Province of the
EASTERN CAPE
EDUCATION

ISATIFIKETI SEBANGA LESHUMI

IBANGA 12

SEPTEMBA 2021

IMATHEMATIKA P1

AMANQAKU: **150**

IXESHA: **3 iiyure**

Eli phepha lemibuzo liqulathe amaphepha ali11, lidibene nephepha lolwazi.

IMIYALELO NEENKCUKACHA

Funda le miyalelo ilandelayo ngocoselelo phambi kokuphendula imibuzo.

1. Eli phepha liqulathe imibuzo ELISHUMI ELINANYE. Phendula YONKE imibuzo.

2. Bonisa ngokucacileyo ZONKE iikhaltyhuleyishini, dayagram, iigrafu, njalonjalo othe wazisebenzisa ukufumana iimpendulo zakho.

3. Ungayisebenzisa isayentifikhi khaltyhuleytha evunyiweyo, ngaphandle kokuba kuchazwe ngenye indlela.

4. Iimpendulo zizodwa zinganganikwa manqaku apheleleyo.

5. Ukuba kunyanzelekile, sondeza iimpendulo zibe kwiindawo ze desimali eZIMBINI, ngaphandle kokuba kuchazwe ngenye indlela.

6. Iidayagram AKUNYANZELEKANGA zizotywe ngokwe skeyile (scale).

7. Nombola iimpendulo ngokuchanekileyo ngohlobo ekunonjolwe ngalo kweli phepha.

8. Iphepha lolwazi neefomyula lidityanisiwe ekupheleni kweli phepha lemibuzo.

9. Bhala cocekileyo nangokucacileyo.

UMBUZO 1

1.1 Solva u x:

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

1.1.2 $3x^2+x-1=0$ (lungisa iye kwiindawo eziMBINI zedesimal) (3)

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

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

1.2 Solva ngaxesha nye u x no y:

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

1.3 Iiruthi ze khwadrathik ikhweyzhini zinikwe ngokulandelayo:

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

Fumana ivelyu (iivelyu) ka (zika) p apho i-ikhweyzhini izakuba neeruthi ezingezozenyani. (4)

[24]

UMBUZO 2

2.1 Kwiphatheni yamanani akhwadrathikh enikiweyo : $-16\ ;\ -16\ ;\ -12\ ;\ -4\ ;\ ...$

2.1.1 Bhala ithem elandelayo yephatheni. (1)

2.1.2 Fumana ijeneral them yephatheni ngolu hlobo $T_n=an^2+bn+c$ (4)

2.1.3 Khaltyhuleytha ivelyu ye 38^{th} them yephatheni . (2)

2.1.4 Fumana ukuba zeziphi iithem ezilandelelanayo zephatheni ezingaba nomahluko ongu 400. (3)

2.2 Unikwe le arithimetikh sirisi : $2+5+8+\ldots+89=k$, khaltyhuleytha:

2.2.1 Inani leethem kwisirisi (2)

2.2.2 Ivelyu ka k (3)

[15]

UMBUZO 3

3.1 Unikwe ukuba kwijiyometrikh sikhwensi u $T_9 = 768$ no $T_{13} = 12\,288$. Fumana iivelyu zekhomon reysho nethem yokuqala kwisikhwensi. (4)

3.2 Isam yeinfinithi yekhonvejenti sirisi ngu $\frac{54}{19}$. Isam ye infinithi yesirisi efanayo ikhalthyuleythwe kwi 3^{rd} them ngu $\frac{24}{19}$.

