



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**SEPTEMBER 2020**

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

**MARKS/PUNTE: 150**

This marking guideline consists of 13 pages.  
Hierdie nasienriglyn bestaan uit 13 bladsye.

**QUESTION 1/VRAG 1**

1.1	$a = -4,1536$ ✓ $b = 0,958$ ✓ $y = -4,1536 + 0,958x$ ✓	$4 \frac{1}{2} p$ Answer Only: Full Marks	$a = -4,1536$ ✓ $b = 0,958$ ✓ $y = -4,1536 + 0,958x$ ✓	(3)
1.2	$r = 0,98$ ✓	Answer Only: Full Marks	$r = 0,98$ ✓	(1)
1.3	Very strong positive correlation/ ✓ <i>Bate sterk positiewe korrelasie</i>	$\in \mathbb{N}$	answer / antwoord ✓	(1)
1.4	$y = 45\%$ ✓	Answer Only: Full Marks	substitution / vervanging ✓ answer / antwoord ✓	(2)
1.5	$\bar{x} = 60,8$ Standard deviation / Standardafwyking = 17,51 (60,8 - 17,51 ; 60,8 + 17,51) (43,29 ; 78,31) ✓	$\frac{6}{6}$ learners / leerders ✓	Standard deviation / Standardafwyking = 17,51 (43,29 ; 78,31) ✓ 6 learners / leerders ✓	(3)
	31 43 49 55 58 59 65 72 81 94			[10]

3  
1  
1  
2  
3

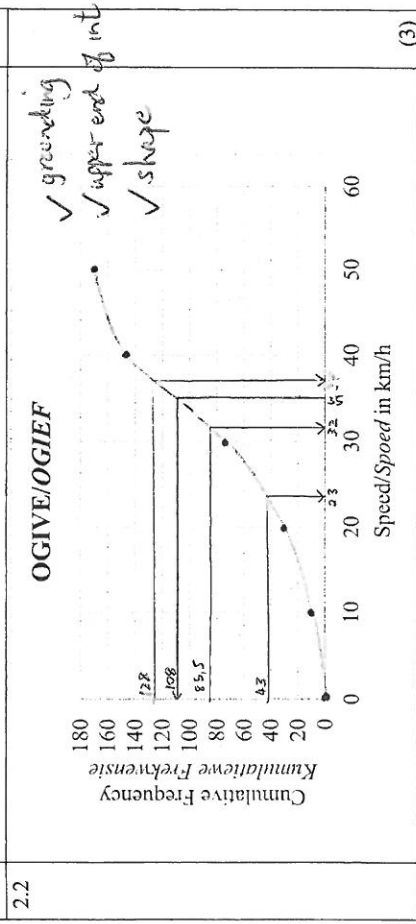
**QUESTION 2/VRAG 2**

2.1	<table border="1"> <thead> <tr> <th>Speed/Spoe (km/h)</th> <th>Frequency Frekwensie (f)</th> <th>Cumulative Frequency Kumulatiewe Frekwensie</th> </tr> </thead> <tbody> <tr> <td><math>0 &lt; x \leq 10</math></td> <td>10</td> <td>10</td> </tr> <tr> <td><math>10 &lt; x \leq 20</math></td> <td>20</td> <td>30</td> </tr> <tr> <td><math>20 &lt; x \leq 30</math></td> <td>45</td> <td>75</td> </tr> <tr> <td><math>30 &lt; x \leq 40</math></td> <td>72</td> <td>147</td> </tr> <tr> <td><math>40 &lt; x \leq 50</math></td> <td>23</td> <td>170</td> </tr> </tbody> </table>	Speed/Spoe (km/h)	Frequency Frekwensie (f)	Cumulative Frequency Kumulatiewe Frekwensie	$0 < x \leq 10$	10	10	$10 < x \leq 20$	20	30	$20 < x \leq 30$	45	75	$30 < x \leq 40$	72	147	$40 < x \leq 50$	23	170	✓ freq column / frek. kolom ✓ ✓ cum freq column / kum. frek kolom ✓	(2)
Speed/Spoe (km/h)	Frequency Frekwensie (f)	Cumulative Frequency Kumulatiewe Frekwensie																			
$0 < x \leq 10$	10	10																			
$10 < x \leq 20$	20	30																			
$20 < x \leq 30$	45	75																			
$30 < x \leq 40$	72	147																			
$40 < x \leq 50$	23	170																			

QUESTION 2/VRAG 2

SPEED / SPOED (KM/H)	FREQUENCY / FREKWENSIE (F)	CUMULATIVE FREQUENCY / KUMULATIEWE FREKWENSIE
$0 < x \leq 10$	10 ✓	10 ✓
$10 < x \leq 20$	20 .	30
$20 < x \leq 30$	45	75 .
$30 < x \leq 40$	72	147 .
$40 < x \leq 50$	23 .	170

2



3

2.3

$$M = T_{85,5} = 32 \text{ km/h} \checkmark$$

$$Q_1 = T_{43} = 23 \text{ km/h} \checkmark$$

2

2.4

0	23	32	37	50
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2.5

0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
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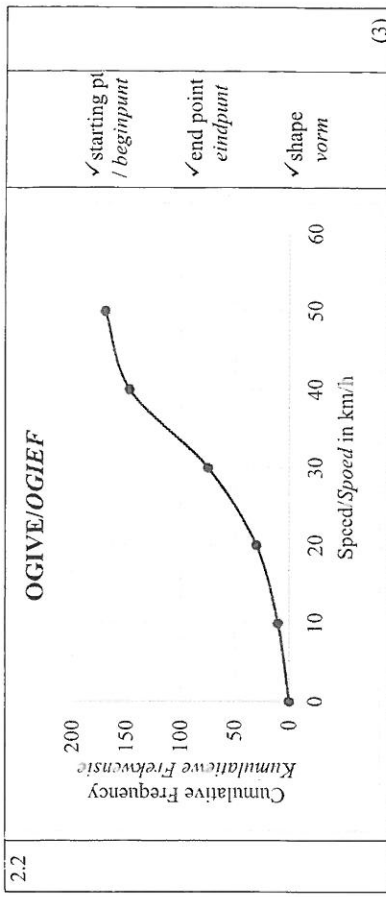
$\leq 35 \text{ km/h} = 108$

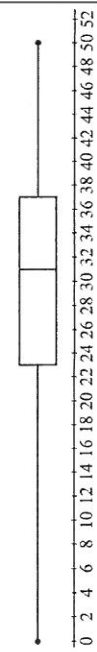
$> 35 \text{ km/h} = 170 - 108 = 62 \text{ cyclists} \checkmark$

