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Provinsie van die Oos Kaap: Departement van Onderwys
Porafensie Ya Kapa Botjhabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

KEREITI 12

LOETSE 2026

MATEMATIKA P2

MATSHWAO: 150

NAKO: Dihora tse 3

Pampiri ena e na le maqephe a 13 ho kenyelletsa le leqephe la tlhahisoleseding le buka ya ho arabela e nang le maqephe a 22.

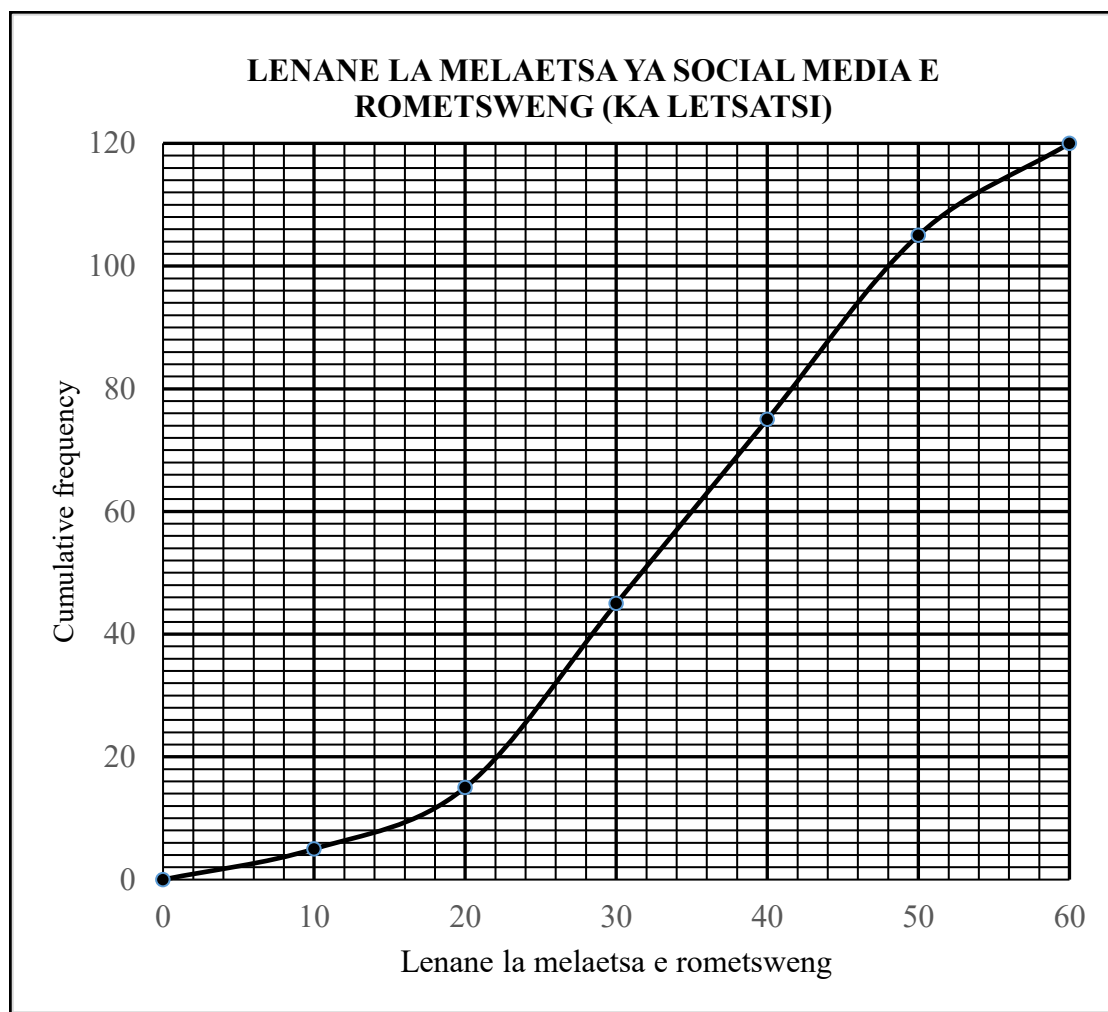
DITAELO LE TLHAHISOLESERING

Bala ditaelo tse latelang ka hloko pele o araba dipotso.

