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.

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

1.1

Marks/*Punte*	Frequency/*Frekwensie*
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)

1.2

42 learners/*leerders*

✓answer/*antwoord*
(1)

1.3.1

Range/*Variasiewydte*
$= 9 - 1$
$= 8$

Answer only: 2/2 marks

✓max = 9 and min = 1
✓answer/*antwoord*
(2)

1.3.2

$$\bar{x} = \frac{(1\times3)+(2\times4)+(3\times5)+(4\times3)+(5\times6)+(7\times7)+(8\times9)+(9\times5)}{42}$$

$$= \frac{234}{42}$$
$$= 5,57$$

Answer only: 3/3 marks

✓ sum of (frequencies × values)

✓÷ *n*
✓answer/*antwoord*
(3)

1.4

Position of the median/*Posisie van die mediaan* $= \frac{n+1}{2}$

$= 21,5^{th/de}$ position/*posisie*

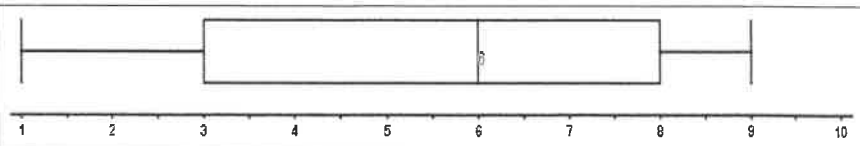
$Q_2 = \frac{5+7}{2}$

$= 6$

Answer only: 3/3 marks

✓ identification of 5 and 7
✓$\frac{5+7}{2}$
✓answer/*antwoord*
(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

$$x_T = \frac{x_1 + x_2}{2} \qquad y_T = \frac{y_1 + y_2}{2}$$
$$= \frac{1+6}{2} \qquad = \frac{0+3}{2}$$
$$= \frac{7}{2} \qquad = \frac{3}{2}$$
$$T\left(\frac{7}{2}; \frac{3}{2}\right)$$

✓*x*-value/*x-waarde*
✓*y*-value/*y-waarde* (2)

2.2.1

$$QR = QP = \sqrt{34}$$
$$QT = \frac{1}{2}PQ$$

OR/*OF*

$$QT = \frac{1}{2}\sqrt{34}$$
$$QT = \sqrt{\left(\frac{7}{2}-6\right)^2 + \left(\frac{3}{2}-3\right)^2}$$
$$QT = \frac{\sqrt{34}}{2}$$

✓ $QR = \sqrt{34}$
✓ $QT = \frac{1}{2}\sqrt{34}$

$$\text{Area of } \Delta QTR = \frac{1}{2}(QR)(QT)$$
$$= \frac{1}{2}(\sqrt{34})\left(\frac{1}{2}.\sqrt{34}\right)$$
$$= \frac{17}{2} = 8{,}5 \text{ sq units/eenhede}$$

OR/*OF*

✓answer/*antwoord* (3)

	$QR = QP = \sqrt{34}$ Area of $\Delta QTR = \frac{1}{2}$ Area of ΔQPR $= \frac{1}{2}\left(\frac{1}{2}.QR.QP\right)$ $= \frac{1}{2}\times\frac{1}{2}.(\sqrt{34})(\sqrt{34})$ $= \frac{17}{2}$ sq units/eenhede	✓ $QR = \sqrt{34}$ ✓ $\frac{1}{2}\sqrt{34}$ ✓answer/*antwoord* (3)
2.2.2	$\theta = 121^\circ - 90^\circ$ (ext ∠ Δ/*buitehoek van Δ*) $= 31^\circ$ **OR/*OF*** $Q\hat{S}P = 59°$ (∠ str line/*hoek op reguitlyn*) $\theta = 31°$ (∠ sum Δ/*binnehoek van Δ*)	✓ reason ✓answer/*antwoord* (2) ✓ ∠ sum Δ/*binnehoek van Δ* ✓ 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) **OR/*OF*** $\sin Q\hat{S}P = \frac{PQ}{PS}$ $\sin 59° = \frac{\sqrt{34}}{PS}$ $PS = \frac{\sqrt{34}}{\sin 59°}$ $PS = 6{,}80$	✓ $\cos\theta = \frac{PQ}{PS}$ or/*of* $\sin Q\hat{S}P = \frac{PQ}{PS}$ ✓ *x*-value/*x-waarde* ✓ *y*-value/*y-waarde* (3) ✓ $m_{QR} = m_{QS}$ ✓ $y = 0$ ✓ *x*-value/*x-waarde* (3) ✓ equation of QR/*verhouding van QR* ✓ $y = 0$ ✓ *x*-value/*x-waarde*

