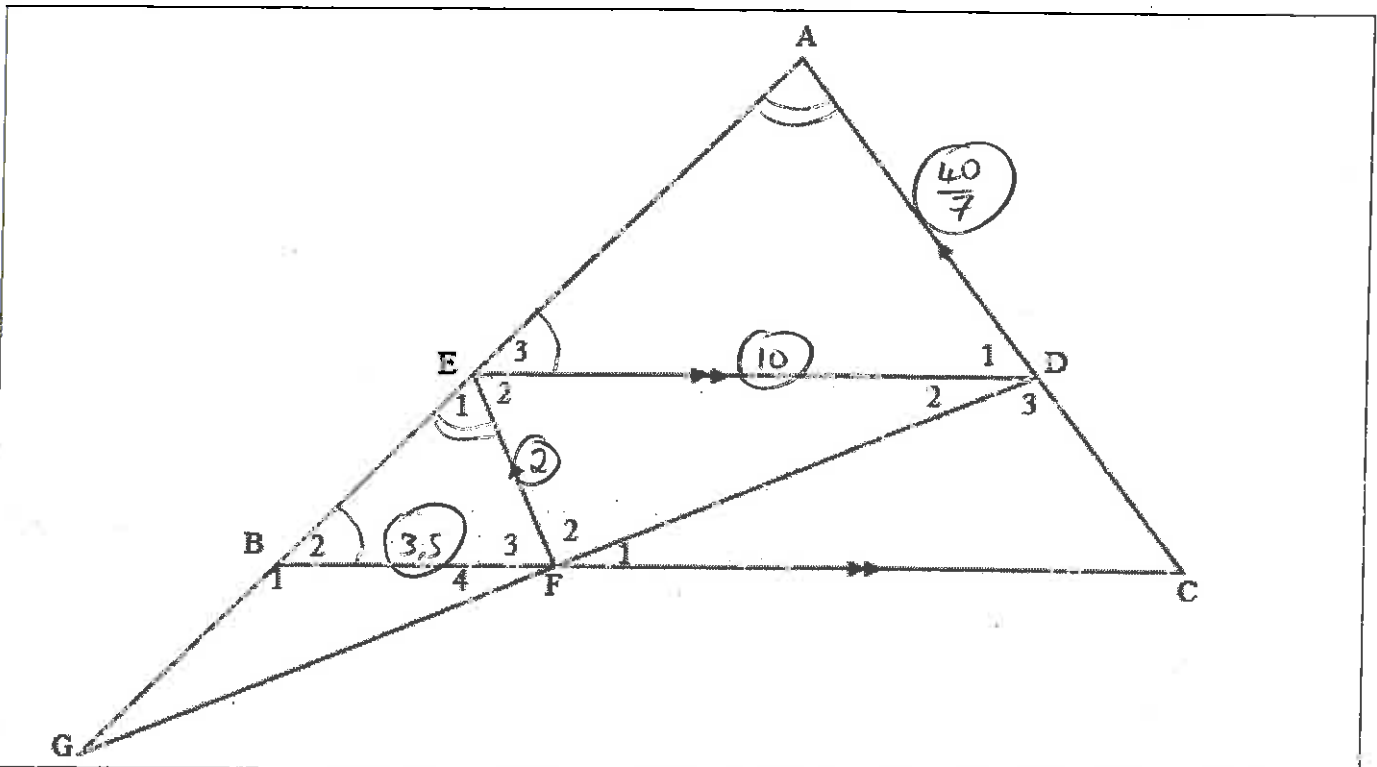
$\therefore$  TOUV is a cyclic quad  $\rightarrow$  conv opp ^1s cyclic quad  $= 180^\circ$  ✓<sup>R</sup>

5

(5)  
[19]

**Additional Space/Addisionele Ruimte**


QUESTION/VRAAG 10



10.1

$$\frac{BC}{FC} = \frac{BA}{EA} \quad \checkmark \quad \checkmark \quad \text{line} \parallel \text{1 side of } \Delta$$

$$\frac{BA}{EA} = \frac{CA}{DA} \quad \checkmark \quad \checkmark \quad \text{line} \parallel \text{1 side of } \Delta$$

$$\therefore \frac{BC}{FC} = \frac{CA}{DA} \quad \text{both} = \frac{BA}{EA}$$

$$\therefore \frac{BC}{FC} = \frac{AC}{DA}$$

4

10.2

In  $\Delta$ 's  $B_2 F_3 E_1, E_3 D_1 A$

1.  $\hat{B}_2 = \hat{E}_3 \quad \checkmark_{SP} \text{ Corr } \hat{S} =, DE \parallel BC$
2.  $\hat{E}_1 = \hat{A} \quad \checkmark_{SP} \text{ Corr } \hat{S} =, EF \parallel AC$

$\therefore \Delta BFE \parallel \Delta EDA \quad AAA \checkmark$

3

(3)

