



Province of the  
**EASTERN CAPE**  
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo  
Provinsie van die Oos Kaap: Departement van Onderwys  
Porafensie Ya Kapa Bojahlabele: Lefapha la Thuto

# **NATIONAL SENIOR CERTIFICATE**

**GRADE/*KEREITI* YA 12**

**LOETSE 2024**

**MATHEMATICS P2/*MMETSE P2*  
MARKING GUIDELINE/*TATAISO YA HO TSHWAYA***

**MARKS/*MATSHWAO*: 150**

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This marking guideline consists of 17 pages.  
*Tataiso ena ya ho tshwaya e na le maqephe a 17.*

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**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone a question, mark the crossed out version.
- Consistency accuracy applies in ALL aspects of the Marking Guideline. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

<b>GEOMETRY</b>	
<b>S</b>	A mark for a correct statement (A statement mark is independent of a reason)
<b>R</b>	A mark for the correct reason. (A reason mark may only be awarded only if the statement is correct)
<b>S/R</b>	Award a mark if a statement AND a reason are both correct

**ELA HLOKO:**

- *Ebang mohlalobwa o arabile potso e le nngwe HA BEDI, tshwaya karabo YA PELE fela.*
- *Ebang mohlalobuwa o hlabile karabo ya hae mme a se ke a ngola karabo e nngwe, mo tshwaye karabo eo e hlabilweng .*
- *Ho latellwe tataiso ena ya ho tshwaya ka kelohloko ka dinako TSOHLE. Lesa ho tshwaya ho phoso ya bobedi e entsweng.*
- *Ho nahanela dikarabo/manane bakeng sa ho fumana diakarabo HA HO a amoheleha.*

<b>JIYOMETRI</b>	
<b>S</b>	<i>Letshwao bakeng sa setatements se nepahetseng (letshwao la setatements le ikemetse ha le kopane le la lebaka)</i>
<b>R</b>	<i>Letshwao bakeng sa lebaka (ho fanwe ka letshwao la lebaka ha fela setatements se nepahetse)</i>
<b>S/R</b>	<i>Aba letshwao ha fela setatements LE lebaka bobedi di nepahetse</i>

## QUESTION 1/POTSO YA 1

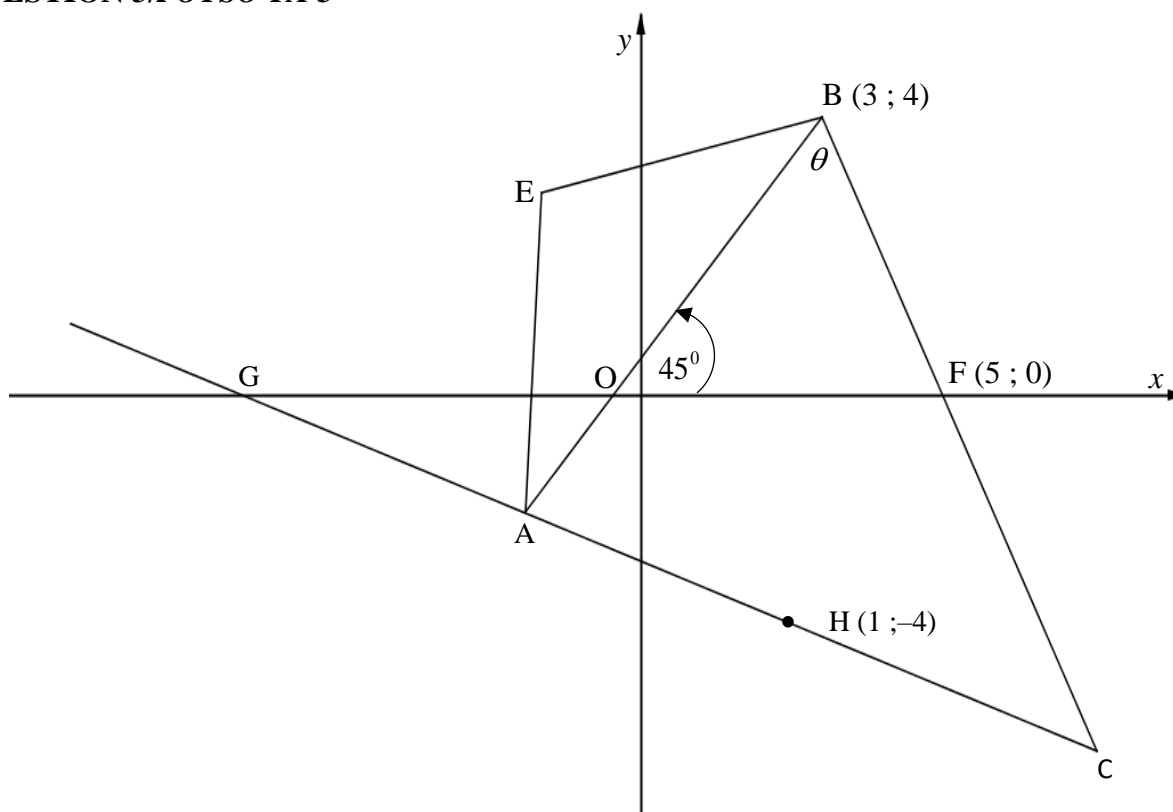
1.1	<div>82      64      55      50      41</div> <div>71      78      88      98      96</div> <div>63      66      80      84      88</div>		
1.1.1	88	✓ answer / karabo	(1)
1.1.2	Range / Omvang = $98 - 41 = 57$	✓ answer / karabo	(1)
1.1.3	$\bar{x} = \frac{1104}{15}$ $= 73,60$	✓ 1104 ✓ answer / karabo	(2)
1.1.4	$\sigma = 16,30$	✓ answer / karabo	(1)
1.1.5	$\bar{x} - \sigma = 73,60 - 16,30$ $= 57,30$ $\therefore$ There were 3 truck drivers. <i>Daar was 3 trokbestuurders</i>	✓ $73,60 - 16,30$ ✓ 57,30 ✓ answer / karabo	(3)
1.2	let total mass of 8 people be $x$ : <i>laat die totale massa van 8 mense <math>x</math> wees :</i>  number of people to be added be $k$ : <i>aantal mense wat by moet kom <math>k</math> wees :</i>  $\frac{x}{8} = 75$ $x = 600$ $75k + 600 = 1000$ $\therefore k = \frac{1000 - 600}{75}$ $k = 5,333$ It will be approximately equal to 5 people <i>E ka ba haufi kapa e lekane le batho ba 5</i>	✓ $\frac{x}{8} = 75$ ✓ mass of 8 people (600) <i>Mass ya batho ba 8 (600)</i> ✓ equation / ikhweishene $(75k + 600 = 1000)$  ✓ answer / karabo	(4)
			[12]

