Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

KEREITE 12

LWETSE 2021

DIPALO P1

MATSHWA0: **150**

NAKO: **Dihora tse 3**

Pampiri ena e na le maqephe a 11 ho kenyelleditswe le leqephe le nang le tlhahisoleseding.

DITAELO LE TLHAHISOLESEDING

Bala ditaelo tse latelang ka hloko pele o araba dipotso.

1. Pampiri ena e na le dipotso tse LESHOME LE MOTSO O MONG (11). Araba dipotso KAOFELA.

2. Bontsha ka ho hlakileng dipalo, matshwao, dikerafo, meralo eo oe sebedisitseng ho hlalosa dikarabo tsa hao.

3. O ka sebedisa khalthulara e dunyelletsweng (esa progremuwang le esanang di kerafo), ntle le haeba ho boletswe ka tsela e nngwe.

4. Dikarabo feela di kanna tsa se fuwe matshwao afelletseng.

5. Hao hlokahala atametsa ho di desimale tse PEDI, ntle le haeba ho boletswe ka tsela e nngwe.

6. Ditshwantsho ha di ya latela di tekanyo tse nepahetseng.

7. Nomora dikarabo ka o nepahetseng feela jwalo ka ha di nomorilwe pampering ya dipotso.

8. Pampiri ya tlhahisoleseding ena le meralo e kenyelleditswe mafelong a pampiri ya dipotso.

9. Ngola ka mongolo o makgethe le o balehang.

POTSO 1

1.1 Fumana tharollo ya x:

1.1.1 $x^2+2x-15=0$ (3)

1.1.2 $3x^2+x-1=0$ (atametsa ho desimal tse PEDI) (3)

1.1.3 $x(x-3)\geq -2$ (4)

1.1.4 $\sqrt{43-x}-x+1=0$ (5)

1.2 Fumana tharollo ya x le y :ka nako e le nngwe

$2y-x=3$ and $y^2+3x=2xy$ (5)

1.3 Diruthi tsa kwadratiki ekweshini di nehilwe ka mokgwa o latelang:

$$x=\frac{5\pm\sqrt{p(6-p)-9}}{2}$$

Batla velu kapa divelu tsa p moo ekweshini ena le diruthi tse seng tsa nnete. (4)

[24]

POTSO 2

2.1 O fuwe kwadratik namba paterone: $-16\ ;\ -16\ ;\ -12\ ;\ -4\ ;\ ...$

2.1.1 Ngola fatshe themo e latelang ya paterone. (1)

2.1.2 Fumana themo ya kakaretso ya paterone ka mokgwa $T_n=an^2+bn+c$ (4)

2.1.3 Bala velu ya 38^{th} themo ya paterone. (2)

2.1.4 Batla hore ke di feng dithemo tse pedi tse latelanang tsa paterone tse tlaba le phapang ya 400. (3)

2.2 O nehilwe arithimetiki serisi : $2+5+8+\ldots+89=k$, bala:

2.2.1 Di namba tsa dithemo ho serisi (2)

2.2.2 Velu ya k (3)

[15]

POTSO 3

3.1 O nehilwe hore ho jeometriki sekwense $T_9 = 768$ le $T_{13} = 12\,288$. Fumana di velu kapa divelu tsa khomon rashiyo le themo ya pele ya sekwense. (4)

3.2 Samo ya infinithi ya konvejent jeometriki serisi ke $\frac{54}{19}$. Samo ya infinithi ya serisi tshwanang e baduweng ho tluwa ho 3rd themo ke $\frac{24}{19}$.

