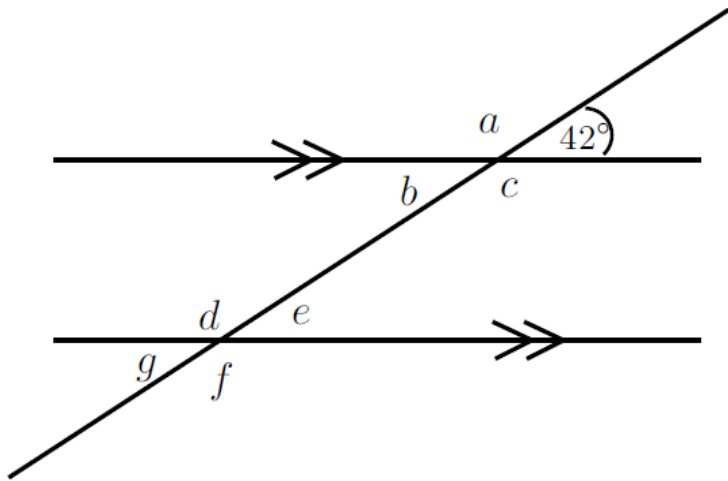


Euclidean Geometry Grade 10 Memo

Example 1



$b = 42^\circ$	vertically opp $\angle$ s
$a + 42^\circ = 180^\circ$	sum of $\angle$ on a straight line
$a = 136^\circ$	
$c = 136^\circ$	vertically opp $\angle$ s
$e = b = 42^\circ$	alt $\angle$ s
$d = c = 136^\circ$	alt $\angle$ s
$f = c = 136^\circ$	corresponding $\angle$ s
$g = b = 42^\circ$	corresponding $\angle$ s

Example 2

Step 1 : Use the properties of parallel lines to find all equal angles on the diagram

Step 2 : Determine the unknown angles

$$AB \parallel CD \quad (\text{given})$$

$$\therefore \hat{x} = 60^\circ \quad (\text{alt. int. } \angle\text{'s})$$

$$\hat{y} + 160^\circ = 180^\circ \quad (\text{co-int. } \angle\text{'s})$$

$$\therefore \hat{y} = 20^\circ$$

$$\hat{p} = \hat{y} \quad (\text{vert. opp. } \angle\text{'s})$$

$$\therefore \hat{p} = 20^\circ$$

$$\hat{r} + \hat{p} = 180^\circ \quad (\text{sum of } \angle\text{'s str. line})$$

$$\therefore \hat{r} = 160^\circ$$

$$\hat{s} + \hat{x} = 90^\circ \quad (\text{given})$$

$$\hat{s} + 60^\circ = 90^\circ$$

$$\therefore \hat{s} = 30^\circ$$

Example 3

a)

$\angle ACB = \angle DCF = 32^\circ$ (Vert. opp. $\angle$'s) $\angle EBC = \angle ACB = 32^\circ$ (Alt. $\angle$'s, $EB \parallel DA$)
--

b)

$$\angle CAB + \angle ABE = 180^\circ \text{ (Co int. } \angle \text{'s : } EB \parallel DA \text{) } \checkmark \text{S/F}$$

$$\angle CAB = 180^\circ - 65^\circ \quad \checkmark \text{M}$$

$$\angle CAB = 115^\circ \quad \checkmark \text{A}$$

OR

$$\angle CAB + \angle ACB + \angle ABC = 180^\circ \text{ (} \angle \text{'s of a } \Delta \text{) } \checkmark \text{S/R}$$

$$\angle CAB = 180^\circ - (32^\circ + 33^\circ) \text{ [} \angle ABC = 65^\circ - 32^\circ \text{]} \checkmark \text{M}$$

$$\angle CAB = 180^\circ - 65^\circ$$

$$\angle CAB = 115^\circ \quad \checkmark \text{A}$$

Example 4

6. a) $\widehat{ADE} = \widehat{PAD} = 53^\circ$ Alternate angles are =
- b) $\widehat{ABE} = 180^\circ - \widehat{ABE}$ Co-interior angles = 180°
 $\widehat{ABE} = 180^\circ - 104^\circ$
 $\widehat{ABE} = 76^\circ$
- c) $\widehat{CBX} = \widehat{ABE} = 76^\circ$ Vertically opposite angles are =
- d) $\widehat{EFY} = 180^\circ - \widehat{EFC}$ Angles in a straight line = 180°
 $\widehat{EFY} = 180^\circ - 149^\circ$
 $\widehat{EFY} = 31^\circ$
- e) $\widehat{BCF} = 31^\circ = \widehat{EFY}$ Corresponding angles are =
- f) $\widehat{CBE} = 180^\circ - \widehat{ABE}$ Angles in a straight line = 180°
 $\widehat{CBE} = 180^\circ - 76^\circ$
 $\widehat{CBE} = 104^\circ$

g) $\hat{BCF} = 31$

Answer to question 6. e)

$\hat{CBE} = 104^\circ$

Answer to question 6. f)

$31^\circ + 104^\circ \neq 180^\circ$

This is because the lines XY and YZ are not parallel so the two angles are not co-interior.

Example 5

a)

$\angle A + \angle ABC = \angle BCE$ (Ext $\angle$ of a Δ) ✓S/R

$(2x - 48^\circ) + (x + 14^\circ) = 116^\circ$ ✓M

$3x - 34^\circ = 116^\circ$

$3x = 150^\circ$

✓A

$x = 50^\circ$

OR

✓S/R

$\angle A + \angle ABC + \angle ACB = 180^\circ$ ($\angle$'s of a Δ)

$(2x - 48^\circ) + (x + 14^\circ) + 64^\circ = 180^\circ$ ✓M

$3x + 30^\circ = 180^\circ$

$3x = 150^\circ$

$x = 50^\circ$

✓A

b)

$\angle A = 2x - 48^\circ$

$= 2(50^\circ) - 48^\circ$ ✓M

$= 100^\circ - 48^\circ$

$= 52^\circ$ ✓A

c)

$\angle ABC = 50^\circ + 14^\circ = 64^\circ$

$\angle ACB = 180^\circ - 116^\circ = 64^\circ$

✓S

✓R

ΔABC is an isosceles triangle ($\angle ABC = \angle ACB$)

Example 6

a)

$$\overset{\check{S}}{\angle ABC} = 40^\circ \quad \overset{\check{R}}{\text{(Complementary } \angle's)}$$

b)

$$\overset{\check{S}}{\angle ADO} = 32^\circ \quad (\overset{\check{R}}{AO = OD} \text{ / radii})$$

Example 7

STATEMENT	REASON
$KL = KN$	Given $\check{A}$
$LM = NM$	Given $\check{A}$
$KM = KM$	Common $\check{A}$
$\therefore \triangle KLM \equiv \triangle KNM.$	SSS $\check{A}$

Example 8

a)

