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ISATIFIKETI SEBANGA LESHUMI

IBANGA 12

SEPTEMBER 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 11.1 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 : $-16 ; -16 ; -12 ; -4 ; \dots$

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 : $2 + 5 + 8 + \dots + 89 = k$, khaltyhuleytha:

2.2.1 Inani leethem kwisirisi (2)

2.2.2 Ivelyu ka k (3)**[15]**

UMBUZO 3

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

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

3.2.1 Khalthyuleytha isam yeethem ezimbini zokuqala zesirisi: (1)

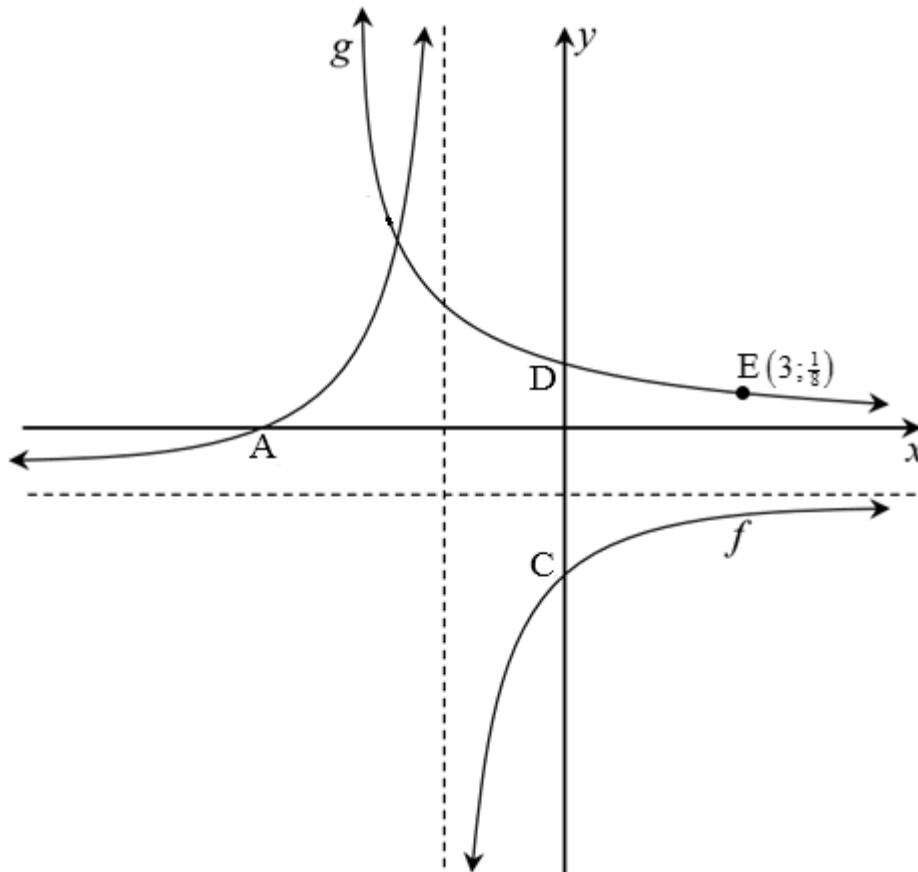
3.2.2 Bonisa ukuba u: $a = \frac{30}{19(1+r)}$ (1)

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 -intasepthe zika f ngokulandelelanayo, apho u D ayi y -intasepthe ka g . U $E\left(3; \frac{1}{8}\right)$ yipoynti eku g .



- 4.1 Bhala iikho-odineythe 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-odineythe zika A no C. (3)
- 4.6 Bhala i-ikhweyzhini ka g^{-1} , kwi fomula ka $y = \dots$
- 4.7 Fumana ivelyu ka x apho u:
 - 4.7.1 $f(x) \cdot g(x) > 0$ (2)
 - 4.7.2 $g^{-1}(x) \geq 3$ (2)