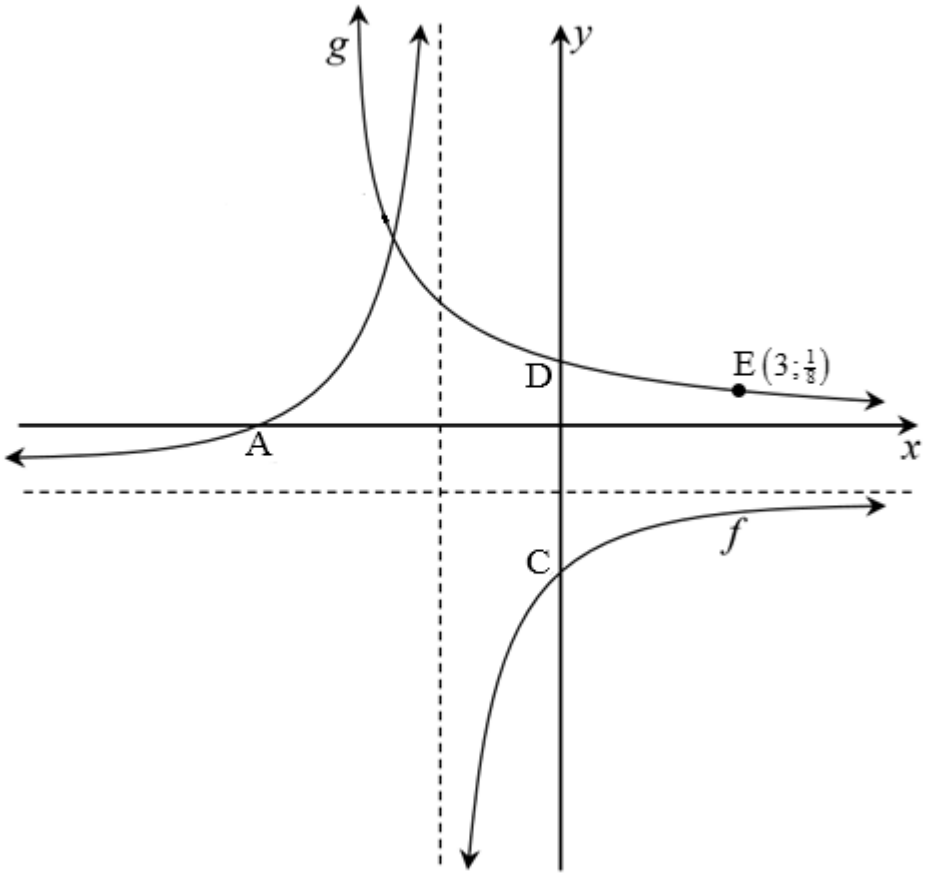
3.2.1 Bala samo ya dithemo tse pedi tsa pele tsa serisi. (1)

3.2.2 Bontsha hore: $a = \frac{30}{19(1+r)}$ (1)

3.2.3 Batla velu ya r, haeba $r > 0$ (3)
[9]

POTSO 4

Ditshwantsho tse ka tlase di bontsha dikerafo tsa $f(x)=\frac{-3}{x+2}-1$ le $g(x)=b^x$, moo $b>0$. A le C ke di *x* le *y*-intasepts tsa f ka ho latelanang, haeba D ke *y*-intasepts ya *g*. $E\left(3;\frac{1}{8}\right)$ ke ntlha e hodima *g*.