STATEMENT	REASON
$\hat{A} = \hat{P}$	Alt. $\angle$'s, $AB \parallel PQ$ $\check{A}$
$\hat{B} = \hat{Q}$	Alt. $\angle$'s, $AB \parallel PQ$ $\check{A}$
$\hat{AOB} = \hat{POQ}$	Vert. opp. $\angle$'s $\check{A}$
$\therefore \triangle ABO \equiv \triangle PQO.$	AAA $\check{A}$

b)

$$\frac{OQ}{OB} = \frac{OP}{AO} \quad (\text{Corr. sides are proportional}) \quad \check{S/f}$$

$$\frac{x}{5 \text{ cm}} = \frac{12 \text{ cm}}{6 \text{ cm}} \quad \check{A}$$

$$x = OQ = 10 \text{ cm} \quad \check{CA}$$

2018 Eastern Cape November Q 5.1-5.2

5.1			
5.1.1	$\checkmark A$ $x = 85^\circ$ (Alternate $\angle$'s; AC//HF)	Answer: 1 Mark Reason: 1 Mark	(2)
5.1.2	$\checkmark A$ $y = 95^\circ$ (Co-interior $\angle$'s = 180° ; BF//CD)	Answer: 1 Mark Reason: 1 Mark	(2)
5.2			
5.2.1	$\angle Q_1 = 55^\circ$ (Corresponding $\angle$'s; MN//QP) $\checkmark S/R$ $55^\circ + 2x - 5^\circ + 3x + 40^\circ = 180^\circ$ (3 $\angle$'s of $\triangle PQO = 180^\circ$) $\checkmark S$ $5x + 90^\circ = 180^\circ$ $x = 18^\circ$ $\checkmark CA$	Statement and reason: 1 Mark Statement: 1 Mark Reason: 1 Mark Answer: 1 Mark	(4)
5.2.2	$\angle MON = 2x - 5^\circ$ $= 2(18^\circ) - 5^\circ$ $\checkmark M$ $= 31^\circ$ $\checkmark CA$	Substitution/Method: 1 Mark Answer: 1 Mark	(2)

2017 Gauteng November Q 7.1

7.1.1	Vertically Opposite angles / <i>Vertikale teenoorgestelde hoeke</i>	1 for reason / <i>rede</i>
7.1.2	$B_1 = F_4$	1 for answer / <i>antwoord</i>
7.1.3	180°	1 for answer / <i>antwoord</i>
7.1.4	CF or FC ; $\angle$'s opposite the equal sides / <i>teenoorgestelde van die ewewydige sy</i>	1 for CF / <i>vir CF</i> 1 for reason / <i>vir rede</i>

7.3.1	$D_1 + D_2 = 50^\circ$ $D_2 = 25^\circ$ $\angle$'s of $\Delta = 180^\circ$ / <i>Binnehoeke van $\Delta = 180^\circ$</i>	1 for answer / <i>antwoord</i> 1 for reason / <i>rede</i>
7.3.2	$C_1 = 70^\circ$ (E) Corr. angles / <i>Ooreenk hoeke</i> $C_2 = D_2$ Alt. angles / <i>Verwiss hoeke</i> $C_2 = 25^\circ$ $C_1 + C_2 + C_3 = 180^\circ$ Angles on straight line / <i>Hoeke op reguit lyn</i> $C_3 = 85^\circ$	1 for answer / <i>antwoord</i> 1 for reason / <i>rede</i> 1 for answer / <i>antwoord</i> 1 for reason / <i>rede</i> 1 for answer / <i>antwoord</i> 1 for reason / <i>rede</i>
7.3.3	$B_1 = D$ (50°) Corr. angles / <i>Ooreenkomstige hoeke</i> $B_1 = 50^\circ$ $B_2 = 180^\circ - 50^\circ = 130^\circ$ Angles on straight lines / <i>Hoeke op reguit lyne</i> Or / of $B_2 = 180^\circ - D_1 - C_2$ $= 180^\circ - 25^\circ - 25^\circ$ $= 130^\circ$ Sum of angles of triangle. / <i>Som van hoeke op driehoek.</i>	1 for answer / <i>antwoord</i> 1 for reason / <i>rede</i> 1 for answer / <i>antwoord</i> 1 for reason / <i>rede</i>

7.4	$\frac{DF}{KF} = \frac{DE}{KL} = \frac{EF}{LF}$ $\frac{y}{15} = \frac{\frac{10}{3}}{\frac{1}{3}} = \frac{12}{x}$ $y = 45$ $x = 4$	1 for substitution / <i>substitusie</i> 1 for / <i>vir</i> 45 1 for / <i>vir</i> 4
-----	---	--

2022 Gauteng November Paper 2 Q 2.2-2.3

2.2	STATEMENT/ BEWERING	REASON/REDE	1 mark for statement & reason/ 1 punt vir bewering en rede
	$\hat{S}_1 + \hat{S}_2 + \hat{S}_3 = 180^\circ$	$\angle s$ on a str. line ✓ M	1 mark for reasoning $\hat{S}_2 = \frac{1}{2}x$ / 1 punt vir redenasie $\hat{S}_2 = \frac{1}{2}x$
	$\hat{S}_2 = \frac{1}{2}\hat{S}_3, \hat{S}_3 = x$	$\angle e$ op 'n reguit lyn	1 mark for reasoning $\hat{S}_1 = \frac{3}{2}x$ / 1 punt vir redenasie $\hat{S}_1 = \frac{3}{2}x$
	$\hat{S}_2 = \frac{1}{2}x$ and ✓ M	Given/Gegee	1 mark for substitution/ 1 punt vir vervanging
	$\hat{S}_1 = 3\hat{S}_2 = 3(\frac{1}{2}x) = \frac{3}{2}x$ ✓ M		1 mark for answer/ 1 punt vir antwoord
	$\frac{3}{2}x + \frac{1}{2}x + x = 180^\circ$ ✓ M	Substitute $\hat{S}_1, \hat{S}_2$ and $\hat{S}_3 = 180^\circ$ / Vervang $\hat{S}_1, \hat{S}_2$ en $\hat{S}_3 = 180^\circ$	
	$\frac{6}{2}x = 180^\circ / 3x = 180^\circ$		
	$x = 60^\circ$ ✓ CA		(5)

2.3	2.3.1	STATEMENT/ BEWERING	REASON/REDE	1 mark for statement & reason/ 1 punt vir bewering & rede 1 mark for answer/ 1 punt vir antwoord
		$\hat{B}_3 = 110^\circ - 35^\circ$	ext. $\angle$ of Δ ✓ M buite-hoek van Δ	
		$\hat{B}_3 = 75^\circ$ ✓ A		(2)
	2.3.2	STATEMENT/ BEWERING	REASON/REDE	1 mark for statement & reason/ 1 punt vir bewering & rede 1 mark for answer/ 1 punt vir antwoord
		$\hat{F}\hat{B}\hat{E} = \hat{P}_2 = 110^\circ$	corr. $\angle s$ and $FG \parallel JM$ ✓ M ooreenkomstige $\angle e$ en $FG \parallel JM$	
		$\hat{F}\hat{B}\hat{E} = \hat{B}_5 = 110^\circ$	vert. opp. $\angle s$ ✓ M regoorst. $\angle e$	(2)
	2.3.2	STATEMENT/ BEWERING	REASON/REDE	1 mark for statement & reason/ 1 punt vir bewering & rede 1 mark for $\hat{P}_1 = \hat{B}\hat{L}\hat{H}$ / 1 punt vir $\hat{P}_1 = \hat{B}\hat{L}\hat{H}$ 1 mark for correct conclusion & reason/ 1 punt vir korrekte afleiding & rede
		$\hat{P}_1 + \hat{P}_2 = 180^\circ$	$\angle s$ on a str. line ✓ M $\angle e$ op 'n reguit lyn	
		$\hat{P}_1 = 180^\circ - 110^\circ = 70^\circ$		
		$\hat{P}_1 = \hat{B}\hat{L}\hat{H} = 70^\circ$ ✓ A but they are corresponding/ maar hulle stem ooreen $\angle s$ $\therefore HL \parallel KM$	Given $\hat{B}\hat{L}\hat{H} = 70^\circ$ Gegee $\hat{B}\hat{L}\hat{H} = 70^\circ$ corr. $\angle s$ are equal ✓ M ooreenkomstige $\angle e$ is gelyk	(3)

