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KEREITI 12

LWETSE 2020

DIPALO P1

MATSHWAO: 150

NAKO: dihora tse 3

Pampiri ena e na le maqhephe a 10 ho ke nyelleditswe le leqhephe le nang
le tlhahisoleseding.

DITAELO LE AND TLHAHISOLESERING

Bala ditaelo ka hloko pele o ka araba dipotso.

1. Pampiri ena e na le dipotso TSE LESHOME LE MOTSO O MONG (11).
2. Araba dipotso KAOFELA.
3. Bontsha ka ho hlakileng dipalo, digrafo, ditshwantsho/meralo eo o e sebedisitseng ho hlalosa dikarabo tsa hao.
4. O ka sebedisa scientific calculata e dumelletsweng (e sa programuwang le e se nang digrafo), ntle le haeba o dumelehile.
5. Dikarabo fela di kanna tsa se fuwe matshwao a felletseng.
6. Moo ho hlokahalang atametsa dikarabo ho di desimal TSE PEDI ntle le haeba ho boletswe tse hlokahalang.
7. Ditshwantsho/Diagrams ha di ya latela ditekanyo tse nepahetseng.
8. Nomora dipotso tsa hao ka mokgwa o nepahetseng jwalo kamoo di nomorilweng kateng pampiring.
9. Shiti enang le thlahisoleseding e ke nyelleditswe pampiring ena.
10. Ngola hantle ka mokgwa o ka balehang.

POTSO YA 1

1.1 Fumana tharollo ya x :

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

$$1.1.2 \quad x(7x + 2) = 1 \text{ (atametsa ho desimal tse pedi)} \quad (4)$$

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

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

1.2 O fuwe:

- $(x - 2)^2 + y^2 = 25$ ke ekweishini ya sekele
- $x + 3 - 3y = 0$ ke ekweishini ya mola o setereiti le
- Digrafo tsa sekele le mola o parolang matshwao a A le B.

Tseba, o bontsha dipalo tse hlokehang, coordinates tsa matshwao a A le B. (6)

1.3 Fumana metso ya ekweishini hore $(x + m)(x + n) = 3p^2$ ke ya nnete bakeng sa boleng of m , n and p . (4)

[26]

POTSO YA 2

2.1 O fuwe paterone(pattern) ya kwadretik (quadratic): 86; 119; 150; 179; ...

2.1.1 Ngola fatshe tse PEDI tse latelang tsa paterone. (2)

2.1.2 Fumana T_n , paterone kakaretso(general) ka mokgwa wa $T_n = an^2 + bn + c$. (4)

2.1.3 Ke dife/efe themo e nang le boleng ba 326? (3)

2.1.4 Taine o kopanya konstant, k ho dithemo ka bonngwe ho paterone e fanang ka paterone e ntjha P_n . fumana ka kakaretso themo ya paterone e ntjha. (2)

2.2 Dithemo tse tharo tsa pele tsa dipalo ya sekwense ke:

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

2.2.1 Fumana T_{30} ka mokgwa wa y . (3)

2.2.2 Fumana boleng (value) ba y , ha o fuwe kopanyo ya di themo tse 30 tsa pele ho sekwense hore ke -2820 . (4)

[18]

POTSO YA 3

3.1 O fuwe tatellano ya: $1 + 2 + 3 + 4 + 5 + 6 + \dots + 5000$

Ngola fatshe tatellano ka sigma notation haeba kaofela phawa tsa 4 di tlositswe ho tatellano. (4)

3.2 Haeba o fuwe tatellano tse pedi tsa geometric ebile di konverjent:

$$1 + x + x^2 + x^3 + \dots \text{ and } 1 - x + x^2 - x^3 + \dots$$

Fumana boleng ba x e leng kopanyo ya ditatellano tse pedi ho re fa 8. (6)
[10]

POTSO YA 4

O fuwe: $f(x) = \frac{a}{x-1} + 3$, moo $a \in \mathbb{Z}$.

