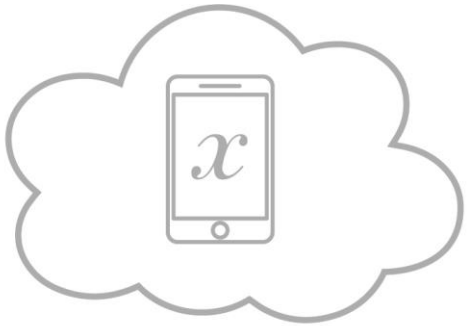


Promaths

ONLINE

MATHEMATICS

GRADE : 10

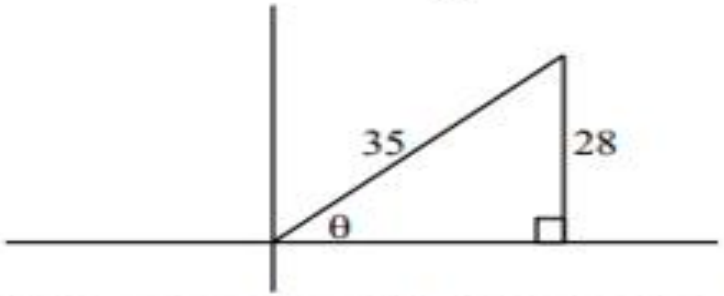
Consoildation

22 October 2021

TRIG 1

QUESTION 3

3.1 In the diagram below, the value of $\sin\theta = \frac{28}{35}$



3.1.1 Without calculating the value of θ, determine the value of $\cos\theta$. (3)

3.1.2 Hence, or otherwise, prove that: $\sin^2\theta + \cos^2\theta = 1$ (3)

3.2 If $37\sin\theta + 35 = 0$ and $\tan\theta > 0$, determine with the help of a diagram, the value of $24\sec\theta - 70\cot\theta$. (6)

3.3 Solve for x, if $x \in [0°; 90°]$. Give your answer correct to 1 decimal place.

3.3.1 $8\cos(x+10°) = 5$ (3)

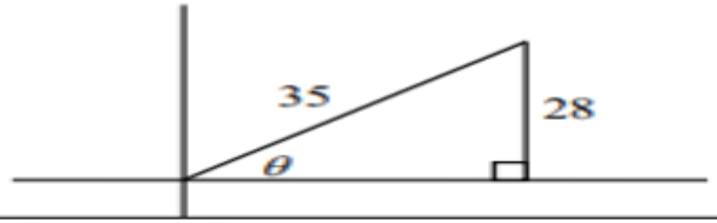
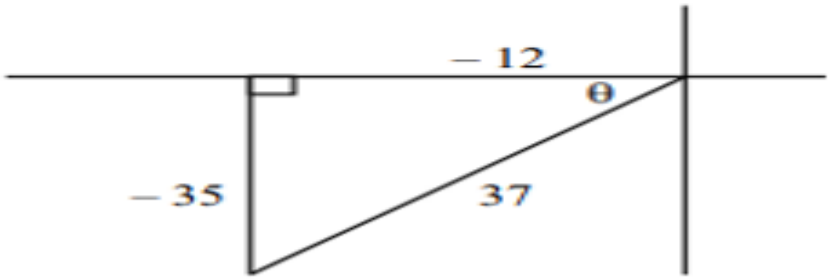
3.3.2 $\text{cosec}\ 2x = 2$ (3)

3.4 Prove the following without the use of a calculator:

$$\frac{\sin 30° \times \tan 60°}{\tan 30° \times \cos 60°} = 3$$ (5)

