



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 10

MATHEMATICS P2/WISKUNDE V2

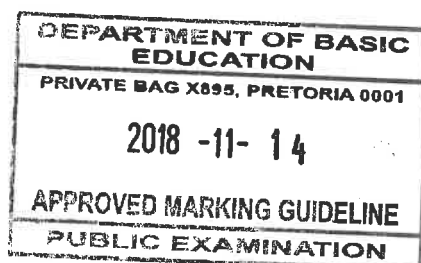
NOVEMBER 2018

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 100

**These marking guidelines consist of 13 pages.
Hierdie nasienriglyne bestaan uit 13 bladsye.**

Approved
Sontell
14/11/2018



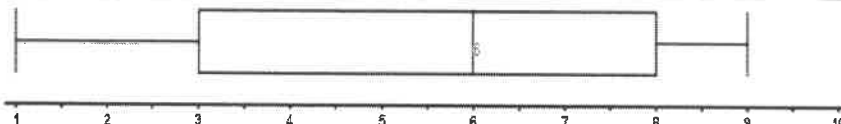
NOTE:

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

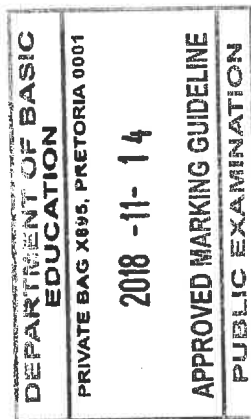
QUESTION/VRAAG 1

DEPARTMENT OF BASIC EDUCATION PRIVATE BAG X895, PRETORIA 0001 2018 -11- 14 APPROVED MARKING GUIDELINE PUBLIC EXAMINATION		1	<table><thead><tr><th>Marks/<i>Punte</i></th><th>Frequency/<i>Frekwensie</i></th></tr></thead><tbody><tr><td>0</td><td>0</td></tr><tr><td>1</td><td>3</td></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>5</td></tr><tr><td>4</td><td>3</td></tr><tr><td>5</td><td>6</td></tr><tr><td>6</td><td>0</td></tr><tr><td>7</td><td>7</td></tr><tr><td>8</td><td>9</td></tr><tr><td>9</td><td>5</td></tr><tr><td>10</td><td>0</td></tr></tbody></table>	Marks/ <i>Punte</i>	Frequency/ <i>Frekwensie</i>	0	0	1	3	2	4	3	5	4	3	5	6	6	0	7	7	8	9	9	5	10	0	2 marks: all 11 values correct 1 mark: 5 – 10 values correct 0 marks: 0 – 4 values correct (2)
Marks/ <i>Punte</i>	Frequency/ <i>Frekwensie</i>																											
0	0																											
1	3																											
2	4																											
3	5																											
4	3																											
5	6																											
6	0																											
7	7																											
8	9																											
9	5																											
10	0																											
1.2	42 learners/ <i>leerders</i>		✓ answer/ <i>antwoord</i> (1)																									
1.3.1	Range/ <i>Variasiewydte</i> = 9 – 1 = 8	Answer only: 2/2 marks	✓ max = 9 and min = 1 ✓ answer/ <i>antwoord</i> (2)																									
1.3.2	$\bar{x} = \frac{(1 \times 3) + (2 \times 4) + (3 \times 5) + (4 \times 3) + (5 \times 6) + (7 \times 7) + (8 \times 9) + (9 \times 5)}{42}$ $= \frac{234}{42}$ $= 5,57$	Answer only: 3/3 marks	✓ sum of (frequencies × values) ✓ ÷ <i>n</i> ✓ answer/ <i>antwoord</i> (3)																									
1.4	Position of the median/ <i>Posisie van die mediaan</i> = $\frac{n+1}{2}$ = 21,5 ^{th/de} position/ <i>posisie</i> $Q_2 = \frac{5+7}{2}$ = 6	Answer only: 3/3 marks	✓ identification of 5 and 7 ✓ $\frac{5+7}{2}$ ✓ answer/ <i>antwoord</i> (3)																									
1.5			✓ Q ₁ ✓ Q ₃ ✓ rest of the box (3)																									
[14]																												