## QUESTION 2/POTSO YA 2

TEST A / TOETS A	39	33	35	44	37	40	24	31	30	5
TEST B / TOETS B	41	45	48	40	47	42	37	44	43	24

2.1	(44 ; 40)	✓ 44 in TEST A / <i>TEKO YA A</i>	(1)
2.2	$a = 25,48$ $b = 0,49$ $y = 25,48 + 0,49x$	✓ $a = 25,48$ ✓ $b = 0,49$ ✓ $y = 25,48 + 0,49x$	(3)
2.3	$y = 25,48 + 0,49(14)$ $= 32$	✓ correct substitution / <i>Sabstitjhshene e nepahetsseng</i> ✓ answer / <i>karabo</i>	(2)
2.4	$r = 0,79$ Strong positive correlation <i>correlation e phositive e strong</i>	✓ $r = 0,79$ ✓ comment / <i>ho tshwaela</i>	(2)
			[8]

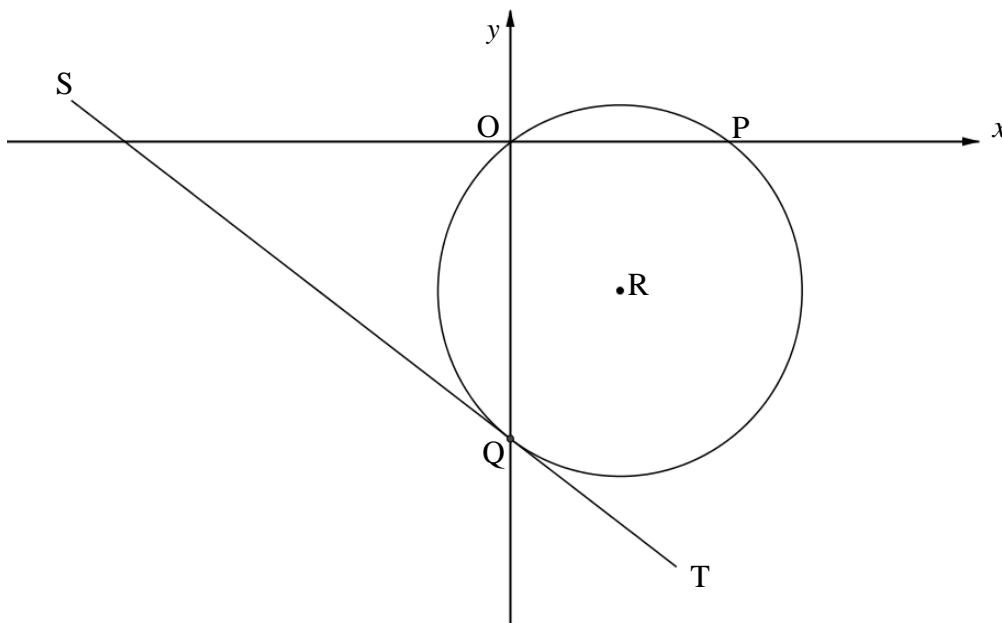
## QUESTION 3/POTSO YA 3



3.1	$BF = \sqrt{(3-5)^2 + (4-0)^2}$ $= \sqrt{20}$	✓ correct substitution <i>Sabstijhshene e nepahetseng</i> ✓ answer / karabo	(2)
3.2	$m_{BF} = \frac{4-0}{3-5}$ $= -2$	✓ correct substitution <i>Sabstijhshene e nepahetseng</i> ✓ answer / karbo	(2)
3.3	$\tan \alpha = -2$ $\alpha = 116,57^\circ$ $\theta = 116,57^\circ - 45^\circ = 71,57^\circ$ [ext $\angle$ of a $\Delta$ ]	✓ $\tan \alpha = m_{BF} = -2$ ✓ $\alpha = 116,57^\circ$ ✓ $\theta = 71,57^\circ$	(3)
3.4	$\tan 45^\circ = m_{AB} = 1$ $m_{HF} = \frac{1-5}{-4-0}$ $= 1$ $\therefore HF \parallel AB$ [ $m_{AB} = m_{HF} = 1$ ]	✓ $m_{AB} = 1$ ✓ correct substitution <i>Sabstijhshene e nepahetseng</i> ✓ $m_{HF} = 1$ ✓ Reason / Lebaka [ $m_{AB} = m_{HF}$ ]	(4)

3.5	Kite / Khaethe	✓ answer / karabo	(1)
3.6	$\frac{HC}{AH} = \frac{FC}{BF}$ [line/lyn    to one side of a $\Delta$ / aan een sy van $\Delta$ ] $\frac{2}{1} = \frac{FC}{2\sqrt{5}}$ $FC = 4\sqrt{5}$ $BC = 4\sqrt{5} + 2\sqrt{2} = 6\sqrt{5}$ $AC = 6\sqrt{5}$ [adj. sides of a kite / aangr. sye van vlieër]	✓ correct ratio / Reshio e nepahetseng ✓ correct substitution / Sabstitjhushene e nepahetseng ✓ FC ✓ AC = BC	(4)
3.7	$\hat{B} = \hat{A} = 71,57^\circ$ [ $\angle$ s opp = sides / $\angle$ e teenoor = sye] $\therefore \hat{C} = 36,87^\circ$ Area of/van AOFC = Area of/van $\Delta ABC$ – Area of/van $\Delta OBF$ $= \frac{1}{2} \times 6\sqrt{5} \times 6\sqrt{5} \times \sin 36,87^\circ - 12$ $= 41,99$	✓ $\hat{C} = 36,87^\circ$ ✓ Area of/ya $\Delta ABC$ ✓ answer / karabo	(3)
			[19]