1. Pampiri ena e na le dipotso tse 11.
2. Arabela dipotso KAOFELA ho BUKA YA HO ARABELA o e fuweng.
3. Bontsha ka ho hlakileng dikhaltjhuleishene, didayakeramo, dikerafo KAOFELA, jwalo jwalo tseo o di sebedisitseng ho fumana dikarabo tsa hao.
4. Dikarabo feela di KE KE tsa abelwa matshwao a felletseng.
5. O ka sebedisa saentifikhi khaltjhuleitha e dumelletsweng (e sa porokeramuwang le e se nang kerafo), ntle le ha ho boletswe ka tsela e nngwe.
6. Moo ho hlokehang, atametsa dikarabo ho dibaka tsa didesimale TSE PEDI, ntle le haeba ho boletswe tse hlokehang.
7. Didayakeramo HA DI A latella ditekanyo tse nepahetseng.
8. Leqephe la tlhahisolesering le nang le difomula le kenyeleditswe qetellong ya pampiri ya dipotso.
9. Ngola ka mongolo o makgethe, o balehang.

POTSO YA 1

Ogive (cumulative frequency curve) e ka tlase e bontsha lenane la melaetsa ya social media e romelwang ke barutwana ba 120 ka letsatsi.



Sebedisa ogive ho araba dipotso tse latelang.

- 1.1 Ke barutwana ba bakae ba rometseng melaetsa e ka tlase ho 50? (2)
- 1.2 Akanya median namba ya melaetsa e rometsweng ka letsatsi. (2)
- 1.3 Fumana interquartile range (IQR) ya datha. (3)
- 1.4 Teroya box and whisker dayakeramo ya data ho nambalaene o e fuweng ho BUKA YA HO ARABELA, haeba minimum ke 0 mme maximum ke 60. (2)
- 1.5 Mean namba ya melaetsa e lekanyetswa ho 37. Tshwaela ho distribution ya datha. (2)

[11]

POTSO YA 2

Ho sehlopha sa dipapadi tsa sekolo, dibapadi tse robedi tse nyane di kgethilwe. Theibole e ka tlase e bontsha dihora ka beke tsa weightlifting tsa bona le sebaka (ka dimithara) ba di nkileng ho akgela javelin ka yona.

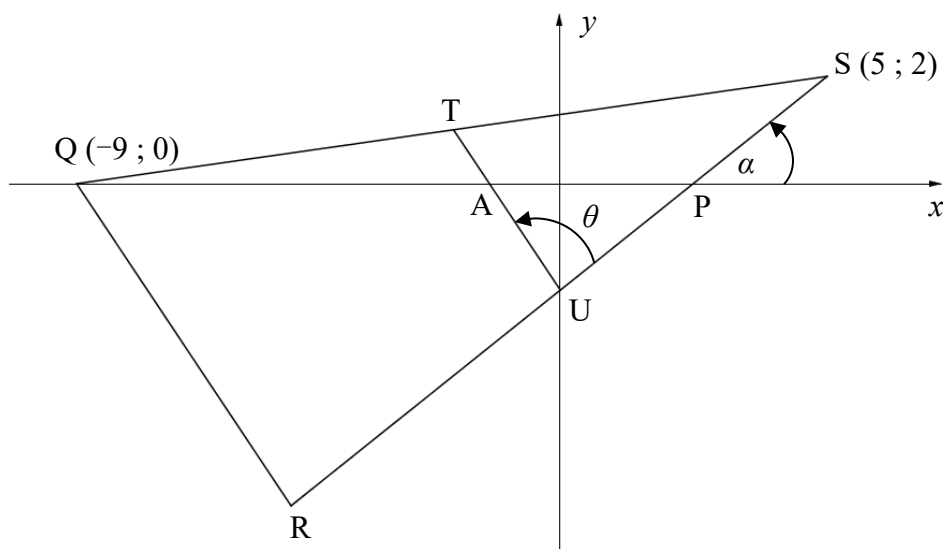
Morutwana	1	2	3	4	5	6	7	8
Lenane la dihora (x)	5	12	15	20	25	30	42	45
Sebaka sa javelin (y)	130	118	115	95	88	72	48	30