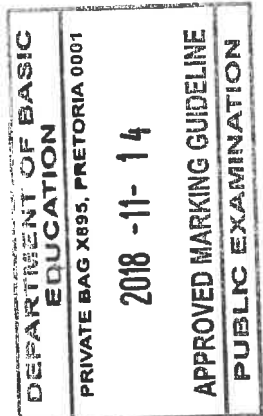
QUESTION/VRAAG 2

2.1.1	$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(1 - 6)^2 + (0 - 3)^2}$ $= \sqrt{25 + 9}$ $= \sqrt{34}$	Answer only: 2/2 marks	✓ subst./verv. ✓ answer/antwoord (2)
2.1.2	$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3 - 0}{6 - 1}$ $= \frac{3}{5}$	Answer only: 2/2 marks	✓ subst./verv. ✓ answer/antwoord (2)
2.1.3	$x_T = \frac{x_1 + x_2}{2}$ $= \frac{1 + 6}{2}$ $= \frac{7}{2}$ $T\left(\frac{7}{2}; \frac{3}{2}\right)$ $y_T = \frac{y_1 + y_2}{2}$ $= \frac{0 + 3}{2}$ $= \frac{3}{2}$		✓ x-value/x-waarde ✓ y-value/y-waarde (2)
2.2.1	$QR = QP = \sqrt{34}$ $QT = \frac{1}{2}PQ$ $QT = \frac{1}{2}\sqrt{34}$ $QT = \sqrt{\left(\frac{7}{2} - 6\right)^2 + \left(\frac{3}{2} - 3\right)^2}$ $QT = \frac{\sqrt{34}}{2}$ $\text{Area of } \triangle QTR = \frac{1}{2}(QR)(QT)$ $= \frac{1}{2}(\sqrt{34})\left(\frac{1}{2}\sqrt{34}\right)$ $= \frac{17}{2} = 8,5 \text{ sq units/eenhede}$ OR/OF	DEPARTMENT OF BASIC EDUCATION PRIVATE BAG X895, PRETORIA 0001 2018 -11- 14 APPROVED MARKING GUIDELINE PUBLIC EXAMINATION	✓ $QR = \sqrt{34}$ ✓ $QT = \frac{1}{2}\sqrt{34}$ ✓ answer/antwoord (3)

	$QR = QP = \sqrt{34}$ $\text{Area of } \Delta QTR = \frac{1}{2} \text{Area of } \Delta QPR$ $= \frac{1}{2} \left(\frac{1}{2} \cdot QR \cdot QP \right)$ $= \frac{1}{2} \times \frac{1}{2} \cdot (\sqrt{34}) (\sqrt{34})$ $= \frac{17}{2} \text{ sq units/eenhede}$	$\checkmark QR = \sqrt{34}$ $\checkmark \frac{1}{2} \sqrt{34}$ $\checkmark \text{answer/antwoord}$ (3)
2.2.2	$\theta = 121^\circ - 90^\circ$ (ext $\angle \Delta$ /buitehoek van Δ) $= 31^\circ$ OR/OF $\widehat{QSP} = 59^\circ$ ($\angle$ str line/hoek op reguitlyn) $\theta = 31^\circ$ ($\angle$ sum Δ /binnehoek van Δ)	$\checkmark$ reason $\checkmark$ answer/antwoord (2) $\checkmark \angle$ sum Δ /binnehoek van Δ $\checkmark$ answer/antwoord (2)
2.2.3	$\cos \theta = \frac{PQ}{PS}$ $\cos 31^\circ = \frac{\sqrt{34}}{PS}$ $PS = \frac{\sqrt{34}}{\cos 31^\circ}$ $PS = 6,80$ $S(6,8 + 1; 0)$ $S(7,8; 0)$ OR/OF $m_{QR} = -\frac{5}{3}$ $\frac{3-0}{6-x} = -\frac{5}{3}$ $9 = -30 + 5x$ $x = 7,8$ OR/OF $m_{QR} = -\frac{5}{3}$ Equation of QR $y - 3 = -\frac{5}{3}(x - 6)$ $y = -\frac{5}{3}x + 13$ $0 = -\frac{5}{3}x + 13$ $x = 7,8$ $S(7,8; 0)$	$\checkmark \cos \theta = \frac{PQ}{PS}$ or/of $\sin \widehat{QSP} = \frac{PQ}{PS}$ $\checkmark x\text{-value}/x\text{-waarde}$ $\checkmark y\text{-value}/y\text{-waarde}$ (3) $\checkmark m_{QR} = m_{QS}$ $\checkmark y = 0$ $\checkmark x\text{-value}/x\text{-waarde}$ (3) $\checkmark$ equation of QR/verhouding van QR $\checkmark y = 0$ $\checkmark x\text{-value}/x\text{-waarde}$ (3)