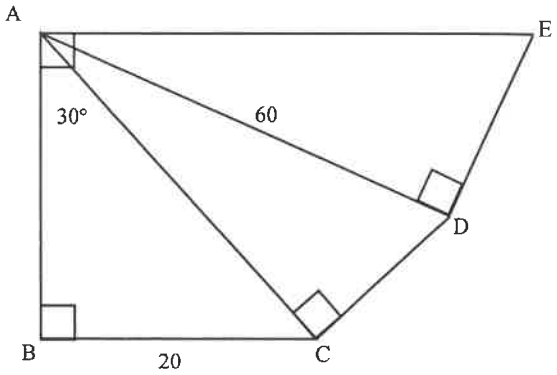
		(3)
2.3	$m_{QR}=\frac{3-(-2)}{6-(9)}$ $=-\frac{5}{3}$ $m_{T-\text{midpoint}}=m_{\text{QR}}$ (Midpoint Theorem) $m_{T-\text{midpoint}}=-\frac{5}{3}$ **OR/*OF*** Midpoint PR$\left(\frac{9+1}{2};\frac{-2+0}{2}\right)$ Midpoint PR$(5;-1)$ $m_{T\ and/en\ PR}=\frac{\frac{3}{2}-(-1)}{\frac{7}{2}-(5)}$ $=-\frac{5}{3}$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

QUESTION/*VRAAG* 3

3.1.1	$\tan(90^\circ - \text{R})=\frac{\text{PR}}{\text{QP}}$ OR/*OF* $\frac{q}{r}$	✓answer/*antwoord* (1)
3.1.2	sec Q **OR/*OF*** cosec R **OR/*OF*** cosec (90° – Q) **OR/*OF*** sec (90° – R)	✓ answer/*antwoord* (1) ✓ answer/*antwoord* (1) ✓ answer/*antwoord* (1) ✓ answer/*antwoord* (1)
3.2.1	OS $=\sqrt{(-3)^2+(-4)^2}$ (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)
3.3	$\frac{\text{cosec } 45°}{\sin 90°.\tan 60°}$ $= \frac{\frac{1}{\sin 45°}}{(1).(\sqrt{3})}$ $= \frac{2}{\sqrt{2}} \div \sqrt{3}$ $= \frac{2}{\sqrt{2}} \times \frac{1}{\sqrt{3}}$ $= \frac{2}{\sqrt{6}}$ **OR/*OF*** $\frac{\text{cosec } 45°}{\sin 90°.\tan 60°}$ $= \frac{\frac{1}{\sin 45°}}{(1).(\sqrt{3})}$ $= \frac{\sqrt{2}}{\sqrt{3}}$ If the answer is left as $\frac{\sqrt{6}}{3}$ and no other rationalisation working is shown: max 3/4 marks	✓ $\frac{2}{\sqrt{2}}$ ✓ 1 ✓ $\sqrt{3}$ ✓answer/*antwoord* (4) ✓ $\sqrt{2}$ ✓ 1 ✓ $\sqrt{3}$ ✓answer/*antwoord* (4)
		[11]