- 2.1 Khaltjhuleitha standard deviation sa distance ya javelin. (2)
- 2.2 Khaltjhuleitha correlation coefficient (r) ya datha. (1)
- 2.3 Fumana ikhweijene ya least squares regression line. (3)
- 2.4 Morutwana a sa kgethwang o qetile dihora tse 35 ka beke ho weightlifting.
- 2.4.1 Sebedisa regression equation ho akanya distance ya javelin a ka e nkang. (2)
- 2.4.2 E kaba ho atisa dihora tsa ho ikwetlisa ho ka etsa betere distance ya javelin? Netefatsa karabo ya hao. (2)

[10]

POTSO YA 3

Ho dayakeramo e ka tlase, $S(5; 2)$, $Q(-9; 0)$ le R ke divertices tsa ΔSQR . Pointe T ke midpoint ya QS . Ikhweijene ya SR e fanwe e le $5y = 4x - 10$. U ke y -inthasepthe ya TAU le $SPUR$. A le P ba hodima x -axis. $\hat{TUS} = \theta$. Inclination ya $SPUR$ ke α .

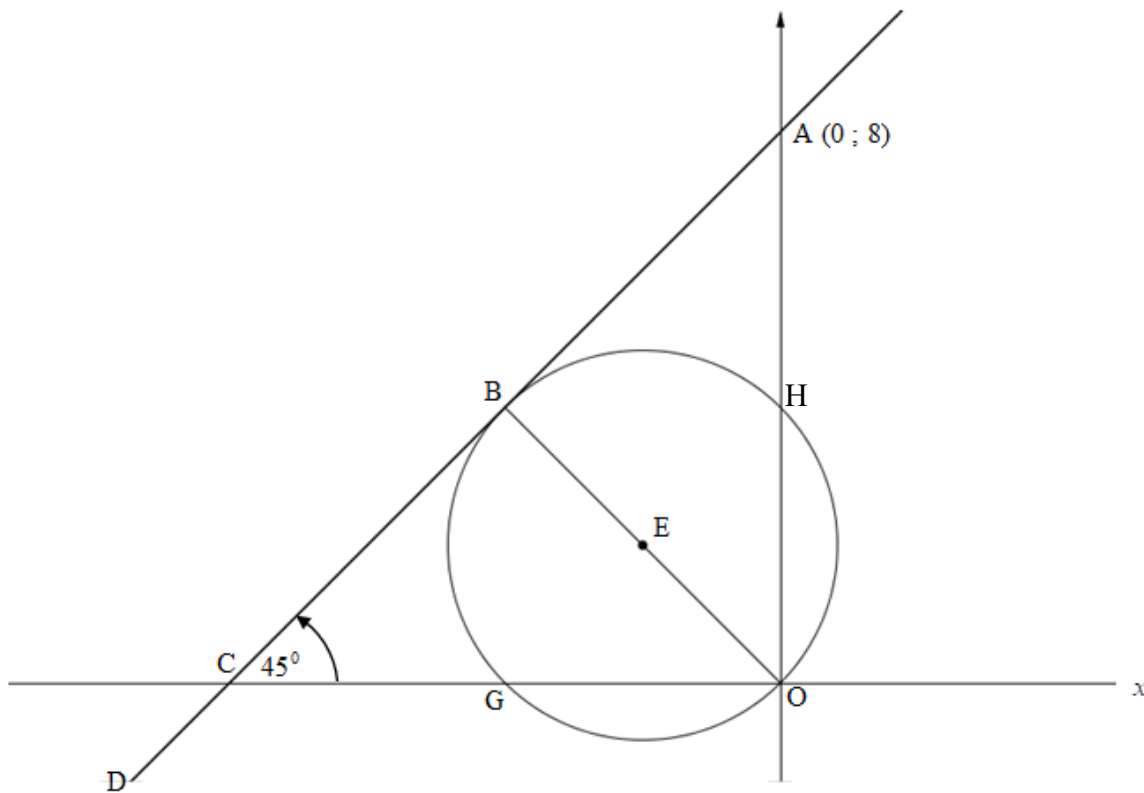


- 3.1 Khaltjhuleitha dikhoodineithe tsa T , midpoint ya QS . (2)
- 3.2 Khaltjhuleitha dikhoodineithe tsa U . (2)
- 3.3 Khaltjhuleitha length ya SU . (2)
- 3.4 Haeba o fuwe hore $3x + 2y + 27 = 0$ ke ikhweijene ya QR , bontsha hore $QR \parallel TU$. (3)
- 3.5 Nka qeto kapa ka mokgwa o mong, ngola length ya QR . (2)
- 3.6 Fumana size ba θ . (4)
- 3.7 Fumana area ya ΔSQR (4)

[19]

POTSO YA 4