CP

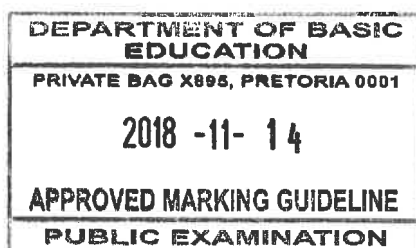
2.3	$m_{QR} = \frac{3 - (-2)}{6 - (9)}$ $= -\frac{5}{3}$ $m_{T\text{-midpoint}} = m_{QR} \text{ (Midpoint Theorem)}$ $m_{T\text{-midpoint}} = -\frac{5}{3}$ OR/OF $\text{Midpoint PR} \left(\frac{9+1}{2}; \frac{-2+0}{2} \right)$ $\text{Midpoint PR}(5; -1)$ $m_{T \text{ and/en PR}} = \frac{\frac{3}{2} - (-1)}{\frac{7}{2} - (5)}$ $= -\frac{5}{3}$	 ✓ m_{QR} ✓ $m_{T\text{-midpoint}} = m_{QR}$ ✓ Midpoint theorem/ Middelpunt-stelling (3) ✓ midpoint of PR ✓ subst ✓ answer (3)
		[17]

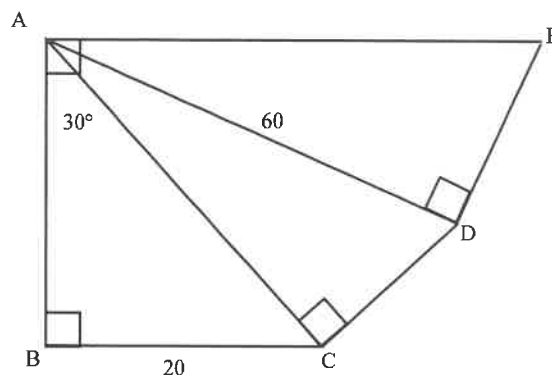
QUESTION/VRAAG 3

3.1.1	$\tan(90^\circ - R) = \frac{PR}{QP}$ OR/OF $\frac{q}{r}$	✓ answer/antwoord (1)
3.1.2	sec Q OR/OF cosec R OR/OF cosec $(90^\circ - Q)$ OR/OF sec $(90^\circ - R)$	✓ answer/antwoord (1) ✓ answer/antwoord (1) ✓ answer/antwoord (1) ✓ answer/antwoord (1) ✓ answer/antwoord (1)
3.2.1	$OS = \sqrt{(-3)^2 + (-4)^2} \text{ (Pythagoras)}$ $= 5$	Answer only: 2/2 marks ✓ subst./verv. ✓ answer/antwoord (2)
3.2.2	$\sec\theta + \sin^2\theta$ $= -\frac{5}{3} + \left(-\frac{4}{5}\right)^2$ $= -\frac{5}{3} + \frac{16}{25}$ $= -\frac{77}{75}$	✓ $-\frac{5}{3}$ ✓ $-\frac{4}{5}$ ✓ answer/antwoord (3)