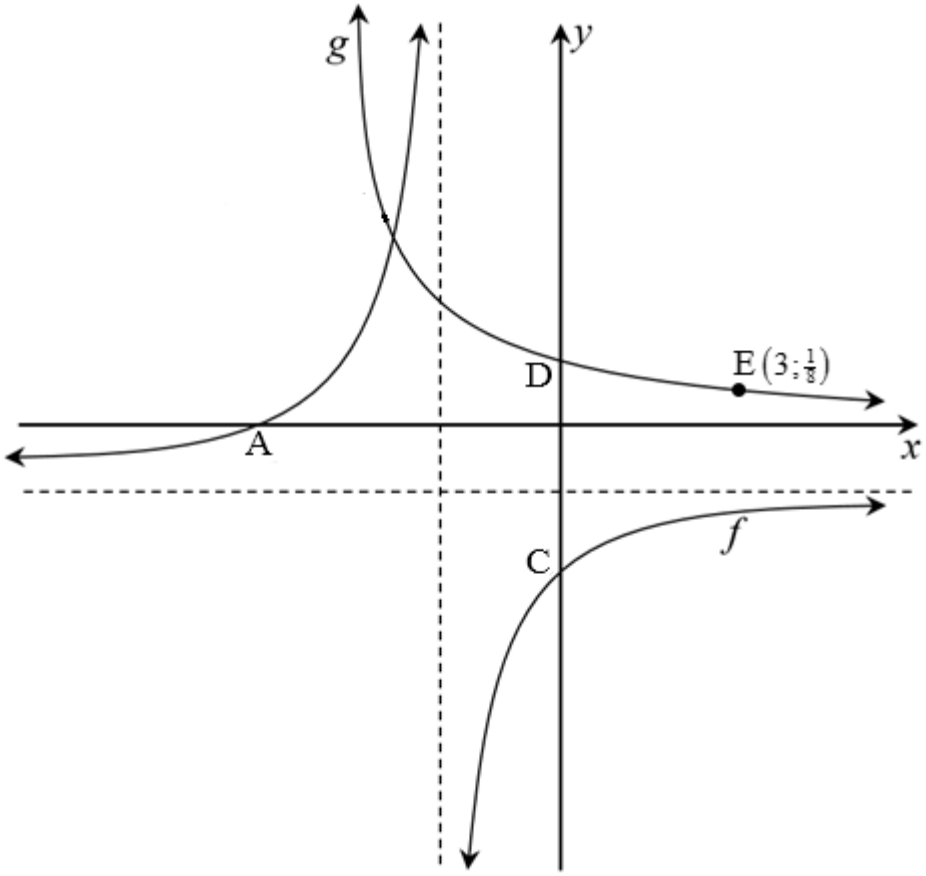
3.2.1 Khaltyhuleytha isam yeethem ezimbini zokuqala zesirisi: (1)

3.2.2 Bonisa ukuba u: $a = \frac{30}{19(1+r)}$ (1)

3.2.3 Fumana ivelyu ka r, ukuba u $r > 0$ (3)
[9]

UMBUZO 4

Idayagram engezantsi ibonisa iigrafu zika $f(x)=\frac{-3}{x+2}-1$ no $g(x)=b^x$, apho u $b>0$.
U A no C zii *x* nee *y*- intasepthi zika f ngokulandelelanayo, apho u D ayi *y*-intasepthi ka g. U E$\left(3;\frac{1}{8}\right)$ yipoynti eku g.