10.3	10.3.1	$\frac{AD}{EF} = \frac{DE}{FB}$ ✓ <sup>S</sup> ✓ <sup>R</sup> $\Delta BFE \parallel \Delta EDA$	4
		$\frac{AD}{2} = \frac{10}{3.5}$ ✓ <sub>sub</sub>	
		$AD = \frac{40}{7}$ ✓	
		$\hookrightarrow 5,71$	
	(4)		
	10.3.2	$FE \parallel DC$ given	2
		$ED \parallel FC$ given	

[13]

TOTAL/TOTAAL: 150

Additional Space/Addisionele Ruimte

10.3.2 cont.	$\therefore$ EDCF is a	both opp	2
	$\parallel$ gm	sides $\parallel$	
	$\therefore DC = 2$ ✓ <sup>S</sup> ✓ <sup>R</sup>	opp sides $\parallel$ gm =	



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**SEPTEMBER 2017**

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

**MARKS/PUNTE: 150**

---

This marking guideline consists of 15 pages.  
*Hierdie nasienriglyn bestaan uit 15 bladsye.*

---

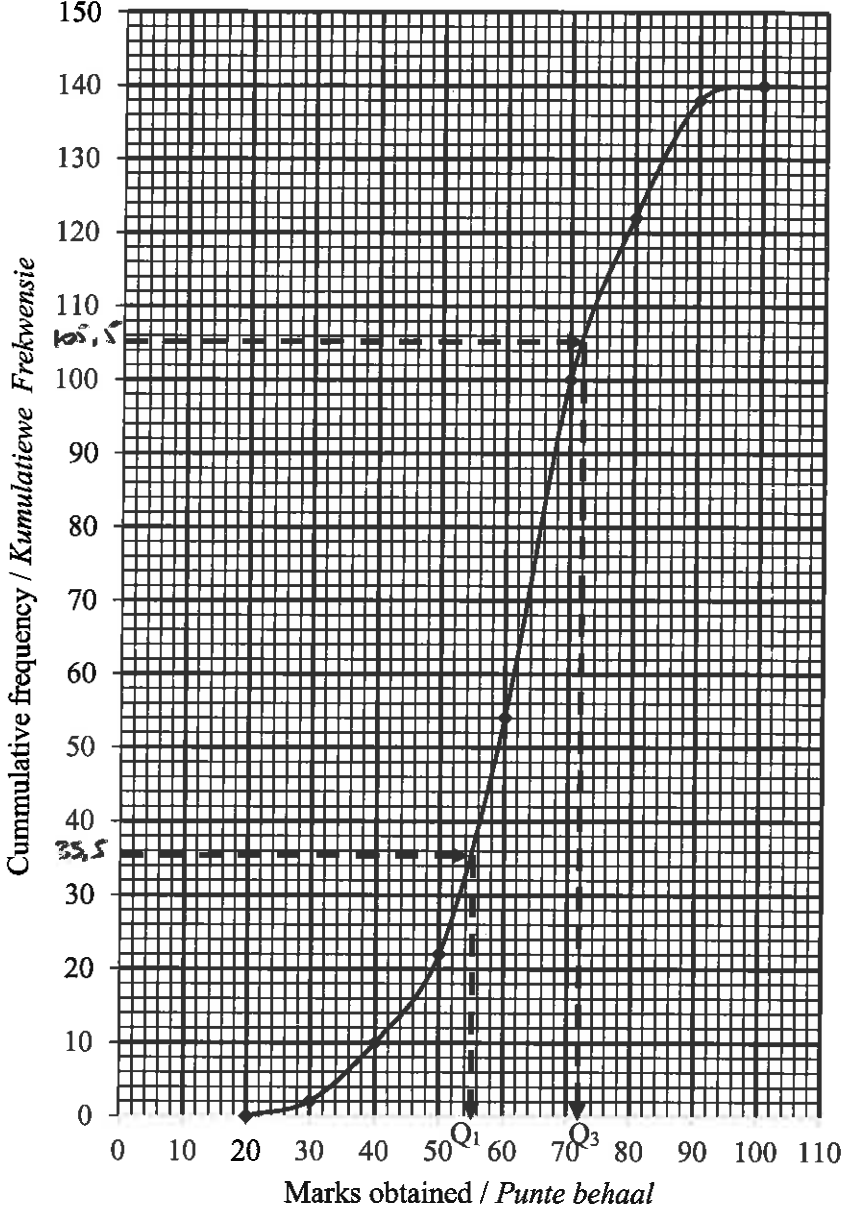
## QUESTION/VRAAG 1

Employee / <i>Werknemer</i>	1	2	3	4	5	6	7	8	9	10
Hours in training / <i>Ure in opleiding</i>	16	36	20	38	40	30	35	22	40	24
Productivity (units produced per day) <i>Produktiwiteit (eenhede per dag vervaardig)</i>	45	70	44	56	60	48	75	60	63	38
1.1	<p style="text-align: center;">Scatter plot / <i>Spreidiagram</i></p> <p style="text-align: center;">Productivity units produced per day / <i>Produktiwiteit eenhede per dag vervaardig</i></p> <p style="text-align: center;">Hours in training / <i>Ure in opleiding</i></p>						<ul style="list-style-type: none"> <li>✓ 2-4 correct points / <i>korrekte punte</i></li> <li>✓ 5-7 correct points / <i>korrekte punte</i></li> <li>✓ plotting all points / <i>afsteek van alle punte</i></li> </ul>	(3)		