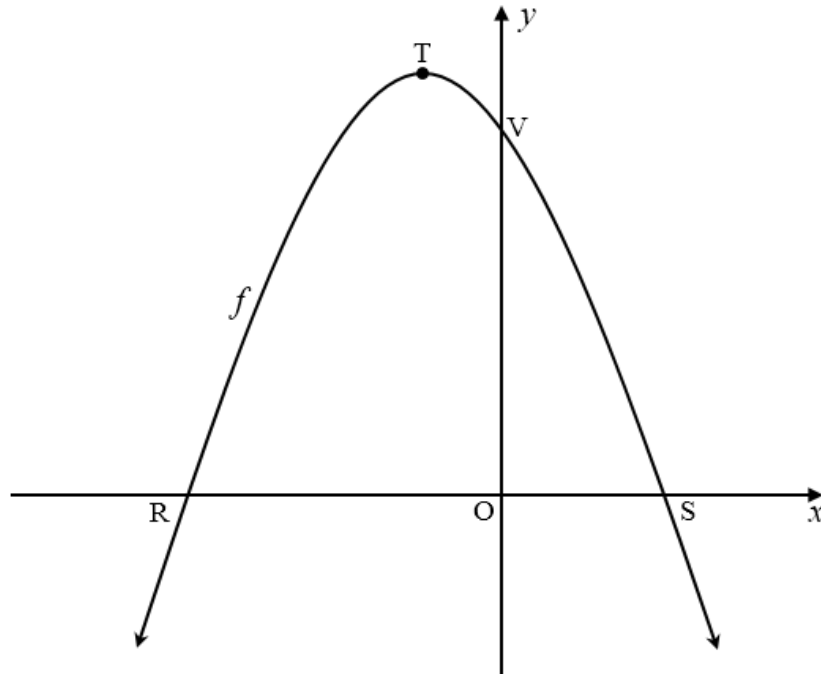
[16]

UMBUZO 5

Idayagram engezantsi ibonisa igrafu ka $f(x) = -x^2 - 2x + 8$.

U R no S zii x -intasepthe, u V yi y -intasepthe ka f .

U T yi poyinti ejikayo ka f .



- 5.1 Fumana ubude buka RS. (4)
- 5.2 Fumana iikho-odineythe zika T. (3)
- 5.3 Igradiyent yethanjenti kwigrafu ka f kwi poyinti ka W ilingana no 2.
 - 5.3.1 Fumana iikho-odineythe zika W. (4)
 - 5.3.2 Fumana i-ikhweyzhini yomgca ostreythe, u g , ophephendityhula kwi thanjenti aphinde adlule ku V. (2)
- 5.4 Igrafu ka f ishiftwe ngeyunithi enye ukuya ngaseraythe 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. Ivelu yelephthophu iyehla ukusuka kwi R9 670,00 kwiridyusing-bhalansi methodi ukuya kwiveliyo yayo yangoku eyi R5 509,70. Khalthuleytha ianyuwali reyithi (annual rate) yokwehla kwelephthophu. (3)

6.2 UMnu Duda ugqibe ekugcineleni unyana wakhe imali yemfundo 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 uzokugqibela ukubhatala ekupheleni kuka Disemba xa unyana wakhe egqibe uGreyidi 12. Unyana wakhe akakhangaphinde nenye igreyidi.
- Uye wakhupha zonke iiseyivingzi (savings) zakhe kwinyanga emva kokuba ebhatale okokugqibela.

Khalthuleytha 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-intrest 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 Khalthuleytha i-instolment yenyanga kaPilisa. (3)