4.1 Bhala iikho-odineythi zika D. (1)

4.2 Bhala ii ikhweyzhini zee asimpthowuthi zika f. (2)

4.3 Bhala idomeyn ka f. (2)

4.4 Fumana ivelyu ka b. (2)

4.5 Fumana iikho-odineythi zika A no C. (3)

4.6 Bhala i-ikhweyzhini ka g^{-1}, kwi fomu ka $y = \ldots$

4.7 Fumana ivelyu ka *x* apho u:

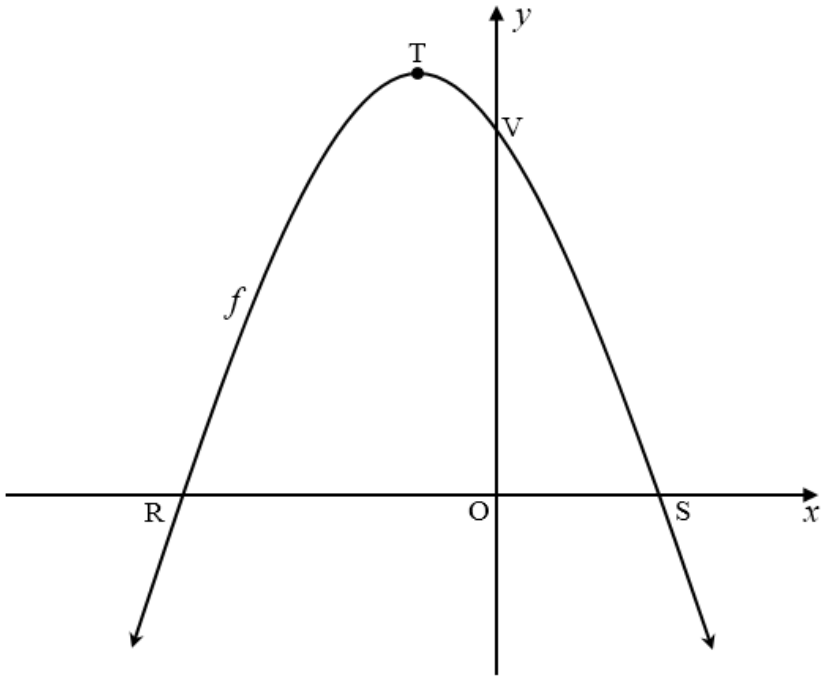
4.7.1 $f(x).g(x)>0$ (2)

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

[16]

UMBUZO 5

Idayagram engezantsi ibonisa igrafu ka $f(x) = -x^2 - 2x + 8$.
U R no S zii x- intasepthi , u V yi y-intasepthi ka f.
U T yi poynti ejikayo ka f.



5.1 Fumana ubude buka RS. (4)

5.2 Fumana iikho-odineythi zika T. (3)

5.3 Igradiyent yethanjenti kwigrafu ka f kwi poyinti ka W ilingana no 2.

5.3.1 Fumana iikho-odineythi zika W. (4)

5.3.2 Fumana i-ikhweyzhini yomgca ostreythi ,u g, ophephendityhula kwi thanjenti aphinde adlule ku V. (2)

5.4 Igrafu ka f ishiftwe ngeyunithi enye ukuya ngaseraythi yariflekhtha kwi x-ekziz ukuveza ifankshini entsha engu h. Fumana i-ikhweyzhini ka h kwifom ka: $h(x) = ax^2 + bx + c$. (4)
[17]

UMBUZO 6

6.1 U Eli uthenge ilephthophu (laptop) kwiminyaka emi 4 edlulileyo. Ivelyu yelephthophu iyehla ukusuka kwi R9 670,00 kwiridyusing-bhalansi methodi ukuya kwivelyu yayo yangoku eyi R5 509,70.
Khaltyhuleytha ianyuwali reythi (annual rate) yokwehla kwelephthophu. (3)

6.2 UMnu Duda ugqibe ekugcineleni unyana wakhe imali yemfumdo yasetheshiyari ngolu hlobo:

- Ubhatale iR600 ngenyanga kwiakhawunti ebhatala inzala ka 8,7% ngo nyaka khompawunded ngenyanga (compounded monthly)
- Uqale ukubhatala ekupheleni kuka Januwari apho unyana wakhe ebeqala uGreyidi 1 kwaye uzokugqibelisa ukubhatala ekupheleni kuka Disemba xa unyana wakhe egqibe uGreyidi 12.Unyana wakhe akakhange aphinde nenye igreyidi.
- Uye wakhupha zonke iiseyivingzi (savings) zakhe kwinyanga emva kokuba ebhatale okokugqibela.

Khalthyuleytha ukuba yimalini ibikwi akhawunti yakhe uMnu Duda ngelixa ebekhupha imali yakhe yonke ekwi seyivingzi. (4)

6.3 U Pilisa uthatha ilowuni ukuthenga imoto exabisa i R350 000. Ibhanki imnika i-intresti reyithi engu 9,3% p.a. khompawundedi ngenyanga nepheyimenti phiriyodi (payment period) yeminyaka eyi 6. I-instolment yakhe yokuqala isekupheleni kwenyanga yokuqala emva kokuba ethathe ilowuni.