1.2	$a = 29,22$ $b = 0,89$ $y = 29,22 + 0,89x$			<ul style="list-style-type: none"> <li>✓ A</li> <li>✓ B</li> <li>✓ equation / <i>vergelyking</i></li> </ul>			(3)			
1.3	<del>(30,9; 55,50)</del> (30,1; 55,9) <i>y</i> -int / <i>y</i> -afsnit 29,22			<ul style="list-style-type: none"> <li>✓ mean point / <i>gemiddelde punt</i> (30,90; 55,50)</li> <li>and/en <i>y</i>-int/<i>y</i>-afsnit 29,22      30,1 55,9</li> <li>✓ regression line / <i>regressielyn</i></li> </ul>			(2)			
1.4	$y = 29,22 + 0,89(25)$ $= 51,47$ <b>OR/OF</b> $y = 51,38$ [calculator use] / [sakrekenaar gebruik]			<b>ANSWER ONLY FULL MARKS</b> <b>SLEGS ANTWOORD VOLPUNTE</b>			<ul style="list-style-type: none"> <li>✓ subst. / <i>yerv.</i></li> <li>✓ answer / <i>antwoord</i></li> </ul>	(2)		
1.5	$r = 0,66$			<ul style="list-style-type: none"> <li>✓ answer / <i>antwoord</i></li> </ul>			(1)			
1.6	Moderately strong positive correlation / <i>Matige sterk positiewe korrelasie</i>			<ul style="list-style-type: none"> <li>✓ answer / <i>antwoord</i></li> </ul>			(1)			

[12]

QUESTION/VRAAG 2

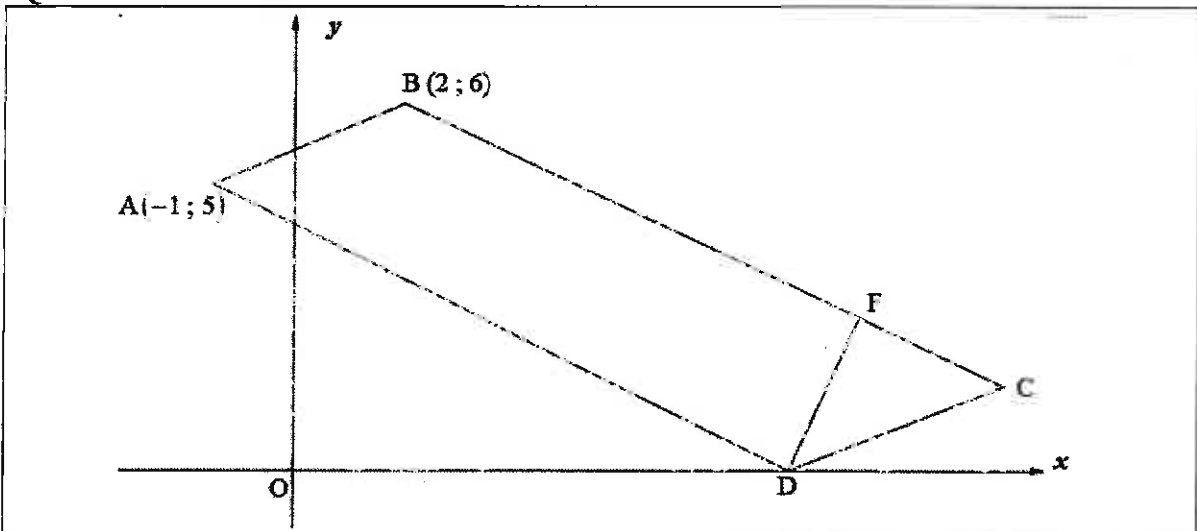
X

2.1	140 learners / <i>leerders</i>	✓ answer / <i>antwoord</i>	(1)	
2.2	$60 < x \leq 70$ <b>60 - 69</b>	✓ answer / <i>antwoord</i>	(1)	
2.3	<p style="text-align: center;">Marks for Mathematics Test / <i>Punte vir Wiskunde-toets</i></p> 		<p>✓ grounding / <i>anker</i></p> <p>✓ cumulative frequency / <i>kumulatiewe frekwensie</i></p> <p>✓ plotting against the upper limit / <i>afsteek teen die boonste limiet</i></p> <p>✓ shape / <i>vorm</i></p>	(4)
2.4	$Q_3 - Q_1 = 72 - 55$ $= 17$	✓ $Q_3$ & $Q_1$ ✓ IQR	(2)	

[8]



