basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2015

MEMORANDUM

MARKS: 150
PUNTE: 150

This memorandum consists of 13 pages./
Hierdie memorandum bestaan uit 13 bladsye.

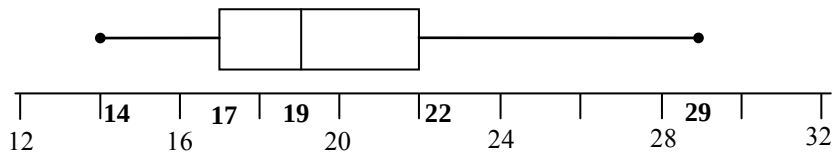
NOTE:
- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:
- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- Indien 'n kandidaat 'n antwoord doodgetrek het en nie oorgedoen het nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.

Om antwoorde/waardes om 'n probleem op te los, te veronderstel, word NIE toegelaat NIE.

QUESTION/*VRAAG* 1

14	15	16	16	17	17	18	18	19	19
19	20	21	21	22	23	24	24	29	

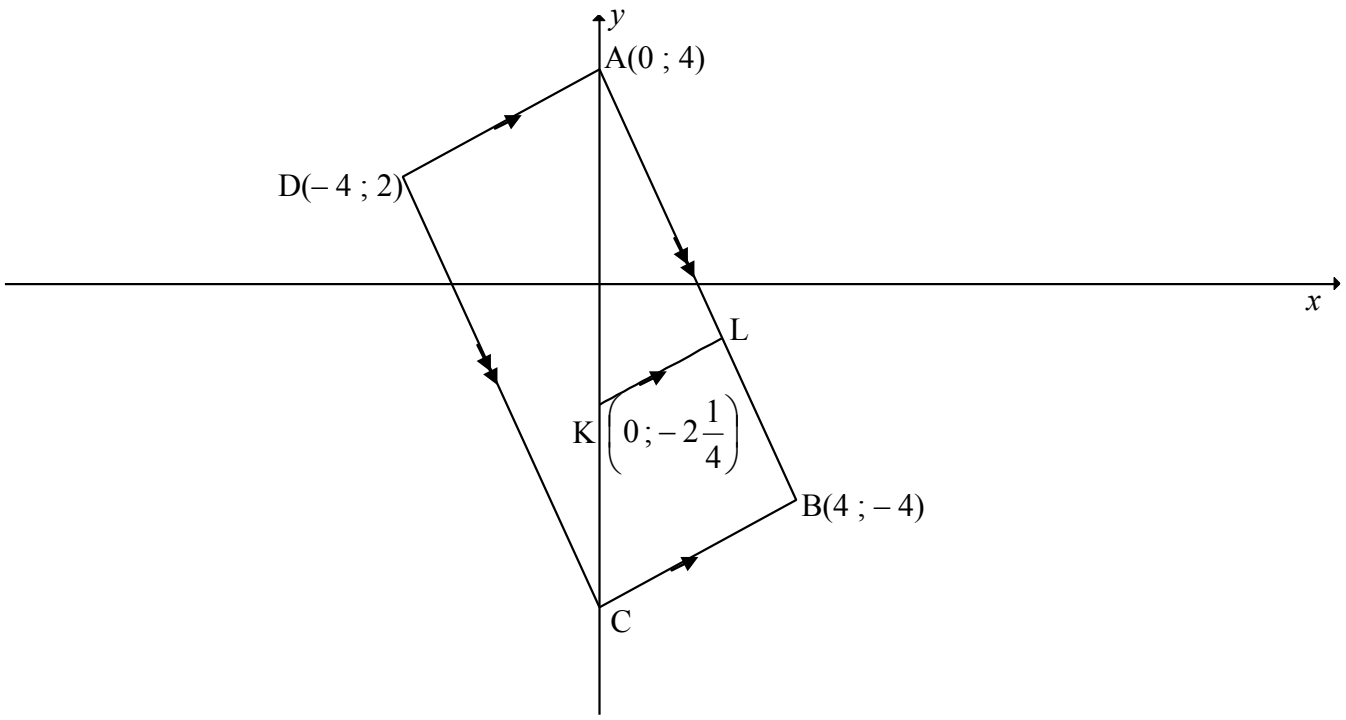
1.1	Median/*Mediaan* = 19 seconds/*sekondes*	✓ answer/*antw* (1)
1.2	Lower quartile/*Onderste kwartiel* ($Q_{1)}$ = 17 Upper quartile/*Boonste kwartiel* ($Q_{3)}$ = 22	✓ Q_1 ✓ Q_3 (2)
1.3		✓ box/*mond* ✓ whiskers/*snor* (2)
1.4.1	IQR/*IKO* = 26 – 19 = 7	✓ $Q_3 - Q_1$ ✓ answer/*antw* (2)
1.4.2	75% of the boys took at least 19 seconds to complete the puzzle./*75% van die seuns het ten minste 19 sekondes geneem om die legkaart te voltooi.*	✓ 75% (1)
1.5	About 50% but not more than 75% of the boys completed the puzzle in less than 23 seconds./*Ongeveer 50% maar nie meer as 75% van die seuns het die legkaart in minder as 23 sekondes voltooi.* More than 75% of the girls completed the puzzle in less than 23 seconds./*Meer as 75% van die dogters het die legkaart in minder as 23 sekondes voltooi.* Therefore more girls completed the puzzle in less than 23 seconds./*Meer dogters het dus die legkaart in minder as 23 sekondes voltooi.*	✓relevant/*relevante* explanation/*verduideliking* ✓ girls/*dogters* (2) **[10]**