2

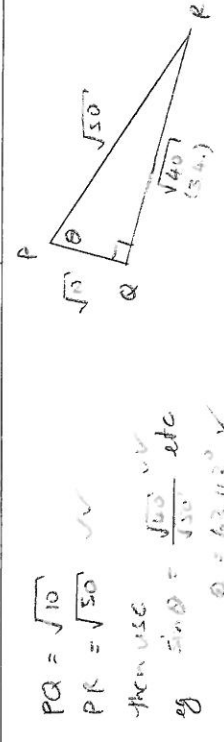
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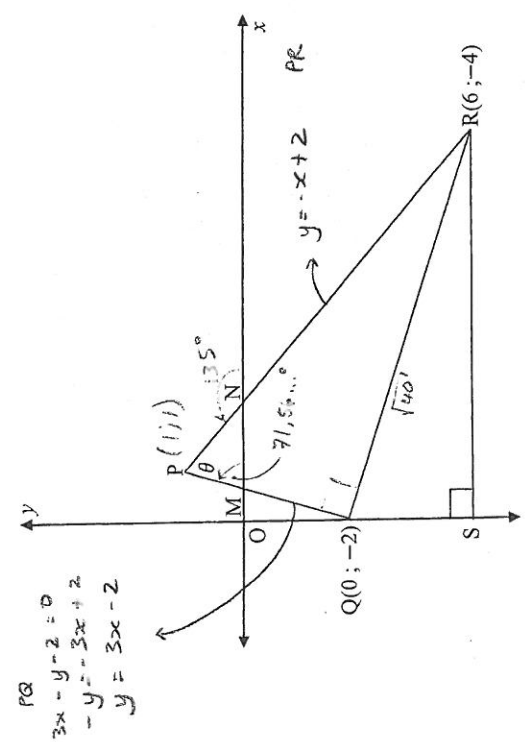
[10]



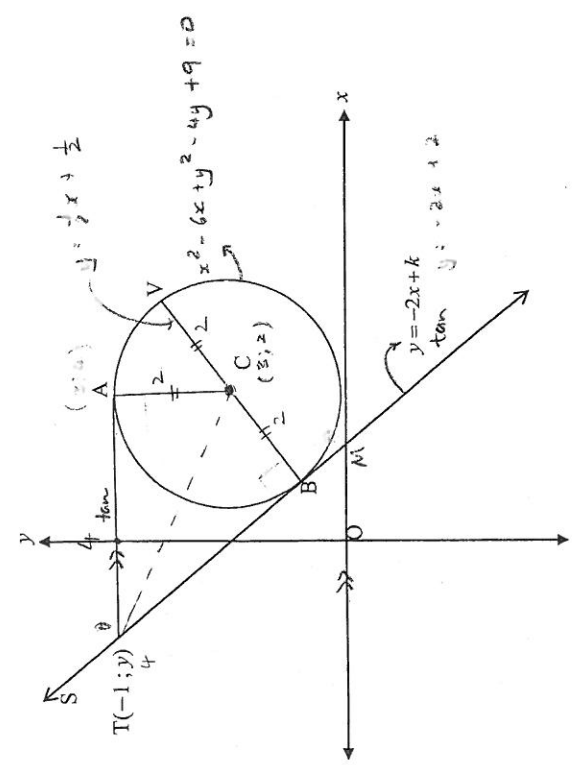
2.3	Q <sub>1</sub> = 23 Median / Mediaan = 31 (accept / aanvaar 22 - 24) (accept / aanvaar 30 - 32)	✓ Q <sub>1</sub> ✓ Median Mediaan	(2)
2.4		✓ for / vir Q <sub>3</sub> = 37 (accept / aanvaar 36 - 38) ✓ correct shape / korrekte vorm	(2)
2.5	170 - 110 = 60 cyclists / fietsryers (accept / aanvaar 59 - 61)	✓ answer / antwoord	(1)
<b>QUESTION 3 / VRAAG 3</b>			
3.1	$\frac{\sqrt{-2 - (-4)}}{0 - 6} = -\frac{1}{3}$ $\frac{1}{3}$ P(0, -2) P(6, -6)	✓ substitution / vervanging ✓ answer / antwoord	(2)
3.2	$m_{PQ} = 3$ $m_{PQ} \times m_{QR} = 3 \times \frac{-1}{3} = -1$ $\therefore \angle PQR = 90^\circ$	✓ $m_{PQ} = 3$ ✓ $m_{PQ} \times m_{QR} = 3 \times \frac{-1}{3} = -1$	(2)
3.3	Sub/Verw: $y = -x + 2$ into/in $3x - y - 2 = 0$ $\therefore 3x - (-x + 2) - 2 = 0$ $y = 3x - 2$ $3x - 2 = -x + 2$ $3x + x - 2 - 2 = 0$ $4x = 4$ $x = 1$ $y = 1$ $\therefore P(1, 1)$ Simult. eqn. perpendicular m <sub>1</sub> m <sub>2</sub> = -1	✓ substitution / vervanging ✓ x - coordinate / x - koördinaat ✓ y - coordinate / y - koördinaat	(3)
3.4	$QR = \sqrt{(0 - 6)^2 + (-2 - (-4))^2}$ $QR = 2\sqrt{10}$ OR/OF $\sqrt{40}$ Surd form	✓ substitution in correct / vervanging in korrekte / antwoord	(2)

3.5	PR is the diameter Midpoint of / Middelpunt van PR $PR = \sqrt{(1-6)^2 + (1+4)^2}$ $PR = \sqrt{50}$ $r = \frac{\sqrt{50}}{2}$ $(x - \frac{7}{2})^2 + (y + \frac{3}{2})^2 = (\frac{\sqrt{50}}{2})^2$	✓ for the statement PR is the diameter / vir stelling PR is die middellyn ✓ Midpoint of PR / Middelpunt van PR P(1, 1) P(6, -4) ✓ for the radius / vir die radius ✓ equation / vergelyking	(5)
3.6	$\tan \angle PNX = -1$ $\therefore \angle PNX = 135^\circ$ $\tan \angle PMX = 3$ $\therefore \angle PMX = 71,57^\circ$ $\theta = 135^\circ - 71,57^\circ = 63,43^\circ$	✓ $\tan \angle PNX = -1$ ✓ $\therefore \angle PNX = 135^\circ$ ✓ $\tan \angle PMX = 3$ ✓ $\therefore \angle PMX = 71,57^\circ$ ✓ answer / antwoord ✓ formula / formule	(5)
3.7	$A = \frac{1}{2} \times PQ \times QR$ $A_{PQR} = \frac{1}{2} \times 10 \times \sqrt{40}$ $A_{PQR} = 10$ square units / vierkante eenhede	✓ $A = \frac{1}{2} \times PQ \times QR$ ✓ $A_{PQR} = \frac{1}{2} \times 10 \times \sqrt{40}$ ✓ $A_{PQR} = 10$ square units / vierkante eenhede OR/OF $A_{PQR} = \frac{1}{2} \times PQ \times PR \times \sin 63,43^\circ$ $A_{PQR} = \frac{1}{2} \times \sqrt{10} \times \sqrt{50} \times \sin 63,43^\circ$ $A_{PQR} = 10$ square units / vierkante eenhede	(3)





3.



4.