Working area

Solution

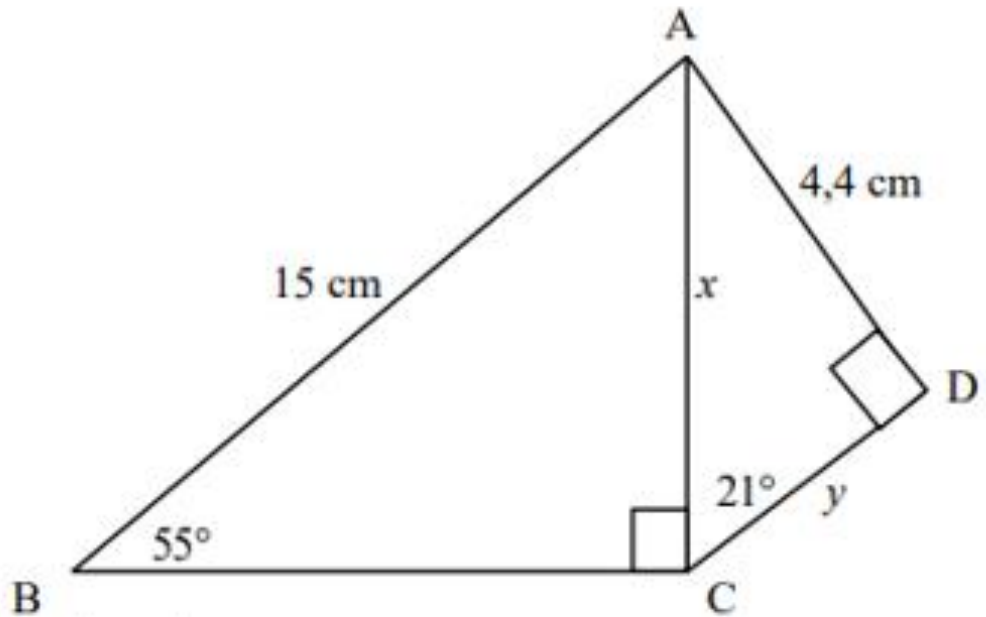
3.1.1	$x^2 = 35^2 - 28^2$ $x = 21$ $\therefore \cos\theta = \frac{21}{35}$ 	✓sub in Pythagoras ✓$x = 21$ ✓ $\frac{21}{35}$ (3)
3.1.2	$\sin^2\theta + \cos^2\theta = \left(\frac{28}{35}\right)^2 + \left(\frac{21}{35}\right)^2$ $= 1$ $=$ RHS	✓ $\left(\frac{28}{35}\right)^2$ ✓ $\left(\frac{21}{35}\right)^2$ ✓ 1 (3)
3.2	If $37\sin\theta + 35 = 0$ $\therefore \sin\theta = -\frac{35}{37}$ $x^2 = 37^2 - 35^2$ $x = 12$  $24\sec\theta - 70\cot\theta$ $= 24(\frac{37}{-12}) - 70(\frac{-12}{-35})$ $= -74 - 24$ $= -98$	✓ $\sin\theta = \frac{-35}{37}$ ✓ 3rd quadrant ✓ x value $= -12$ ✓✓ substitution ✓answer (6)

Solution

3.3.1	$8\cos(x + 10°) = 5$ $\cos(x + 10°) = \frac{5}{8}$ $x + 10° = 51{,}32°$ $x = 41{,}32°$	✓ $\cos(x + 10°)$ ✓ $x + 10°$ ✓ answer (3)
	$\sin 2x = \frac{1}{2}$ $2x = 30^0$ $x = 15^0$	✓ $\sin 2x = \frac{1}{2}$ ✓ $2x = 30°$ ✓ answer (3
3.4	$\frac{\sin 30° \times \tan 60°}{\tan 30° \times \cos 60°} = \frac{\frac{1}{2} \times \frac{\sqrt{3}}{1}}{\frac{1}{\sqrt{3}} \times \frac{1}{2}}$ $= 3$ $=$ RHS	✓ $\frac{1}{2}$ ✓ $\sqrt{3}$ ✓ $\frac{1}{\sqrt{3}}$ ✓ $\frac{1}{2}$ ✓ answer (5

TRIG 2

3.5 In the diagram below, $A\hat{C}B = 90°$, AB = 15 cm, AD = 4,4 cm, $\hat{B} = 55°$, $A\hat{C}D = 21°$ and $A\hat{D}C = 90°$.



Determine the value of:

3.5.1 x (2)

3.5.2 y (2)