QUESTION/*VRAAG* 2

NUMBER OF HOURS ***GETAL UUR* (*h*)**	**FREQUENCY** ***FREKWENSIE***
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

2.1	The modal class is/*Die modale klas is* $6 < h \leq 8$	✓ $6 < h \leq 8$ (1)
2.2	Average/*Gemiddelde* = $\frac{1\times10+3\times15+\ \ldots.\ \ +11\times5}{120}$ Estimated mean/*Geskatte gemiddelde* ($\bar{x}$) = $\frac{730}{120}$ = 6,08 hours/*uur*	✓ midpts/*midpte* ✓ 730 ✓ answer/*antw* (3) **[4]**

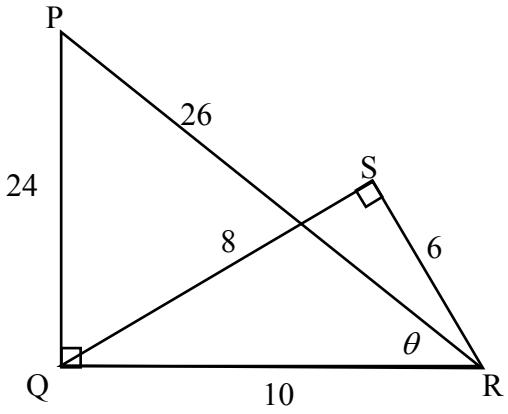
QUESTION/*VRAAG* 3



3.1	$DB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ $= \sqrt{(-4-4)^2 + (2-(-4))^2}$ $= \sqrt{64+36}$ $= \sqrt{100}$ $= 10$	✓ correct formula/ *korrekte formule* ✓ subst ✓ answer/*antw* (3)
3.2	$M\left(\frac{x_1+x_2}{2} ; \frac{y_1+y_2}{2}\right)$ $M\left(\frac{-4+4}{2} ; \frac{2-4}{2}\right)$ $\therefore M(0 ; -1)$	✓ correct formula/ *korrekte formule* ✓ *x*-value/*waarde* ✓ *y*-value/*waarde* (3)
3.3	$m_{AD} = \frac{y_1 - y_2}{x_1 - x_2}$ $= \frac{4-2}{0-(-4)}$ $= \frac{2}{4} = \frac{1}{2}$	✓ correct formula/ *korrekte formule* ✓ subst into/*in* gradient form/ gradiëntvorm ✓ answer/*antw* (3)