#### QUESTION 4/POTSO YA 4

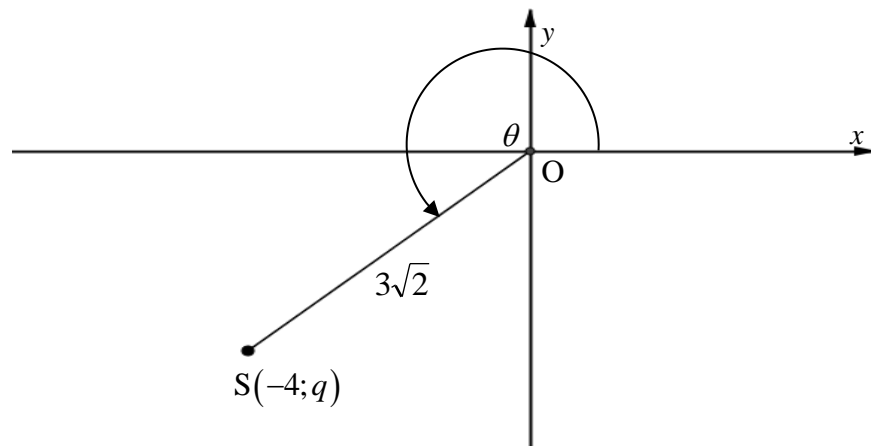


4.1.1	$y = -\frac{3}{4}(0) - 8$ $= -8$ $Q(0 ; -8)$	✓ $x = 0$ ✓ y- coordinate / y-khoodineithi	(2)
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4.1.2	$m_{QR} = \frac{4}{3}$ [tan $\perp$ rad / raakl $\perp$ rad] $y + 8 = \frac{4}{3}(x - 0)$ $y = \frac{4}{3}x - 8$	$\checkmark m_{QR}$ $\checkmark$ substituting $m_{QR}$ and $Q(0; -8)$ <i>sabstitjhushene <math>m_{QR}</math> le <math>Q(0; -8)</math></i> $\checkmark$ equation / <i>ikhweishene</i>	(3)
4.1.3	$\frac{4}{3}x - 8 = 0$ $x = 6$ $P(6; 0)$	$\checkmark y = 0$ $\checkmark x = 6$	(2)
4.1.4	$x_R = \frac{0+6}{2}; y_R = \frac{-8+0}{2}$ $x_R = 3; y_R = -4$	$\checkmark$ correct substitution <i>Sabstitjhushene e nepahetseng</i> $\checkmark x_R = 3 \quad \checkmark y_R = -4$	(3)
4.1.5	$r^2 = (0-3)^2 + (-8+4)^2$ $= 25$ $(x-3)^2 + (y+4)^2 = 25$	$\checkmark$ correct substitution <i>Sabstitjhushene e nepahetseng</i> $\checkmark r^2 = 25$ $\checkmark$ equation / <i>ikhweishene</i>	(3)
4.1.6	$k = -4 + 5$ or / of $k = -4 - 5$ $k = 1$ or / of $k = -9$	$\checkmark$ method / <i>mokgwa</i> $\checkmark k = 1 \quad \checkmark k = -9$	(3)
4.2	$(x - \sin \theta)^2 + (y + 2 \sin \theta)^2 = -2 + \sin^2 \theta + 4 \sin^2 \theta$ $r^2 = -2 + 5 \sin^2 \theta$  For any value of $\theta$ maximum of $\sin^2 \theta = 1$ <i>Vir enige waarde van <math>\theta</math> is maksimum van <math>\sin^2 \theta = 1</math></i> $\therefore r = \sqrt{-2 + 5(1)}$ $= \sqrt{3}$	$\checkmark (x - \sin \theta)^2 + (y + 2 \sin \theta)^2$ $\checkmark r^2 = -2 + 5 \sin^2 \theta$  $\checkmark$ maximum of $\sin^2 \theta = 1$ <i>Maksimamo ya <math>\sin^2 \theta = 1</math></i> $\checkmark r = \sqrt{-2 + 5(1)}$ $\checkmark$ answer / <i>karabo</i>	(5)