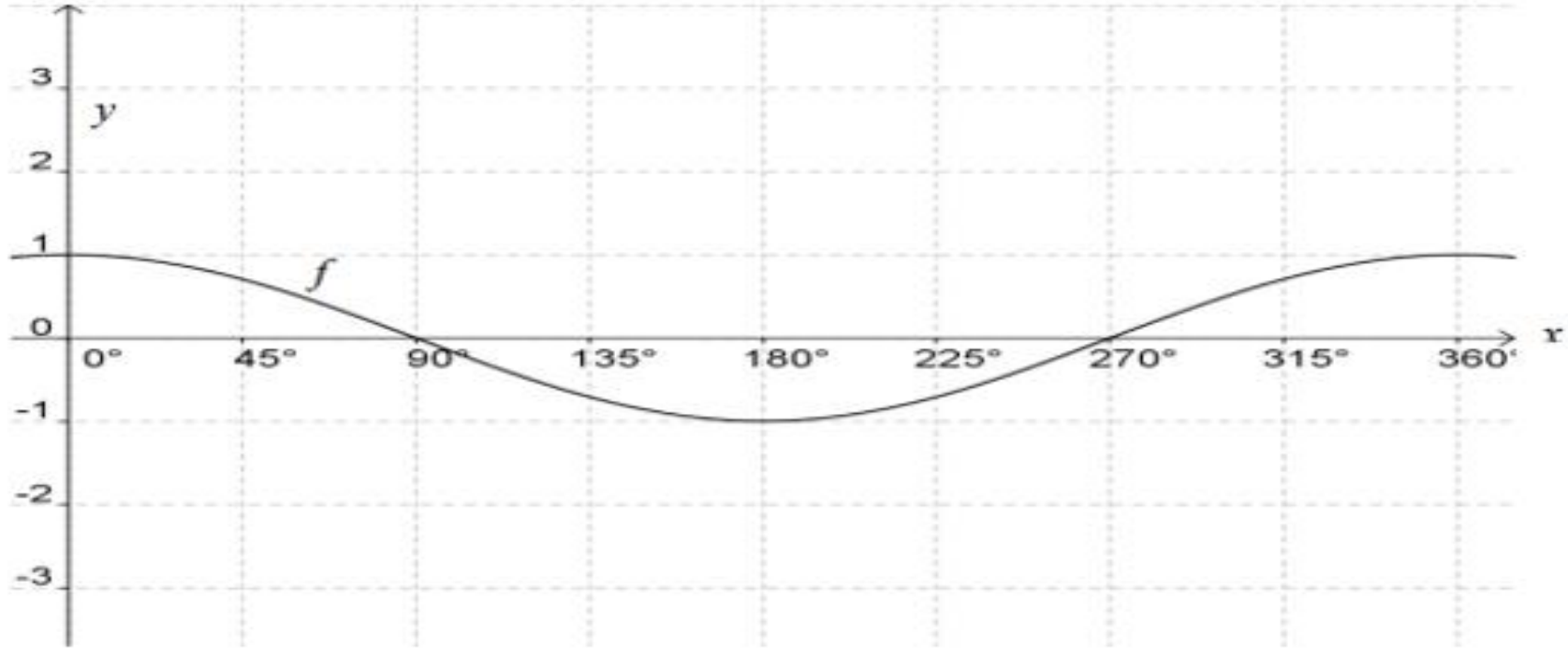
Working area

Solution

3.5.1	$\sin 55° = \frac{x}{15}$ $x = 15 \times \sin 55°$ $= 12{,}29°$ **OR** $\cos 35° = \frac{x}{15}$ $x = 12{,}29°$	✓ using $\sin 55°$ ✓ answer (2) ✓ using $\cos 35°$ ✓ answer (2)
3.5.2	$\tan 21° = \frac{4{,}4}{y}$ $y = \frac{4{,}4}{\tan 21°}$ $= 11{,}46$ **OR** $\tan 69° = \frac{y}{4{,}4}$ $y = 11{,}46$ **OR** $y^2 = 12{,}29^2 - 4.4^2$ $y = 11{,}48$	✓ using $\tan 21°$ ✓ answer (2) ✓ Pythagoras ✓ answer (2)

QUESTION 4

In the diagram below, the graph of $f(x) = \cos x$ is drawn for $x \in [0°; 360°]$