2011 November Paper Q 4.1-4.2

QUESTION 4				
		$\frac{PQ}{SP} = \frac{QR}{PR} \quad \text{i.e.} \quad \frac{20}{10} = \frac{p}{9} \quad \checkmark$ $10p = 180$ $\frac{10p}{10} = \frac{180}{10}$ $p = 18 \text{ cm} \quad \checkmark$	(2)	Cross multiplication Answer
	4.1.2	The corresponding sides of the two triangles are proportional. $\checkmark$	(1)	
4.2	4.2.1	$LM = LO + OM$ $= 6 \text{ cm} + 3 \text{ cm} \quad \checkmark$ $\therefore LM = 9 \text{ cm}$ Similarly $QO = QM + MO$ $= 6 \text{ cm} + 3 \text{ cm} \quad \checkmark$ $\therefore QO = 9 \text{ cm}$ $\therefore LM = QO$	(2)	Length of LM Length of QO

	4.2.2	In $\triangle POQ$ and $\triangle NML$ $\angle POQ = \angle NML = 90^\circ$ ($PO \perp LQ$ & $MN \perp LQ$) $\checkmark$ $PQ = LN \quad (\text{given}) \quad \checkmark$ $OQ = ML \quad \text{proved in 4.2.1}$ $\therefore \triangle POQ \equiv \triangle NML \quad (\text{RHS}) \quad \checkmark$	(3)	Statement Statement Conclusion
--	-------	---	-----	--

2013 Eastern Cape November Paper Q 6.3

6.3	6.3.1	$BF^2 = (15 \text{ cm})^2 + (8 \text{ cm})^2$ Pythagoras Theorem ✓ $= 225 \text{ cm}^2 + 64 \text{ cm}^2$ $BF = \sqrt{289 \text{ cm}^2}$ $BF = 19 \text{ cm}$ ✓	(2)	1 mark for stating theorem 1 mark for correct answer
	6.3.2	In $\triangle DFE$ and $\triangle BAC$ $DF = BA$ opposite sides of rect. ABDF ✓ $FE = AC$ opposite sides of rect. ACEF ✓ $DE = BC$ opposite sides of rect. BCED ✓ $\triangle DFE \cong \triangle BAC$ SSS ✓	(4)	1 mark for each reason

2015 Gauteng November Q 6.1-6.4

6.1 6.1.1

$$\begin{aligned} x &= 36^\circ \checkmark & [\text{angles opposite equal sides}] \checkmark \left(\frac{1}{2}\right) \\ y &= 90^\circ - 36^\circ \checkmark & [\text{sum of angles of a triangle}] \checkmark \left(\frac{1}{2}\right) \\ y &= 54^\circ \checkmark \end{aligned}$$

(4)

6.1.2 In $\triangle CAB$

$$\begin{aligned} x &= \hat{B} \checkmark \left(\frac{1}{2}\right) & [\text{angles opposite equal sides}] \checkmark \left(\frac{1}{2}\right) \\ 2x &= 180^\circ - 80^\circ \checkmark \left(\frac{1}{2}\right) & [\text{sum of angles of a triangle}] \checkmark \left(\frac{1}{2}\right) \\ x &= 50^\circ \checkmark \left(\frac{1}{2}\right) \\ x &= y + 25^\circ \checkmark \left(\frac{1}{2}\right) & [\text{exterior angle of a triangle}] \checkmark \left(\frac{1}{2}\right) \\ y &= 50 - 25^\circ \checkmark \left(\frac{1}{2}\right) \\ y &= 25^\circ \checkmark \left(\frac{1}{2}\right) \end{aligned}$$

(4)

6.2 $\hat{E} = \hat{G} \checkmark \left(\frac{1}{2}\right)$

[alternate angles; EFHG] $\checkmark \left(\frac{1}{2}\right)$

$\hat{F} = \hat{H} \checkmark \left(\frac{1}{2}\right)$

[alternate angles; EFHG] $\checkmark \left(\frac{1}{2}\right)$

$$\left(\begin{array}{l} \text{OR} \\ \hat{O}_1 = \hat{O}_2 \text{ vertical opposite angles} \\ \therefore \triangle EFO \equiv \triangle GHO \checkmark \left(\frac{1}{2}\right) \quad [\text{AAS}] \checkmark \left(\frac{1}{2}\right) \end{array} \right)$$

$FO = OH \checkmark \left(\frac{1}{2}\right)$

[given] $\checkmark \left(\frac{1}{2}\right)$

(4)

6.3 $\frac{x}{17} = \frac{69}{23} \checkmark$

$x = 17 \times 3 = 51 \checkmark \checkmark$

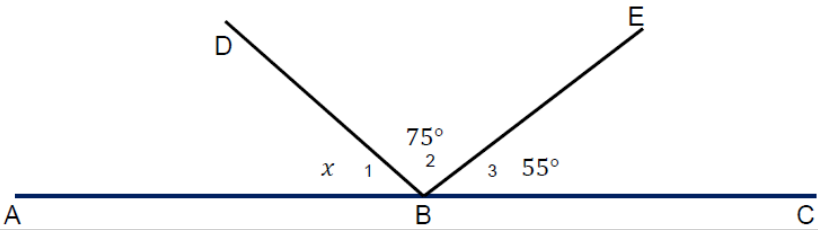
$\frac{y}{75} = \frac{23}{69} \checkmark$

$3y = 75$

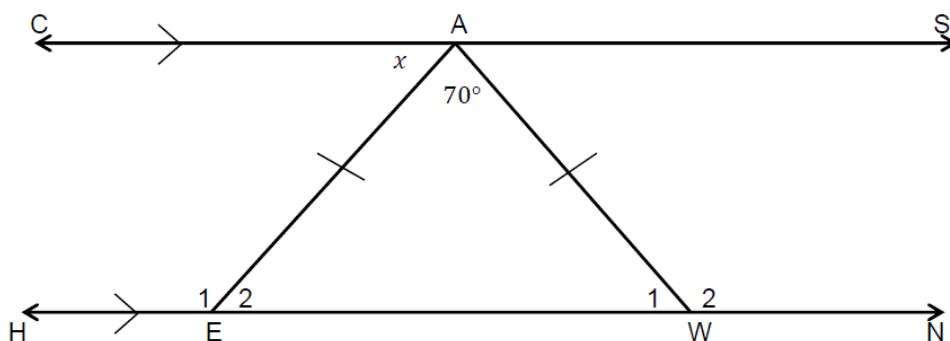
$y = 25 \checkmark$

(5)

2019 Eastern Cape November Paper Q 6

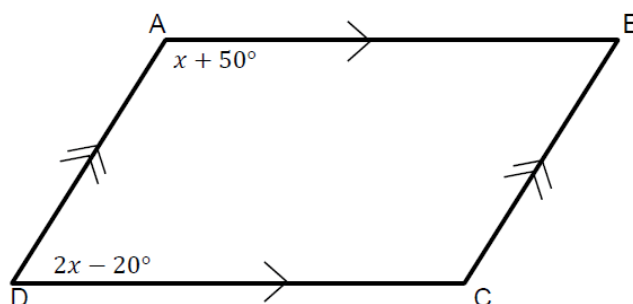
6.1			
	$x + 75^\circ + 55^\circ = 180^\circ (\angle's \text{ on a str. line})$ $x = 50^\circ$		
	Statement and reason: 1 mark (A) Answer: 1 mark (CA)		(2)