QUESTION 4 / VRAAG 4

4.1	$x^2 - 6x + y^2 - 4y + 9 = 0$ $x^2 - 6x + 9 + y^2 - 4y + 4 = -9 + 9 + 4$ $(x-3)^2 + (y-2)^2 = 4$ ✓ C(3;2) and / en r=2 ✓ a o 4/4 ✓	✓ completing square voltooiing van vierkant ✓ standard form / standaardvorm ✓3 ✓2	(4)	
4.2	$m_{\text{tan}} = -2$ $m_{\text{PR}} = \frac{1}{2}$ ✓ $y - 2 = \frac{1}{2}(x - 3)$ $y = \frac{1}{2}x + \frac{1}{2}$ ✓ $y = 4$ ✓ $T(-1; 4)$ $y = -2x + k$ $4 = -2(-1) + k$ ✓ $k = 2$ ✓	$T \perp BV = 90^\circ$ tan $\perp$ rad. $y = \frac{1}{2}x + c$ Subst. C(3;2) $2 = \frac{1}{2}(3) + c$ ✓ $\frac{1}{2} = c$ $y_A = \frac{1}{2}x + \frac{1}{2}$ $x_A - x_B = 3 - (-1)$ tan's form evl (common p) ✓ $y_A = 2 + 2$ ✓ $x_A = 2 + 2$ ✓	✓ $m_{\text{PR}} = \frac{1}{2}$ ✓ substitution / vervanging ✓ answer / antwoord ✓ answer / antwoord	(3)
4.3	$TA = 4$ units ✓ $TB = TA$ tan's form evl (common p) ✓ $TB = 4$ units / eenhede ✓	✓ length of TA / lengte van TA ✓ S ✓ R ✓ answer / antwoord	(1)	
4.4	$T(-1; 4)$ $y = -2x + k$ $4 = -2(-1) + k$ ✓ $k = 2$ ✓	✓ substitution / vervanging ✓ answer / antwoord	(4)	
4.5	$\tan \widehat{STA} = -2$ ✓ $\widehat{STA} = 116,57^\circ$ ✓ $\therefore \widehat{ACB} = 116,57^\circ$ (ext. angle of a c.q.) ✓ (buitehoek van koördervierhoek)	✓ $\tan \widehat{STA} = -2$ ✓ $\widehat{STA} = 116,57^\circ$ ✓ answer / antwoord ✓ reason / rede	(2)	
4.6	Let $\widehat{SAC} = \theta$ $\cos \theta = \frac{1}{2}$ $\therefore \widehat{SAC} = 60^\circ$ $\tan \theta = \frac{1}{2}$ $\therefore \widehat{TAC} + \widehat{TCB} = 90^\circ$ $\tan \perp$ rad $\therefore \widehat{TAC} + \widehat{TCB} = 90^\circ$ $\tan \perp$ rad $\therefore \widehat{TAC} + \widehat{TCB} = 90^\circ$ $\tan \perp$ rad $\therefore \widehat{TAC} + \widehat{TCB} = 90^\circ$ $\tan \perp$ rad $\therefore \widehat{TAC} + \widehat{TCB} = 90^\circ$ $\tan \perp$ rad	OR/OF $\tan \widehat{VCE} = \frac{1}{2}$ $\therefore \widehat{VCE} = 26,57^\circ$ ✓ answer / antwoord ✓ reason / rede	(4)	

4 3 1 4 2 4

QUESTION 5/VRAG 5

<p>5.1.1</p> <p> <math>\cos 158^\circ = -\cos 22^\circ</math>  <math>= -p</math> </p>	<p>Sum <math>\sin^{-1}</math> in <math>\Delta = 180^\circ</math>  Pythag</p> <p> <math>\checkmark -\cos 22^\circ</math>  <math>\checkmark -p</math> </p>	<p>(2)</p>
<p>5.1.2</p> <p> <math>\sin 112^\circ = \sin(90^\circ + 22^\circ)</math>  <math>= \cos 22^\circ</math>  <math>= p</math> </p>	<p> <math>\checkmark \cos 22^\circ</math>  <math>\checkmark p</math> </p>	<p>(2)</p>
<p>5.1.3</p> <p> <math>\sin 38^\circ = \sin(60^\circ - 22^\circ)</math>  <math>= \sin 60^\circ \cos 22^\circ - \cos 60^\circ \sin 22^\circ</math>  <math>= \frac{\sqrt{3}}{2} p - \frac{1}{2} \sqrt{1-p^2}</math> </p>	<p> <math>\checkmark \sin(60^\circ - 22^\circ)</math>  <math>\checkmark</math> expansion / uitbreiding  <math>\checkmark \frac{\sqrt{3}}{2} p</math>  <math>\checkmark \frac{1}{2} \sqrt{1-p^2}</math> </p>	<p>(4)</p>
<p>5.2</p> <p> <math>\sin P = \sin 2P</math>  <math>\sin P - \sin 2P = 0</math>  <math>\sin P - 2 \sin P \cos P = 0</math>  <math>\sin P(1 - 2 \cos P) = 0</math>  <math>\sin P = 0</math> or of <math>\cos P = \frac{1}{2}</math> </p> <p> <math>P = 0^\circ; 60^\circ; 180^\circ; 300^\circ; 360^\circ</math> </p> <p>OR/OF</p> <p> <math>P = 2P + 360^\circ k</math> or/of <math>P = 180^\circ - 2P + 360^\circ k</math>  <math>P \in \mathbb{Z}</math>  <math>P = -360^\circ k</math> or/of <math>3P = 180^\circ + 360^\circ k</math>  <math>P = 60^\circ + 120^\circ k</math>  <math>P \in [0^\circ; 60^\circ; 180^\circ; 300^\circ; 360^\circ]</math> </p>	<p> <math>\checkmark</math> standard form / standaardvorm  <math>\checkmark</math> expansion / uitbreiding  <math>\checkmark</math> factorisation / faktorisering  <math>\checkmark</math> all correct values of P  <i>alle korrekte waardes van P</i> </p> <p> <math>\checkmark P = 2P + 360^\circ k</math>  <math>\checkmark P = 180^\circ - 2P + 360^\circ k</math>  <math>\checkmark P = 60^\circ + 120^\circ k</math>  <math>\checkmark</math> all correct values of P  <i>alle korrekte waardes van P</i> </p>	<p>(4)</p>
<p>5.3</p> <p> <math>A + B + C = 180^\circ</math>  <math>A + B = 180^\circ - C</math>  <math>\cos(A + B) = \cos(180^\circ - C)</math>  <math>\cos(A + B) = -\cos C</math> </p>	<p> <math>\checkmark A + B = 180^\circ - C</math>  <math>\checkmark \cos(A + B) = \cos(180^\circ - C)</math> </p>	<p>(2)</p>

$P \in [0^\circ; 360^\circ]$

$\forall A: 2P$  (KE 2)  
 $\sin P = \sin A$   
 $\sin A$   $\sin(180^\circ - A)$

$\sin P = \sin A$  or  $\sin P = \sin(180^\circ - A)$   
 $P = A + k 360^\circ$   $P = 180^\circ - A + k 360^\circ$   
 $-P = k 360^\circ$   $-P = 180^\circ + k 360^\circ$   
 $P = -k 360^\circ$   $P = 60^\circ + k 120^\circ$   
 $P = 0^\circ; 360^\circ; 60^\circ; 180^\circ$  or  $300^\circ$

5.2.  $\sin P = \sin 2P$

$\checkmark \sin P = 2 \sin P \cos P$   
 $\checkmark \sin P - 2 \sin P \cos P = 0$  (KE 2)  
 $\checkmark \sin P(1 - 2 \cos P) = 0$   
 $\sin P = 0$  or  $\cos P = \frac{1}{2}$   
 $P = k 180^\circ$   $\text{ref}^\circ = 60^\circ$

$\cos + \sin$   
 $I: P = 60^\circ + k 360^\circ$   
 $II: P = 300^\circ + k 360^\circ$   
 $\therefore x = 0^\circ; 180^\circ; 360^\circ; 60^\circ$  or  $300^\circ$