4.1 Sketch on the same axis the graph of $g(x) = 2\sin x$ for $x \in [0°; 360°]$. (3)

4.2 Write down the period of g. (1)

4.3 Write down the range of $m(x)$ *if* $m(x) = -3f(x) + 1$. (3)

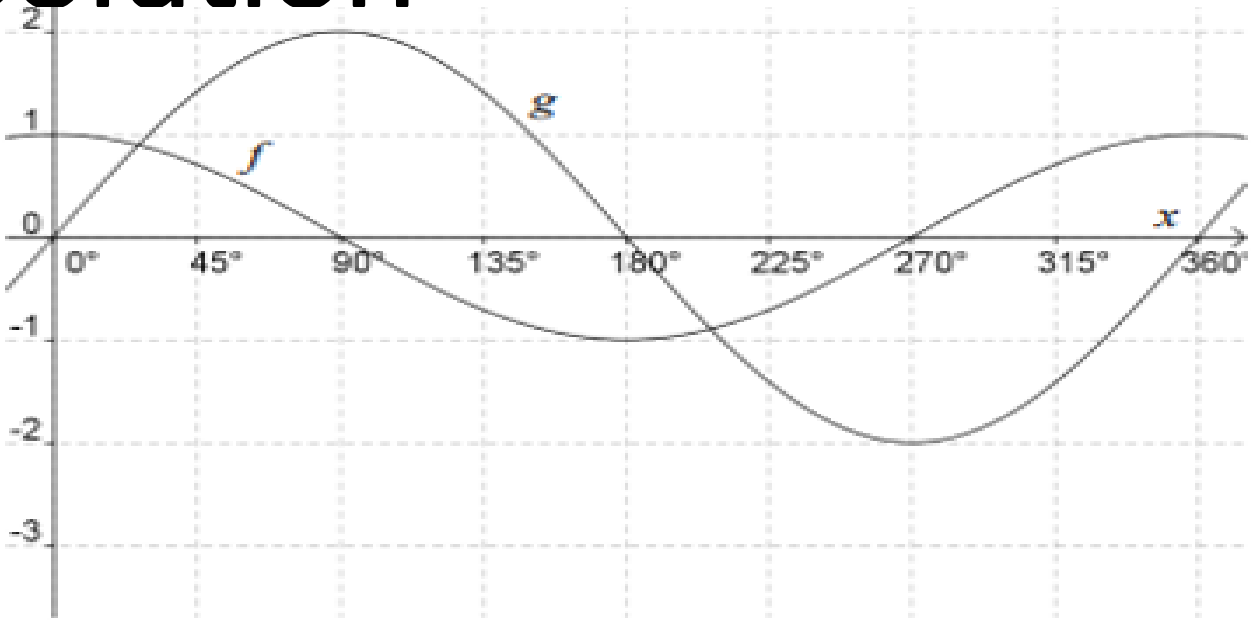
4.4 For which value(s) of x is g decreasing? (2)

4.5 For which value(s) of x is $f(x) \times g(x) < 0$? (3)

[12]

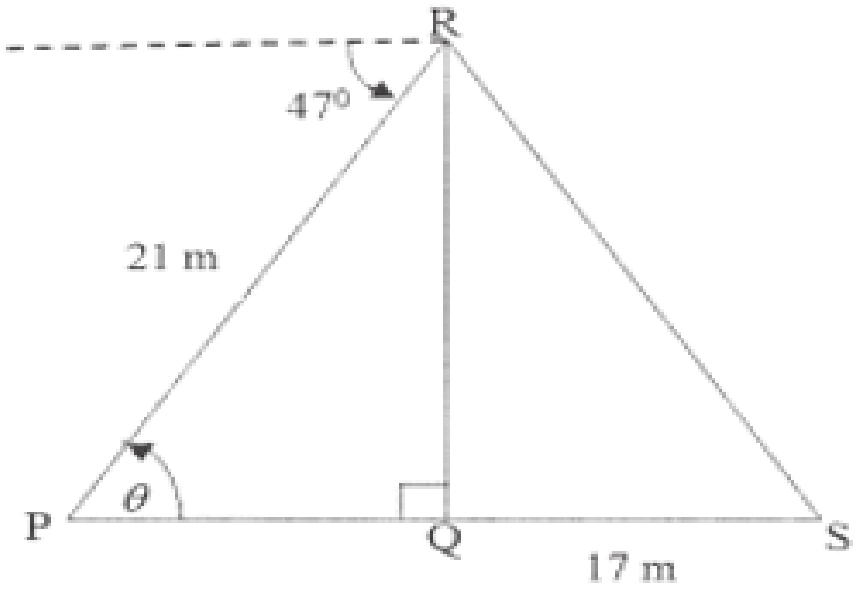
Working area

Solution

		✓ intercepts ✓ turning pts ✓ shape (3)
4.2	period of g = 360^0	✓ answer (1)
4.3	range of $m(x)$ if $m(x) = -3f(x) + 1$ range of -3 f(x): $-3 \leq y \leq 3$ range of $m(x)$: $-2 \leq y \leq 4$	✓ notation ✓✓ endpoints (3)
4.4	g decreasing: $90^0 < x < 270^0$	✓ notation ✓ endpoints (2)
4.5	$f(x) \times g(x) < 0$ $90° < x < 180°$ or $270° < x$ 360°	✓ notation ✓ endpoints ✓ endpoints (3)
		[12]

QUESTION 6

RQ is a vertical pole. The foot of the pole, Q, is on the same horizontal plane as P and S. The pole is anchored with wire cables RS and RP. The angle of depression from the top of the pole to point P is 47°. PR is 21 m and QS is 17 m. $R\hat{P}Q = \theta$.