6.3.1 Khaltyhuleytha i-instoliment yenyanga kaPilisa. (3)

6.3.2 Khaltyhuleytha ibhalansi yelowuni yakhe emva kokuba ebhatale kayi 40. (3)

6.3.3 U Pilisa ukhethe ukwenyusa i-instolment yakhe yenyanga iye kwi R7 000 nge nyanga emva kokuba ebhatele kayi 40. Iza kumthatha ixesha elingakanani ukugqiba ukubhatala ilowuni emva kweepheyimenti ezingama 40? (4)

[17]

UMBUZO 7

7.1 Fumana u $f'(x)$ ukusuka kwiprinsipuli zokuqala ukuba u $f(x)=5-2x^2$ (5)

7.2 Fumana:

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

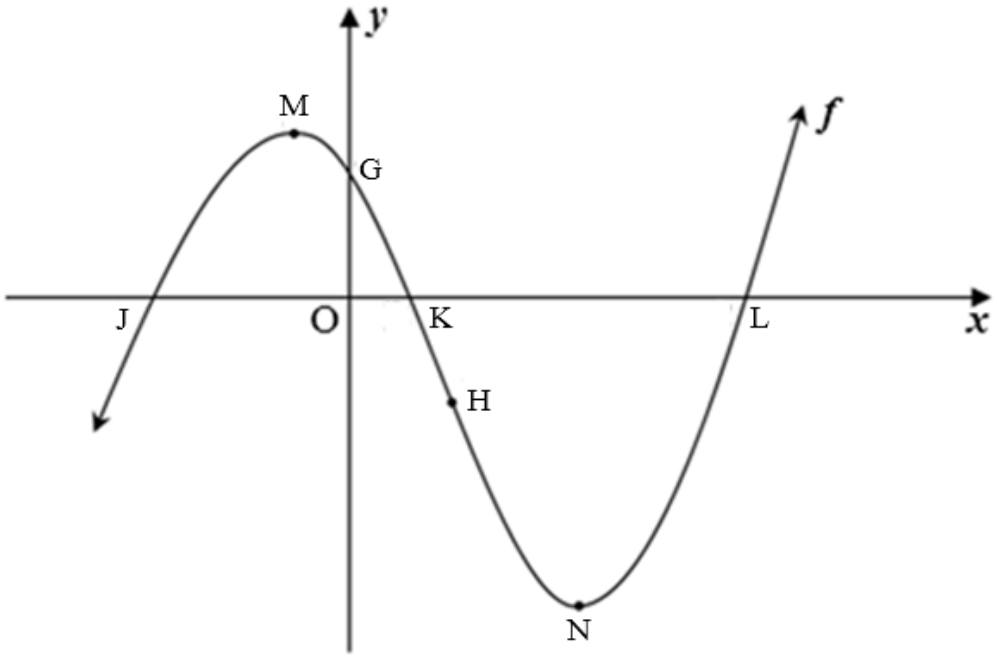
7.2.2 $D_x\left[\frac{3x^2-7x-6}{x}\right]$ (4)

[12]

UMBUZO 8

8.1 Idayagram engezantsi ibonisa igrafu ka $f(x) = 2x^3 + bx^2 + cx + d$.

Iipoynti J(–1 ; 0), K($\frac{1}{2}$; 0) no L(3 ; 0) zii *x*-iintasephthi no G yi *y*-intasephthi zika *f*. M no N bazipoynti ezijikayo no H uyipoynti yeriflekhshini ka *f*.



8.1.1 Fumana iivelyu zika *b*, *c* no *d* kwi ikhweyizhini ka *f*. (4)

8.1.2 Ukuba unikwe u $f(x) = 2x^3 - 5x^2 - 4x + 3$, fumana iikho-odineythi zika N, iminimam poynti yokujika ka *f*. (4)

8.1.3 Kukweziphi iivelyu zika x, apho aya kuba:

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

(b) f eyikhonkheyvu (concave) ejonge ezantsi? (3)