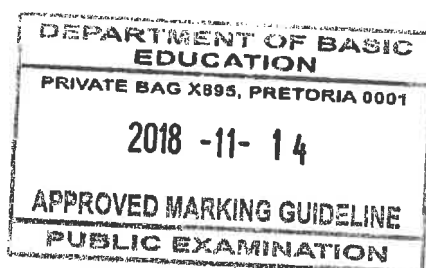
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3.3	$\frac{\operatorname{cosec} 45^\circ}{\sin 90^\circ \cdot \tan 60^\circ}$ $= \frac{1}{\sin 45^\circ}$ $= \frac{2}{\sqrt{2}} \div \sqrt{3}$ $= \frac{2}{\sqrt{2}} \times \frac{1}{\sqrt{3}}$ $= \frac{2}{\sqrt{6}}$ OR/OF $\frac{\operatorname{cosec} 45^\circ}{\sin 90^\circ \cdot \tan 60^\circ}$ $= \frac{1}{\sin 45^\circ}$ $= \frac{\sqrt{2}}{\sqrt{3}}$ If the answer is left as $\frac{\sqrt{6}}{3}$ and no other rationalisation working is shown: max 3/4 marks	$\checkmark \frac{2}{\sqrt{2}}$ $\checkmark 1$ $\checkmark \sqrt{3}$ $\checkmark$ answer/antwoord (4) $\checkmark \sqrt{2}$ $\checkmark 1$ $\checkmark \sqrt{3}$ $\checkmark$ answer/antwoord (4)
		[11]

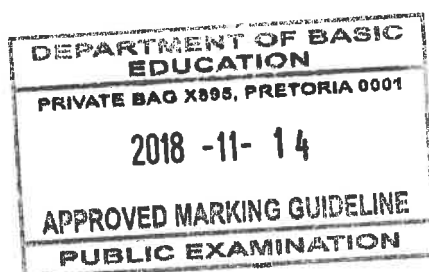



QUESTION/VRAAG 4

4.1.1	$\sin 30^\circ = \frac{20}{AC}$ $AC = \frac{20}{\sin 30^\circ}$ $AC = 40$ OR/OF $\cos 60^\circ = \frac{20}{AC}$ $AC = \frac{20}{\cos 60^\circ}$ $AC = 40$	$\operatorname{cosec} 30^\circ = \frac{AC}{20}$ $AC = \frac{20}{\sin 30^\circ}$ $AC = 40$ OR/OF $\sec 60^\circ = \frac{AC}{20}$ $AC = \frac{20}{\cos 60^\circ}$ $AC = 40$	$\checkmark \sin 30^\circ = \frac{20}{AC} \text{ or}$ $\operatorname{cosec} 30^\circ = \frac{AC}{20}$ $\checkmark$ answer/antwoord (2)
4.1.2	$\cos \hat{CAD} = \frac{AC}{60}$ $\cos \hat{CAD} = \frac{40}{60}$ $\hat{CAD} = 48,19^\circ$	$\checkmark \cos \hat{CAD} = \frac{AC}{60}$ $\checkmark$ answer/antwoord (2)	$\checkmark \cos \hat{CAD} = \frac{AC}{60}$ $\checkmark$ answer/antwoord (2)
4.1.3	$\hat{DAE} = 90^\circ - (30^\circ + \hat{CAD})$ $\hat{DAE} = 90^\circ - (30^\circ + 48,19^\circ)$ $= 11,81^\circ$ $\tan 11,81^\circ = \frac{DE}{60}$ $DE = 60 \tan 11,81^\circ$ $DE = 12,55$	$\checkmark \hat{DAE} = 11,8^\circ$ $\checkmark \tan 11,81^\circ = \frac{DE}{60}$ $\checkmark$ answer/antwoord (3)	$\checkmark \hat{DAE} = 11,8^\circ$ $\checkmark \tan 11,81^\circ = \frac{DE}{60}$ $\checkmark$ answer/antwoord (3)