4.1 Ngola fatshe dikoodinetse tsa D. (1)

4.2 Ngola fatshe di ekweshini tsa asempthotsi tsa *f*. (2)

4.3 Ngola fatshe domeyini ya *f*. (2)

4.4 Batla velu ya *b*. (2)

4.5 Fumana dikoordinetse tsa A le C. (3)

4.6 Ngola fatshe ekweshini ya g^{-1}, ka mokgwa $y=\ldots$

4.7 Ngola fatshe velu ya *x* moo:

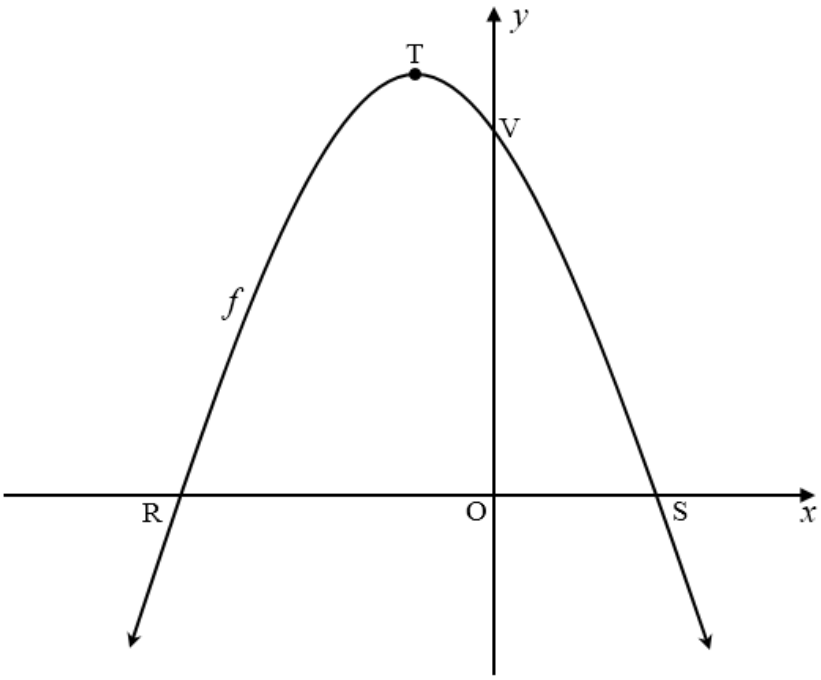
4.7.1 $f(x).g(x)>0$

4.7.2 $g^{-1}(x)\geq 3$ (2)

[16]

POTSO 5

Setshwantsho se ka tlase se bontsha kerafo ya $f(x) = -x^2 - 2x + 8$.
R le S ke di *x*-intasepts mme V ke *y*-intasept ya f.
T ke theneng pointi ya f.



5.1 Fumana bolelele ba RS. (4)

5.2 Batla di koodineithi tsa T. (3)

5.3 Keratient ya thanjenti ho kerafo f ho le tshwao W e lekana le 2. (3)

5.3.1 Fumana di khoodinetse tsa W. (4)

5.3.2 Batla ekweshin ya mola o setereite, g , o phephendikhula ho thanjent e fetang ho V. (2)

5.4 Kerafo ya f e shiftile ha nngwe hoya letsohong le letona ya reflektha ho *x*-axis ho hlahisa funshini entjha e leng *h*. Batla ekhweshini ya *h* ka mokgwa:
$h(x) = ax^2 + bx + c$. (4)
[17]

POTSO 6

6.1 Eli o rekile lepthophu dilemong tse 4 tse fetileng. Velu ya lepthophu e theoha ho tloha ho R9 670,00 ho rejusing-balanse method hoya ho velu ya yona ya jwale eleng R5 509,70.
Bala reite ya theoho ya lepthophu ka selemo. (3)

6.2 Mr Duda o nkile qeto ya ho beha tjhelete bakeng sa thuto e phahameng ya mora wa hae ka ho latelang:

- O lefile R600 ka kgwedi ho akhauntu e lefang 8,7% ya tswala p.a. khompounded kgwedi le kgwedi.
- Tefo ya pele e ne ele mafelong a January moo mora wa hae a ne a qala Grade 1 mme tefo ya ho qetela e ne e le mafelong a December ha mora wa hae a qeta Grade12. Mora wa hae ha a kaba a pheta kereite.
- O hotse dipeehelo tsa hae ka kgwedi ka mora tefo ya ho qetela.

Bala ke bokae tjhelete ene e le akhautung ha Mr Duda a hula dipeehelo kaofela. (4)

6.3 Pilisa o nkile kadimo bakeng sa horeka koloi e betsang R350 000. Banka e mo file itherest reite ya 9,3% p.a. compounded kgwedi le kgwedi le tefo ennkang dilemo tse 6 . Tefo ya hae ya pele e batleha mafelong a kgwedi a nnkile kadimo.