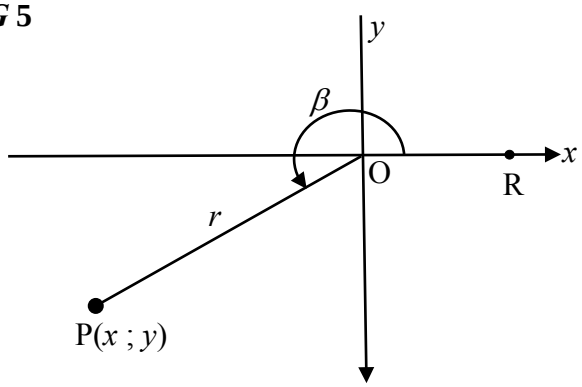
3.4	$m_{AB} = \frac{y_1 - y_2}{x_1 - x_2}$ $= \frac{4-(-4)}{0-4}$ $= \frac{8}{-4} = -2$ $\therefore m_{AD} \times m_{AB} = \frac{1}{2} \times -2 = -1$ $\therefore$ AD $\perp$ AB	✓ subst ✓ gradient of AB/ *gradiënt van AB* ✓ $m_{AD} \times m_{AB} = -1$ (3)
3.5	parallelogram with one internal angle = 90° *parallelogram met een binnehoek = 90°*	✓ R (1)
3.6	$m_{KL} = m_{AD} = \frac{1}{2}$ [KL | | AD] $\therefore y = \frac{1}{2}x - 2\frac{1}{4}$	✓ gradient of KL *gradiënt van KL* ✓ equation/*vgl* (2)
3.7	AC = DB = 10 units [diag of rectangle =/*hkle v regh* =] $4 - y_C = 10$ $y_C = -6$ $\therefore$ C(0 ; –6) **OR/*OF*** $m_{BC} = m_{AD} = \frac{1}{2}$ [sides of rectangle | |/*sye v regh* | |] $\frac{-4 - y_C}{4-0} = \frac{1}{2}$ $-8 - 2y_C = 4$ $y_C = -6$ $\therefore$ C(0 ; –6)	✓ R ✓ equation/*vgl* ✓ answer/*antw* (3) ✓ R ✓ equation/*vgl* ✓ answer/*antw* (3)
		[18]

QUESTION/*VRAAG* 4



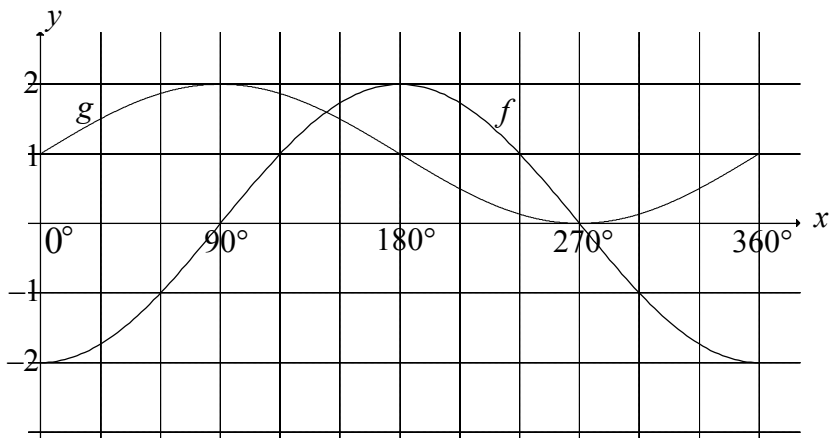
4.1.1	$\tan \hat{P} = \frac{10}{24} = \frac{5}{12}$	Accept answers as unsimplified fractions.	✓ answer/*antw* (1)
4.1.2	$\sin S\hat{Q}R = \frac{6}{10} = \frac{3}{5}$		✓ answer/*antw* (1)
4.1.3	$\cos \theta = \frac{10}{26} = \frac{5}{13}$	*Aanvaar antwoorde as nie-vereenvoudigde breuke.*	✓ answer/*antw* (1)
4.1.4	$\sec S\hat{R}Q = \frac{10}{6} = \frac{5}{3}$		✓ answer/*antw* (1)
4.2	$\frac{\cot \theta}{\text{cosec } Q\hat{R}S}$ $= \frac{10}{24} \div \frac{10}{8}$ $= \frac{1}{3}$		✓$\frac{10}{24}$ ✓$\frac{10}{8}$ ✓$\frac{1}{3}$ (3) **[7]**