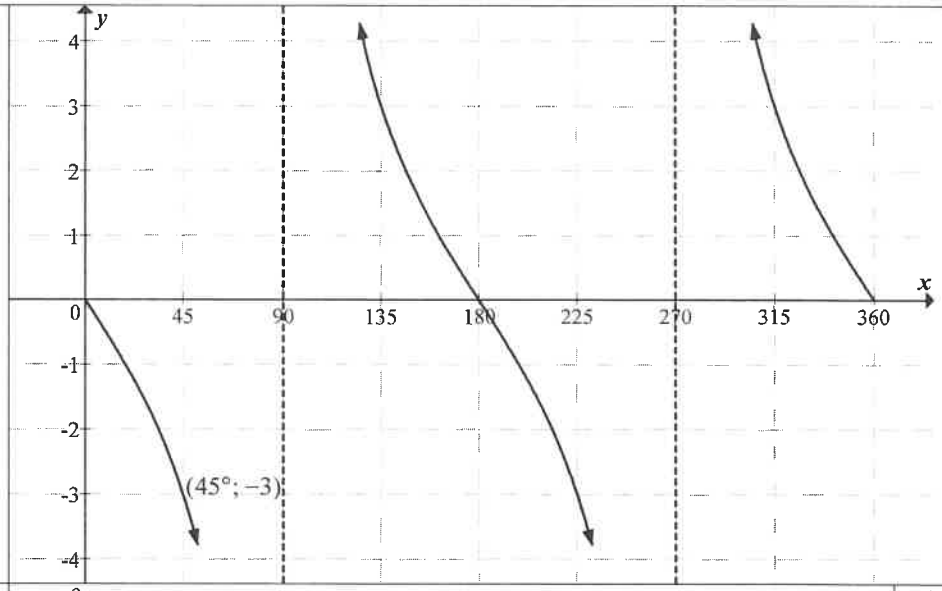
QUESTION/*VRAAG* 4



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

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

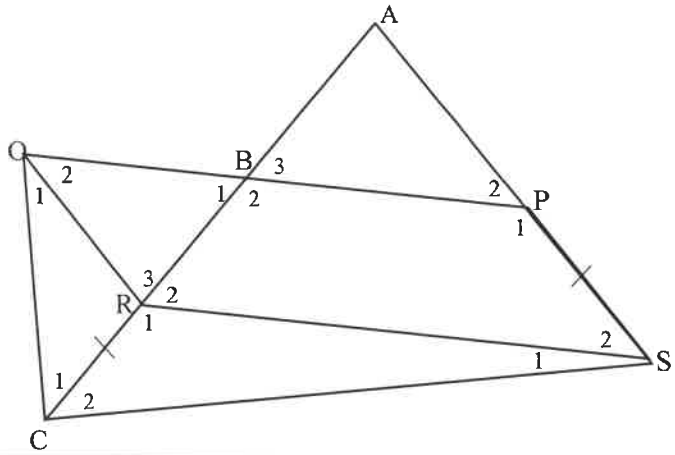
QUESTION/*VRAAG* 5

5.1.1		✓ Tan graph passing through (45°; –3) or (135°; 3) or (225°; –3) or (315°; 3) ✓ *x*-intercepts/ *x-snypunte* ✓ both asymptotes/ *albei asimptote* (3)
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	$-4 \le y \le 0$ **OR/*OF*** $y \in [-4; 0]$	✓critical values/*kritieke waardes* ✓notation/*notasie* (2)
5.2.4	$-2(\cos 0° + \cos 1° + \cos 2° + ... + \cos 358° + \cos 359° + \cos 360°)$ $= -2(1)$ $= -2$	✓✓answer/*antwoord* (2)
		[12]

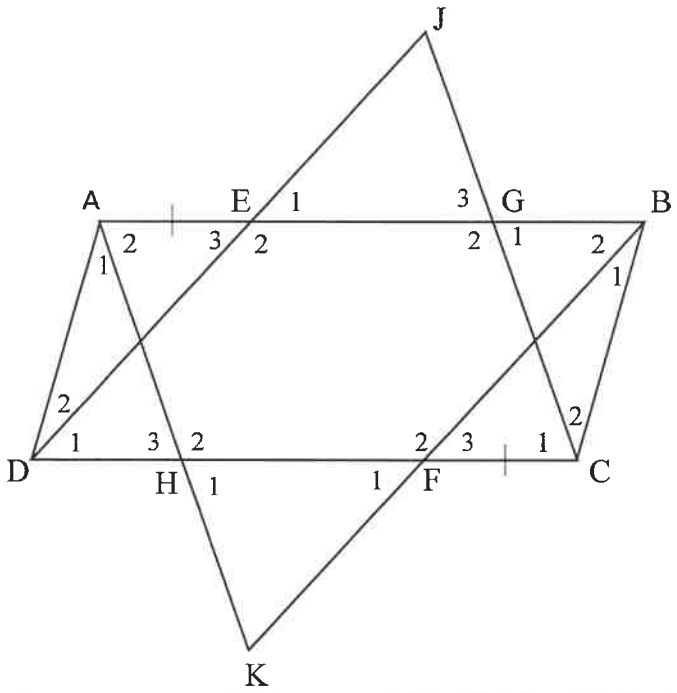
QUESTION/*VRAAG* 6

6.1	$r = 3$ cm $V = \pi r^2 h$ $117\pi = \pi(3)^2 h$ $h = 13\,cm$			✓$r = 3$ cm ✓subst./*verv.* ✓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 $= \pi r^2 + 2\pi rh$ $= \pi(3)^2 + 2\pi(3)(10{,}4)$ $= 224{,}31\,\text{cm}^2$	✓$\pi r^2 + 2\pi rh$ ✓subst./*verv.* ✓80% of height/*van hoogte* ✓answer (4)
				[7]

QUESTION/*VRAAG* 7

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

QUESTION/*VRAAG* 8



8.1.1

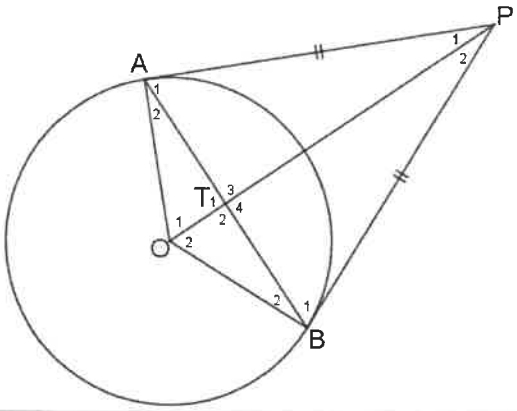
AB = DC
AE + EB = DF + FC (opp sides of a parallelogram equal) ✓ S/R
AE = CF (given)
∴ EB = DF ✓ EB = DF
DF || EB (opp sides parallelogram parallel) ✓ S/R
EDFB is a parallelogram (one pair opp sides = and ||) ✓ R
∴ ED || FB ✓ ED || FB
∴ DJ || BK (5)

