



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

IBANGA 12

SEPTEMBER 2020

IMATHEMATIKA P1

AMANQAKU: 150

IXESHA: 3 iiyure

Eli phepha lemibuzo linamaphepha ali 10, lidibene nephepha lolwazi.

IMIYALELO NOLWAZI

Funda imiyalelo elandelayo ngocoselelo phambi kokuphendula imibuzo.

1. Eli phepha lemibuzo linemibuzo eyi ELEVEN.
2. Phendula YONKE imibuzo.
3. Bonisa ngokucacileyo ZONKE iikhaltyhuleyshini, iidayagram, iigrafu, njl. ozisebenzisileyo ukubonisa iimpendulo zakho.
4. Ungayisebenzisa ikhaltyhuleytha esayentifikhi evunyiweyo (engaprogranyangwa nengenagrafikhi nengafakwanga mizobo), ngaphandle kokuba uxelelwe ngeny'indlela.
5. Iiphendulo kuphela azinyanzelekanga ukunikwa amanqaku apheleleyo.
6. Ukuba kunyanzelekile, sondeza iimpendulo kwiindawo EZIMBINI zedesimal, ngaphandle kokuba uxelelwe ngeny'indlela.
7. Iidayagram AZI zotywanga ngokwesikeyile (scale).
8. Nambarisha iimpendulo ngokuchanekileyo ngendlela esetyenzisiweyo ukunambarisha eli phepha lemibuzo.
9. Iphepha lolwazi elineefomyula lifakwe ekugqibeleni kwiphepha lemibuzo.
10. Bhala ngokucocekileyo nangokucacileyo.

UMBUZO 11.1 Solva u x :

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

1.1.2 $x(7x + 2) = 1$ (lungisa iye kwiindawo eziMBINI zedesimal) (4)

1.1.3 $-x^2 - x + 2 \leq 0$ (4)

1.1.4 $2^x + 2^{2-x} = \frac{17}{2}$ (5)

1.2 Unikwe:

- $(x - 2)^2 + y^2 = 25$ yi-ikhweyzhini yesekile
- $x + 3 - 3y = 0$ yi-ikhweyzhini yomgca ostreyti nee
- Iigrafu zesekile nomgca zi-intasektha kupoynti A no B

Fumana (Determine) ubonise zonke iikhalthuleyshini eziyimfuneko, iikhodineyithi zepoynti A no B. (6)

1.3 Bonisa ukuba iingcambu zeikhweyzhini $(x + m)(x + n) = 3p^2$ ziyinyani (are real) kwiivelyu zika m , n and p . (4)

[26]**UMBUZO 2**

2.1 Unikwe ikhwadrathik phatheni: 86 ; 119 ; 150 ; 179 ; ...

2.1.1 Bhala iithem ezilandelayo eziMBINI zephatheni. (2)

2.1.2 Fumana u T_n , ithem ejeneral yephatheni ngale fom $T_n = an^2 + bn + c$. (4)

2.1.3 Yeyi (zezi) phi iithem zephatheni ezinevelyu engu 326? (3)

2.1.4 UTaine udibanisa ukhostent k kwithem nganye kwiphatheni enika iphatheni entsha u P_n . Fumana ithem ejeneral yephatheni entsha. (2)

2.2 Iithem zokuqala ezintathu zearhithmetik sikhwensi zii:

$2y - 1 ; 4y - 1 ; 6y - 1.$

2.2.1 Fumana u T_{30} ngokwe them ka y . (3)2.2.2 Fumana ivelyu ka y , xa unikwe isam yeethem zokuqala eziyi 30 zesikhwensi ngu -2820 . (4)**[18]**

UMBUZO 3

3.1 Unikwe iisiris: $1 + 2 + 3 + 4 + 5 + 6 + \dots + 5000$

Bhala iisiris ngokwe sigma noteyshini ukuba zonke iiphawa zika4 zisusiwe kwiisiris. (4)

3.2 Unikwe ukuba iijonetric siris ezimbini ezilandelayo ziikhonvejent (convergent):

$$1 + x + x^2 + x^3 + \dots \quad \text{no} \quad 1 - x + x^2 - x^3 + \dots$$

Fumana i(i)velyu zika x apho isam yeesiris ezimbini ilingana no 8. (6)
[10]

UMBUZO 4

Unikwe: $f(x) = \frac{a}{x-1} + 3$, apho $u \ a \in \mathbb{Z}$.