6.1 Write down the size of θ. (1)

6.2 Calculate the length of RQ. (3)

6.3 Hence, calculate the size of $\hat{S}$. (2)

6.4 If P, Q and S lie in a straight line, how far apart are the anchors of the wire cables? (4)

[10]

Working area

Solution

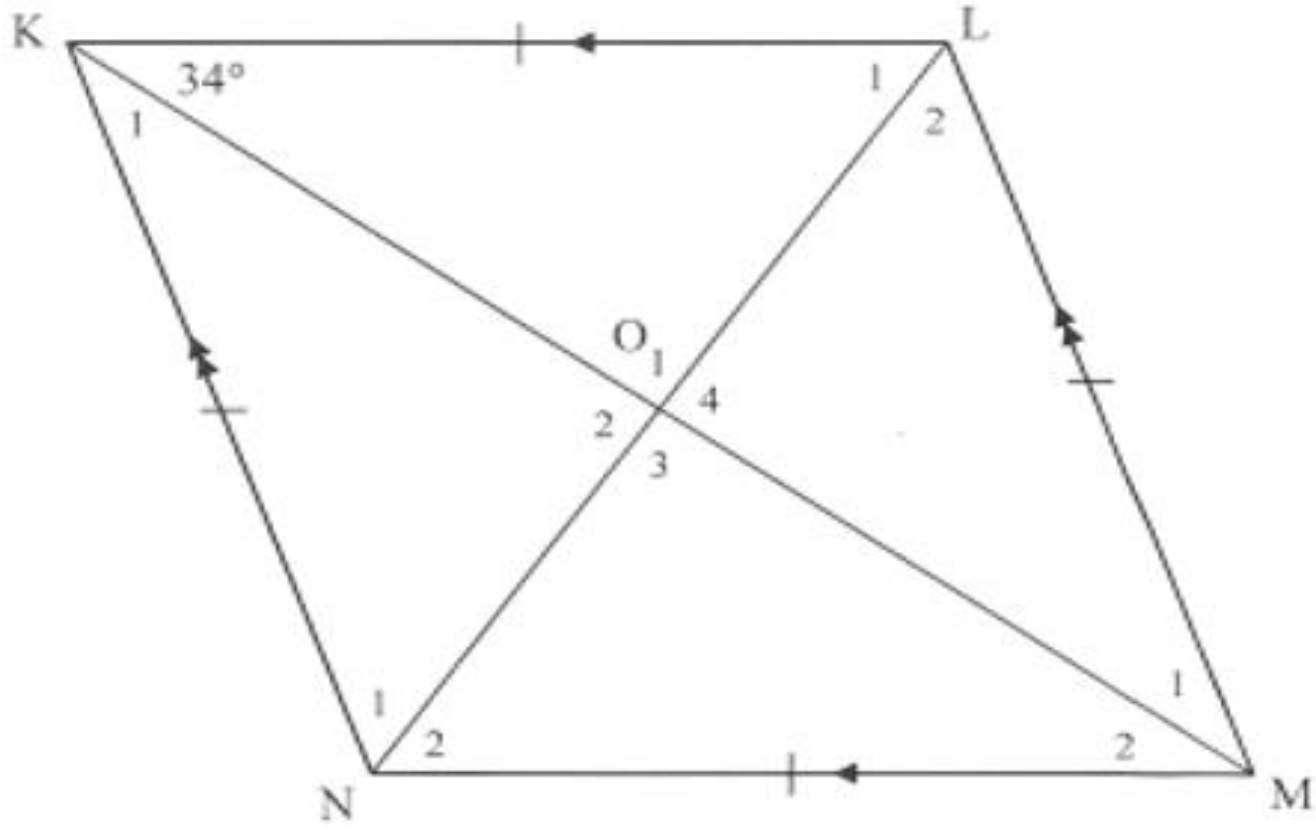
6.1	$\theta = 47°$	✓ answ./*antw.* (1)
6.2	$\sin P = \frac{RQ}{RP}$ $\sin 47° = \frac{RQ}{21}$ $RQ = 21 \sin 47°$ $RQ = 15{,}36 \text{ m}$ **OR/OF** $P\hat{R}Q = 43°$ $\cos P\hat{R}Q = \frac{RQ}{RP}$ $\cos 43° = \frac{RQ}{21}$ $RQ = 21 \cos 43°$ $RQ = 15{,}36 \text{ m}$	✓ trig. ratio/*trig. verhoud* ✓ correct subst./ *korrekte instelling.* ✓ answ./*antw.* (3) **OR/OF** ✓ trig. ratio/*trig. verhoud* ✓ correct subst./ *korrekte instelling.* ✓ answ./*antw.* (3)