## QUESTION/VRAAG 3



3.1	$BC: x + 2y = 14$ $y = -\frac{1}{2}x + 7$ $m_{BC} = m_{AD} = -\frac{1}{2}$ $y - 5 = -\frac{1}{2}(x + 1)$ $y = -\frac{1}{2}x + \frac{9}{2}$	<ul style="list-style-type: none"> <li>✓ <math>m_{AD} = -\frac{1}{2}</math></li> <li>✓ subst. <math>m</math> and A into correct formula / verv. van <math>m</math> en A in korrekte formule</li> <li>✓ <math>y = -\frac{1}{2}x + \frac{9}{2}</math></li> </ul>	(3)
3.2	$-\frac{1}{2}x + \frac{9}{2} = 0$ $x = 9$ <p style="text-align: center;"><b>OR/OF</b></p> $D(9; 0)$ $m_{AD} = m_{BC}$ $\frac{0 - 5}{x + 1} = -\frac{1}{2}$ $-10 = -x - 1$ $x = 9$ $D(9; 0)$	<ul style="list-style-type: none"> <li>✓ <math>y = 0</math></li> <li>✓ <math>x = 9</math></li> <li>✓ <math>y = 0</math></li> <li>✓ <math>x = 9</math></li> </ul>	(2)

3.3	$m_{FD} = \frac{2-0}{10-9}$ $= 2$ $m_{BC} \times m_{FD} = 2 \times -\frac{1}{2}$ $= -1$ $FD \perp BC \quad [m_{BC} \times m_{FD} = -1]$	<p>✓ correct subst. / korrekte verv.</p> <p>✓ <math>m_{FD} = 2</math></p> <p>✓ <math>m_{BC} \times m_{FD} = -1</math></p>	(3)
3.4	$AD = \sqrt{(-1-9)^2 + (5-0)^2}$ $= \sqrt{125}$ $= 5\sqrt{5}$	<p>✓ subst. into correct formula / verv. in korrekte formule</p> <p>✓ <math>AD = 5\sqrt{5}</math></p>	(2)
3.5	$FD = \sqrt{(9-10)^2 + (0-2)^2}$ $= \sqrt{5}$ $A \text{ of } ABCD = b \times h$ $= 5\sqrt{5} \times \sqrt{5}$ $= 25$	<p>✓ subst. into correct formula / verv. in korrekte formule</p> <p>✓ <math>FD = \sqrt{5}</math></p> <p>✓ subst into correct formula / verv. in korrekte formule</p> <p>✓ answer / antwoord</p>	(4)
3.6	$m_{AB} = m_{DC}$ $= \frac{6-5}{2-(-1)}$ $= \frac{1}{3}$ <p>∴ Inclination of / Helling van DC = 18,43°</p> $\text{Inclination of / Helling van } AD = 180^\circ - \tan^{-1}\left(\frac{1}{2}\right)$ $= 153,43^\circ$ $\hat{A}DC = 153,43^\circ - 18,43^\circ$ $= 135^\circ$ <p>∴ <math>\hat{A}BC = 135^\circ</math> [opp ∠s of a parm. / teenoorst. ∠e van <math>\parallel^m</math>]</p>	<p>✓ subst. into correct formula / verv. in korrekte formule</p> <p>✓ <math>m_{AB} = \frac{1}{3}</math></p> <p>✓ <math>\theta_{DC} = 18,43^\circ</math></p> <p>✓ <math>\theta_{AD} = 153,43^\circ</math></p> <p>✓ <math>\hat{A}DC = 135^\circ</math></p> <p>✓ <math>\hat{A}BC = 135^\circ</math></p>	(6)

[20]

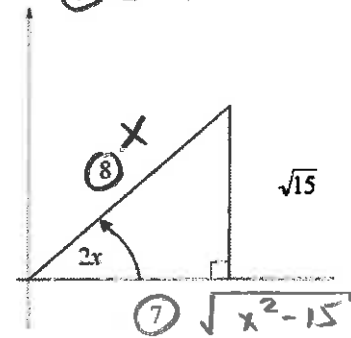
## QUESTION/VRAAG 4

4.1	$x_s = \frac{0+4}{2} = 2$ $y_s = \frac{0-6}{2} = -3$ <p>S(2; -3)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><b>Answer only full marks</b> <b>Slegs antwoord volpunte</b></p> </div>	<ul style="list-style-type: none"> <li>✓ subst. into correct formula verv. in korrekte formule</li> <li>✓ both coordinates / beide koördinate</li> </ul>	(2)
4.2	$SP = \sqrt{(2-4)^2 + (-3+6)^2}$ $= \sqrt{13}$	<ul style="list-style-type: none"> <li>✓ subst. into correct formula verv. in korrekte formule</li> <li>✓ answer / antwoord</li> </ul>	(2)
4.3	$(x-2)^2 + (y+3)^2 = 13$	<ul style="list-style-type: none"> <li>✓ correct subst. centre / korrekte verv. middelpunt</li> <li>✓ <math>r^2 = 13</math>.</li> </ul>	(2)
4.4	Tangent $\perp$ radius / Raaklyn $\perp$ radius	<ul style="list-style-type: none"> <li>✓ answer / antwoord</li> </ul>	(1)
4.5	$m_{\text{rad}} = \frac{-3+6}{2-4} = -\frac{3}{2}$ $m_{\text{tan}} = \frac{2}{3} \quad [\text{radius} \perp \text{tan}] \quad [\text{radius} \perp \text{raaklyn}]$ $y+6 = \frac{2}{3}(x-4)$ $= \frac{2}{3}x - \frac{26}{3}$	<ul style="list-style-type: none"> <li>✓ subst. into correct form. verv. in korrekte formule</li> <li>✓ <math>m_{\text{rad}} = -\frac{3}{2}</math></li> <li>✓ <math>m_{\text{tan}} = \frac{2}{3}</math></li> <li>✓ subst. into correct form / verv. in korrekte formule</li> </ul>	(4)