6.3.1 Bala tefo ya kgwedi ya Pilisa. (3)

6.3.2 Bala balanse ya kadimo ka mora tefo ya bo 40^{th}. (3)

6.3.3 Pilisa o nka qeto ya o atetsa tefo ya hae ya kgwedi ho ba R7 000 ka mora tefo ya bo 40^{th}. Ke nako e kae ka mora tefo ya bo 40^{th} e ka monka ho qeta kadimo? (4)
[17]

POTSO 7

7.1 Fumana $f'(x)$ hotswa ho prinsipele ya pele haeba $f(x)=5-2x^2$ (5)

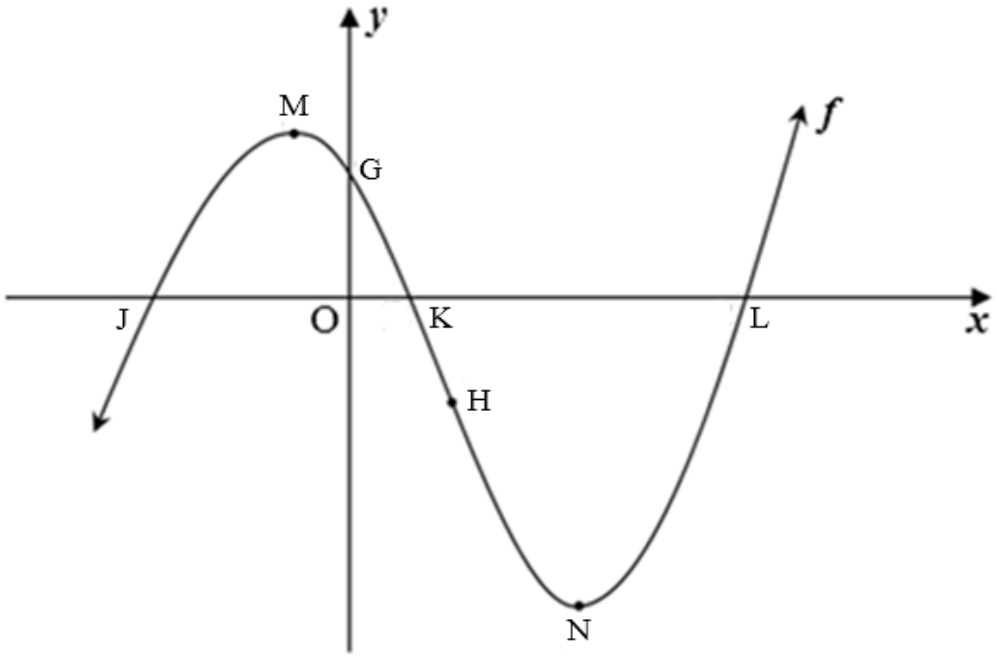
7.2 Fumana:

7.2.1 $\frac{dy}{dx}$ if $y=7x^4+\frac{2x^2}{\sqrt{x}}$ (3)

7.2.2 $D_x\left[\frac{3x^2-7x-6}{x}\right]$ (4)
[12]

POTSO 8

8.1 Setshwantsho se ka tlase se bontsha kerafo ya $f(x) = 2x^3 + bx^2 + cx + d$.
Dinthla J(–1 ; 0), K($\frac{1}{2}$; 0) and L(3 ; 0) ke di x-intasepts mme G ke y-intercept ya f. M le N di theneng pointe mme H pointe ya inflekshini ya f.



8.1.1 Fumana divelu tsa b, c le d ho ekweshini ya f. (4)

8.1.2 Haeba o fuwe hore $f(x) = 2x^3 - 5x^2 - 4x + 3$, batla di koodineite tsa N, e le menimamo theneng pointe ya f. (4)

8.1.3 Ke divelu dife tsa x, moo:

(a) $f'(x) < 0$? (2)

(b) f o shebile fatshe? (3)

8.2 haeba $g(x) = px^3 + qx^2 + rx$ ke khubekhi fankshini e kgotsofatsang maemo a latelang:

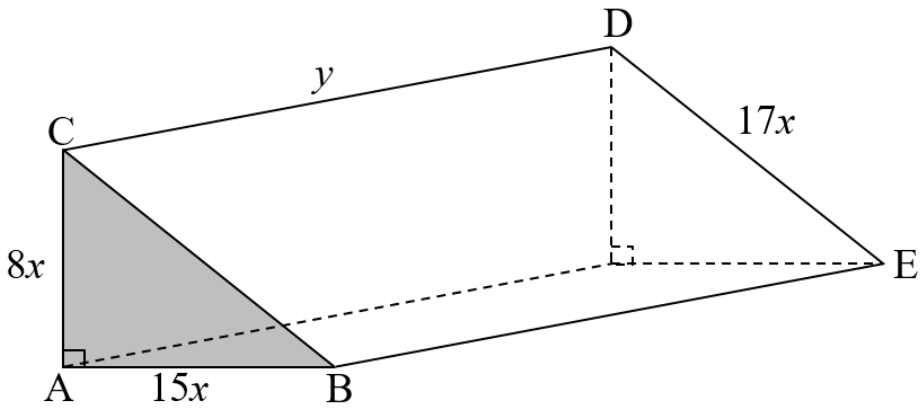
- $p < 0$
- $g'(m) = g(m) = 0$, moo $m > 0$

Taka seketshe sa kerafo ya g ka o hlakileng bontsha e nngwe ya di theneng pointe tsa g ka mokgwa wa m le di intasept kaofela . (3)

[16]

POTSO 9

Setshwantsho se ka tlase se bontsha teraengula prism. Teraenkele ke right-angled le bophahamo ba di metara tse $8x$, beisi ya di metara tse$15x$, le haephothenuse ya di metara tse $17x$ jwalo ka di bontshitswe ho setshwantsho. Bolelele ba prism ke di y metara mme total safeisi eria ke $5\ 760\ m^2$.



9.1 Bontsha hore $y = \dfrac{5760 - 120x^2}{40x}$. (2)

9.2 E be, o bontsha hore volumo ya prism e ka ngolwa ka mokgwa:
$V(x) = 8640x - 180x^3$. (2)

9.3 Fumana velu ya x moo volume ya prism e ka ba hodimo. (4)
[8]

POTSO 10

10.1 A le B ke di ketsahalo tse pedi tse ikemetsing ho etsa hore P(A) = 0,2 le P(**ha se** B) = 0,45.
Batla:

10.1.1 P(B) (1)

10.1.2 P(A or B) (3)

10.2 Asanda o ya sekolong ka baesekile kapa tekisi. Monyetla wa hoba aka palama tekesi ke *x*. haeba o sebedisa baesikile monyetla wa hoba a be lata sekolong ke $\frac{2}{5}$ haeba o palama tekesi , monyetla wa hoba aka ba lata ke $\frac{1}{2}$.

Fumana velu ya *x* haeba monyetla wa hoba Asanda **ha a** lata sekolong ke $\frac{8}{15}$. (4)
[8]

POTSO 11

Ho province e etseng dikhoudu tsa nomoro plata ya koloi di na le fomati e latelang: **@@@ ###** (tlhaku tse 3 di latellwa ke di nomoro tse) moo **@** a e metsi tlhaku le **#** nomoro ho tluha ho 0 ho ya ho 9. Ka namba plaite khoutu e le nngwe e nehilweng koloi, ho latellwa maemo a tlameha ho newa hloko:

- Ditlhaku kaofela ntle le E, G le O di ka sejediswa **di seke** tsa phetwa.
- Hao namba pleite khouti e ka qalang ka vawele.
- Di nomoro kaofela di ka sejediswa di kanna tsa phetwa.

11.1 Ke dikoloi tse kae tse ka fuwang namba pleite khoudu ho ya ka sestimo? (3)

11.2 Bala monyetla wa hoba namba pleite khoutu e kgethuweng ho di namba pleiti ho POTSO 11.1 kantle le ho rera e na le **vawele e le nngwe hape efela ka nomoro e evene**. (5)
[8]

MATSHWAO KAOFELA: 150

LEQEPHE LA TLHAHISOLESEDING: DIPALO

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

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

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

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

$$T_n = ar^{n-1} \qquad S_n = \frac{a\left(r^n - 1\right)}{r-1} \;; \quad r \neq 1 \qquad S_\infty = \frac{a}{1-r} \;; \; -1 < r < 1$$

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

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \mathrm{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}{n} \qquad P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$