2 2 4 4 2

<p>5.4</p> $\frac{\cos^2 x - \cos x - \sin^2 x}{2 \sin x \cos x + \sin x} = \frac{1 - \cos x}{\tan x \sin x}$ <p>LHS / LK = <math>\frac{\cos^2 x - \cos x - \sin^2 x}{2 \sin x \cos x + \sin x}</math></p> $= \frac{\cos^2 x - \cos x - (1 - \cos^2 x)}{\sin x (2 \cos x + 1)}$ $= \frac{2 \cos^2 x - \cos x - 1}{\sin x (2 \cos x + 1)}$ $= \frac{\sin x (2 \cos x + 1)}{\sin x (2 \cos x + 1)}$ $= \frac{(2 \cos x + 1)(\cos x - 1)}{\sin x (2 \cos x + 1)}$ $= \frac{\cos x - 1}{\sin x} = \frac{1}{\sin x} = \text{RHS / RK}$	<p>5.5</p> $4 + 7 \cos \theta + \cos 2\theta = 0$ $4 + 7 \cos \theta + 2 \cos^2 \theta - 1 = 0$ $2 \cos^2 \theta + 7 \cos \theta + 3 = 0$ $(2 \cos \theta + 1)(\cos \theta + 3) = 0$ <p>or/of <math>\cos \theta = -\frac{1}{2}</math> (N/A)</p> <p><math>\theta = 120^\circ + 360^\circ k</math> or/of <math>\theta = 240^\circ + 360^\circ k, k \in \mathbb{Z}</math></p>
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$$\begin{aligned} \text{RHS} &= \frac{\cos x - 1}{\sin x} - \frac{1}{\sin x} \\ &= 1 \times \frac{\cos x}{\sin x} - \frac{1}{\sin x} \\ &= \frac{\cos x}{\sin x} - \frac{1}{\sin x} \\ &= \frac{\cos x - 1}{\sin x} \end{aligned}$$

$\therefore \text{LHS} = \text{RHS}$

<p>QUESTION 6 / VRAAG 6</p>		<p>6.1 <math>b = \frac{1}{2}</math> ✓</p>	<p>✓ answer / antwoord</p>	<p>(1)</p>
<p>6.2 <math>A(30^\circ; 1)</math></p>		<p>✓ <math>30^\circ</math> ✓ 1</p>	<p>✓ <math>90^\circ</math> ✓ <math>\frac{1}{2}</math></p>	<p>(2)</p>
<p>6.3 <math>g(90^\circ) = \cos(90^\circ - 30^\circ) = \cos 60^\circ = \frac{1}{2}</math></p> <p><math>Q(90^\circ; \frac{1}{2})</math></p>		<p>OR/OF</p> <p><math>-1 \leq y \leq 3</math> <math>y \in [-1; 3]</math></p>	<p>✓ answer / antwoord</p>	<p>(1)</p>
<p>6.4 <math>x = 160^\circ</math> ✓</p>		<p>✓ <math>x = 160^\circ</math></p>	<p>✓ answer / antwoord</p>	<p>(2)</p>
<p>6.5 <math>-1 \leq y \leq 3</math> <math>y \in [-1; 3]</math></p>		<p>OR/OF</p>	<p>✓ answer / antwoord</p>	<p>(2)</p>
<p>QUESTION 7 / VRAAG 7</p>		<p>7.1 <math>\widehat{LNM} = 180^\circ - 2p</math> (angles opp. = sides) ✓ <math>\sqrt{5}</math> sum <math>a \leq m \leq 150^\circ</math></p>	<p>✓ answer / antwoord ✓ reason / rede</p>	<p>(2)</p>
<p>7.2 <math>\frac{LM}{\sin(180^\circ - 2p)} = \frac{d}{\sin p}</math></p> <p><math>\frac{LM}{\sin 2p} = \frac{d}{\sin p}</math></p> <p><math>LM = \frac{d \sin 2p}{\sin p}</math></p>		<p>7.3 <math>\tan q = \frac{h}{LM}</math> <math>h = LM \tan q</math> <math>h = \frac{d \sin 2p}{\sin p} \cdot \tan q</math> <math>h = \frac{2d \sin p \cos p \tan q}{\sin p}</math> <math>h = 2d \cos p \tan q</math></p>	<p>✓ for applying the sine rule gebruik van sinusreël ✓ <math>\sin 2p</math> ✓ <math>\tan q = \frac{h}{LM}</math> ✓ <math>h = \frac{d \sin 2p}{\sin p} \cdot \tan q</math> ✓ <math>h = \frac{2d \sin p \cos p \tan q}{\sin p}</math></p>	<p>(2)</p>
<p>7.3 <math>\tan q = \frac{h}{LM}</math> <math>h = LM \tan q</math> <math>h = \frac{d \sin 2p}{\sin p} \cdot \tan q</math> <math>h = \frac{2d \sin p \cos p \tan q}{\sin p}</math> <math>h = 2d \cos p \tan q</math></p>		<p>✓ <math>\tan q = \frac{h}{LM}</math> ✓ <math>h = \frac{d \sin 2p}{\sin p} \cdot \tan q</math> ✓ <math>h = \frac{2d \sin p \cos p \tan q}{\sin p}</math></p>	<p>✓ <math>\tan q = \frac{h}{LM}</math> ✓ <math>h = \frac{d \sin 2p}{\sin p} \cdot \tan q</math> ✓ <math>h = \frac{2d \sin p \cos p \tan q}{\sin p}</math></p>	<p>(3)</p>
<p>OR</p>		<p>see PTO</p>	<p>7</p>	<p>7</p>

6.1.  $y = \tan bx$   
 Sub  $P(90^\circ; 1)$   
 $1 = \tan 90^\circ \cdot b$   
 Let  $90^\circ \cdot b = A$   
 $1 = \tan A$   
 $\text{ref}^\circ = 45^\circ$   
 $\tan + \text{in}$   
 I:  $A = 45^\circ$   
 $90^\circ \cdot b = 45^\circ$   
 $b = \frac{1}{2} \rightarrow$

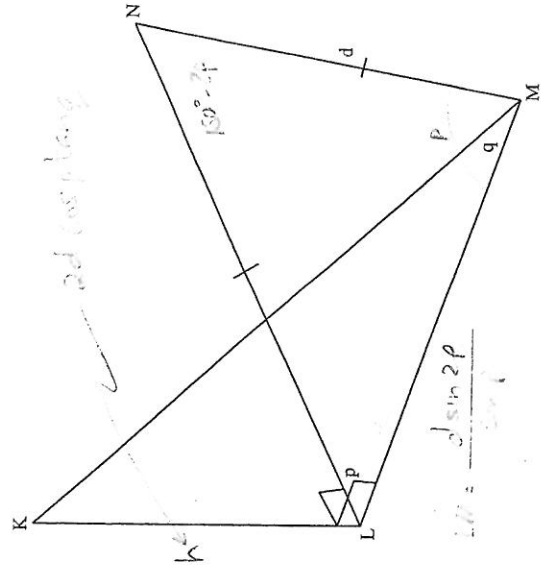
6.2.  $y = \cos(x - 30^\circ)$   
 $\cos x \geq 0 \rightarrow$

6.4.  $y = \tan b(x + 20^\circ)$   
 $\tan bx \geq 20^\circ \leftarrow$   
 $x = 180^\circ - 20^\circ = 160^\circ$   
 $x = -200^\circ = 160^\circ$   
 $x^*$

6.5.  $y \in [-1; 1]$   
 $2y \in [-2; 2]$   
 $+1 \in [-1; 3] \rightarrow$

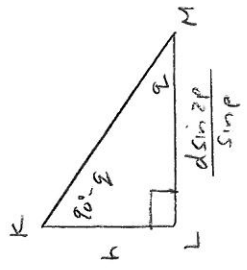
7. Should be asymptotes at  $x = -180^\circ$  or  $x = 180^\circ$