6.2



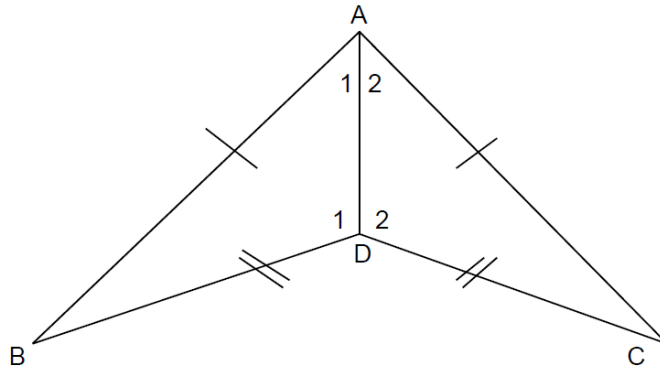
6.2.1	Alternate angles. $CS \parallel HN$	Answer: 1 mark	(1)
6.2.2	$\hat{W}_1 = x$ ($\angle's \text{ opp; equal sides}$) $x + x + 70^\circ = 180^\circ$ ($\text{Sum of int } \angle's$) $2x = 110^\circ$ $x = 55^\circ$	Answer and reason: 1 mark (A) Statement and reason: 1 mark (M) Answer: 1 mark (CA)	(3)

6.3



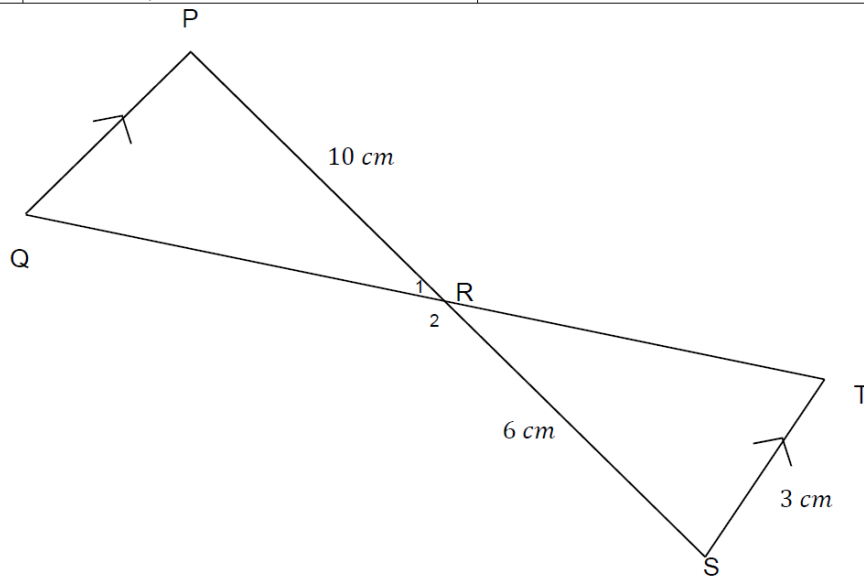
6.3	$x + 50^\circ + 2x - 20^\circ = 180^\circ$ ($AB \parallel CD$; $co - int \angle$'s) $3x = 150^\circ$ $x = 50^\circ$ $\hat{B} = \hat{D} = 2x - 20^\circ$ ($opp \angle$'s of $parm$) $\hat{B} = 2(50) - 20$ $\hat{B} = 80^\circ$	Statement and reason: 1 mark (A) Answer: 1 mark (CA) Statement and reason: 1 mark Answer: 1 mark (CA)	(4)
-----	---	--	-----

6.4



6.4.1	In $\triangle ABD$ and $\triangle ACD$ $AB = AC$ (Given) $BD = CD$ (Given) AD is common $\therefore \triangle ABD \equiv \triangle ACD$ (S,S,S)	Statement and reason: 1 mark (A) Statement and reason: 1 mark (A) Statement and reason: 1 mark (A) Statement and reason: 1 mark (A)	(4)
6.4.2	$\hat{A}_1 = \hat{A}_2$ ($\triangle ABD \equiv \triangle ACD$) Therefore, DA bisects $\hat{BAC}$.	Statement and reason: 1 mark (A)	(1)

6.5



6.5.1	In $\triangle PQR$ and $\triangle STR$ $\hat{P} = \hat{S}$ (Alt $\angle$'s; $PQ \parallel ST$) $\hat{Q} = \hat{T}$ (Alt $\angle$'s; $PQ \parallel ST$) $\hat{R}_1 = \hat{R}_2$ (Vert opp) $\therefore \triangle PQR \parallel \triangle STR$ ($<, <, <$)	Statement and reason: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark	(4)
6.5.2	$\frac{PQ}{ST} = \frac{PR}{SR} = \frac{QR}{TR}$ (proportional ; $\triangle PQR \parallel \triangle STR$) $\frac{PQ}{3} = \frac{10}{6}$ $PQ \times 6 = 3 \times 10$ $PQ = 30 \div 6$ $PQ = 5cm$	Statement and reason: 1 mark (A) Substitution: 1 mark (M) Answer: 1 mark (CA)	(3)

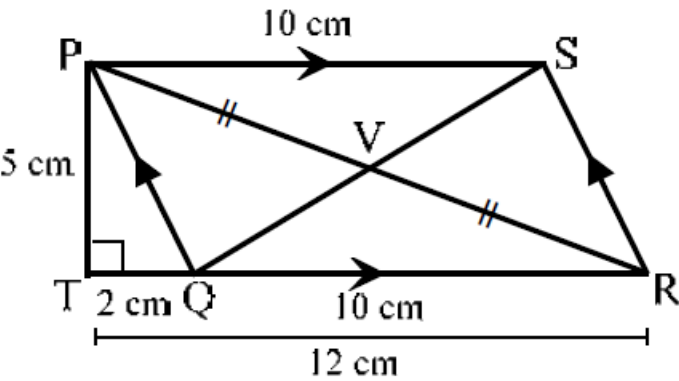
Example 9

Solutions

Statement	Reason
(a) $2x + x = 180^\circ$	co-int $\angle$ s ; $DM \parallel EL$
$\therefore 3x = 180^\circ$	
$\therefore x = 60^\circ$	
$\therefore \hat{E} = 60^\circ$ and $\hat{M} = 60^\circ$	opp $\angle$ s of parm equal
$\hat{D} = 2(60^\circ) = 120^\circ$	
$\hat{L} = 120^\circ$	opp $\angle$ s of parm equal
(b) $DE = 10 \text{ cm}$	opp sides of parm
$\therefore DM = 5 \text{ cm}$	$DE = 2DM$
$\therefore EL = 5 \text{ cm}$	opp sides of parm

Example 10

Solution



Statement	Reason
$QR = 10 \text{ cm}$	opp sides of parm equal
$TQ = 2 \text{ cm}$	given
$\therefore TR = 12 \text{ cm}$	
$PT = 5 \text{ cm}$	given
$PR^2 = (5)^2 + (12)^2$	Pythagoras ; $\hat{P}TQ = 90^\circ$
$PR^2 = 169$	
$\therefore PR = 13 \text{ cm}$	
$PV = VR$	diags of parm bisect
$\therefore VR = 6,5 \text{ cm}$	

Example 11

Statement	Reason
$\hat{E}_2 = 70^\circ$	$\angle$ s opp = sides
$\hat{C}_1 = 70^\circ$	alt $\angle$ s ; AD BC