4.1 Bhala ii-ikhweyzhini zeasymptotes ka f . (2)

4.2 Fumana i x ne y intasephi zika f ngokwe them ka a . (3)

4.3 Unikwe ukuba $u \ a = -1$, zoba isikhethshi esicocekileyo sika f , bonisa ngokucacileyo zonke iiasymptotes nee intasephi nge-ekheziz. (4)

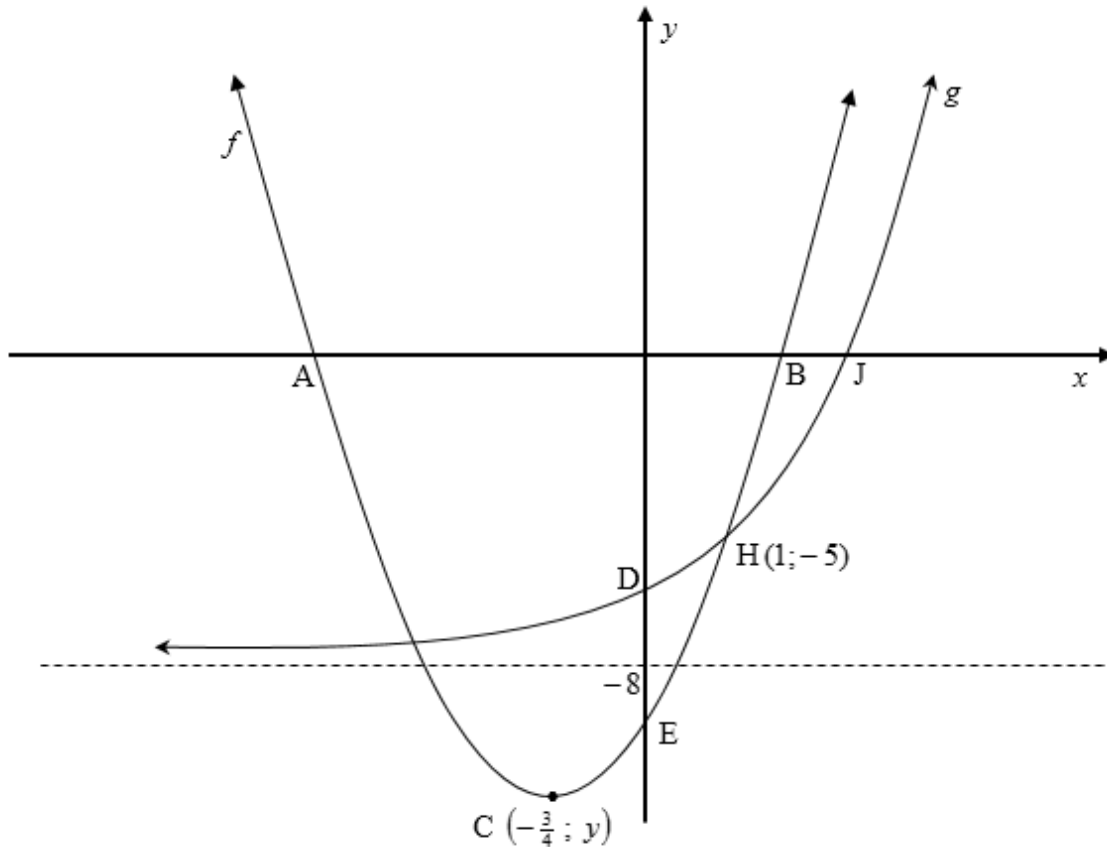
4.4 Igrafu ka f ibhekiswe ngeeyunithi ezi 3 ukuya ngasekhohlo nangeeyunithi ezi2 ukuya ezantsi. Bhala i-ikhweyzhini entsha ka f ngokwee them zika a . (2)

[11]

UMBUZO 5

Idayagram engezantsi ibonisa iigrafu zika $f(x) = ax^2 + bx + c$ and $g(x) = b^x + q$.

U A no B zii x -intasepithi, u E yi y -intasepithi no $C(-\frac{3}{4}; y)$ yipoynti ejikayo (turning point) ka f . U J yi x -intasepithi aze u D abeyi y -intasepithi ka g . $y = -8$ yi-ikhweyzhini ye asymptote ka g . $H(1; -5)$ yenye yeipoynti zeintasekshini ka f no g .