Solution

6.3	$\tan S = \frac{RQ}{QS}$ $\tan S = \frac{15{,}36}{17}$ $\hat{S} = \tan^{-1}\left(\frac{15{,}36}{17}\right)$ $\hat{S} = 42{,}10°$	✓subst into trig ratio./*verv in trig verh* ✓answ./*antw.* (2)
6.4	$\cos 47° = \frac{PQ}{21}$ $PQ = 21 \times \cos 47°$ $PQ = 14{,}32$ $PS = 14{,}32 + 17$ $= 31{,}32$ m **OR/*OF*** $\sin 43° = \frac{PQ}{21}$ $PQ = 21 \times \sin 43°$ $PQ = 14{,}32$ $PS = 14{,}32 + 17$ $= 31{,}32$ m	✓subst into trig. ratio/ *verv in trig. verhoud* ✓PQ = 14,32 m ✓addition/*optel* ✓answ./antw. (4)
OR/OF		

QUESTION 8

8.1 KLMN is a rhombus with diagonals intersecting at O. $L\hat{K}M = 34°$.



8.1.1 Write down the size of $\hat{O}_1$. (1)

8.1.2 Calculate the size of $\hat{L}_1$. (2)

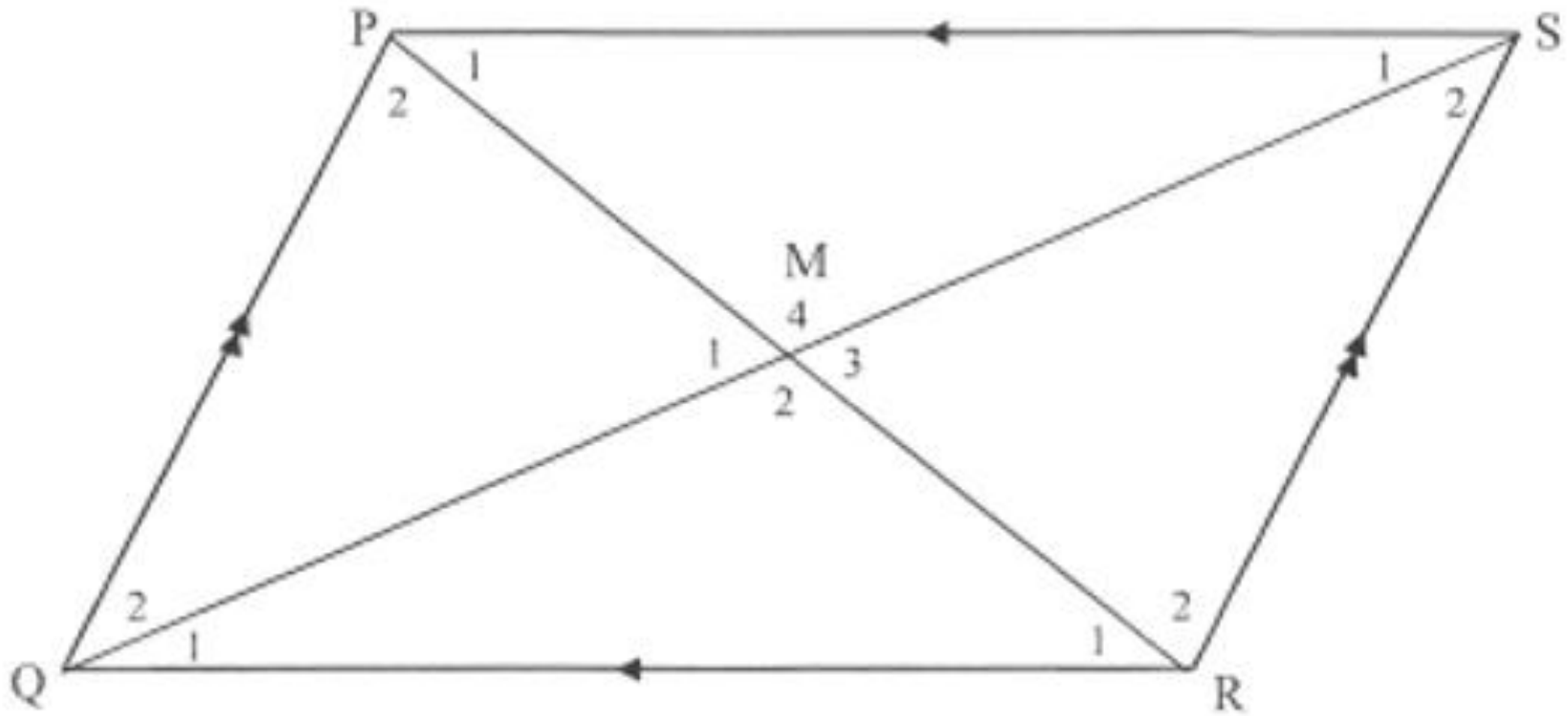
8.1.3 Calculate the size of $K\hat{N}M$. (2)