8.2 Ukuba u $g(x) = px^3 + qx^2 + rx$ uyithyubhikh fankshini (cubic function) eyenelisa ezi meko zilandelayo:

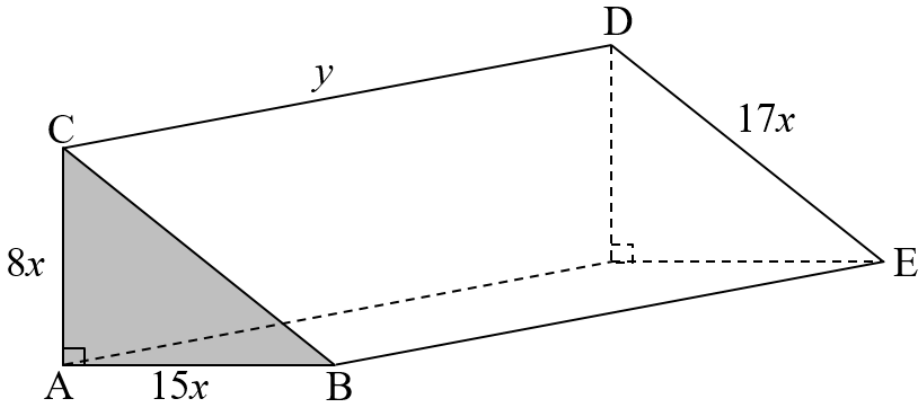
- $p < 0$
- $g'(m) = g(m) = 0$, apho u $m > 0$

Zoba isiketshi grafu sika g ngokucacileyo ubonise enye yeepoynti ezijikayo zika g kwiithem zika m nazo zonke ii-intasephthi. (3)

[16]

UMBUZO 9

Idayagram engezantsi ibonisa isolidi trayendyula prizim (triangular prism). Itrayengile yiraythi-englid enomphakamo oziimitha e $8x$, ibheyisi eziimitha e $15x$, nehayiphothenusi eziimitha e $17x$ nanjengoko izotyiwe kwidayagram. Ubude beprizim zii y mitha ze itotali safeyisi eriya yeprizim ibe ngu 5 760 m^2.



9.1 Bonisa ukuba u $y = \dfrac{5760 - 120x^2}{40x}$. (2)

9.2 Ngoko , bonisa ukuba ivolyum yeprizim ingabhalwa njengo:
$V(x) = 8640x - 180x^3$. (2)

9.3 Fumana ivelyu ka x apho ivolyum yeprizim izoba phezulu. (4)
[8]

UMBUZO 10

10.1 U A no B zii iivents ezimbini ezizimeleyo kangangokuba u P(A) = 0,2 no P(**hayi u** B) = 0,45.
Fumana:

10.1.1 P(B) (1)

10.1.2 P(A okanye u B) (3)

10.2 UAsanda uya esikolweni ngeskuta okanye ngeteksi. Iprobhabhilithi yokuba ukhwela iteksi ngu *x.* Ukuba usebenzisa iskuta sakhe, iprobhabhilithi yokuba uza kufika kade esikolweni ngu $\frac{2}{5}$ kwaye ukuba uhamba ngeteksi, iprobhabhilithi yokuba uzakufika kade ngu $\frac{1}{2}$.
Fumana ivelyu ka *x* ukuba iprobhabhilithi yokuba uAsanda **akazufika** kade esikolweni ngu $\frac{8}{15}$. (4)
[8]

UMBUZO 11

Kwiphondo elithile iinamba pleyti khowudi zemoto zinefomathi ezilandelayo:
@@@ ### (ngonobumba abathathu balandelwe ngamanani amathathu) apho u **@** amele unobumba ize i**#** imele amanani ukuqala ku 0 kuyophela ku 9. Ngenamba pleyiti khowudi nganye yombhalo ebhalwe kwisithuthi, kukho le miqathango ilandelayo ekufuneka izalisekisiwe:

- Bonke onoobumba ngaphandle kuka E, G no O bangasetyenziswa kwaye **akukho** nobumba ufanele ukuphindwa.
- Akukho namba pleyti khowudi emayiqale qale ngonobumba.
- Onke amanani angasetyenziswa kwaye inani ngalinye lingaphindwaphindwa.

11.1 Zingaphi izithuthi ezinganikwa ikhowudi yenamba pleyti ngokwale sistim? (3)

11.2 Khaltyhuleytha iprobhabhilithi yokuba inamba pleyti khowudi ikhethwe kumbhalo wepleyti ku UMBUZO 11.1 ngokungacwangcisekanga iqulatha **isikhamiso (vowel) omnye** kwaye **iphele ngenani eli-ivini (even).** (5)
[8]

AMANQAKU EWONKE: 150

IPHEPHA LOLWAZI : IMATHEMATIKA

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2}{n} \qquad P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ okanye } B) = P(A) + P(B) - P(A \text{ no } B)$$

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