4.6	$(0-2)^2 + (y+3)^2 = 13$ $(y+3)^2 = 9$ $y+3 = \pm 3$ $y_T = -6$ $T(0; -6)$ <p><b>OR / OF</b></p> $(0-2)^2 + (y+3)^2 = 13$ $y^2 + 6y = 0$ $y(y+6) = 0$ $y_T = -6$ $T(0; -6)$ <p><b>OR / OF</b></p> <p>Draw horizontal line <math>y = -3</math> with M on OT  <i>Trek horisontale lyn <math>y = -3</math> met M op OT</i></p> <p>OM = MT [<math>\perp</math> from centre bisect the chord]  <i>[<math>\perp</math> vanaf middelpunt halveer koord]</i></p> $OM = 3$ $\therefore MT = 3$ $\therefore OT = 6$ $\therefore T(0; -6)$	<ul style="list-style-type: none"> <li>✓ <math>x = 0</math></li> <li>✓ <math>(y+3)^2 = 9</math></li> <li>✓ <math>y+3 = \pm 3</math></li>   <li>✓ <math>y = -6</math></li>   <li>✓ subst. <math>x = 0</math> in eqn of circle  <i>verv. <math>x = 0</math> in verg. van sirkel</i></li> <li>✓ standard form /  <i>standaardvorm</i></li> <li>✓ factors / <i>faktore</i></li> <li>✓ <math>y_T = -6</math></li>   <li>✓ S/R</li>   <li>✓ length of / <i>lengte van</i> MT</li>   <li>✓ length of / <i>lengte van</i> OT</li> <li>✓ answer / <i>antwoord</i></li> </ul>	(4)
4.7	$\text{At } U, y = -\frac{26}{3}$ $\therefore TU = \frac{26}{3} - 6$ $= \frac{8}{3}$ $\frac{\text{Area } \triangle OTP}{\text{Area } \triangle PTU} = \frac{\frac{1}{2} \times 6 \times 4}{\frac{1}{2} \times \frac{8}{3} \times 4}$ $= \frac{9}{4}$	<ul style="list-style-type: none"> <li>✓ <math>U\left(0; -\frac{26}{3}\right)</math></li>   <li>✓ length of / <i>lengte van</i> TU</li>   <li>✓ length of / <i>lengte van</i> OT</li> <li>✓ correct subst /  <i>korrekte verv.</i></li>   <li>✓ answer / <i>antwoord</i></li> </ul>	(5)

[20]

## QUESTION/VRAAG 5

5.1.1	$\sin 2x = \frac{\sqrt{15}}{8} \leftarrow x \text{ in Question paper}$  $\cos 2x = 2\cos^2 x - 1$ $2\cos^2 x = \cos 2x + 1$ $\cos x = \sqrt{\frac{\cos 2x + 1}{2}}$ $= \sqrt{\frac{\frac{7}{8} + 1}{2}}$ $= \frac{\sqrt{15}}{4}$ <p><b>OR / OF</b></p> $\cos 2x = 2\cos^2 x - 1$ $\frac{7}{8} = 2\cos^2 x - 1$ $\frac{15}{16} = \cos^2 x$ $\therefore \cos x = \frac{\sqrt{15}}{4}$	<p>See SUT'S solns</p> <ul style="list-style-type: none"> <li>✓ diagram / diagram</li> <li>✓ identity of <math>\cos 2x</math> identiteit van <math>\cos 2x</math></li> <li>✓ <math>\cos x</math> subject of formula / <math>\cos x</math> onderwerp v/d formule</li> <li>✓ <math>\cos 2x = \frac{7}{8}</math></li> <li>✓ answer / antwoord</li> <li>✓ identity / identiteit</li> <li>✓ <math>\cos 2x = \frac{7}{8}</math></li> <li>✓ <math>\cos^2 x = \frac{15}{16}</math></li> <li>✓ answer / antwoord</li> </ul>
5.2	$\frac{\sin(180^\circ - \theta) \sin(540^\circ - \theta) \cos(\theta - 90^\circ)}{\tan(-\theta) \sin^2(360^\circ - \theta)}$ $= \frac{(\sin \theta)(\sin \theta)(\sin \theta)}{(-\tan \theta)(-\sin \theta)^2}$ $= \frac{\sin \theta}{\sin \theta}$ $= \frac{\sin \theta}{\cos \theta}$ $= -\cos \theta$	<ul style="list-style-type: none"> <li>✓ <math>\sin \theta</math></li> <li>✓ <math>\sin \theta</math></li> <li>✓ <math>\sin \theta</math></li> <li>✓ <math>(-\tan \theta)</math></li> <li>✓ <math>(-\sin \theta)^2</math></li> <li>✓ <math>\frac{\sin \theta}{\cos \theta} = \tan \theta</math></li> <li>✓ <math>(-\cos \theta)</math></li> </ul>