4.1 Ngola fatshe di ekweishini tsa asymptotes tsa f . (2)

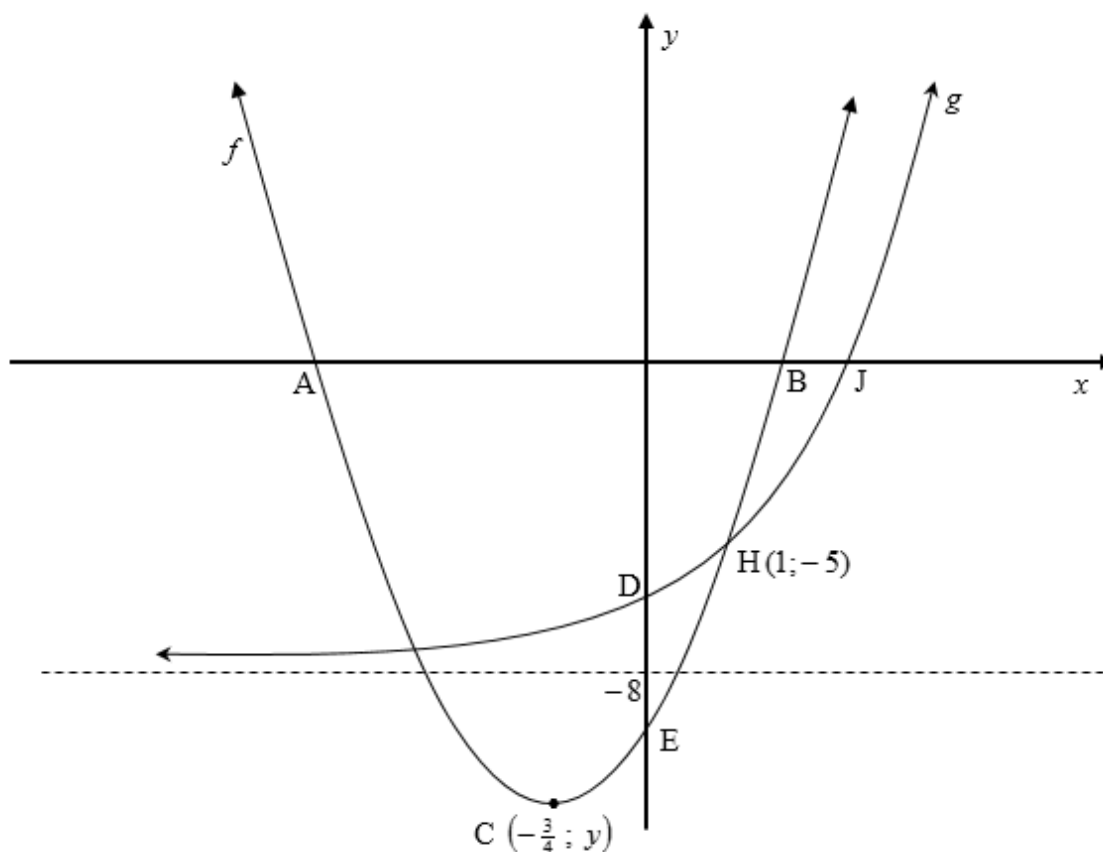
4.2 Fumana di intasepts tsa x and y ho f ka mokgwa wa a . (3)

4.3 O fuwe hore $a = -1$, fumana setshwantsho sa f ka mokgwa o hlakileng hantle, bontsha asymptotes le intasepts hong le axes. (4)

4.4 Grafo e shiftile ka diyuniti tse ho ya ka lenqeleng and tse pedi ho ya tlase. Ngola ekweishini e ntjha ka themo ya a . (2)
[11]

POTSO YA 5

Ditshwantsho tse ka tlase di bontsha digrafo tsa $f(x) = ax^2 + bx + c$ and $g(x) = b^x + q$. A le B ke di x -intasepts, E intasept ya y -intasept le $C(-\frac{3}{4}; y)$ ke kgutlo e phethohang ya f . J ke x -intasept and D ke y -intasept ya g . $y = -8$ ke ekweishini ya asymptote ya g . $H(1; -5)$ ke enngwe kgutlo ya intasept ya f le g .