Working area

Solution

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

8.2 Given parallelogram PQRS with diagonals PR and QS intersecting at M.



Prove that the diagonals bisect each other. (4)

Working area

Solution

8.2	Given/*Gegee* : $\|\|^m$ $PQRS$ with diagonals/*met hoeklyne* PR and/*en* QS. *R.P.T* : $PM = MR$ Proof/*Bewys* : In ΔPMS and/*en* ΔRMQ 1. $\hat{P}_1 = \hat{R}_1$ (alt./*verw.* $\angle_s$, $PS \parallel QR$) 2. $\hat{S}_1 = \hat{Q}_1$ (alt./*verw.* $\angle_s$, $PS \parallel QR$) 3. $PS = QR$ (opp. sides parm are /*teenoorst. sye van parm.* =) $\therefore \Delta PMS \equiv \Delta RMQ$ (AAS) $\Rightarrow PM = MR$ *and* $MS = MQ$	✓ 1. S/R ✓2. S ✓3. S/R ✓congruency/*kongruensie* (AAS) (4)

Solution

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Given/*Gegee* $||:^{m}$ $PQRS$ with diagonals/*met hoeklyne* PR and/*en* QS.

$R.P.T: QM = MS$

Proof/*Bewys*: In ΔPQM and/*en* ΔRSM

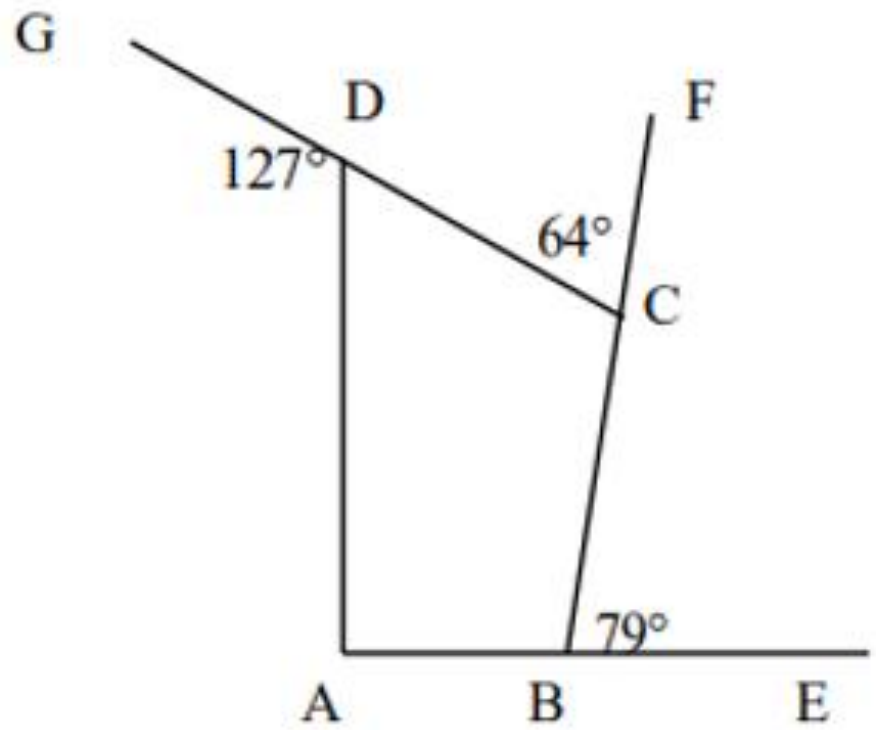
1. $\hat{P}_2 = \hat{R}_2$ (alt./*verw.* $\angle_s, QP \parallel SR$) ✓ 1. S/R
2. $\hat{S}_2 = \hat{Q}_2$ (alt./*verw.* $\angle_s, SR \parallel PQ$) ✓2. S
3. $PQ = SR$ (opp. sides parm are/*teenoorst. sye van parm* =) ✓3. S/R

$\therefore \Delta PQM \equiv \Delta RSM$ (AAS) ✓congruency/*kongruensie* (AAS)

$\Rightarrow QM = MS$ *and* $PM = MR$ (4)

QUESTION 5

5.1 The sides of a quadrilateral ABCD are produced such that AB is produced to E, BC is produced to F and CD is produced to G.