Sekele e na le sentha E e feta ho origin. Sekele e inthasektha x -axis ho G le y -axis ho H. Tangent ya sekele ho B e kgaola y -axis ho A (0;8) mme e etsa engele ya 45° le x -axis.



- 4.1 Ngola gradiente ya AD. (1)
- 4.2 Fumana ikhweijene ya OB. (3)
- 4.3 Fumana dikhoodineithe tsa B, haeba ikhweijene ya tangent e fuwe e le: $y = x + 8$ (3)
- 4.4 Khaltjhuleitha length ya radius ya sekele. (3)
- 4.5 Fumana ikhweijene ya sekele ka mokgwa wa $(x-a)^2 + (y-b)^2 = r^2$ (4)
- 4.6 Ke di velu dife tsa t moo ikhweijene $y = x + t$ e tla ba tangent ho sekele? (2)
- 4.7 Sekele e nngwe e nang le ikhweijene $(x-4)^2 + (y-8)^2 = 9$ e fuwe. Fumana hore disekele tse PEDI di a kopana na kapa tjhe. Netefatsa karabo ya hao. (4)

[20]

POTSO YA 5

5.1 O fuwe: $\sin 49^\circ = q$, fumana tse latelang ka mekgwa ya q :

5.1.1 $\tan 41^\circ$ (2)

5.1.2 $\cos 229^\circ$ (2)

5.1.3 $\sin 4^\circ$ (4)

5.2 O fuwe: $f(x) = \frac{\sin(x-180^\circ) \cdot \sin(90^\circ + x)}{\sin^2 x - \cos^2(360^\circ - x)}$

5.2.1 Simplifaya $f(x)$ e be trigonometric ratio e le nngwe ya x . (7)

5.2.2 Ke divelu dife tsa $x \in [-180^\circ + 0^\circ]$, moo $f(x)$ a leng undefined? (2)

[17]

POTSO YA 6

6.1 O fuwe: $\cos(A - B) = \cos A \cos B + \sin A \sin B$

Sebedisa fomula o e fuweng ka hodimo ho deriva fomula ya $\cos(A + B)$ (3)