$x \in [-180^\circ; 180^\circ]$   
 $*$



7.3.  $\hat{K} = 90^\circ - \theta$   $\text{sum}^\circ \text{in } \Delta = 180^\circ$

$\frac{h}{\sin \theta} = \frac{LM}{\sin(90^\circ - \theta)} \checkmark$   
 $h = \frac{LM \sin \theta}{\cos \theta} \checkmark$   
 $= LM \tan \theta \checkmark$   
 $= \frac{d \sin 2\theta}{\sin \theta} \cdot \tan \theta$   
 $= \frac{d \cdot 2 \sin \theta \cos \theta \cdot \tan \theta}{\sin \theta}$   
 $= 2d \cos \theta \tan \theta \rightarrow$



3

10 MATHEMATICS P2/II/WSKUNDE V2 (EC/SEPTEMBER 2020)

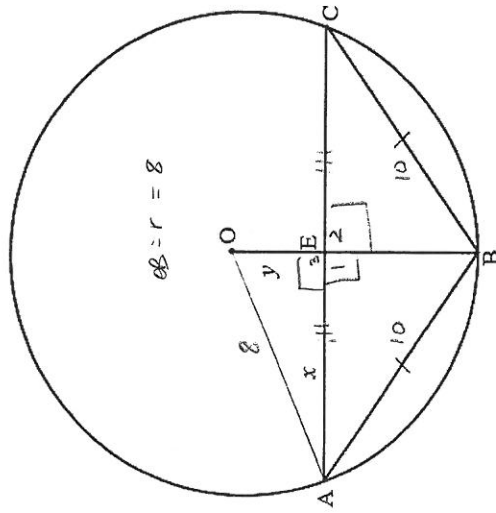
QUESTION 8 / VRAAG 8		answerv/antwoord	(1)
8.1	bisects the chord / <i>helfveer die koord</i>	✓ answer / antwoord	(1)
8.2	$EB = 8 - y$ In $\triangle AEB$ : $10^2 = x^2 + (8 - y)^2$ .....(1) Eqn of the circle / <i>Verg. van die sirkel</i> : $x^2 + y^2 = 64$ $x^2 = 64 - y^2$ .....(2) Subst./ <i>Verv.</i> (2) into/in (1) $100 = 64 - y^2 + 64 - 16y + y^2$ $100 = 128 - 16y$ $16y = 28$ $y = \frac{7}{4}$ $\therefore OE = \frac{7}{4}$	✓ for/vir EB ✓ Pythagoras in $\triangle AEB$ ✓ equation of the circle / <i>vergeljking van sirkel</i> ✓ substitution / <i>vervanging</i> ✓ answer / antwoord	(5)
8.3	Double the size of the angle subtended by the same arc. Dubbel die grootte van die hoek wat deur dieselfde boog onderspan word.	✓ answer / antwoord	(1)
8.4.1	$\hat{O}_2 = 2\hat{B}_2$ ( $\angle$ at centre = $2 \times \angle$ at the circumf) / <i>(Middel-puntse <math>\angle = 2 \times</math> Omtreks-hoek)</i>	✓ statement / <i>stelling</i> ✓ reason / <i>rede</i>	(2)
8.4.2	$\hat{C}_1 = \hat{D}_1 + \hat{D}_2$ ( $\angle$ s opp = sides) / <i>(<math>\angle</math>e teenoor = sye)</i>	✓ statement / <i>stelling</i> ✓ reason / <i>rede</i>	(2)
8.4.3	$\hat{B}_1 + \hat{B}_2 = 180^\circ - (\hat{D}_1 + \hat{D}_2)$ (opp. $\angle$ s of a cyclic quad) / <i>(teenoorst. <math>\angle</math>e van 'n koordvierhoek)</i>	✓ statement / <i>stelling</i> ✓ reason / <i>rede</i>	(2)
8.4.4	$\hat{D}_1 = \hat{C}_1$ ( $\angle$ s in the same segment) / <i>(<math>\angle</math>e in dieselfde segment)</i>	✓ statement / <i>stelling</i> ✓ reason / <i>rede</i>	(2)
			[15]

QUESTION 8 / VRAAG 8

8.1

bisects the chord ✓

(1)



8.2

$\hat{E}_1 = \hat{E}_2 = 90^\circ$   
 $\hat{E}_2 = 90^\circ$   
 $x^2 + y^2 = 64$  ✓  
 $BE = 8 - y$  ✓  
 $10^2 = x^2 + (8 - y)^2$  ✓  
 $100 = x^2 + 64 - 16y + y^2$  ✓  
 $100 = 64 + 64 - 16y$  ✓  
 $16y = 28$   
 $y = \frac{7}{4}$  ✓  
 $= OE$  ✓

(5)



twice the angle subtended by the same arc at the circumference

8.3

8.4

8.4.1  $\hat{O}_2 = 2\hat{B}_2$  ✓ s ✓ f ✓ a centre = 2 x 2 circum

8.4.2  $\hat{C}_3 = \hat{D}_1 + \hat{D}_2$  ✓ s ✓ f ✓ s opp = sides radius

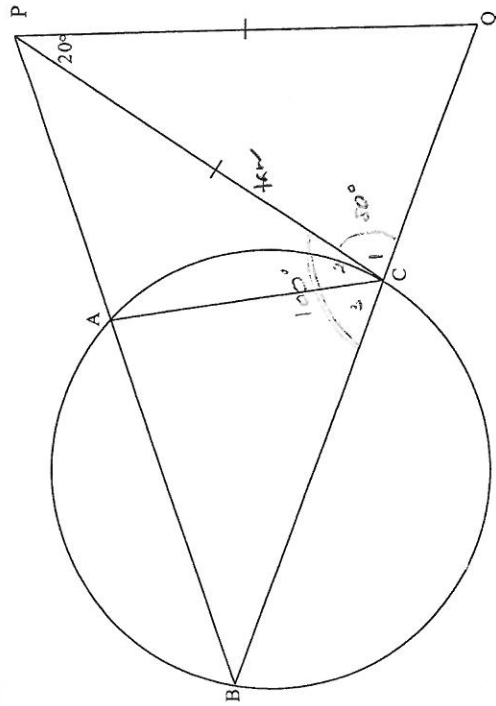
8.4.3  $\hat{B}_1 + \hat{B}_2 + \hat{D}_1 + \hat{D}_2 = 180^\circ$  opp ✓ s ✓ f ✓ a cyclic quad = 180°