			[21]

## QUESTION 5/POTSO YA 5

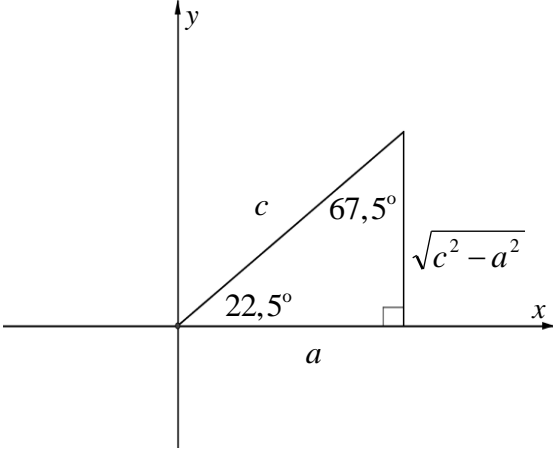
5.1



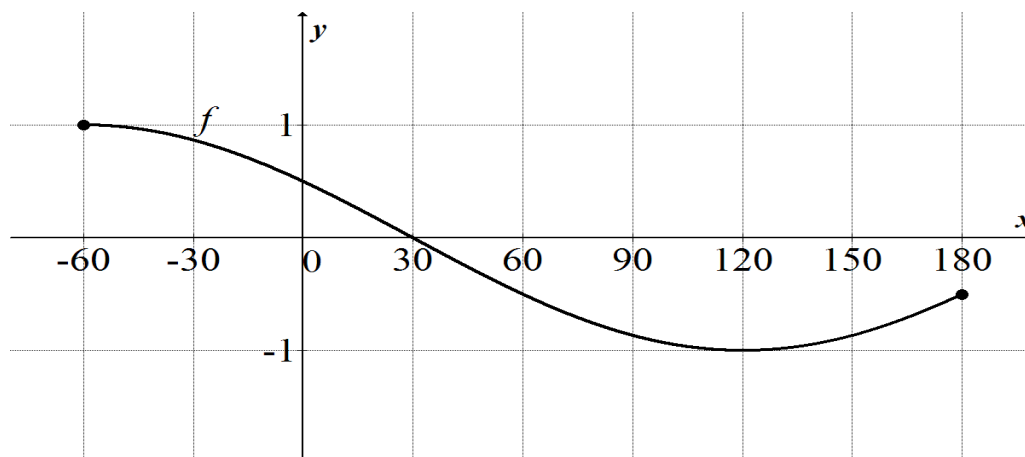
5.1.1	$q = -\sqrt{(3\sqrt{2})^2 - (-4)^2}$ $= -\sqrt{2}$ <p style="text-align: center;"><i>Pyth</i></p>	✓ correct substitution <i>Sabstitjhushene e nepahetseng</i> ✓ answer / karabo	(2)
5.1.2	$\sin(\theta + 45^\circ) = \sin \theta \cdot \cos 45^\circ + \cos \theta \sin 45^\circ$ $= \frac{-\sqrt{2}}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{2} + \left(\frac{-4}{3\sqrt{2}}\right) \cdot \frac{\sqrt{2}}{2}$ $= \frac{-1 - 2\sqrt{2}}{3\sqrt{2}}$	✓ expansion / tlhaloso  ✓ ratios of / reshiyo ya $\sin \theta$ & $\cos \theta$ ✓ special angles / engele e ikgethileng ✓ answer / karabo	(4)
5.1.3	$\cos(2\theta - 360^\circ) = \cos 2\theta$ $= 2\cos^2 \theta - 1$ $= 2\left(\frac{-4}{3\sqrt{2}}\right)^2 - 1$ $= \frac{7}{9}$	✓ $\cos 2\theta$ ✓ identity / identhithi  ✓ ratio of / verhouding van $\cos \theta$  ✓ answer / karabo	(4)
5.2	$\frac{\sin(90^\circ - \theta) \cdot \cos 480^\circ + \cos(180^\circ - \theta) \cdot \tan 45^\circ}{\cos \theta \cdot \sin 390^\circ - \tan 180^\circ}$ $= \frac{\cos \theta \cdot (-\cos 60^\circ) + (-\cos \theta) \cdot (\tan 45^\circ)}{\cos \theta (\sin 30^\circ) - \tan 180^\circ}$ $= \frac{-\frac{1}{2} \cos \theta - \cos \theta (1)}{\cos \theta \left(\frac{1}{2}\right) - 0}$ $= \frac{-\frac{3}{2} \cos \theta}{\frac{1}{2} \cos \theta}$ $= -3$	✓ $\cos \theta$ ✓ $-\cos 60^\circ$ ✓ $\sin 30^\circ$  ✓ special angles / diengele tse ikgethileng  ✓ answer / karabo	(5)