- 5.1 Bhala iikhoodineyithi zika D. (1)
- 5.2 Bhala ivelyu ka q . (1)
- 5.3 Bonisa ukuba u $a = 2$, $b = 3$ no $c = -10$. (6)
- 5.4 Bhala irheyntji ka g . (2)
- 5.5 Umgca ne ikhweyzhini, $y + 9x = -28$, yithanjent ka f kupoynti T. Fumana iikhoodineyithi zika T. (5)
- 5.6 Unikwe ukuba u $h(x) = g(x) + 8$, bhala u $h^{-1}(x)$ ngokwe fom $y = \dots$ (2)
- 5.7 Unikwe ukuba u $p(x) = f(x) + 1$, fumana ivelyu zika x apho u $x \cdot p(x) < 0$. (4)

[21]

UMBUZO 6

- 6.1 UColby wathenga ilaptop exabisa i R x yezifundo zakhe zaseyunivesithi. Ivelyu yelaptop yehla nge r % ngonyaka kusetyenziswa imethodi yebhalansi enciphayo. Emva kweminyaka emi 4, ivelyu yelaptop yayixabisa i $\frac{1}{3}$ yexabiso layo lakuqala. Khalityhuleytha u r , irheythi yediprishiyeysini. (3)
- 6.2 Nge 1 February 2014, uNcominkosi wathatha ilowuni ebhankini ukuthenga imoto. Intlawulo yakhe yokuqala yelowuni yayingomhla we 31 July 2014. Ukuqala nje kwakhe ukuhlawula ilowuni, kwamthatha iminyaka eyi 6 ukuyihlawula yonke ilowuni ngerheythi yenzala eyi 9,5% ngonyaka idityaniswe kwinkunzi ngenyanga. Wabhatala ibhanki iR596 458,10 iyonke.
- 6.2.1 Yayiyimalini i-instolmenyi yakhe ngenyanga? (5)
- 6.2.2 Yimalini awayeyibolekile ebhankini?
Bhala impendulo yakho kwirandi ekufutshane. (6)
- [14]**

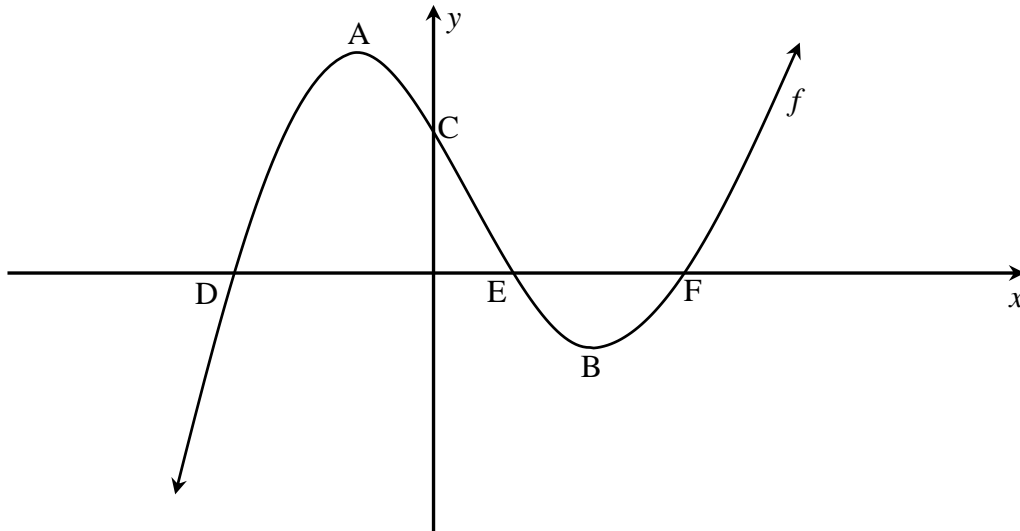
UMBUZO 7

Fumana:

- 7.1 $f'(x)$ ukusuka kwiprinsiple yokuqala ukuba u $f(x) = -2x^2$ (5)
- 7.2 $\frac{dy}{dx}$ ukuba $y = 7x^4 - \frac{2}{\sqrt{x^3}}$ (3)
- 7.3 $D_t \left[\frac{1}{2}gt^2 - \frac{5}{t} + 3g \right]$ (4)
- [12]**

UMBUZO 8

Kwidayagram engezantsi, igrafu ka $f(x) = 2x^3 + x^2 - 12x + 9$ izotywe. U A no B bazipoynti ezijikayo (turning points) zika f u C yi y -intasepthi. U D, E no F zii x -intasepthi.