If $E\hat{B}C = 79°$, $F\hat{C}D = 64°$ and $G\hat{D}A = 127°$, calculate the value of $B\hat{A}D$.

Working area

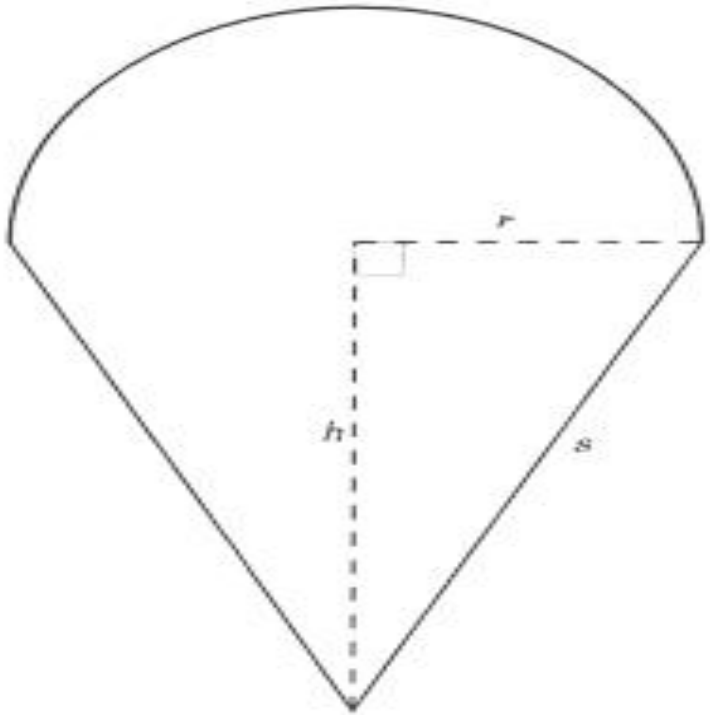
Solution

QUESTION 5

5.1	$A\hat{D}C = 53°$ (∠s on a straight line) $D\hat{C}B = 116°$ (supplementary adj ∠s) $C\hat{B}A = 101°$ (∠s on a straight line) $B\hat{A}D = 360° - 53° - 116° - 101°$ $= 90°$ (∠s of a quad = 360°) Answer only: full marks, provided one reason is given	✓ SR ✓SR ✓SR ✓ answer (4)

QUESTION 7

The diagram below shows the cross-section of a solid made up of a hemisphere placed on top of a right circular cone with radius r and slant height s. The perpendicular height of the cone, h, is 6,5 cm and the volume of the cone is 83,38 cm^3.



Formulae:

Surface area of sphere $= 4\pi r^2$

Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of cone $= \pi r^2 + \pi r s$

Volume of cone $= \frac{1}{3}\pi r^2 h$

Calculate, correct to TWO decimal places:

7.1 The radius, r, of the cone (2)

7.2 The slant height, s, of the cone (2)

7.3 The surface area of the solid (2)

[6]

Working area

Solution

QUESTION/*VRAAG* 7

7.1	$V = \frac{1}{3}\pi r^2 h$ $83{,}38 = \frac{1}{3} \times 6{,}5\pi r^2$ $r^2 = \frac{3 \times 83{,}38}{6{,}5\pi}$ $r = 3{,}50 \text{ cm}$	✓subst./*verv.* ✓answ./*antw.* (2)
7.2	$s^2 = h^2 + r^2$ $s^2 = 6{,}5^2 + 3{,}5^2$ $s = 7{,}38 \text{ cm}$	✓subst./*verv.* ✓answ./*antw.* (2)
7.3	Surface area of the solid/*Buite-oppervlakte (Oppervlakarea) van die vaste liggaam* $= 2\pi r^2 + \pi rs$ $= 2\pi(3{,}5)^2 + \pi(3{,}5)(7{,}38)$ $= 158{,}12 \text{ cm}^2$	✓subst./*verv.* ✓answ./*antw.* (2)
		[6]