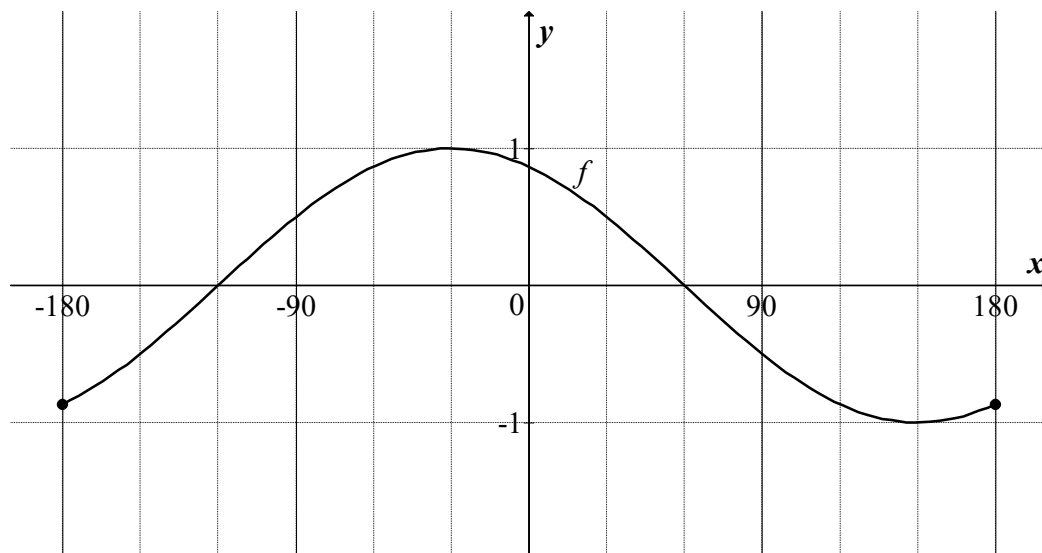
6.2 O sa sebedise khaltjhuleitha, pruva hore

$$\frac{\sin 22^\circ \cdot \cos 320^\circ + \sin 40^\circ \sin 68^\circ}{\sin 391^\circ \cdot \cos 31^\circ} = 2 \quad (6)$$

6.3 Ho fanwe hore $\cos 2x + 5 \sin x = 3$. Fumana divelu tsa x ho inthavale moo $-360^\circ \leq x \leq 0^\circ$. (5)
[14]

POTSO YA 7

O fuwe: $f(x) = a \cos(x + p)$ moo $x \in [-180^\circ; 180^\circ]$



7.1 Fumana divelu tsa a le p . (2)

7.2 Ngola period ya f (1)

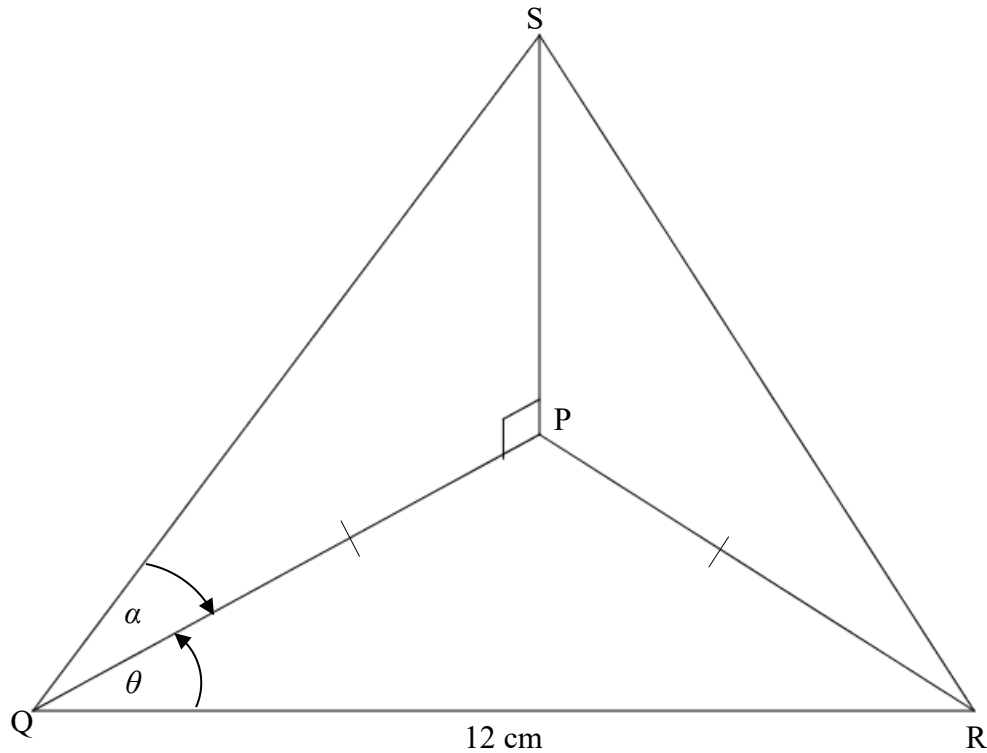
7.3 Sketjha kerafo ya $g(x) = -\sin x$, moo $x \in [-180^\circ; 180^\circ]$ ho kiridi o e fanweng ho BUKA YA HO ARABELA. Bontsha ka ho hlaka diinthasepthe le di-axes. (3)