8.4.4  $\hat{D}_1 = \hat{C}_1$  ✓ s ✓ f ✓ a ✓ s in same O s g m =

QUESTION 9 / VRAAG 9

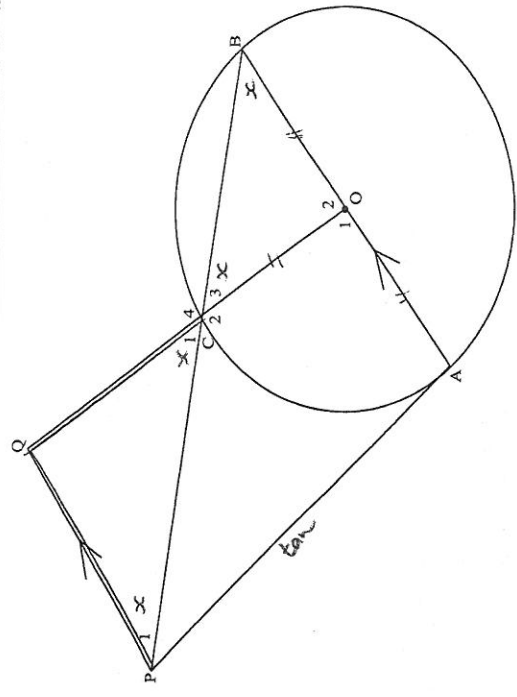
9.1	$\hat{P}\hat{C}\hat{Q} = 80^\circ$ ( $\angle$ s opp = sides) / ( $\angle$ e teenoor = sye) $\hat{P}\hat{C}\hat{B} = 100^\circ$ ( $\angle$ s on a straight line) ( $\angle$ e op 'n reguitlyn) $\therefore$ BC is not a diameter (angle between the tangent and BC is not equal to $90^\circ$ ) BC is nie 'n middellyn nie. (hoek tussen die raaklyn en BC is nie gehyë aan $90^\circ$ nie)	✓ statement / stelling ✓ reason / rede ✓ statement / stelling ✓ reason / rede ✓ conclusion / gevolgtrekking	(5)
9.2	$\hat{P}_1 = \hat{B}$ (alt $\angle$ s, PQ $\parallel$ AB) / (verw. $\angle$ e, PQ $\parallel$ AB) $\hat{B} = \hat{C}_3$ ( $\angle$ s opp = sides; radii) ( $\angle$ e teenoor = sye; radiusse) $\hat{C}_3 = \hat{C}_1$ (vert. opp. angles) / (regoorst. hoeke) $\therefore \hat{P}_1 = \hat{C}_1$ $\therefore$ PQ = QC (sides opp = angles) (sye teenoor = hoeke)	✓ statement / stelling ✓ reason / rede ✓ statement / stelling ✓ reason / rede ✓ statement / stelling ✓ statement and reason stelling en rede	(6)
9.3	$\hat{A} = \hat{E}_2$ (ext. $\angle$ of a cq) / (buite $\angle$ van koordev.) $\hat{D} = 180^\circ - \hat{E}_2$ (co-interior $\angle$ s; BE $\parallel$ CD) (ko-binne $\angle$ e; BE $\parallel$ CD) $\hat{D} + \hat{A} = 180^\circ$ $\therefore$ ACDF is a cq (opp $\angle$ s supplementary) / is 'n koordev (teenoorst. $\angle$ e is suppl.) OR/OF $\hat{D} = \hat{E}_1$ (corres. $\angle$ s; BE $\parallel$ CD) (oorreenk. $\angle$ e; BE $\parallel$ CD) $\hat{E}_2 = 180^\circ - \hat{E}_1$ ( $\angle$ s on a straight line) ( $\angle$ e op 'n reguitlyn) $\hat{A} = 180^\circ - \hat{E}_1$ (opp $\angle$ s of a cq) (teenoorst. $\angle$ e is suppl.) $\hat{D} + \hat{A} = 180^\circ$ $\therefore$ ACDF is a cyclic quad. / is 'n koordevierhoek (opp $\angle$ s of a quad. supplementary) (teenoorst. $\angle$ e van koordev. is supplementêr)	✓ statement / stelling ✓ reason / rede ✓ statement and reason stelling en rede ✓ statement and reason stelling en rede ✓ reason / rede ✓ statement / stelling ✓ reason / rede ✓ statement and reason stelling en rede ✓ statement and reason stelling en rede ✓ reason / rede	(5)
			116

QUESTION 9/1/RAAG 9



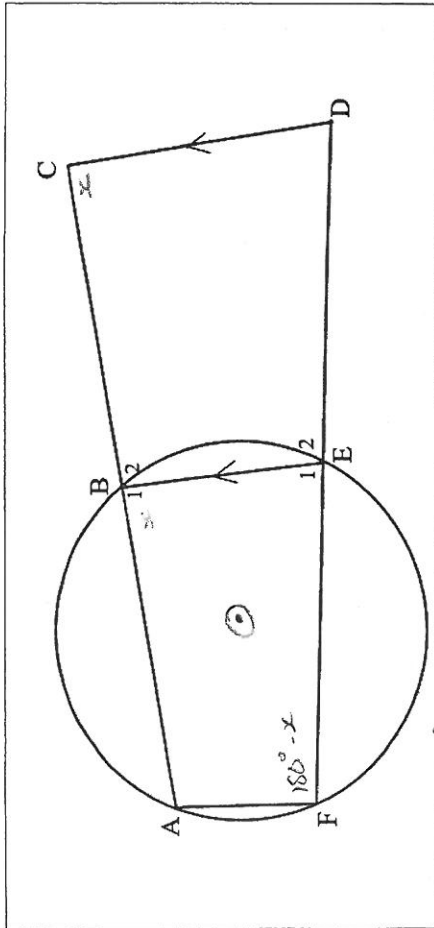
9.1  $\hat{C}_1 = \hat{Q}$  ✓  $\hat{C}_1$  opp = sides  
 $\therefore \hat{C}_1 = 30^\circ$  ✓  
 $\therefore \hat{C}_2 + \hat{C}_3 = 100^\circ$  ✓  
 $\neq 90^\circ$  ✓  
 $\therefore BC$  not diam ✓  
 conv  $\tan \perp$  rad

(5)



9.2 Let  $\hat{P}_1 = x$   
 $\therefore \hat{B} = x$  ✓  $\hat{C}_1$  opp = sides  
 $OC = OB$  radius  
 $\therefore \hat{C}_3 = x$  ✓  $\hat{C}_3$  opp = sides  
 $\therefore \hat{C}_1 = x$  ✓ vert opp  $\hat{C}_1 = x$   
 $\therefore \hat{C}_1 = \hat{P}_1$  both = x  
 $\therefore PQ = QC$  ✓ sides opp = sides

(6)

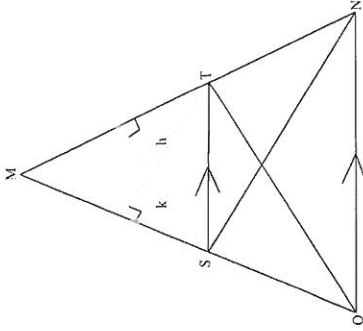


9.3 Let  $\hat{B}_1 = x$   
 $\therefore \hat{F} = 180^\circ - x$  ✓ opp  $\hat{1}$ 's cyclic quad =  $180^\circ$  ✓  
 $\hat{C} = x$  ✓  $\hat{5}$   $\hat{6}$   $\hat{1}$ 's =,  $BE \parallel CD$  ✓  
 $\therefore \hat{F} + \hat{C}$  ✓  
 $= 180^\circ - x + x$  ✓  
 $= 180^\circ$  ✓  
 $\therefore ACDF$  is a  $\sqrt{\text{conc opp}} \hat{1}$ 's cyclic quad =  $180^\circ$  ✓

(5) [16]

QUESTION 10 / VRAAG 10

10.1



RTP/TE BEWYS:  $\frac{MS}{SO} = \frac{MT}{TN}$

Construction: Join SN, and OT, and construct perpendicular heights /  
 Konstruksie: Verbind SN en OT, trek loodregte hoogtes

Proof / Bewys:

$$\frac{\text{area } \Delta MST}{\text{area } \Delta OST} = \frac{\frac{1}{2} \times MS \times h}{\frac{1}{2} \times SO \times h} = \frac{MS}{SO}$$

$$\frac{\text{area } \Delta MST}{\text{area } \Delta TNS} = \frac{\frac{1}{2} \times MT \times k}{\frac{1}{2} \times TN \times k} = \frac{MT}{TN}$$