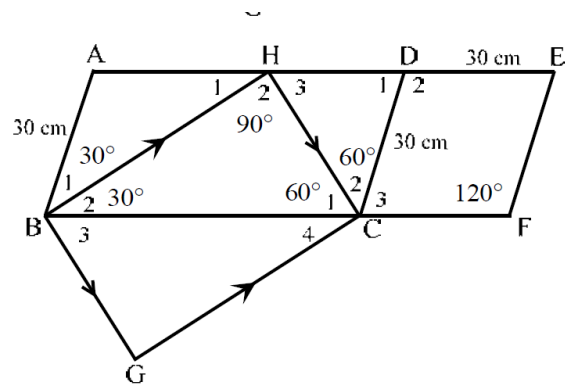
$\therefore \hat{A} = \hat{C}_1$	
$\hat{E}_1 = 110^\circ$	adj $\angle$ s on a line
$\hat{B} = 110^\circ$	co-int $\angle$ s ; AD BC
$\therefore \hat{E}_1 = \hat{B}$	
Therefore, ABCE is a parallelogram	opp $\angle$ s of quad equal

2022 Gauteng November Paper 2 Q 8

8.1	$\hat{P}_1 = \hat{P}_2 = x$ $\hat{S}_1 = \hat{S}_2 = y$ $x + x + y + y = 180^\circ$ $2x + 2y = 180^\circ$ $\therefore x + y = 90^\circ$	[given/gegee] [given/gegee] [co-interior $<$ s PQ // SR/ <i>ko-binne $<$ e ; PQ // SR]</i>	✓ S ✓ S ✓ S ✓ R	(4)
8.2	$\hat{W}_1 + x + y = 180^\circ$ $\hat{W}_1 = 90^\circ$ PWST is a parallelogram/ PWST is 'n <i>parallelogram</i> $\therefore$ PWST is a rectangle PWST is 'n <i>reghoek</i>	[sum int $<$ of Δ / <i>som binne $<$ e van Δ</i>] [both pairs of opp sides parallel/ <i>albei pare</i> <i>teenoorstaande sye ewewydig</i>] [$\hat{W}_1 = 90^\circ$ and PWST is a parm $\hat{W}_1 = 90^\circ$ en PWST is 'n <i>parm</i>]	✓ S/R ✓ S ✓ S ✓ R	(4)
				[8]

Example 12

Solutions



Statement	Reason
(a) BCGH is a parallelogram	BH GC and BG HC ; given
$\hat{A}BC = 60^\circ$	given
$\therefore \hat{B}_1 = \hat{B}_2 = 30^\circ$	BH bisects $\hat{A}BC$
$\hat{B}CD = 120^\circ$	co-int $\angle$ s ; AB DC
$\therefore \hat{C}_1 = \hat{C}_2 = 60^\circ$	HC bisects $\hat{B}CD$
$\therefore \hat{H}_2 = 90^\circ$	int $\angle$ s of Δ
$\therefore$ BGCH is a rectangle	BGCH is a parm with an interior $\angle = 90^\circ$
(b) $\hat{F} = 120^\circ$	given
$\hat{C}_1 + \hat{C}_2 = 120^\circ$	proved
$\therefore \hat{F} = \hat{C}_1 + \hat{C}_2$	
$\therefore DC EF$	corr $\angle$ s =
$AD BC$	ABCD is a parallelogram
ADE and BCE are straight lines	given
$\therefore DE CF$	
$\therefore$ DCFE is a parallelogram	opp sides
DC = 30 cm	opp sides of parm
DC = DE = 30 cm	
$\therefore$ DCFE is a rhombus	DCFE is a parm with adjacent sides equal

2023 Gauteng November Paper 2 Q 9.2

9.2	9.2.1	$SP = SR$ sides of square/ <i>sy</i> e van vierkant $\hat{P} = \hat{S}$ $\angle$ s of square = $90^\circ / \angle^e$ van vierkant = 90° $PY = SX$ $\therefore \triangle SPY \equiv \triangle RSX$ SAS/ <i>S</i> $\angle$ <i>S</i>	✓ S ✓ R ✓ S ✓ R ✓ S ✓ R	(6)
	9.2.2	$\hat{S}_1 \equiv x$ $\Delta s \equiv$	✓ S ✓ R	(2)
	9.2.3	$\hat{S}_1 + \hat{S}_2 = 90^\circ$ $\angle$ s of square = $90^\circ / \angle^e$ van vierkant = 90° $\hat{S}_2 = 90^\circ - x$ $\hat{O}_2 + \hat{S}_2 + \hat{R}_2 = 180^\circ$ sum of int $\angle$ of Δ /som $\angle^e$ van Δ $\hat{O}_2 + 90 + -x + x = 180^\circ$ $\hat{O}_2 = 90^\circ$ $\therefore SY \perp RX$	✓ S ✓ R ✓ S ✓ R ✓ S	(5)

2021 Gauteng November Paper 2 Q 8.1

8.			
8.1	$MN = NP$ {construction/<i>konstruksie</i>} $\hat{N}_1 = \hat{N}_2$ Vertically opposite angles/ <i>Regoorst</i> $\angle^e$ $AN = AC$ given/<i>gegee</i> $\triangle MNA \equiv \triangle PNC$ SAS / <i>s</i> $\angle$ <i>s</i> $MA = CP$ ($\equiv \Delta s$) / $\Delta^e \equiv$ $MP = BC$ and $MB = PC$ $\therefore MPCB$ is a parallelogram [both pairs of opp side =] $MPCB$ is '<i>n</i> $\parallel^m$ [beide pare teenoorst sye =] $MN \parallel BC$ [opp sides of $\parallel$gm/teenoorst sye van $\parallel^m$]	✓ construction/ <i>konstruksie</i> /	(6)

PAST EXAM PAPERS

2024 North West November Paper 2 Q 9

9.1 $PQ = 2(2x + 4) = 4x + 8$

9.2	$18 = 4x + 8$ $18 - 8 = 4x$ $\frac{10}{4} = \frac{5}{2} = x$	$\checkmark 18=4x+8$ $\checkmark 10=4x$ $\checkmark$ answer (3)
9.3	RS is a midpoint $\therefore SR \parallel PQ$ $\hat{Q} = \hat{R} = 39^\circ - \text{corr } \angle\text{'s } SR \parallel PQ(A)$ $\hat{P} = \hat{S} = 55^\circ - \text{corr } \angle\text{'s } SR \parallel PQ(A)$ $\hat{T} = \hat{T} - \text{common } \angle(A)$ $\therefore \triangle TRS \parallel \triangle TQP, AAA$	$\checkmark S \checkmark R$ $\checkmark S \checkmark R$ $\checkmark$ conclusion (5)

2017 November Paper 2 Q 8.3

9.1	In $\triangle ACG$ F and H are midpoints/is middelpunte (given/gegee) $\therefore FH \parallel CG$ (line joining the midpoints/ linstuk wat middelpunte verbind) $FE \parallel BC$ (same straight lines/dieselfde reguitlyne) In $\triangle AGB$, H is the midpoint/is die middelpunt $HE \parallel BG$ (proved/bewys) $\therefore E$ is the midpoint/is die middelpunt (Line drawn from midpt of side/Lyn getrek vanaf midpt van sy, // to 2nd side/na 2de sy)	$\checkmark FH \parallel CG$ $\checkmark$ reason/rede $\checkmark$ reason/rede (3)
9.2	$\hat{A}EH = \hat{A}BC = 90^\circ$ (Corr angle/Ooreenst hoek $BC \parallel EF$) $\text{In } \triangle AEH, \text{Area/Oppervl.} = \frac{1}{2} EH \times AE$ $9,5 = \frac{1}{2} \times 3,5 \times AE$ $AE = \frac{38}{7} = 5,43 \text{ cm}$ $AB = 2AE$ $AB = 2\left(\frac{38}{7}\right)$ $= \frac{76}{7}$ $= 10,86 \text{ cm}$	$\checkmark$ subst./verv. $\checkmark AE$ $\checkmark AB$ (3)