5.3	$\begin{aligned} \text{LHS} / LK &= \frac{\cos x}{\sin 2x} - \frac{\cos 2x}{2 \sin x} \\ &= \frac{2 \sin x \cos x - \cos 2x \sin 2x}{2 \sin 2x \sin x} \\ &= \frac{\sin 2x - \cos 2x \sin 2x}{2 \sin 2x \sin x} \\ &= \frac{\sin 2x(1 - \cos 2x)}{2 \sin 2x \sin x} \\ &= \frac{1 - (1 - 2 \sin^2 x)}{2 \sin x} \\ &= \frac{2 \sin^2 x}{2 \sin x} \\ &= \sin x \end{aligned}$	<p>✓ simplification / <i>simplifikheishene</i></p> <p>✓ <math>\sin 2x</math></p> <p>✓ common factor / <i>Khomone fekthara</i></p> <p>✓ identity / <i>identhithi</i> <math>1 - 2 \sin^2 x</math></p> <p>✓ <math>\frac{2 \sin^2 x}{\sin x}</math></p>	(5)
5.4.1	$\begin{aligned} \frac{\cos 60^\circ}{\sin x} - \frac{\sin 60^\circ}{\cos x} &= 2 \\ \frac{\cos 60^\circ \cos x - \sin 60^\circ \sin x}{\sin x \cos x} &= 2 \\ \cos(x + 60^\circ) &= 2 \sin x \cos x \\ \cos(x + 60^\circ) &= \sin 2x \\ \cos(x + 60^\circ) &= \cos(90^\circ - x) \end{aligned}$	<p>✓ simplification / <i>simplifikheishene</i></p> <p>✓ <math>\cos(x + 60^\circ)</math></p> <p>✓ <math>\sin 2x</math></p>	(3)
5.4.2	$\begin{aligned} \cos(x + 60^\circ) &= \cos(90^\circ - 2x) \\ x + 60^\circ &= \pm(90^\circ - 2x) + 360^\circ.k \\ x + 60^\circ &= 90^\circ - 2x + 360^\circ.k \text{ or / of } x + 60^\circ = -90^\circ + 2x + 360^\circ.k \\ 3x &= 30^\circ + 360^\circ.k \text{ or / of } -x = -120^\circ + 360^\circ.k \\ x &= 10^\circ + 120^\circ.k \text{ or / of } x = 120^\circ - 360^\circ.k, k \in \mathbb{Z} \\ \text{OR / OF} \\ x + 60^\circ &= 90^\circ - 2x + 360^\circ.k \text{ or / of } x + 60^\circ = 360^\circ - 90^\circ + 2x + 360^\circ.k \\ 3x &= 30^\circ + 360^\circ.k \text{ or / of } -x = 240^\circ + 360^\circ.k \\ x &= 10^\circ + 120^\circ.k \text{ or / of } x = -240^\circ - 360^\circ.k, k \in \mathbb{Z} \end{aligned}$	<p>✓ <math>x + 60^\circ = 90^\circ - 2x</math></p> <p>✓ <math>\left[ \begin{array}{l} 3x = 30^\circ + 360^\circ.k \\ \text{or / of} \\ -x = -120^\circ + 360^\circ.k \end{array} \right]</math></p> <p>✓ <math>\left[ \begin{array}{l} x = 10^\circ + 120^\circ.k \\ \text{or / of} \\ x = 120^\circ - 360^\circ.k \end{array} \right]</math></p> <p>✓ <math>360^\circ.k, k \in \mathbb{Z}</math></p>	(4)