OR/*OF*

In ΔAED and ΔCFB
1. FC = AE (given)
2. $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$ (opp ∠ ||m =)
3. BC = AD (opp sides ||m =)

ΔAED ≡ ΔCFB (S∠S) ✓ ΔAED ≡ ΔCFB
$\hat{E}_3 = \hat{F}_3$ (≡ Δs) ✓ $\hat{E}_3 = \hat{F}_3$
$\hat{E}_3 = \hat{D}_1$ (alt ∠s; AB || DC) ✓ S/R
$\hat{F}_3 = \hat{D}_1$ ✓ $\hat{F}_3 = \hat{D}_1$
DJ || BK (corres ∠s =) ✓ R
(5)

	OR/*OF* In ΔAED and ΔCFB 1. FC = AE (given) 2. $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$ (opp ∠ ‖m =) 3. BC = AD (opp sides ‖m =) ΔAED ≡ ΔCFB (S∠S) DE = FB (≡ Δs) AB = DC AE + EB = DF + FC (opp sides of a parallelogram equal) AE = CF (given) ∴ EB = DF EDFB is a parallelogram (both pairs opp sides =) DE ‖ FB (opp sides ‖m ‖) DJ ‖ KB	✓ ΔAED ≡ ΔCFB ✓ DE = FB ✓ S/R ✓ EB = DF ✓ Reason
8.1.2	$\hat{E}_1 = \hat{D}_1$ (corres. ∠'s, AB‖DC) $\hat{F}_1 = \hat{D}_1$ (alt. ∠'s, DE‖FB) $\therefore \hat{E}_1 = \hat{F}_1$ **OR/*OF*** $\hat{E}_3 = \hat{D}_1$ (alt. ∠'s, AB‖DC) $\hat{F}_1 = \hat{D}_1$ (alt. ∠'s, DE‖FB) $\therefore \hat{E}_3 = \hat{F}_1$ $\hat{E}_3 = \hat{E}_1$ (vert. opp. ∠'s) $\therefore \hat{E}_1 = \hat{F}_1$ **OR/*OF*** $\hat{E}_1 = \hat{D}_1$ (corres ∠'s, AB‖DC) $\hat{F}_3 = \hat{D}_1$ (corres ∠'s, DE‖FB) $\therefore \hat{E}_3 = \hat{F}_1$ $\hat{F}_3 = \hat{F}_1$ (vert. opp. ∠'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 ∠s ‖m =) $\hat{E}_1 = \hat{F}_1$ (∠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 ΔOAP and ΔOBP 1. AP = BP (given) 2. OA = OB (radii) 3. OP is common ∴ ΔOAP ≡ ΔOBP (SSS) $\hat{O}_1 = \hat{O}_2$ (≡ Δs) In ΔOAT and ΔOBT 1. $\hat{O}_1 = \hat{O}_2$ (≡ Δs) 2. OA = OB (radii) 3. OT is common ∴ ΔOAT ≡ ΔOBT (S∠S) AT = TB (≡ Δs) $\hat{P}_1 = \hat{P}_2$ (≡ Δs) In ΔPAT and ΔPBT 1. $\hat{P}_1 = \hat{P}_2$ (≡ Δs) 2. AP = PB (given) 3. PT is common ΔPAT ≡ ΔPBT (S∠S)	✓ S ✓ OA = OB ✓ OAPB is a kite/*'n vlieër* ✓ two pairs adj sides = ✓ reason/*rede* (5) ✓ AP = BP ✓ OA = OB ✓ $\hat{O}_1 = \hat{O}_2$ or $\hat{P}_1 = \hat{P}_2$ (≡ Δs) ✓ ∴ ΔOAT ≡ ΔOBT or ΔPAT ≡ ΔPBT ✓ ≡ Δs (5)
8.2.2	$O\hat{T}A = 90°$ (properties of a kite) **OR/*OF*** $O\hat{T}A = O\hat{T}B$ (ΔOTA ≡ ΔOTB) but: $O\hat{T}A + O\hat{T}B = 180^\circ$ (∠s on a str.line) ∴ $O\hat{T}A = 90^\circ$	✓ R (1) ✓ R (1)
		[15]

TOTAL/*TOTAAL*: 100