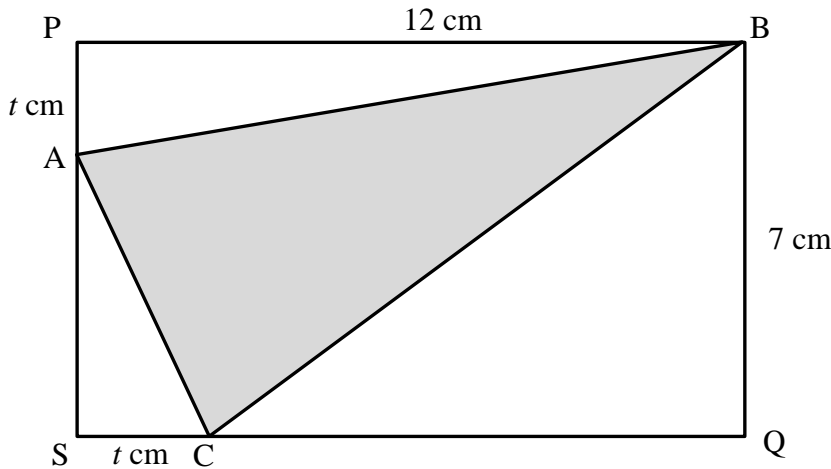


- 8.1 Bhala iikhoodineyithi zika C. (1)
- 8.2 Khaltyhuleytha iikhoodineyithi zika D, E no F. (6)
- 8.3 Fumana iivelyu zika x apho u f eyikhonkheyvu ezantsi. (4)
- 8.4 Fumana iivelyu zika x apho u $f'(x) \leq 0$. (4)

[15]

UMBUZO 9

Idayagrm engezantsi ibonisa itrayengle ABC ezotywe kangangokuba iivetisis zayo zilale kwirekthengle PBQS, njengoko ibonisiwe. $PA = SC = t$ cm. $PB = 12$ cm ze u $BQ = 7$ cm.



Khaltyhuleytha eyona ndawo enobancinci ye ΔABC .

[6]

UMBUZO 10

E St Johns High School, uphando lwenziwa ukufumana inani labafundi bebanga le 12 abafunda iMathematics (M), Physical Sciences (P) ne Accounting (A). Ulwazi olulandelayo lwaqokelelwa:

- 135 yabafundi bathatha inxaxheba kuphando
- 5 yabafundi bafunda iMathematics ne Accounting kodwa hayi iPhysical Sciences
- 12 yabafundi bafunda iMathematics ne Physical Sciences kodwa hayi iAccounting
- 24 yabafundi bafunda iPhysical Sciences ne Accounting kodwa hayi iMathematics
- y yabafundi ifunda iPhysical Sciences kuphela
- x yabafundi ifunda zonke izifundo zontathu
- y yabafundi ifunda iAccounting kuphela
- $2y + 3$ yabafundi bafunda iMathematics kuphela
- 60 yabafundi abafunda iAccounting
- Inani labafundi abafunda iMathematics lilingana nenani labafundi abafunda iPhysical Sciences

10.1 Riprezanta ulwazi olungentla kwiVenn-diagram. (4)

10.2 Fumana iivelyu zika x no y . (4)

10.3 Khaltyhuleytha iprobhabhiliti ethi umfundi okhethe nje wenza iMathematics okanye zombini iPhysical Sciences ne Accounting. (3)

[11]

UMBUZO 11

ULwazi no Cwenga zinkokheli zamakhwenkwe namantombazana esikolweni sabo ngokulandelelanayo. Ukongeza, kukho amakhwenkwe ama 3 namantombazana ama 2 aziprifekhthi. Kumele balindele ukufotwa kabini kwirowu.

11.1 Kwifoto yabo yakuqala indlela abahleli ngayo ayibalulekanga. Bangahlala ngeendlela ezingaphi? (2)

11.2 Kwifoto yabo yesibini, uLwazi no Cwenga bangahlala kuphela kwizihlalo zesithathu nakwesesihlanu nangayiphi indlela. Ithini iprobhabhiliti yokokuba isitulo sokugqibela sihlelwe yinkwenkwe yaye yintombi kuphela enokuhlala kwisitulo sesine? (4)

[6]

EWONKE: 150



INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

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

$$m = \tan \theta$$

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



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

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

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n}$$

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

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

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

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

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