QUESTION/*VRAAG* 5

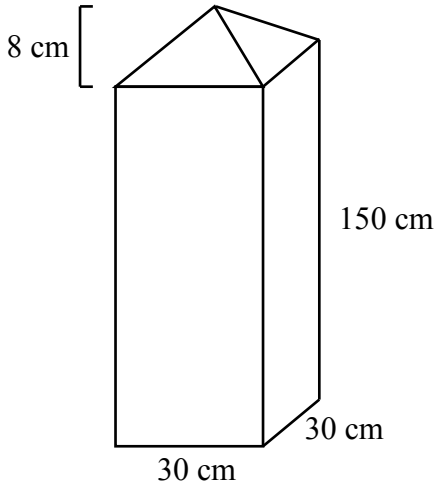


5.1.1	$x = -15$ $r = 17$ $x^2 + y^2 = r^2$ $(-15)^2 + y^2 = 17^2$ $y^2 = 64$ $y = -8$	✓ *x*-value/*waarde* ✓ *r*-value/*waarde* ✓ using/*gebruik* Pyth ✓ *y*-value/*waarde* (4)
5.1.2(a)	$\sin\beta = -\frac{8}{17}$	✓ answer/*antw* (1)
5.1.2(b)	$\cos^2 30°.\tan\beta$ $= \left(\frac{\sqrt{3}}{2}\right)^2 . \frac{-8}{-15}$ $= \frac{3}{4} \times \frac{8}{15}$ $= \frac{2}{5}$	✓ $\frac{\sqrt{3}}{2}$ ✓ $\frac{-8}{-15}$ ✓ answer/*antw* (3)
5.1.3	$R\hat{O}P = 180° + 28{,}07°$ $= 208{,}07°$	✓ ref /*verw*∠ ✓ answer/*antw* (2)
5.2.1	$\tan x = 2{,}22$ $x = 65{,}75°$	✓✓ answer/*antw* (2)
5.2.2	$\sec(x + 10°) = 5{,}759$ $\cos(x + 10°) = 0{,}173...$ **OR/*OF*** $\cos(x + 10°) = \frac{1}{5{,}759}$ $x + 10° = 80{,}0°$ $x = 70{,}0°$	✓ $\cos(x + 10^\circ) = \frac{1}{5{,}759}$ ✓ ref/*verw* ∠ ✓ answer/*antw* (3)
5.2.3	$\frac{\sin x}{0{,}2} - 2 = 1{,}24$ $\frac{\sin x}{0{,}2} = 3{,}24$ $\sin x = 0{,}648$ $x = 40{,}39°$	✓ addition/*optelling* ✓ multipl/*vermenigv* ✓ answer/*antw* (3) **[18]**

QUESTION/*VRAAG* 6

6.1	amplitude = 2	✓ answer/*antw* (1)
6.2	min value/*waarde* = –2 + 3 = 1	✓ answer/*antw* (1)
6.3		✓ *y*-intercept/*afsnit* ✓ (90° ; 2) ✓ (270° ; 0) (3)
6.4.1	$f(180°) - g(180°)$ $= 2 - 1$ $= 1$	✓ correct values/ *korrekte waardes* ✓ answer/*antw* (2)
6.4.2	$x \in (90° ; 270°)$ **OR/*OF*** $90° < x < 270°$	✓ correct values/ *korrekte waardes* ✓ notation/*notasie* (2)
6.5.1	$f(x) = 2\cos x - 3$	✓✓ answer/*antw* (2)
6.5.2	$y \in [-5 ; -1]$ **OR/*OF*** $-5 \leq y \leq -1$	✓✓ answer/*antw* (2)
		[13]