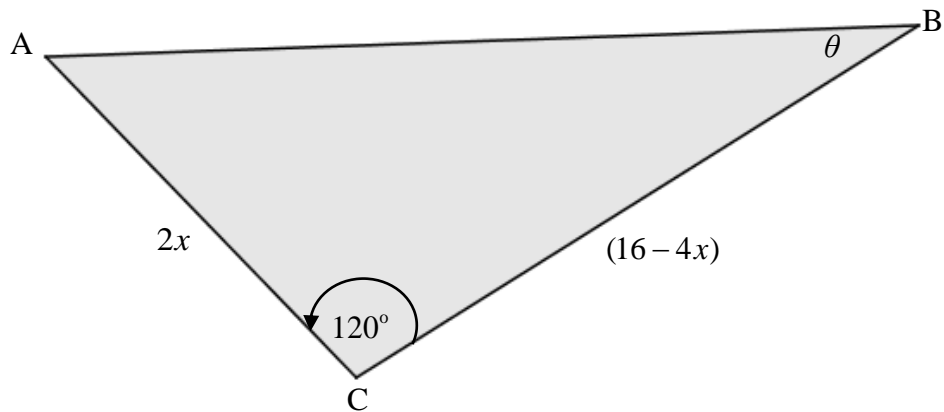
5.5	<p><math>y = \sqrt{c^2 - a^2}</math> Pyth Theorem / Stelling</p>  $\frac{\sqrt{2}}{2} = \sin 45^\circ$ $= 2 \sin 22,5^\circ \cos 22,5^\circ$ $= 2 \cdot \frac{\sqrt{c^2 - a^2}}{c} \cdot \frac{a}{c}$ $= 2 \cdot \frac{\sqrt{a^2 + b^2 - a^2}}{c} \cdot \frac{a}{c}$ $= \frac{2ab}{c^2}$	<p>✓  <math>y = \sqrt{c^2 - a^2}</math> Pyth Theorem / Stelling</p> <p><b>OR/KAPA</b> correct diagram  <i>Dayakeramo e nepahetseng</i></p> <p>✓ <math>\sin 45^\circ</math></p> <p>✓ <math>2 \sin 22,5^\circ \cdot \cos 22,5^\circ</math></p> <p>✓ substitution / vervanging</p> <p>✓ <math>c^2</math> i.t.o./ i.t.v <math>a^2</math> &amp; <math>b^2</math></p>	(5)
			<b>[32]</b>

## QUESTION 6/POTSO YA 6



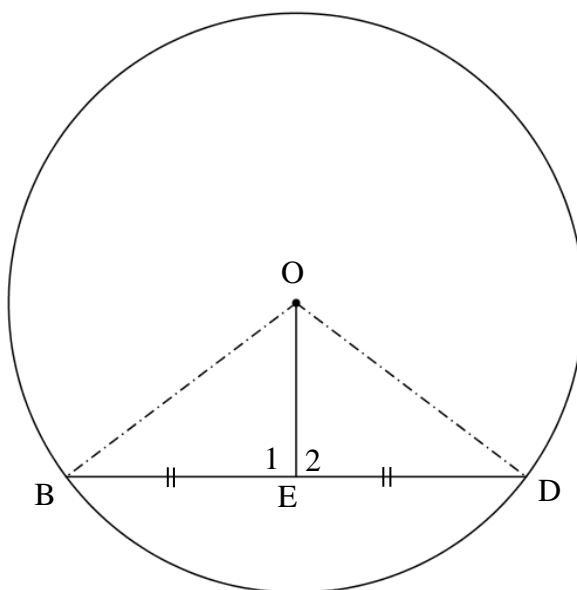
6.1	Period / <i>Pheriode</i> is/ ke $360^\circ$	✓ answer / <i>karabo</i>	(1)
6.2	Min value / <i>waarde</i> = $-1$	✓ answer / <i>karabo</i>	(1)
6.3	$-1 \leq y \leq 1$ $-1+1 \leq y \leq 1+1$ $0 \leq y \leq 2$	✓ correct critical values <i>Dicritical velu tse nepahetseng</i> ✓ correct notation / <i>notheishene e nepahetseng</i>	(2)
6.4	$120^\circ < x < 180^\circ$	✓ correct critical values <i>Dicritical velu tse nepahetseng</i> ✓ correct notation / <i>notheishene e nepahetseng</i>	(2)
6.5	$g(x) = -\sin(x - 30^\circ - 60^\circ)$ $= -\sin(x - 90^\circ)$ $= -\cos x$	✓ $-(-\sin x - 30^\circ - 60^\circ)$ ✓ $\sin(x - 90^\circ)$ ✓ $-\cos x$	(3)
6.6		✓ intercepts with the axes <i>Inthasepthe ho di-axis</i> ✓ turning points / <i>thening poente</i> ✓ shape / <i>sebopeho</i>	(3)
			[12]