4.2.1	$\tan x = 2,01$ $x = 63,5^\circ$	If the rounding is incorrect: max 1/2 marks	$\checkmark\checkmark$ answer/antwoord (2)
4.2.2	$5 \cos x + 2 = 4$ $5 \cos x = 2$ $\cos x = \frac{2}{5}$ $x = 66,4218\dots^\circ$ $x = 66,4^\circ$		$\checkmark 5 \cos x = 2$ $\checkmark \cos x = \frac{2}{5}$ $\checkmark$ answer/antwoord (3)
4.2.3	$\frac{\operatorname{cosec} x}{2} = 3$ $\operatorname{cosec} x = 6$ $\frac{1}{\sin x} = 6$ $\sin x = \frac{1}{6}$ $x = 9,6^\circ$		$\checkmark \operatorname{cosec} x = 6$ $\checkmark \sin x = \frac{1}{6}$ $\checkmark$ answer/antwoord (3)
			[15]



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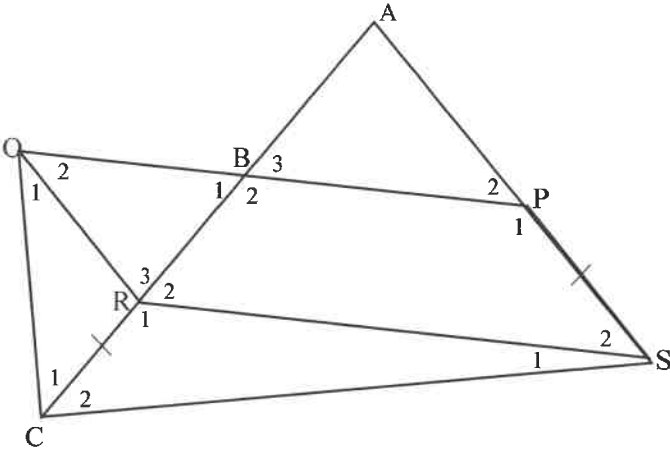
QUESTION/VRAAG 5

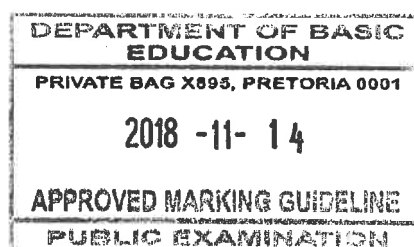
5.1.1		✓ Tan graph passing through (45°; -3) or (135°; 3) or (225°; -3) or (315°; 3) ✓ x-intercepts/ x-sny punte ✓ both asymptotes/ albei asimptote
5.1.2(a)	180°	✓ answer/antwoord (1)
5.1.2(b)	$h(x) = 3 \tan x$	✓ answer/antwoord (1)
5.2.1	$a = -2$ $b = 1$	✓ a ✓ b (2)
5.2.2	$90^\circ < x < 270^\circ$ OR/OF $x \in (90^\circ ; 270^\circ)$	✓ answer/antwoord (1)
5.2.3	$-4 \leq y \leq 0$ OR/OF $y \in [-4 ; 0]$	✓ critical values/kritieke waardes ✓ notation/notasie (2)
5.2.4	$-2(\cos 0^\circ + \cos 1^\circ + \cos 2^\circ + \dots + \cos 358^\circ + \cos 359^\circ + \cos 360^\circ)$ $= -2(1)$ $= -2$	✓ ✓ answer/antwoord (2)
		[12]