But / Maar  $\Delta MST$  is common / gemeen

And / En

area of  $\Delta OST$  = area of  $\Delta TNS$  (same base, same height)

area of  $\Delta OST$  = area of  $\Delta TNS$  (dies. basis en dies. hoogte)

$$\therefore \frac{MS}{SO} = \frac{MT}{TN}$$

(5)

area / oppervlakte

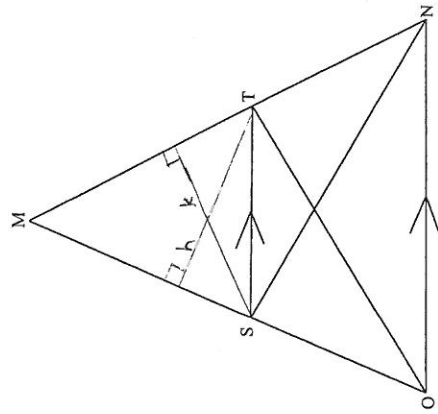
✓ area of the two triangles  
 area van twee driehoeke  
 ✓  $\frac{MS}{SO}$

✓ area of the two triangles  
 area van twee driehoeke  
 ✓  $\frac{MT}{TN}$

✓ statement and reason  
stelling en rede

QUESTION 10/VRAAG 10

10.1



$$\text{area } \triangle MST = \frac{1}{2} MS \cdot h = \frac{1}{2} MS \cdot h$$

$$\text{area } \triangle SOT = \frac{1}{2} SO \cdot h = \frac{1}{2} SO \cdot h$$

$$\text{area } \triangle MTS = \frac{1}{2} MT \cdot k = \frac{1}{2} MT \cdot k$$

$$\text{area } \triangle TNS = \frac{1}{2} TN \cdot k = \frac{1}{2} TN \cdot k$$

Now,

$$\text{area } \triangle MST = \text{area } \triangle MTS \quad \text{Same } \Delta$$

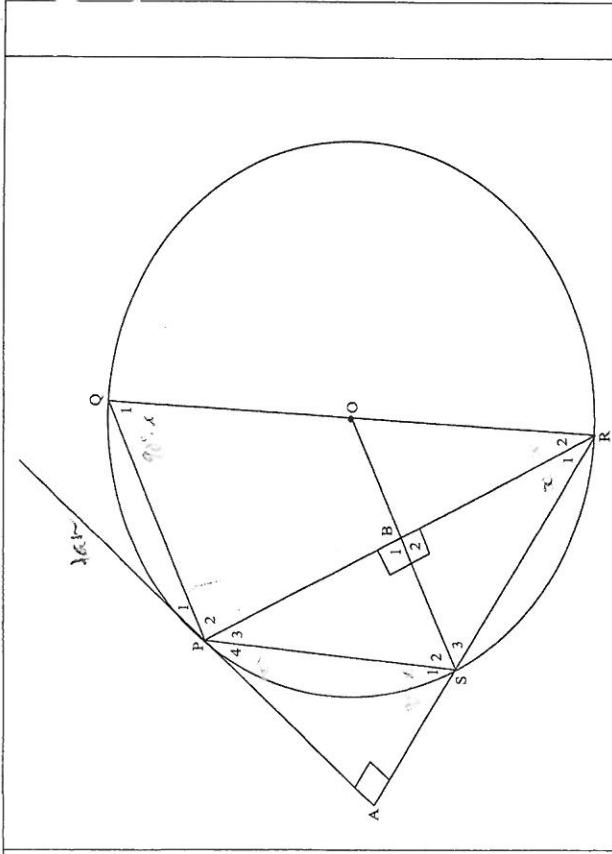
$$\text{area } \triangle SOT = \text{area } \triangle TNS \quad \checkmark \text{ Same base, ST same height, ST} \parallel \text{ON}$$

$$\therefore \frac{\text{area } \triangle MST}{\text{area } \triangle SOT} = \frac{\text{area } \triangle MTS}{\text{area } \triangle TNS}$$

$$\therefore \frac{MS}{SO} = \frac{MT}{TN}$$

5

10.2.1	In $\triangle APS$ and/en $\triangle BRS$ $\hat{P}_4 = \hat{R}_1$ (tan – chord theorem) (raaklyn-koord Stelling) $\hat{A} = \hat{B}_2 = 90^\circ$ (given) / (gegee) $\triangle APS \parallel \triangle BRS$ (AAA) / ( $\angle\angle\angle$ )	$\checkmark$ statement and reason stelling en rede $\checkmark$ statement / stelling $\checkmark 3^{rd} \angle / 3^{de} \angle$ <b>OR/OF</b> reason for similarity rede vir gelykvoornigheid	(3)
10.2.2	$\frac{AP}{BR} = \frac{PS}{RS} = \frac{AS}{BS}$ (similar triangles) (gelykvoornige driehoeke) $\therefore AP \cdot RS = BR \cdot PS$	$\checkmark$ for the statement vir die stelling	(1)
10.2.3	$\hat{P}_2 = 90^\circ$ ( $\angle$ s in a semi – circle) ( $\angle$ e in 'n semi-sirkel) Let/Laat: $\hat{P}_4 = x$ $\therefore \hat{S}_1 = 90 - x$ ( $\angle$ s of APS) / ( $\angle$ e van APS) $\therefore \hat{Q} = 90 - x$ (ext $\angle$ of a cq) / (buite $\angle$ van kv) $\therefore \hat{R}_2 = x$ ( $\angle$ s of QPR) / ( $\angle$ e van QPR) $\therefore \hat{P}_4 = \hat{R}_2$	$\checkmark \hat{P}_2 = 90^\circ$ ( $\angle$ in a semi – circle) / ( $\angle$ e in 'n semi-sirkel) $\checkmark \hat{S}_1 = 90 - x$ $\checkmark \hat{Q} = 90 - x$ $\checkmark \hat{R}_2 = x$	(4)
10.2.4	In $\triangle ASP$ and/en $\triangle PQR$ $\hat{A} = \hat{P}_2$ (proven / bewys) $\hat{P}_4 = \hat{R}_2$ (proven / bewys) $\triangle ASP \parallel \triangle PQR$ (AAA) / ( $\angle\angle\angle$ ) $\frac{AS}{PQ} = \frac{SP}{QR} = \frac{AP}{PR}$ (similar triangles) (gelykvoornige driehoeke) $\therefore AP \cdot QR = SP \cdot PR$ $\therefore \frac{AP}{PS} = \frac{PR}{RQ}$ $\frac{AP}{PS} = \frac{BR}{RS}$ (from / vanaf 10.2) $\therefore \frac{PR}{RQ} = \frac{BR}{RS}$ $\therefore BR \cdot RQ = RS \cdot RP$	$\checkmark$ statement and reason stelling en rede $\checkmark$ statement / stelling $\checkmark$ reason for similarity rede vir gelykvoornigheid $\checkmark \therefore \frac{AP}{PS} = \frac{PR}{RQ}$ $\checkmark \frac{AP}{PS} = \frac{BR}{RS}$ $\checkmark \therefore \frac{PR}{RQ} = \frac{BR}{RS}$	(6)
			[19]
<b>TOTAL/TOTAAL:</b>			<b>150</b>