5.3.1	$\text{LHS} = \frac{\sin 5x \cdot \cos 3x - \cos 5x \cdot \sin 3x}{\tan 2x} - 1$ $= \frac{\sin(5x - 3x)}{\tan 2x} - 1$ $= \frac{\sin 2x}{\sin 2x} - 1$ $= \frac{\cos 2x}{\cos 2x} - 1$ $= 1 - 2 \sin^2 x - 1$ $= -2 \sin^2 x$ $\therefore \text{LHS} = \text{RHS}$	<ul style="list-style-type: none"> <li>✓ <math>\sin(5x - 3x)</math></li> <li>✓ <math>\tan 2x = \frac{\sin 2x}{\cos 2x}</math></li> <li>✓ simplification / vereenvoudiging</li> <li>✓ identity/identiteit <math>1 - 2 \sin^2 x</math></li> </ul>	(4)	
5.3.2	$\tan 2x = 0$ $2x = 0^\circ \text{ or / of } 180^\circ$ $x = 0^\circ \text{ or / of } 90^\circ$ $\text{or } 180^\circ$	<p>OR/OF <math>\tan 2x</math> is undefined / is ongedefinieerd</p> $2x = 90^\circ \text{ or / of } 270^\circ$ $x = 45^\circ \text{ or / of } 135^\circ$	<ul style="list-style-type: none"> <li>✓ <math>\tan 2x = 0</math> /undefined ongedefinieerd</li> <li>✓ <math>0^\circ \text{ or / of } 180^\circ</math></li> <li>✓ <math>90^\circ \text{ or / of } 270^\circ</math></li> <li>✓ answers / antwoorde</li> </ul>	(4)

[20]

## QUESTION/VRAAG 6

6.1		<p><i>f</i></p> <ul style="list-style-type: none"> <li>✓ both intercepts / beide afsnitte</li> <li>✓ asymptote / asimptote</li> <li>✓ shape / vorm</li> </ul> <p><i>g</i></p> <ul style="list-style-type: none"> <li>✓ intercepts / afsnitte</li> <li>✓ min &amp; max values / waardes</li> <li>✓ shape / vorm</li> </ul>	(6)	
6.2	Period(e) of/van $f\left(\frac{1}{2}x\right) = \frac{180^\circ}{\frac{1}{2}}$ $= 360^\circ$	Answer only full marks <i>Slegs antwoord volpunte</i>	<ul style="list-style-type: none"> <li>✓ <math>\frac{180^\circ}{\frac{1}{2}}</math></li> <li>✓ <math>360^\circ</math></li> </ul>	(2)
6.3	$0^\circ < x < 30^\circ$	<ul style="list-style-type: none"> <li>✓ critical values / kritiese waardes</li> <li>✓ notation / notasie</li> </ul>	(2)	
6.4	$x = 170^\circ$	✓ answer / antwoord	(1)	

[11]

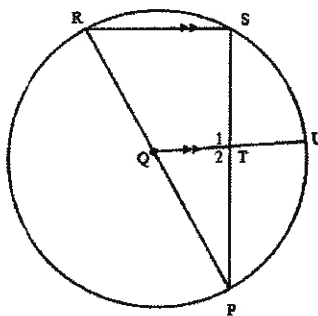
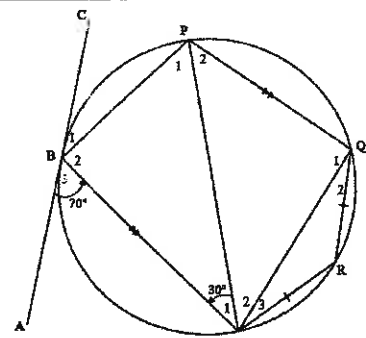
## QUESTION/VRAAG 7

7.1	$\text{Area } \triangle ABC = \frac{1}{2} \cdot AB \cdot BC \cdot \sin \hat{B}$ $= \frac{1}{2} \times 17 \times 17 \times \sin 105^\circ$ $= 139,58$	<ul style="list-style-type: none"> <li>✓ Area rule formula / <i>Oppervlakte reël formule</i></li> <li>✓ correct subst. / <i>korrekte verv.</i></li> <li>✓ answer / <i>antwoord</i></li> </ul>	(3)
7.2	$AC^2 = AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot \cos \hat{B}$ $= 17^2 + 17^2 - 2 \cdot 17 \cdot 17 \cdot \cos 105^\circ$ $= 727,5974081$ $\therefore AC = 26,97$	<ul style="list-style-type: none"> <li>✓ cosine rule formula <i>cosinus-reël formule</i></li> <li>✓ correct subst into cosine rule <i>korrekte verv. in cosinus-reël</i></li> <li>✓ <math>AC = 26,97</math></li> </ul>	(3)
7.3	$\frac{\sin \hat{ACD}}{AD} = \frac{\sin \hat{D}}{AC}$ $\frac{\sin \hat{ACD}}{13} = \frac{\sin 75^\circ}{26,97}$ $\sin \hat{ACD} = 13 \times \frac{\sin 75^\circ}{26,97}$ $= 0,465592721$ $\hat{ACD} = 27,75^\circ$	<ul style="list-style-type: none"> <li>✓ sine rule formula <i>sinus-reël formule</i></li> <li>✓ correct subst. into sine rule <i>korrekte verv. in sinus-reël</i></li> <li>✓ answer / <i>antwoord</i></li> </ul>	(3)
7.4	Converse opp $\angle$ s of a cyclic quad <i>Omgekeerde: <math>\angle</math>e van koordevierhoek</i> OR / OF int. opp. $\angle$ s of a quad supp <i>oorst. binne <math>\angle</math>e van koordevierhoek suppl</i>	<ul style="list-style-type: none"> <li>✓ reason / <i>rede</i></li> <li>OR/OF</li> <li>✓ reason / <i>rede</i></li> </ul>	(1)