7.4 Ngola divelu tsa x moo $g(x) = f(x)$ ho inthavale $x \in [-180^\circ; 180^\circ]$ (2)

7.5 Fumana range ya h , haeba $h(x) = -g(x) - 2$ (2)
[10]

POTSO YA 8

Ho dayakeramo Q, P le R ke dipointe tse ho same horizontal plane. S ke sehlohlolo sa vertical tower. $QR = 12\text{ cm}$, $\hat{SQP} = \alpha$ le $\hat{PQR} = \theta$. $PQ = PR$



8.1 Bontsha hore $SQ = \frac{6}{\cos \theta \cos \alpha}$ (6)

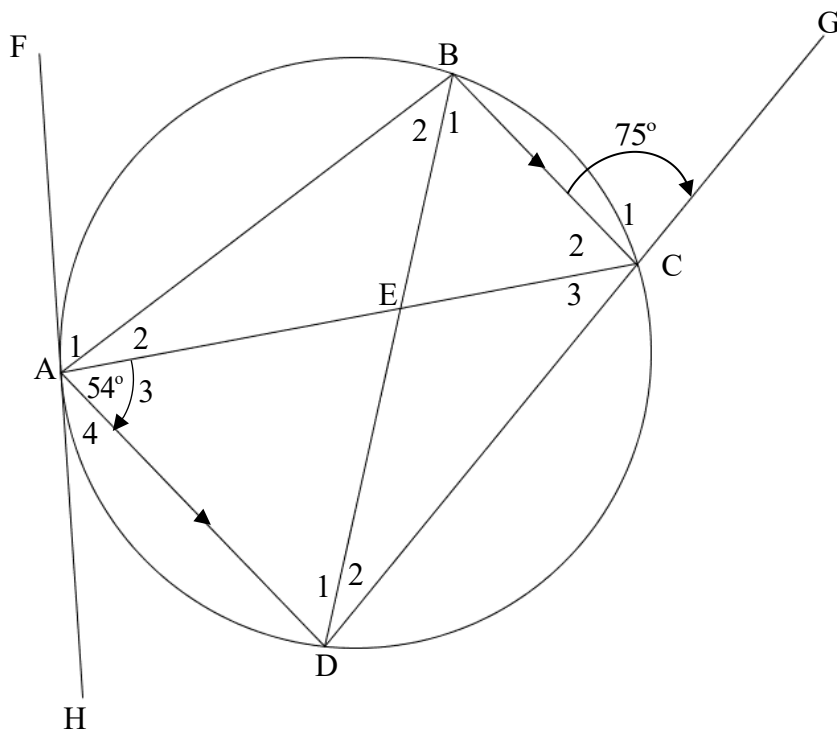
8.2 Haeba o fuwe hore $\theta = 50^\circ$ le $\alpha = 35^\circ$, khaltjhuleitha length ya SQ. [Atametsa karabo ya hao ho sebaka sa didesimale tse 2.] (2)
[8]