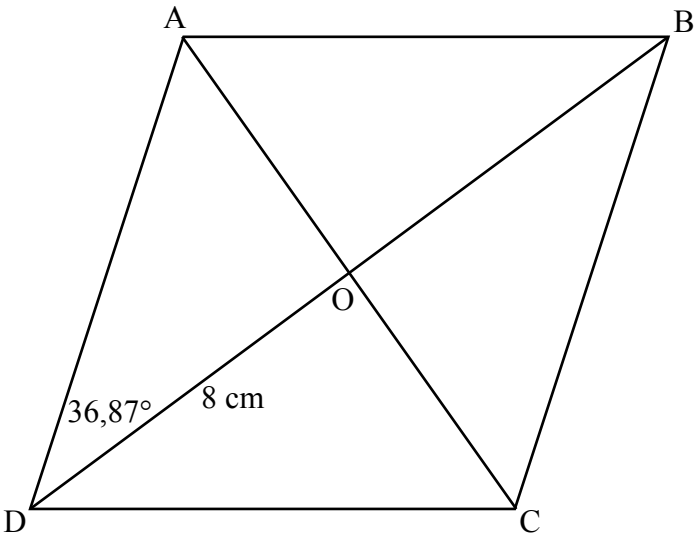
QUESTION/*VRAAG* 7



7.1	Vol of post = vol of rectangle + vol of pyramid = area of base × h + $\frac{1}{3}$ area of base × h *Vol van pilaar = vol v reghoek + vol v piramide* = *oppervl v basis* × *h* + $\frac{1}{3}$ *oppervl v basis* × *h* $\text{Volume} = (30\times30\times150)+\left(\frac{1}{3}(30\times30\times8)\right)$ $= 137\,400\ \text{cm}^3$	✓sum of formulae/ *som v formules* ✓subst into/*in* both/*beide* formulae ✓ answer/*antw* (3)
7.2	Slant height of pyramid/*Skuinshoogte van piramide* $=\sqrt{8^2+15^2}$ $=17$ Total surface area of pyramid = area of base + $\frac{1}{2}$(perimeter of base × slant height) $\text{Surface area of pyramid section} = 4\times\left(\frac{1}{2}\times30\times17\right)$ $=1020\ \text{cm}^2$ Totale buite-oppervlakte van 'n piramide = oppervl v basis + $\frac{1}{2}$(omtrek v die basis × skuinshoogte) Surface area of pyramid section/*Buite-opp van piramide gedeelte* $=4\times\left(\frac{1}{2}\times30\times17\right)$ $=1020\ \text{cm}^2$	✓ 17 ✓subst into/*in* correct/*korrekte* form ✓ answer/*antw* (3)

7.3	$\text{Volume (new)} = \frac{1}{4}(137400)$ $= 34350 \text{ cm}^3$ $\text{Number of smaller posts that can be made} = \frac{137400}{34350}$ $= 4$ $\text{Volume (nuwe)} = \frac{1}{4}(137400)$ $= 34350 \text{ cm}^3$ $\text{Getal kleiner pilare wat gemaak kan word} = \frac{137400}{34350}$ $= 4$ **OR/*OF*** $\text{Volume (nuwe)} = (15 \times 15 \times 150) + \left(\frac{1}{3}(15 \times 15 \times 8)\right)$ $= 34\ 350 \text{ cm}^3$ $\text{Getal kleiner pilare wat gemaak kan word} = \frac{137400}{34350}$ $= 4$ $\text{Volume (new)} = (15 \times 15 \times 150) + \left(\frac{1}{3}(15 \times 15 \times 8)\right)$ $= 34350\ cm^3$ $\text{Getal kleiner pilare wat gemaak kan word} = \frac{137400}{34350}$ $= 4$	✓ 34 350 ✓ 4 (2) ✓ 34 350 ✓ 4 (2) **[8]**