[10]

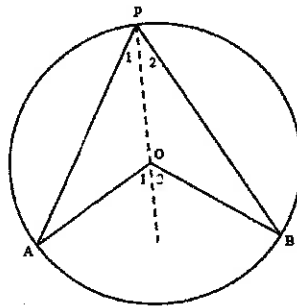


## QUESTION/VRAAG 8

8.1		
8.1.1	$\hat{S} = 90^\circ$ [ $\angle$ in semi-circle / $\angle$ in semi-sirkel]	✓ S ✓ R (2)
8.1.2	$\hat{T}_2 = \hat{S} = 90^\circ$ [corresp. $\angle$ s / ooreenk. $\angle$ e, $RS \parallel QU$ ] $\therefore$ T is the midpt of SP [line from centre $\perp$ to chord] <i>T is die midpt van SP [lyn vanaf middelpunt <math>\perp</math> op koord]</i> $QP = 10$ and/en $TP = 8$ $QT^2 = (10)^2 - (8)^2$ [Pyth. Theorem/Stelling] $\therefore QT = 6$ $QU = QP = 10$ [radii] $\therefore TU = 4$	✓ S/R ✓ S/R ✓ subst. into Pyth. verv. in Pyth. ✓ QT ✓ S/R ✓ TU (6)
8.2		
8.2.1	$\hat{B}_1 = 30^\circ$ [tan chord theorem] / [raaklyn koord stelling]	✓ S ✓ R (2)
8.2.2	$\hat{P}_2 = 30^\circ$ [alt $\angle$ s, $BS \parallel PQ$ ] / [verw. $\angle$ e, $BS \parallel PQ$ ]	✓ S ✓ R (2)
8.2.3	$\hat{R} = 150^\circ$ [opp. $\angle$ s of a cyclic quad] / <i>[oorst. <math>\angle</math>e van 'n koordevierhoek]</i>	✓ S ✓ R (2)
8.2.4	$\hat{Q}_2 = \hat{S}_3$ [ $\angle$ s opp = sides] / [ $\angle$ e teenoor = sye] $\hat{Q}_2 = \frac{180^\circ - 150^\circ}{2}$ [sum of $\angle$ s in a $\Delta$ ] / [som van $\angle$ e in 'n $\Delta$ ] $= 15^\circ$	✓ S/R ✓ S ✓ answer/antwoord (3)

[17]