## QUESTION 7 / POTSO YA 7



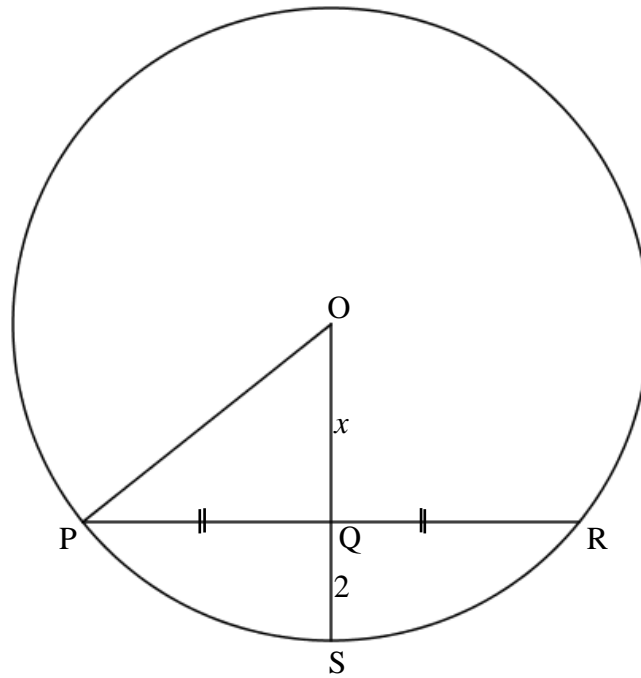
7.1	$A \text{ of } \triangle ABC = \frac{1}{2} \times 2x \times (16 - 4x) \times \sin 120^\circ$ $= (16x - 4x^2) \times \sin 60^\circ$ $= 8\sqrt{3}x - 2\sqrt{3}x^2$	✓ correct substitution / <i>Substitjushene e nepahetseng</i>  ✓ $\sin 60^\circ$ ✓ answer / <i>karabo</i>	(3)
7.2	$A' = 0$ $8\sqrt{3} - 4\sqrt{3}x = 0$ $x = 2$	✓ derivative / <i>direvetive</i> = 0 ✓ $8\sqrt{3} - 4\sqrt{3}x$ ✓ answer / <i>karabo</i>	(3)
			<b>[6]</b>

## QUESTION 8/POTSO YA 8



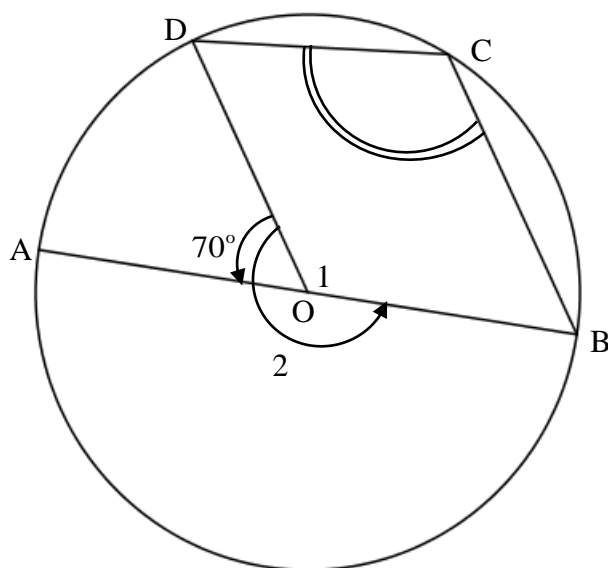
8.1	<p>Construction: Draw DO and OB</p> <p>Proof: In <math>\triangle ODE</math> and <math>\triangle OEB</math></p> <p><math>DE = EB</math> [given]</p> <p><math>OD = OB</math> [radii]</p> <p><math>OE = OE</math> [common]</p> <p><math>\therefore \triangle ODE \equiv \triangle OEB</math> [SSS]</p> <p><math>\hat{E}_1 + \hat{E}_2 = 180^\circ</math> [<math>\angle</math>s on str line]</p> <p><math>\therefore \hat{E}_1 = \hat{E}_2 = 90^\circ</math> [<math>\triangle ODE \equiv \triangle OEB</math>]</p> <p><i>Khonstrakshene:</i> Teroya DO le OB</p> <p><i>prufu:</i> In <math>\triangle ODE</math> le <math>\triangle OEB</math></p> <p><math>DE = EB</math> [gegee]</p> <p><math>OD = OB</math> [radiusse]</p> <p><math>OE = OE</math> [gemeen]</p> <p><math>\therefore \triangle ODE \equiv \triangle OEB</math> [SSS]</p> <p><math>\hat{E}_1 + \hat{E}_2 = 180^\circ</math> [<math>\angle</math>e op reguitlyn]</p> <p><math>\therefore \hat{E}_1 = \hat{E}_2 = 90^\circ</math> [<math>\triangle ODE \equiv \triangle OEB</math>]</p>	<p>✓ construction</p> <p>✓ first statement (radii)</p> <p>✓ other 2 statements</p> <p>✓ reason for congruency</p> <p>✓ R</p> <p>✓ khonstrakshene</p> <p>✓ setatementsa sa pele (radii)</p> <p>✓ ditatementsa tse ding tse 2</p> <p>✓ lebaka la congruency</p> <p>✓ R</p>	(5)
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8.2