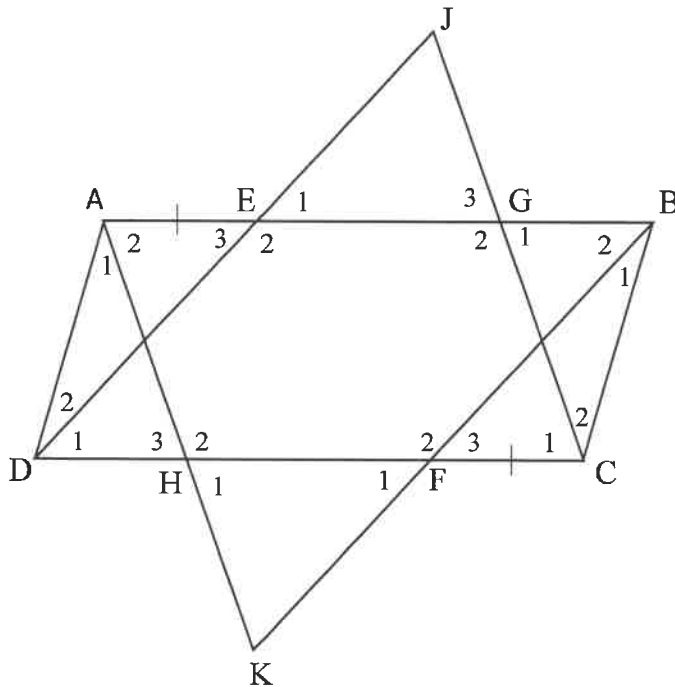
QUESTION/VRAAG 6

6.1	$r = 3 \text{ cm}$ $V = \pi r^2 h$ $117\pi = \pi(3)^2 h$ $h = 13 \text{ cm}$	2018 -11- 14 APPROVED MARKING GUIDELINE PUBLIC EXAMINATION	$\checkmark r = 3 \text{ cm}$ $\checkmark \text{subst./verv.}$ $\checkmark \text{answer/antwoord}$ (3)
6.2	TSA/TBO $= \pi r^2 + 2\pi rh$ $= \pi(3)^2 + 2\pi(3)(13) \times 0,8$ $= 224,31 \text{ cm}^2$ OR/OF TSA/TBO $= \pi r^2 + 2\pi rh$ $= \pi(3)^2 + 2\pi(3)(10,4)$ $= 224,31 \text{ cm}^2$		$\checkmark \pi r^2 + 2\pi rh$ $\checkmark \text{subst./verv.}$ $\checkmark 80\% \text{ of height/van}$ hoogte $\checkmark \text{answer}$ (4)
			[7]

QUESTION/VRAAG 7

7.1	Bisects the third side/ <i>Halveer die derde sy</i>	✓ answer/antwoord (1)
7.2		
7.2.1	$CR = PS$ (given) $PS = QR$ (opp sides $\parallel$ m =) $CR = QR$ $\hat{Q}_1 = \hat{C}_1 = 50^\circ$ ($\angle$ s opp = sides) $\hat{R}_3 = 100^\circ$ (ext $\angle \Delta$) $\hat{A} = 100^\circ$ (alt $\angle$ s; $QR \parallel AS$)	✓ $CR = QR$ ✓ $\hat{Q}_1 = \hat{C}_1 = 50^\circ$ ✓ $\hat{R}_3 = 100^\circ$ ✓ $\hat{A} = 100^\circ$ ✓ Reason (5)
7.2.2	$AP = PS$ (line from midpoint $\parallel$ to one side of triangle) $RS = 120$ (midpoint theorem) $QP = 120$ (opp sides $\parallel$ m =) OR/OF In ΔQBR and ΔPBA 1. $\hat{R}_3 = \hat{A}$ (proven) or (alt $\angle$ s; $QR \parallel QS$) 2. $\hat{B}_1 = \hat{B}_3$ (vert opp $\angle$ s) 3. $BR = BA$ (given) $\Delta QBR \equiv \Delta PBA$ ($\angle \angle S$) $QB = BP = 60$ ($\equiv \Delta$ s) $QP = 120$	✓ $AP = PS$ ✓ Reason ✓ $QP = 120$ Answer only: 1/3 marks ✓ $\Delta QBR \equiv \Delta PBA$ ✓ $QB = BP$ ✓ $QP = 120$ (3)
		[9]