10.2

10.2.1

Let  $\hat{P}_4 = x$

In  $\Delta$ 's  $A P_4 S_1, B_2 R_1 S_2$

- $\hat{A} = \hat{B}_2 = 90^\circ$  ✓ s given
- $\hat{P}_4 = \hat{R}_1 = x$  ✓ s tan chord

$\therefore \Delta APS \parallel \Delta BRS$  AAA ✓

(3)

10.2.2

$\frac{AP}{BR} = \frac{P_2 S_2}{R_2 S_2} \checkmark s$   $\Delta APS \parallel \Delta BRS$

$\therefore AP \cdot RS = BR \cdot PS$  ✓

10.2.3

Since  $\hat{P}_4 = x$  :

$\hat{S}_1 = 90^\circ - x$  ✓ s  $\sum$  in  $\Delta = 180^\circ$

$\hat{Q}_1 = 90^\circ - x$  ✓ s ext.  $\angle$  cyclic quad

$\hat{P}_2 = 90^\circ$  ✓ s in semi  $\circ = 90^\circ$

$\hat{R}_2 + 18^\circ + 90^\circ - x = 180^\circ$   $\sum$  in  $\Delta = 180^\circ$

$\therefore \hat{R}_2 = x$  ✓ s

$\therefore \hat{P}_4 = \hat{R}_2$  ✓

both = x

(OR)

In  $\Delta$ 's  $A P_4 S_1, P_2 P_2 Q_1$

- $\hat{P}_2 = 90^\circ$  in semi  $\circ = 90^\circ$
- $\hat{A} = \hat{P}_2$  both =  $90^\circ$
- $\hat{S}_1 = \hat{Q}_1$  ext.  $\angle$  cyclic quad

$\therefore \Delta APS \parallel \Delta P_2 Q_1$  AAA

$\therefore \hat{P}_4 = \hat{P}_2$   $\Delta APS \parallel \Delta P_2 Q_1$

(4)

10.2.4	<p>In <math>\Delta</math>: <math>E_1, P, S, R, Q</math></p> <p>1. <math>E_2 = P_2 = 90^\circ</math> ✓ given, 10.2.3.</p> <p>2. <math>P_1 = P_2</math> ✓ both = x 10.2.1 10.2.3</p> <p><math>\therefore \Delta BRS \parallel \Delta PRO</math> ✓ AAA</p> <p><math>\therefore \frac{BR}{PR} = \frac{RS}{RO}</math> ✓ <math>\Delta BRS \parallel \Delta PRO</math></p> <p><math>\therefore BR \cdot RO = RS \cdot PR</math></p> <p>ie <math>BR \cdot RO = RS \cdot PR</math></p>	(6)
		[19]

TOTAL/TOTAAL: 150

DRAFT MATHEMATICS PAPER 2 TRIAL EXAMS 2020 MARKING GUIDELINES  
 NOTES AND ERRATA AFTER DISCUSSIONS WITH SUBJECT ADVISORS AND  
 TEACHERS

GENERAL NOTE: Consistent Accuracy (CA) applies in the Marking Guidelines!

QUESTION 1 / VRAAG 1		
1.1	$a = -4,1536$ $b = 0,9580$ $y = -4,1536 + 0,9580x$	$\checkmark a = -4,1536$ $\checkmark b = 0,9580$ $\checkmark y = -4,1536 + 0,9580x$
	Penalty for rounding	
1.5	$\bar{x} = 60,8$ Standard deviation / Standardafwyking = 17,51 (60,8 - 17,51 ; 60,8 + 17,51) (43,29 ; 78,31) 6 learners / leerders	$\checkmark$ Standard deviation / Standardafwyking = 17,51 $\checkmark$ (43,29 ; 78,31) $\checkmark$ 6 learners / leerders
		(3)
		[10]
QUESTION 2 / VRAAG 2		
• Apply CA Marking including reading from learners' graphs!		
2.4	Award 1 mark for Min and Max and 1 mark for $Q_3$	$\checkmark$ Min and Max $\checkmark Q_3$
		(2)
QUESTION 3 / VRAAG 3		
3.6	Alternatives: $PR = \sqrt{50}$ ✓ $\sin \theta = \frac{2\sqrt{10}}{\sqrt{50}}$ ✓ $\theta = 63,43^\circ$ ✓ OR $PR = \sqrt{50}$ ✓ $PQ = \sqrt{10}$ ✓ $\cos \theta = \frac{\sqrt{10}}{\sqrt{50}}$ ✓ $\theta = 63,43^\circ$ ✓ OR $PQ = \sqrt{10}$ ✓ $\tan \theta = \frac{2\sqrt{10}}{\sqrt{10}}$ ✓ $\theta = 63,43^\circ$ ✓	(5)

QUESTION 4 / VRAAG 4

The diagram shifted and some dimensions were not accurate. This caused the question to be opened for different answers when using different methods especially in 4.3 to 4.6.

There is, however, an easy fix: Accept the alternatives in 4.4 and apply CA to the remaining questions		
4.1	$x^2 - 6x + y^2 - 4y + 9 = 0$ $x^2 - 6x + 9 + y^2 - 4y + 4 = -9 + 9 + 4$ $(x - 3)^2 + (y - 2)^2 = 4$ C(3;2) and / en $r = 2$	✓ completing square ✓ voltooiing van vierkant ✓ standard form / standaardvorm ✓3 ✓2
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <b>Answer Only: Full Marks</b> </div>		(4)
4.4	<b>4.4 alternatives:</b> Solve $y = -2x + 2$ and $y = \frac{1}{2}x + \frac{1}{2}$ simultaneously to yield $x = 0,6$ ✓ $y = 0,8$ ✓ $\therefore B(0,6; 0,8)$ $\therefore TB = \sqrt{(-1 - 0,6)^2 + (4 - 0,8)^2} = 3,58$ ✓ <del><math>\frac{4}{5}</math></del> <b>OR</b> Solve $y = \frac{1}{2}x + \frac{1}{2}$ and circle equation simultaneously to yield $x = 1,21$ ✓ $y = 1,12$ ✓ $B(1,21; 1,12)$ $TB = \sqrt{(-1 - 1,21)^2 + (4 - 1,12)^2} = 3,63$ ✓	(4)
4.6	<b>4.6 Alternative:</b> $\widehat{AC} = 90^\circ$ ✓ $\tan \widehat{CT} = 2$ ✓ $\widehat{CT} = 63,43^\circ$ ✓ $\widehat{BCA} = 126,86^\circ$ ✓ $\frac{2}{3} = \frac{y}{x}$ $\widehat{CT} = \widehat{BCA}$	(4)
		<b>[18]</b>

<b>QUESTION 5 / VRAAG 5</b>	
5.2	A common error is to divide by $\sin P$ . Awarded max of 2/4 if solved $\cos P = 0,5$ correctly. (4)

<b>QUESTION 10 / VRAAG 10</b>	
10.2.4	Common alternative: $\widehat{P}_2 = 90^\circ$ ( $<$ in semi – circle) ✓ S/R In $\Delta PQR$ and $\Delta BSR$ ✓ choice of triangles 1) $\widehat{P}_2 = \widehat{B}_2$ (both $90^\circ$ , proven) ✓ S 2) $\widehat{R}_2 = \widehat{R}_1$ (proven) ✓ S $\therefore \Delta PQR \parallel \Delta BSR$ (equiangular) ✓ R $\therefore RQ = RP$ ✓ S $\therefore RS = BR$ $\therefore BR \cdot RQ = RS \cdot RP$