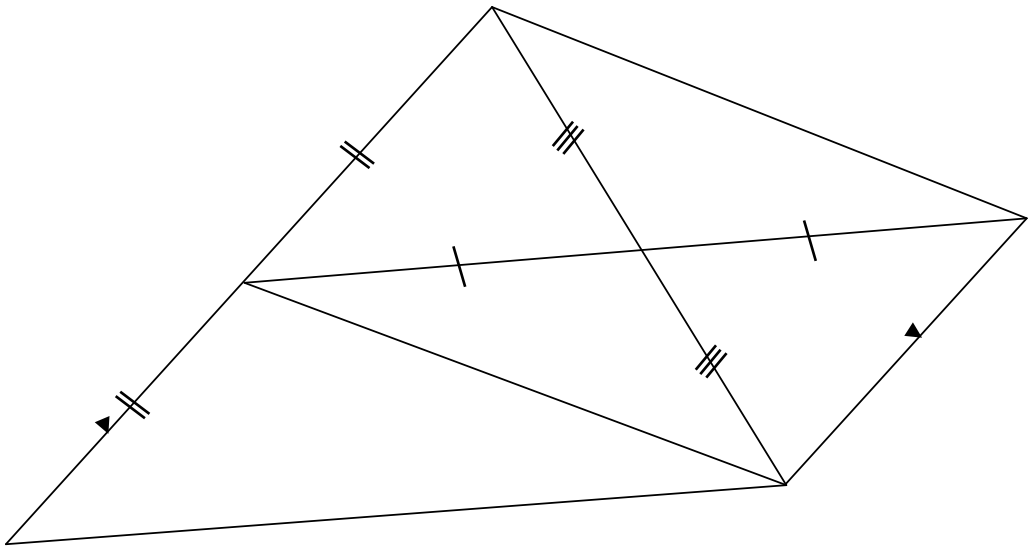
QUESTION/*VRAAG* 8



8.1.1	$C\hat{D}O = 36{,}87°$	✓ answer/*antw* (1)
8.1.2	$A\hat{O}D = 90°$	✓ answer/*antw* (1)
8.2	$\tan 36{,}87° = \frac{AO}{8}$ $AO = 8 \times \tan 36{,}87°$ $= 6$ cm	✓ $\tan 36{,}87° = \frac{AO}{8}$ ✓ answer/*antw* (2)
8.3	$AD^2 = 8^2 + 6^2$ [Theorem of Pythagoras/*se stelling*] $= 100$ $AD = 10$ AE = EB [converse midpoint theorem/*omgekeerde midptst*] $OE = \frac{1}{2}AD = 5$ cm [midpoint theorem/*midptst*]	✓ AD = 10 with reason/*met rede* ✓S ✓R ✓ 5 cm (4) **[8]**

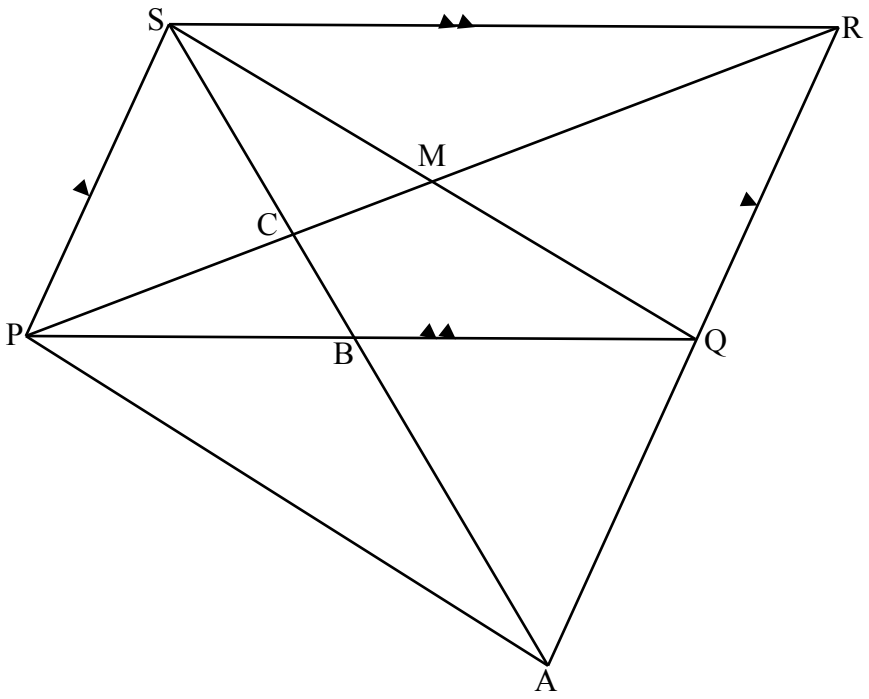
QUESTION/*VRAAG* 9

9.1



9.1.1	Two sides and an included angle/*Twee sye en 'n ingeslote hoek*	✓ R (1)
9.1.2	one pr of sides = and | | *een pr sye = en* | |	✓ R (1)
9.1.3	DE = $\frac{1}{2}$DF [DE = EF] DF = BC [opp sides of parm/*tos sye v parm* =] $\therefore$ DE = $\frac{1}{2}$BC	✓ S ✓S (2)

9.2



9.2.1	In ΔSAR, SB = BA [given/*gegee*] QR = QA [converse midpoint th/*omgekeerde midptst*] But/*maar* QR= SP [opp sides of parm =/*tos sye v parm*=] ∴ SP = QA	 ✓S ✓R ✓S ✓R (4)
9.2.2	SP = QA [proven/*bewys]* SP || QA [opp sides of parm | |/*tos sye v parm* | |] ∴ SPAQ is a parm [one pr of sides = and | |/*een pr sye = en* | |]	✓both statements/ *beide bewerings* ✓R (2)
9.2.3	M midpoint of/*midpt van* PR and/*en* B midpoint of/*midpt van* PQ [diag bisect of parm/*hkle halveer parm*] $MB = \frac{1}{2}QR$ [midpoint theorem/*midptst*] $MB = \frac{1}{2}\left(\frac{1}{2}AR\right)$ ∴ 4MB = AR	✓S ✓ S ✓R ✓ $QR = \frac{1}{2}AR$ (4)
		[14]

TOTAL/*TOTAL*: 100