9.3	BG = 7 cm (line joining the midpoints/ <i>lynstuk wat middelpunte verbind</i>) BC = 14 cm In $\triangle ABC$, Area/Oppervl. = $\frac{1}{2} BC \times AB$ $= \frac{1}{2} \times 14 \times \frac{76}{7}$ $= 76 \text{ cm}^2$	✓ S/R ✓ BC=2BG=14 ✓ answ./antw. (3)
-----	---	---

2019 November Paper 2 Q 7.1

7.2	Perimeter of/Omtrek van PQRS = 12 cm $\text{One side/Een sy} = \frac{12}{4} = 3 \text{ cm}$ $\therefore SR = 3 \text{ cm}$ PM = MR (diag. of rhombus/rombus (ruit) PQRS) PL = LS (given/gegee) In $\triangle PSR$ $LM = \frac{1}{2} SR \text{ (Midpoint thm/Middelpuntstelling)}$ $= \frac{1}{2} (3)$ $= \frac{3}{2} = 1,5 \text{ cm}$	✓ SR=PQ=QR=PS =3cm ✓ S/R ✓ S/R ✓ answer/antwoord (4)
-----	---	--

2021 Gauteng November Paper 2 Q 8.2

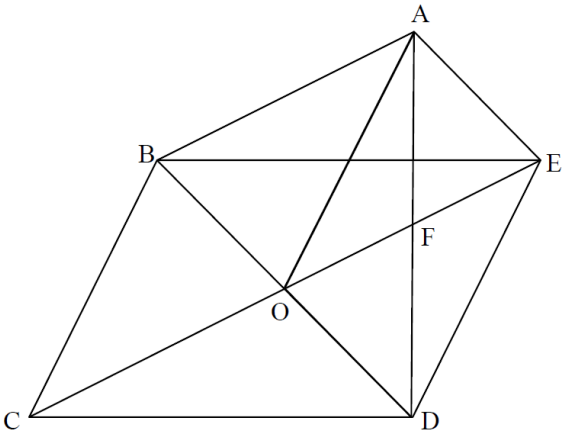
8.2	TS // UR [midpoint theorem/middelpunt stelling] UR=2TS TS=2x [Converse midpoint theorem/omgekeerde midpt stelling] UR=2TS=4x UR=UV+VR VR=3x OR/OF UT = TQ and QS = SR $\left[\begin{smallmatrix} \text{given} \\ \text{gegees} \end{smallmatrix} \right]$ TS UR and TS = $\frac{1}{2}$ UR [midpt theorem/midpt stelling] In $\triangle PTS$ TU = UP [given/gegee] TS UV [proven/bewys] PV = VS and UV = $\frac{1}{2}$ TS [converse; midpt theorem/ omgekeerde midpt stelling] TS = 2x UR = 4x VR = 3x	✓ S/R ✓ S ✓ S/R ✓ S ✓ S ✓ S ✓ S/R ✓ S ✓ S/R ✓ S ✓ S	(6)
-----	--	--	-----

2019 November Paper 2 Q 8

8.1	Bisect each other/ <i>Halveer mekaar</i>	✓ answer/antwoord (1)
8.2.1	A line drawn from the midpoint of one side of a triangle parallel to another side bisects the third side./'n Lyn wat van die middelpunt van een sy van 'n driehoek parallel aan 'n ander sy getrek word, halveer die derde sy.	✓ R (1)
8.2.2 (a)	In $\triangle VWP \equiv \triangle VRS$ 1. $WV = VR$ (proved/bewys) 2. $VP = SV$ (given/gegee) 3. $\hat{V}_1 = \hat{V}_3$ (vert. opp $\angle$ s) $\therefore \triangle VWP \equiv \triangle VRS$ (SAS)	✓ S ✓ S/R ✓ R (3)
8.2.2(b)	$WV = VR$ (proved/bewys) $VP = SV$ (given/gegee) $\therefore$ SWPR is a // ^m (diagonals bisect each other/ <i>hoeklyne halveer mekaar</i>)	✓ S ✓ R (2)
8.2.2(c)	$PQ \parallel SR$ (WP $\parallel$ SR) $SP \parallel RQ$ (given/gegee) $\therefore$ PQRS is a parallelogram (both pairs of opp. sides are // <i>beide pare teenoorgsye is //</i>) OR/OF $PQ \parallel SR$ (WP $\parallel$ SR) $PQ = SR$ ($PQ = WP = SR$, proved/bewys) $\therefore$ PQRS is a // ^m (one pair of opp. sides = and // <i>een paar teenoorgsye = en //</i>)	✓ S ✓ R ✓ R (3) ✓ S ✓ R ✓ R (3)
8.2.3	$SR = TW$ (RSTW is // gram) But $SR = WP$ (proved/bewys) $WP = QP$ (given/gegee) $\therefore TQ = TW + WP + PQ$ $= 3SR$	✓ S/R ✓ S (2)
		[12]