6.3.2 Khalthuleytha ibhalansi yelowuni yakhe emva kokuba ebhatala 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:

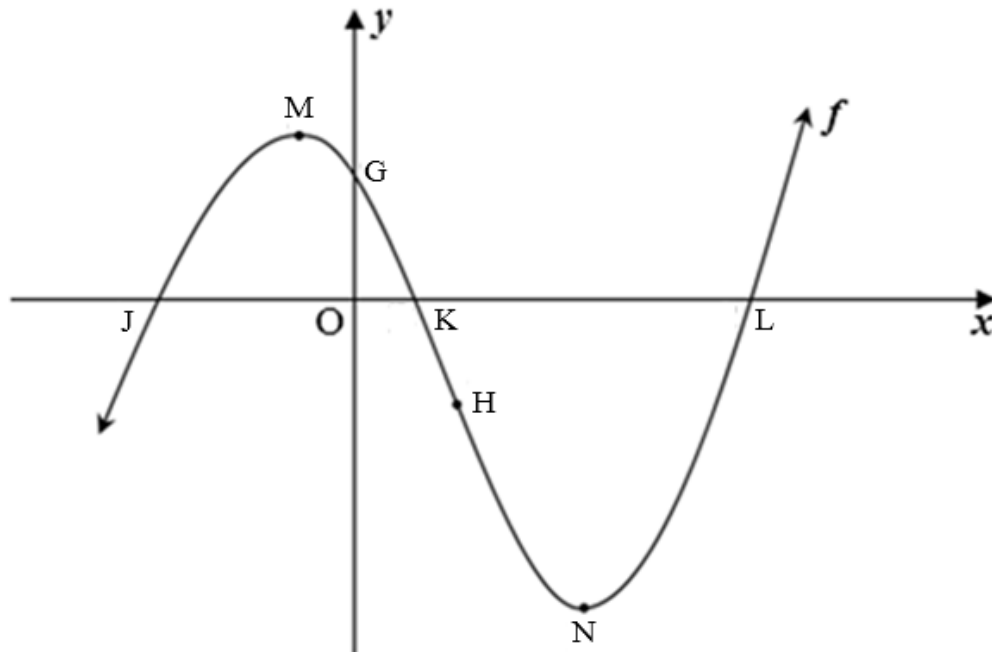
7.2.1 $\frac{dy}{dx}$ if $y = 7x^4 + \frac{2x^2}{\sqrt{x}}$ (3)

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-odineyithi
 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 eyikhonkheyyu (concave) ejonge ezantsi? (3)

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

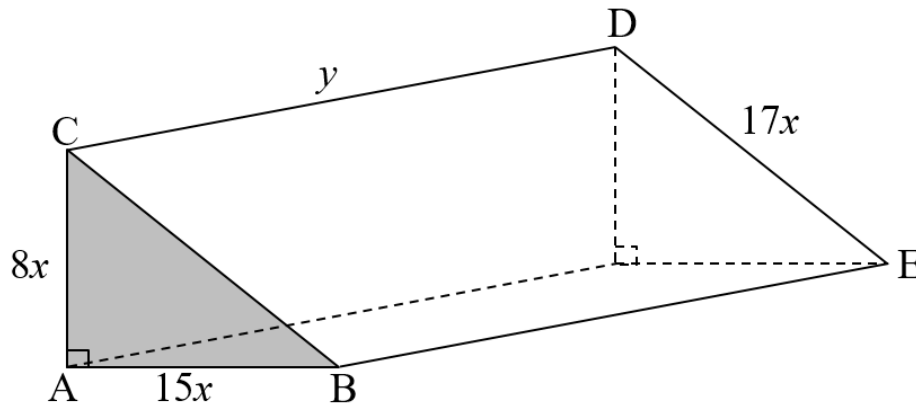
- $p < 0$
- $g'(m) = g(m) = 0$, apho u $m > 0$

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 izotywe kwidayagram. Ubude beprizim zii y mitha ze itotali safeyisi eriya yeprizim ibe ngu $5\,760\text{ m}^2$.



9.1 Bonisa ukuba u $y = \frac{5\,760 - 120x^2}{40x}$. (2)

9.2 Ngoko, bonisa ukuba ivolyum yeprizim ingabhalwa njengo:
 $V(x) = 8\,640x - 180x^3$. (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 $P(\textbf{hayi u B}) = 0,45$.
Fumana:

10.1.1 $P(B)$ (1)

10.1.2 $P(A \text{ okanye u B})$ (3)

- 10.2 UAsanda uya esikolweni ngeskuta okanye ngeteksi. Iprobhabhiliti yokuba ukhwela iteksi ngu x . Ukuba usebenzisa iskuta sakhe, iprobhabhiliti yokuba uza kufika kade esikolweni ngu $\frac{2}{5}$ kwaye ukuba uhamba ngeteksi, iprobhabhiliti yokuba uzakufika kade ngu $\frac{1}{2}$.
Fumana ivelyu ka x ukuba iprobhabhiliti 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 onobumba 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 iprobhabhiliti 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$m = \tan \theta$$

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

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

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

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n} \quad \sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

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

$$P(A \text{ okanye } B) = P(A) + P(B) - P(A \text{ no } B)$$

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

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