POTSO YA 9

9.1 Qetella theorem e ka tlase:

Exterior angle of a cyclic quadrilateral ... (1)

9.2 Ho dayakeramo e ka tlase, ABCD ke cyclic quadrilateral. DC o atisitswe ho ya ho G. FAH tangent ya sekele ho pointe A. $BC \parallel AD$, $\hat{C}_1 = 75^\circ$ le $\hat{A}_3 = 54^\circ$.



Fumana size ya diengele tse latelang, o fane ka mabaka:

9.2.1 $\hat{A}_2$ (2)

9.2.2 $\hat{D}_2$ (2)

9.2.3 $\hat{A}_1$ (3)

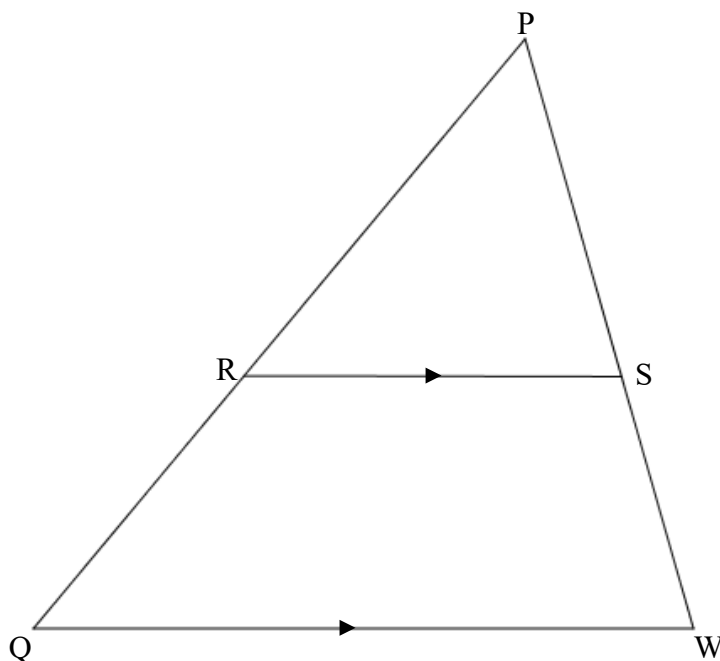
9.2.4 Fana ka lebaka hobaneng $AE = ED$. (3)

[11]

POTSO YA 10

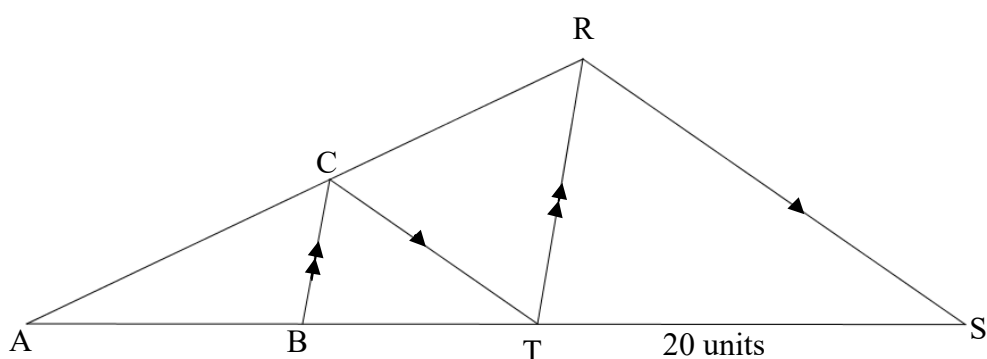
- 10.1 Ho dayakeramo e ka tlase, ΔPQW e teroilwe moo R a leng lehlakoreng la PQ le S a leng lehlakoreng la PW. RS o kopantswe hore $RS \parallel QW$. Pruva theorem e reng a line drawn parallel to one side a triangle divides the other two sides proportionally,

i.e. pruva hore: $\frac{PR}{RQ} = \frac{PS}{SW}$



(5)