## QUESTION/VRAAG 9

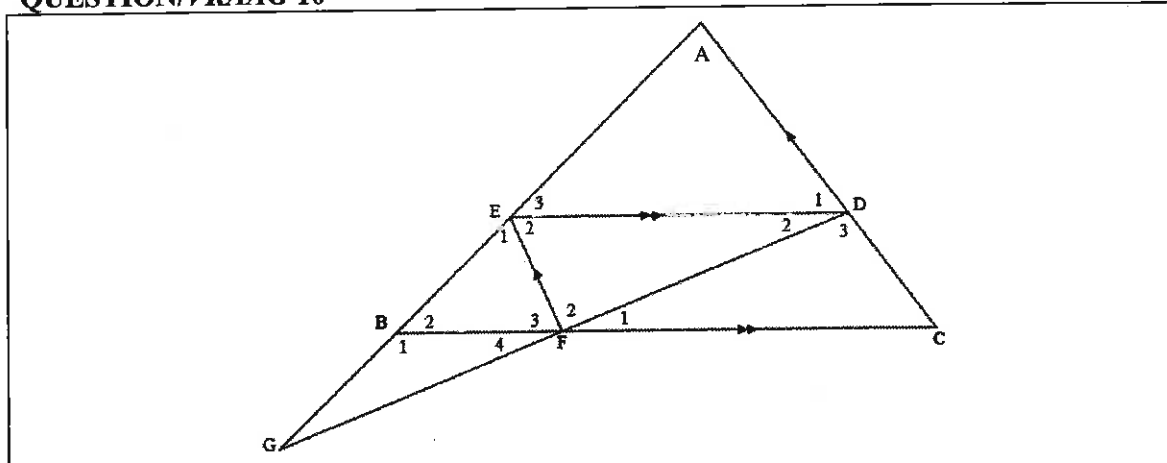


9.1	$\hat{O}_1 = \hat{P}_1 + A$ and / en $\hat{O}_2 = \hat{P}_2 + \hat{B}$ [ext $\angle$ of a $\Delta$ ] / [buite $\angle$ van 'n $\Delta$ ] $AO = OP = OB$ [radii] / [radiusse] $\hat{P}_1 = \hat{A}$ and / en $\hat{P}_2 = \hat{B}$ [ $\angle$ s opp = sides] / [ $\angle$ e teenoor = sye] $\therefore \hat{O}_1 = 2\hat{P}_1$ and / en $\hat{O}_2 = 2\hat{P}_2$ $\therefore \hat{O}_1 + \hat{O}_2 = 2\hat{P}_1 + 2\hat{P}_2$ $A\hat{O}B = 2(\hat{P}_1 + \hat{P}_2)$ $= 2A\hat{P}B$	$\checkmark$ S/R $\checkmark$ S/R $\checkmark$ S/R $\checkmark$ S	(4)
9.2			
9.2.1	$\hat{R}\hat{U}\hat{T} = 90^\circ$ [ $\angle$ in a semi - circle] / [ $\angle$ in 'n semi - sirkel] $\hat{X}_1 = 90^\circ$ [line from centre to midpoint] / [lyn vanaf middelpunt na middelpunt] $\therefore RU \parallel SY$ [corresp. $\angle$ s =] / [ooreenk. $\angle$ e =] <b>OR/OF</b> $\hat{R}\hat{U}\hat{T} = 90^\circ$ [ $\angle$ in a semi - circle] / [ $\angle$ in 'n halwe sirkel] $\hat{X}_2 = 90^\circ$ [line from centre to the midpoint] / [lyn vanaf die middelpunt na die middelpunt] $\therefore \hat{R}\hat{U}\hat{T} + \hat{X}_2 = 90^\circ + 90^\circ = 180^\circ$ $\therefore RU \parallel SY$ [co - int $\angle$ s supp] / [ko - binne $\angle$ e suppl.]	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ R $\checkmark$ R	(5)

9.2.2	$\hat{R}_2 = y$ [tan chord theorem] / [raaklyn koord stelling] $= \hat{O}_1$ [alt $\angle$ s, $RU \parallel SY$ ] / [verw. $\angle$ e, $RU \square SY$ ] $\therefore \hat{T}_1 = \frac{1}{2} \hat{O}_1$ [ $\angle$ at centre = twice $\angle$ at circumf.] [middelpunts $\angle$ = tweemaal omtrekshoek] $= \frac{1}{2} y$	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ R	(5)
9.2.3	$\hat{O}_4 = y = \hat{O}_1$ [vert opp. $\angle$ s] / [regoorst. $\angle$ e] $T\hat{U}V = y$ [tan from same point = in length] [raaklyne vanaf dieselfde punt is = in lengte] $\therefore$ TOUV is a cyclic quad [converse same segment] TOUV is 'n koordevierhoek [omgekeerde dieselfde segment]  <b>OR/OF</b> $V\hat{T}O = 90^\circ$ [tan $\perp$ radius] / [raaklyn $\perp$ radius] $V\hat{U}O = 90^\circ$ [tan $\perp$ radius] / [raaklyn $\perp$ radius] $\therefore V\hat{T}O + V\hat{U}O = 180^\circ$ $\therefore$ TOUV is a cyclic quad [converse opp $\angle$ s of cyclic quad.supp] TOUV is 'n koordevierhoek [omgekeerde teenoorst. $\angle$ e van koordevierhoek]	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ R  $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ R	(5)

[19]

## QUESTION/VRAAG 10



10.1	$\frac{BA}{EA} = \frac{BC}{FC} \quad [\text{prop theorem; } EF \parallel AC] / [\text{Ewerdigh.stelling; } EF \parallel AC]$ $= \frac{CA}{DA} \quad [\text{prop theorem; } ED \parallel BC] / [\text{Ewerdigh.stelling; } ED \parallel BC]$ $\therefore \frac{BC}{FC} = \frac{CA}{DA}$	✓S ✓R  ✓S ✓R	(4)
10.2	$\hat{B}_2 = \hat{E}_3 \quad [\text{corresp } \angle\text{s, ooreenk. } \angle\text{e: } ED \parallel BC]$ $\hat{E}_1 = \hat{A} \quad [\text{corresp } \angle\text{s, ooreenk. } \angle\text{e: } EF \parallel AC]$ $\therefore \hat{F}_3 = \hat{D}_1 \quad [\text{sum of } \angle\text{s of } \Delta / \text{som van } \angle\text{e van } \Delta]$ $\therefore \Delta BFE \parallel \Delta EDA \quad [\angle\angle\angle]$	✓S/R ✓S/R  ✓R	(3)
10.3.1	$\frac{AD}{FE} = \frac{ED}{BF} \quad [\Delta BFE \parallel \Delta EDA]$ $\frac{AD}{2} = \frac{10}{3,5}$ $AD = \frac{40}{7} = 5,71$	✓S ✓R  ✓subst verv.  ✓AD	(4)
10.3.2	$DC = EF = 2 \quad [\text{opp. sides of a parm}] / [\text{oorst. sye van 'n} \parallel^m]$	✓S ✓R	(2)

[13]

TOTAL/TOTAAL: 150