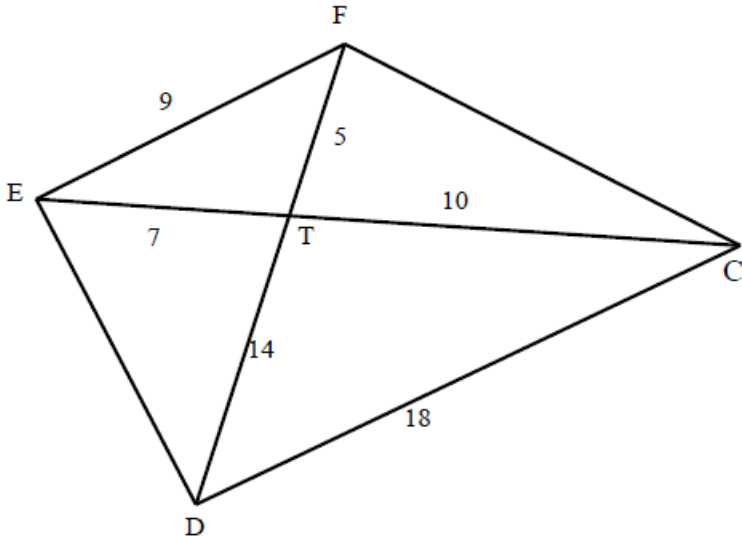
2012 Exemplar Paper 2 Q 9

QUESTION 9



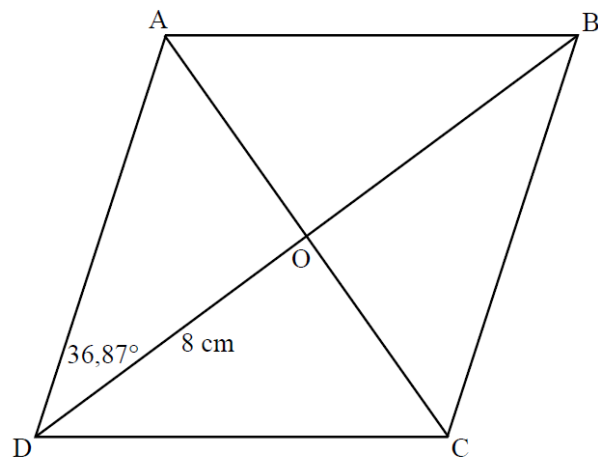
9.1	O is the midpoint of BD. (Diagonals of parm BCDE bisect each other) F is the midpoint of OE. (Diagonals of parm AODE bisect each other) $\therefore OF \parallel AB$ (The line joining the midpoints of two sides in a Δ is $\parallel$ to third side)	✓ O is the midpoint of BD ✓ reason – diagonals of parm ✓ F is the midpoint of OE ✓ reason – midpoint theorem (4)
9.2	$AE \parallel OD$ $\therefore AE \parallel OB$ (Opp sides of parm AODE are parallel) $OF \parallel AB$ (proven above) $\therefore OE \parallel AB$ $\therefore ABOE$ is a parallelogram (both pairs of opposite sides of quad are parallel)	✓ $AE \parallel OB$ ✓ reason ✓ $OE \parallel AB$ ✓ reason – opp sides parallel (4)
9.3	In ΔABO and ΔEOD 1. $AB = EO$... (Opp sides of parm ABOE are equal) 2. $AO = ED$... (Opp sides of parm AODE are equal) 3. $BO = DO$... (Diagonals of parm BCDE bisect each other) $\therefore \Delta ABO \equiv \Delta EOD$ (S, S, S)	✓ $AB = EO$ ✓ $AO = ED$ ✓ reason – opp sides are equal ✓ $BO = DO$ ✓ reason – diagonals of parm (5) [13]

2020 Eastern Cape November Paper 2 Q 5.4

5.4			
5.4.1	In $\triangle FTE$ and / en $\triangle CTD$: $\frac{FT}{TC} = \frac{ET}{TD} = \frac{EF}{CD} = \frac{1}{2}$ $\therefore \triangle FTE \parallel \triangle CTD$ (sides are in proportion / sye is eweredig)	✓ ratio / verhouding ✓ ratio / verhouding ✓ R	(3)
5.4.2	$\hat{FEC} = \hat{TDC}$ () But / Maar $\hat{DFC} = \hat{TDC}$ (given / gegee) $\therefore \hat{FEC} = \hat{TDC} = \hat{TFC}$	✓ R ✓ given / gegee ✓ conclusion / gevolgtrekking	(3)

2015 November Paper 2 Q 8

QUESTION/VRAG 8



8.1.1	$\hat{CDO} = 36,87^\circ$	✓ answer/antw (1)
8.1.2	$\hat{AOD} = 90^\circ$	✓ answer/antw (1)
8.2	$\tan 36,87^\circ = \frac{AO}{8}$ $AO = 8 \times \tan 36,87^\circ$ $= 6 \text{ cm}$	$\checkmark \tan 36,87^\circ = \frac{AO}{8}$ ✓ answer/antw (2)
8.3	$AD^2 = 8^2 + 6^2$ $= 100$ $AD = 10$ $AE = EB$ [converse midpoint theorem/omgekeerde midptst] $OE = \frac{1}{2} AD = 5 \text{ cm}$ [midpoint theorem/midptst]	✓ AD = 10 with reason/met rede ✓ S ✓ R ✓ 5 cm (4) [8]

2022 Gauteng November Paper 2 Q 9

$BD = BD$	[common/ <i>gemeenskaplik</i>]	✓ S	
$\hat{D}_1 = \hat{B}_2$	[alternate < s AD // BC/ <i>verw. binne</i> <°; AD // BC]	✓ S/R	
$\hat{B}_2 = \hat{D}_1$	[alternate < s AB // DC <i>verw. binne</i> <°; AB // DC]	✓ S	
$\therefore \triangle ABC \cong \triangle CBD$	[AAS/HHS]	✓ S	
$\therefore \triangle AD = BC, AB = DC$	$\Delta^s/\Delta^e \equiv$	✓ R	(5)
			[5]

2016 November Paper 2 Q 8.3

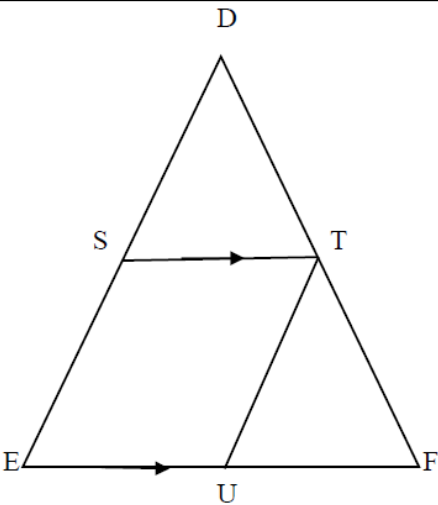
8.3.1	Let/Laat $\hat{N}_1 = \hat{N}_2 = x$ [ON bisects/<i>halveer</i> $\hat{KNM}$] Let/Laat $\hat{M}_1 = \hat{M}_2 = y$ [OM bisects/<i>halveer</i> $\hat{NMP}$] $\therefore 2x + 2y = 180^\circ$ [co-int./<i>ko-bin. hoek</i> KN // PM] $\therefore x + y = 90^\circ$ $\hat{O}_2 + x + y = 180^\circ$ [int. angles of/<i>binnehoeke</i> van Δ] $\therefore \hat{O}_2 + 90^\circ = 180^\circ$ $\therefore \hat{O}_2 = 90^\circ$	✓ S/R ✓ S/R ✓ substitution/<i>vervang</i> ($x + y = 90^\circ$)	(3)
8.3.2	$\hat{N}_2 = \hat{O}_1$ [alt. angle/<i>verw. hoek</i> KP // NM] $\hat{O}_1 = \hat{N}_1$ $\therefore KO = KN$ [opp. Angles =/<i>oorst hoeke</i> =] $\hat{O}_3 = \hat{M}_1$ [alt angle/<i>verw.</i> KP // MN] $\hat{O}_3 = \hat{M}_2$ $\therefore OP = PM$ [sides opp. = angles] [<i>sy e oor. = hoeke</i>] But/Maar $KN = PM$ [opp. sides =/<i>oor sye</i> =] $\therefore KO = OP$ $\therefore O$ is the midpoint/<i>middelpunt</i>	✓ S/R ✓ S ✓ S/R ✓ S/R ✓ S/R ✓ S	(6) [16]

2016 November Paper 2 Q 9

9.1	half the length of /die helfde van die lengte van	✓ half /helfte	(1)
9.2	AB $\parallel$ QR [line joining midpoint or midpoint theorem] [lyn deur middelpunte of middelpuntstelling] AB = $\frac{1}{2}$ QR [line joining midpoint] [lyn deur middelpunte] DE $\parallel$ QR [line joining midpoint/lyn deur middelpunte] DE = $\frac{1}{2}$ QR $\therefore$ AB $\parallel$ DE and/en AB = DE $\therefore$ ADEB is a parm. [one pair of opp. sides = and $\parallel$] [een paar teenoorstaande sye = en $\parallel$]	✓ R ✓ S/R ✓ S ✓ S (both/albei) ✓ R	(5) [6]

2020 Eastern Cape November Paper 2 Q 5.5

5.5.1	AE = EC and /en DE = $\frac{1}{2}$ BC	✓ S	(1)
-------	---------------------------------------	-----	-----

5.5.2			
	ST $\parallel$ EF (given / gegee) DT = TF (converse of midpoint theorem / omgekeerde van middelpuntstelling) $\therefore$ TU $\parallel$ SE (converse of midpoint theorem / omgekeerde van middelpuntstelling) $\therefore$ SEUT is a parallelogram / 'n parallelogram (both pairs of opposite sides $\parallel$/beide pare teenoorstaande sye is $\parallel$)	✓✓ SR ✓ R ✓ R	(4)