- 10.2 Ho dayakeramo e ka tlase, ΔARS e teroilwe le C hodima mola AR, B le T hodima mola AS. $BC \parallel TR$ le $CT \parallel RS$. $TS = 20$ units mme $AC:AR = 3:8$.



Kaltjhuleitha length ya:

10.2.1 AT

(4)

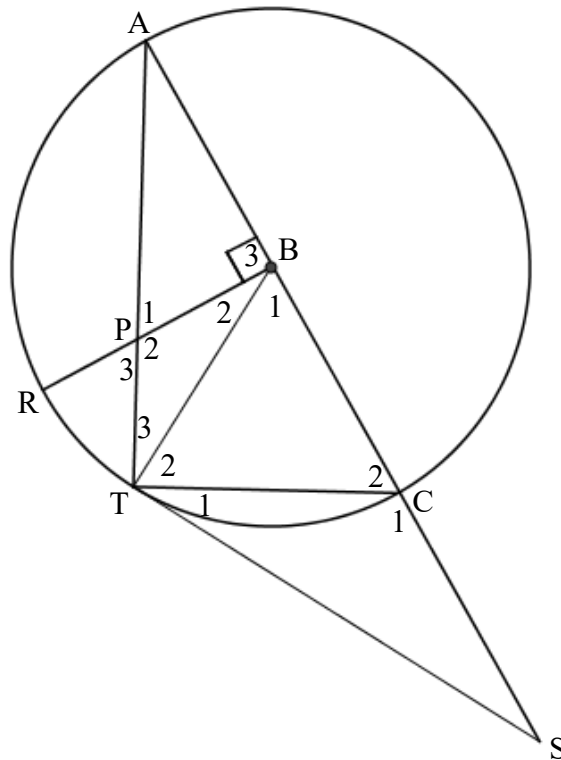
10.2.2 AB

(3)

[12]

POTSO YA 11

Ho dayakeramo e ka tlase, A, R, T le C ke dipointe ho circumference ya sekele. B ke sentha ya sekele. ABC dayametha ya sekele e atisitswe ho ya ho S. TS ke tangent ya sekele ho T. BPR o perpendicular ho ABC.



- 11.1 Fana ka diengele tse ding tse PEDI tse lekanang le $\hat{T}_1$, o fane ka mabaka. (3)
- 11.2 Pruva hore PBCT ke cyclic quadrilateral. (3)
- 11.3 Pruva hore $\triangle SCT \parallel \triangle BPT$ (4)
- 11.4 Pruva hore $SC = \frac{ST \cdot BP}{AB}$ (2)
- 11.5 Fana ka lebaka hobaneng $\hat{BTS} = 90^\circ$ (1)
- 11.6 Haeba o fuwe hore $BR = CS$, pruva hore $TS = 3BP$. (5)

[18]

KAOFELA: 150

PAMPIRI YA TLHAHISOLESSEDING: MATEMATIKA

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$F = \frac{x \left[(1 + i)^n - 1 \right]}{i}$$

$$P = \frac{x \left[1 - (1 + i)^{-n} \right]}{i}$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}(2a + (n - 1)d)$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; \quad r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; \quad -1 < r < 1$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \quad y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad a^2 = b^2 + c^2 - 2bc \cos A \quad \text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\bar{x} = \frac{\sum x}{n} \quad \sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

Difuperweng di se sebediswe ntle ho tumello