QUESTION/VRAAG 8

8.1.1

$AB = DC$
 $AE + EB = DF + FC$ (opp sides of a parallelogram equal)
 $AE = CF$ (given)
 $\therefore EB = DF$
 $DF \parallel EB$ (opp sides parallelogram parallel)
 $EDFB$ is a parallelogram (one pair opp sides = and $\parallel$)
 $\therefore ED \parallel FB$
 $\therefore DJ \parallel BK$

OR/OFIn $\triangle AED$ and $\triangle CFB$

1. $FC = AE$ (given)
 2. $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$ (opp $\angle \parallel m \Rightarrow$)
 3. $BC = AD$ (opp sides $\parallel m \Rightarrow$)
- $\triangle AED \equiv \triangle CFB$ (S/S)
 $\hat{E}_3 = \hat{F}_3$ ($\equiv \Delta s$)
 $\hat{E}_3 = \hat{D}_1$ (alt $\angle s$; $AB \parallel DC$)
 $\hat{F}_3 = \hat{D}_1$
 $DJ \parallel BK$ (corres $\angle s \Rightarrow$)

✓ S/R

✓ $EB = DF$

✓ S/R

✓ R

✓ $ED \parallel FB$

(5)

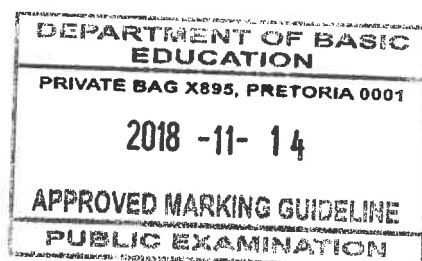
✓ $\triangle AED \equiv \triangle CFB$ ✓ $\hat{E}_3 = \hat{F}_3$

✓ S/R

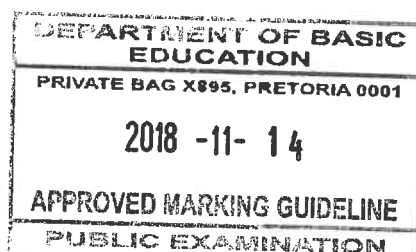
✓ $\hat{F}_3 = \hat{D}_1$

✓ R

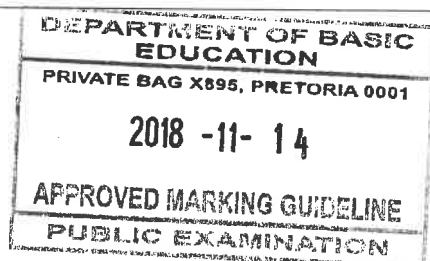
(5)