2017 November Paper 2 Q 8.1

8.1.1	$\hat{O}_1 = 90^\circ$ Diagonal bisect at/ <i>Hoeklyne sny by</i> 90° .	✓S/R (1)
8.1.2	$\hat{L}_1 = 180^\circ - (34^\circ + 90^\circ)$ Sum of angles in/ <i>Som van hoeke</i> Δ . $= 56^\circ$	✓S ✓answ./antw. (2)
8.1.3	$\hat{L}_1 = \hat{L}_2 = 56^\circ$ diagonals bisect the/ <i>hoeklyne sny die</i> $\angle$ s. $\hat{L}_1 + \hat{L}_2 = \hat{N}_1 + \hat{N}_2$ opp. $\angle$ s of rhombus/ <i>teenoorst $\angle$evan die ruit</i> = $\therefore \hat{KNM} = 112^\circ$ OR/OF $\hat{K}_1 = 34^\circ$ diagonals bisect the/ <i>hoeklyne sny die</i> $\angle$ s. $\hat{KNM} + 68^\circ = 180^\circ$ co - int angles $KL \parallel NM$ $\therefore \hat{KNM} = 112^\circ$ OR/OF $\hat{N}_2 = 56^\circ$ alt angles $KL \parallel NM$ $\hat{N}_1 = \hat{N}_2 = 56^\circ$ diagonals bisect the/ <i>hoeklyne sny die</i> $\angle$ s. $\therefore \hat{KNM} = 112^\circ$	✓S/R ✓answ./antw. (2) OR/OF ✓S/R ✓answ./antw. (2) OR/OF ✓S/R ✓answ./antw. (2)

2020 Eastern Cape November Paper 2 Q 5.1

5.1		
	BD is common / <i>gemeen</i> $\hat{B}_1 = \hat{D}_2$ (alt / <i>verwisselende</i> $\angle$, $AB \parallel CD$) $\hat{B}_2 = \hat{D}_1$ (alt / <i>verwisselende</i> $\angle$, $BC \parallel AD$) $\therefore \Delta ABD \equiv \Delta CDB$ ($\angle$, $\angle$, S) $\therefore AB = CD$ and / <i>en</i> $AD = BC$ ($\equiv \Delta$'s / <i>e</i>)	✓ common / <i>gemeen</i> ✓SR ✓SR ✓ $\angle$, $\angle$, S (4)

2017 November Paper 2 Q 8.2

8.2	Given/Gegee : $\parallel^m PQRS$ with diagonals/<i>met hoeklyne</i> PR and/<i>en</i> QS. $R.P.T : PM = MR$ Proof/Bewys : In $\triangle PMS$ and/<i>en</i> $\triangle RMQ$ $\hat{P}_1 = \hat{R}_1$ (alt./<i>verw.</i> $\angle_s$, $PS \parallel QR$) $\hat{S}_1 = \hat{Q}_1$ (alt./<i>verw.</i> $\angle_s$, $PS \parallel QR$) $PS = QR$ (opp. sides <i>parm</i> are/<i>teenoorst. sye van parm.</i> =) $\therefore \triangle PMS \equiv \triangle RMQ$ (AAS) $\Rightarrow PM = MR$ and $MS = MQ$ OR/OF	✓ 1. S/R ✓ 2. S ✓ 3. S/R ✓ congruency/<i>kongruensie</i> (AAS) (4) OR/OF
	Given/Gegee : $\parallel^m PQRS$ with diagonals/<i>met hoeklyne</i> PR and/<i>en</i> QS. $R.P.T : QM = MS$ Proof/Bewys : In $\triangle PQM$ and/<i>en</i> $\triangle RSM$ $\hat{P}_2 = \hat{R}_2$ (alt./<i>verw.</i> $\angle_s$, $QP \parallel SR$) $\hat{S}_2 = \hat{Q}_2$ (alt./<i>verw.</i> $\angle_s$, $SR \parallel PQ$) $PQ = SR$ (opp. sides <i>parm</i> are/<i>teenoorst. sye van parm</i> =) $\therefore \triangle PQM \equiv \triangle RSM$ (AAS) $\Rightarrow QM = MS$ and $PM = MR$	✓ 1. S/R ✓ 2. S ✓ 3. S/R ✓ congruency/<i>kongruensie</i> (AAS) (4)

2017 November Paper 2 Q 8.3

8.3	$DB = 2DE$ (diagonals bisect each other) $DE = FC$ (opp. side of/<i>teenoorst. sy van</i> //gram.) but/<i>maar</i> $FC = 2KC$ (diagonals bisect each other) $DE = 2KC$ ($DE = FC$) $DB = 2(2KC)$ ($DB = 2DE$) $DB = 4KC$	✓ S/R ✓ S/R ✓ S ✓ S (4)
-----	--	--

2019 November Paper 2 Q 7.1

QUESTION/VRAAG 7		
7.1.1	$\hat{E}MF = 120^\circ$ ($\angle$'s on straight line/opreguitlyn) $\hat{F}_1 = \hat{E}_1 = 30^\circ$ ($\angle$'s opp. = sides OR diag. of a rectangle = and bisect each other). OR/OF $\hat{F}_1 = \hat{E}_1$ (angles opp. = sides OR diag. of a rectangle = and bisect each other). $\hat{M}_2 = \hat{E}_1 + \hat{F}_1$ (ext. angle of Δ) $60^\circ = \hat{E}_1 + \hat{F}_1$ $\therefore \hat{F}_1 = 30^\circ$	✓ S/R ✓ S/R (2) ✓ S/R ✓ answer/antwoord (2)
7.1.2	$\hat{E}_1 = \hat{G}_1 = 30^\circ$ (Alt. $\angle$'s: $EF \parallel HG$) $\hat{L}_2 = \hat{G}_1 + \hat{G}ML$ (ext. $\angle$ = sum of two opp. int. $\angle$'s) $40^\circ = 30^\circ + \hat{G}ML$ $\hat{G}ML = 10^\circ$ OR/OF $\hat{M}_1 = 60^\circ$ (vert. opp. angles) $\therefore \hat{G}_2 = \hat{F}_2 = 60^\circ$ (angles opp. = sides) But $\hat{G}_2 + \hat{G}_1 = 90^\circ$ (angles of rectangle) $\hat{G}_1 = 30^\circ$ $\hat{L}_2 = \hat{G}_1 + \hat{G}ML$ (ext. angle of Δ) $40^\circ = 30^\circ + \hat{G}ML$ $\hat{G}ML = 10^\circ$ OR/OF $\hat{G}_1 = \hat{E}_1 = 30^\circ$ (alt. angle $EF \parallel HG$) $\hat{L}_2 = 40^\circ$ (given) $\hat{L}_1 = 180 - 40^\circ = 140^\circ$ (angles in str. line) $\hat{G}ML = 180^\circ - 140^\circ - 30^\circ$ $\hat{G}ML = 10^\circ$ (sum of angles in a Δ)	✓ S/R ✓ S/R ✓ answer/antwoord (3) ✓ $\hat{G}_1 = 30^\circ$ ✓ S/R ✓ answer/antwoord (3) ✓ $\hat{G}_1 = 30^\circ$ ✓ S/R ✓ answer/antwoord (3)