8.2.1	$\angle OQP = 90^\circ$ [line from centre to the midpoint] <i>[mola o tlohang mokgubung ho ya ho midpoente]</i>	✓ S    ✓ R	(2)
8.2.2	$PQ = 4$ $OP^2 = PQ^2 + OQ^2$ [Pyth] $(x+2)^2 = 4^2 + x^2$ $x^2 + 4x + 4 = 16 + x^2$ $4x = 12$ $x = 3$ $OP = OS = 5$ [radii / radiusse]	✓ PQ  ✓ substitution into Pythagoras <i>Sabstitjhushene ho Pythagoras</i>  ✓ simplification / <i>simplifikheishene</i>  ✓ x-value / x-velu ✓ PO	(5)
			[12]

## QUESTION 9/POTSO YA 9



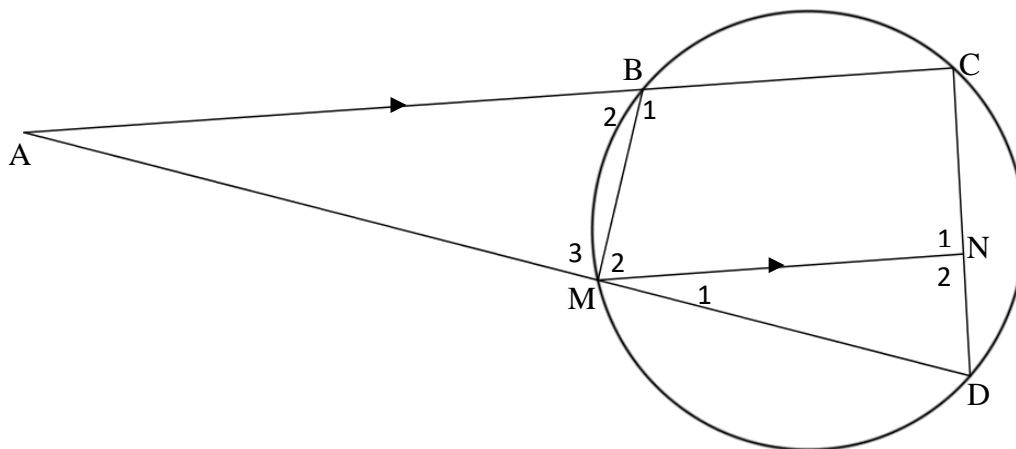
9.1	$\hat{O}_1 = 110^\circ$ [ $\angle$ s on a str. line / $\angle$ e op reguitlyn ] $\hat{O}_2 = 350^\circ$ [ $\angle$ s around a point / $\angle$ e om 'n punt ] $\therefore \hat{C} = 175^\circ$ [ $\angle$ at centre = $2 \times \angle$ at circumf ] [Middelpunts $\angle = 2 \times$ Omtreks $\angle$ ]	$\checkmark$ S/R $\checkmark$ S $\checkmark$ R $\hat{O}_1 = 110^\circ$ $\hat{O}_2 = 250^\circ$ $\therefore \hat{C} = 125^\circ$ $\checkmark$ S $\checkmark$ R	(5)
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**QUESTION 10 / POTSO YA 10**

$AC = 36$  units/*diunithi*,  $AD = 48$  units/*diunithi* and  $BM = 24$  units/*diunithi*



10.1	$\hat{A} = \hat{A}$ [common / <i>gemeen</i> ] $\hat{B}_2 = \hat{D}$ [ext $\angle$ of a cyclic quad / <i>buite <math>\angle</math> van koordev.</i> ] $\hat{M}_3 = \hat{C}$ [ext $\angle$ of a cyclic quad / <i>buite <math>\angle</math> van koordev.</i> ] or / of [3 <sup>rd/de</sup> $\angle$ ] $\triangle ABM \parallel \triangle ADC$ [ $\angle \angle \angle$ ]	$\checkmark$ S $\checkmark$ S $\checkmark$ R $\checkmark$ R 3 <sup>rd</sup> angle/3 <sup>de</sup> <i>hoek</i> <b>OR/KAPA</b> $\checkmark$ R $\angle \angle \angle$	(4)
10.2	$\frac{BM}{DC} = \frac{AM}{AC}$ [ $\parallel \Delta$ s] but/ <i>maar</i> $AM = DC$ [given / <i>gegee</i> ] $\frac{BM}{DC} = \frac{DC}{AC}$ $CD^2 = BM \times AC$	$\checkmark$ S $\checkmark$ R $\checkmark$ $AM = DC$	(3)
10.3	$CD^2 = 24 \times 36 = 864$ $\frac{CN}{CD} = \frac{AM}{AD}$ [line $\parallel$ to one side of a $\Delta$ ] [lyn $\square$ aan een sy van 'n $\Delta$ ] $AM = CD$ $CN = \frac{CD^2}{AD}$ $= \frac{864}{48}$ $= 18$	$\checkmark$ length of $CD^2$ <i>Bolelele ba <math>CD^2</math></i> $\checkmark$ S $\checkmark$ R $\checkmark$ CN in terms of $CD^2$ <i>CN ka mokgwa wa <math>CD^2</math></i> $\checkmark$ correct substitution <i>Sabstijhshene e nepahetseng</i> $\checkmark$ length of CN <i>Bolelele ba CN</i>	(6)
			[13]
		<b>TOTAL/KAOFELA:</b>	<b>150</b>