	OR/OF In $\triangle AED$ and $\triangle CFB$ 1. $FC = AE$ (given) 2. $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$ (opp $\angle$ m =) 3. $BC = AD$ (opp sides m =) $\triangle AED \equiv \triangle CFB$ (S$\angle$S) $DE = FB$ ($\equiv \Delta$s) $AB = DC$ $AE + EB = DF + FC$ (opp sides of a parallelogram equal) $AE = CF$ (given) $\therefore EB = DF$ EDFB is a parallelogram (both pairs opp sides =) $DE \parallel FB$ (opp sides m) $DJ \parallel KB$	✓ $\triangle AED \equiv \triangle CFB$ ✓ $DE = FB$ ✓ S/R ✓ $EB = DF$ ✓ Reason
8.1.2	$\hat{E}_1 = \hat{D}_1$ (corres. $\angle$'s, $AB \parallel DC$) $\hat{F}_1 = \hat{D}_1$ (alt. $\angle$'s, $DE \parallel FB$) $\therefore \hat{E}_1 = \hat{F}_1$ OR/OF $\hat{E}_3 = \hat{D}_1$ (alt. $\angle$'s, $AB \parallel DC$) $\hat{F}_1 = \hat{D}_1$ (alt. $\angle$'s, $DE \parallel FB$) $\therefore \hat{E}_3 = \hat{F}_1$ $\hat{E}_3 = \hat{E}_1$ (vert. opp. $\angle$'s) $\therefore \hat{E}_1 = \hat{F}_1$ OR/OF $\hat{E}_1 = \hat{D}_1$ (corres $\angle$'s, $AB \parallel DC$) $\hat{F}_3 = \hat{D}_1$ (corres $\angle$'s, $DE \parallel FB$) $\therefore \hat{E}_3 = \hat{F}_1$ $\hat{F}_3 = \hat{F}_1$ (vert. opp. $\angle$'s) $\therefore \hat{E}_1 = \hat{F}_1$ OR/OF EDFB is a parallelogram (proven in 8.1.1) $\hat{E}_2 = \hat{F}_2$ (opp $\angle$s m =) $\hat{E}_1 = \hat{F}_1$ ($\angle$s on straight line)	✓S ✓R ✓S ✓R (4) ✓S ✓R ✓S ✓S/R (4) ✓S ✓R ✓S ✓S/R (4) ✓S ✓R ✓S ✓R (4)



8.2		
8.2.1	$AP = BP$ (given) $OA = OB$ (radii) $OAPB$ is a kite (two pairs adj sides =) $AT = TB$ (one diag of kite bisects the other) OR/OF In $\triangle OAP$ and $\triangle OBP$ $AP = BP$ (given) $OA = OB$ (radii) OP is common $\therefore \triangle OAP \equiv \triangle OBP$ (SSS) $\hat{O}_1 = \hat{O}_2$ ($\equiv \Delta s$) In $\triangle OAT$ and $\triangle OBT$ $\hat{O}_1 = \hat{O}_2$ ($\equiv \Delta s$) $OA = OB$ (radii) OT is common $\therefore \triangle OAT \equiv \triangle OBT$ (S$\angle$S) $AT = TB$ ($\equiv \Delta s$) $\hat{P}_1 = \hat{P}_2$ ($\equiv \Delta s$) In $\triangle PAT$ and $\triangle PBT$ $\hat{P}_1 = \hat{P}_2$ ($\equiv \Delta s$) $AP = PB$ (given) PT is common $\triangle PAT \equiv \triangle PBT$ (S$\angle$S)	$\checkmark$ S $\checkmark$ $OA = OB$ $\checkmark$ $OAPB$ is a kite/'n vlieër $\checkmark$ two pairs adj sides = $\checkmark$ reason/rede (5) $\checkmark$ $AP = BP$ $\checkmark$ $OA = OB$ $\checkmark$ $\hat{O}_1 = \hat{O}_2$ or $\hat{P}_1 = \hat{P}_2$ ($\equiv \Delta s$) $\checkmark \therefore \triangle OAT \equiv \triangle OBT$ or $\triangle PAT \equiv \triangle PBT$ $\checkmark \equiv \Delta s$ (5)
8.2.2	$\hat{O}TA = 90^\circ$ (properties of a kite) OR/OF $\hat{O}TA = \hat{O}TB$ ($\triangle OTA \equiv \triangle OTB$) but: $\hat{O}TA + \hat{O}TB = 180^\circ$ ($\angle$s on a str.line) $\therefore \hat{O}TA = 90^\circ$	$\checkmark$ R (1) $\checkmark$ R (1)
		[15]



TOTAL/TOTAAL: 100