- 5.1 Ngola fatshe di coordineite tsa D. (1)
- 5.2 Ngola fatshe boleng ba q . (1)
- 5.3 Fumana hore $a = 2$, $b = 3$ and $c = -10$. (6)
- 5.4 Ngola fatshe reinje ya g . (2)
- 5.5 Mola o nang le ekweishini, $y + 9x = -28$, ke tanjent ya f ho kgutlo T. Bontsha coordineite tsa T. (5)
- 5.6 O fuwe $h(x) = g(x) + 8$, ngola fatshe $h^{-1}(x)$ ka mogwa wa $y = \dots$ (2)
- 5.7 O fuwe $p(x) = f(x) + 1$, fumana boleng ba x hore $x.p(x) < 0$. (4)

[21]

POTSO YA 6

- 6.1 Colby o rekile laptop ya boleng ba Rx mabapi le dithuto tsa university. Boleng ba theolwa ka $r\%$ ka selemo a sebedisa mokgwa wa ho theola balanse. Ka mora lemo tse nne (4) boleng ba laptop ebile $\frac{1}{3}$ ya theko ya pele. Bala r , ya thefulo. (3)
- 6.2 Ka la 1 Hlakola 2014, Ncominkosi o nkile tjhelete ya kadimo banking, bakeng sa theko ya koloi. Patala ya pele ene e hlokeha ka la 31 July 2014. Hoba a qadise ho patala tjhelete ya kadimo, e mo nkile lemo tse 6 ho qeta patala ka tswala ya reiti ya 9,5% ka selemo compounded ka kgwedi. Qetellong o patetse banka R596 458,10.
- 6.2.1 O ne a patala bokae ka kgwedi? (5)
- 6.2.2 O ne a kadimme bokae bankeng? (6)
Ngola fatshe karabo ya hao o e atameditse ho diranta. [14]

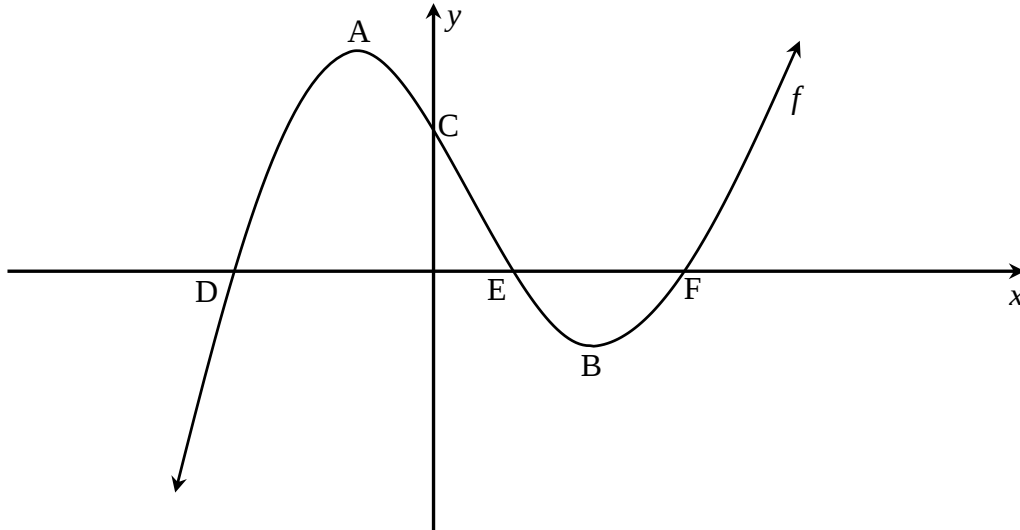
POTSO YA 7

Fumana:

- 7.1 $f'(x)$ ho tloha ho prinsipole ya pele haeba $f(x) = -2x^2$ (5)
- 7.2 $\frac{dy}{dx}$ if $y = 7x^4 - \frac{2}{\sqrt{x^3}}$ (3)
- 7.3 $D_t \left[\frac{1}{2}gt^2 - \frac{5}{t} + 3g \right]$ (4)
[12]

POTSO YA 8

Ho setshwantsho se ka tlase, grafo ya $f(x) = 2x^3 + x^2 - 12x + 9$ e takilwe. A le B ke dikgutlo tse phethohang ho f le C ke di y -intasept. D, E le F ke di x -intasepts.

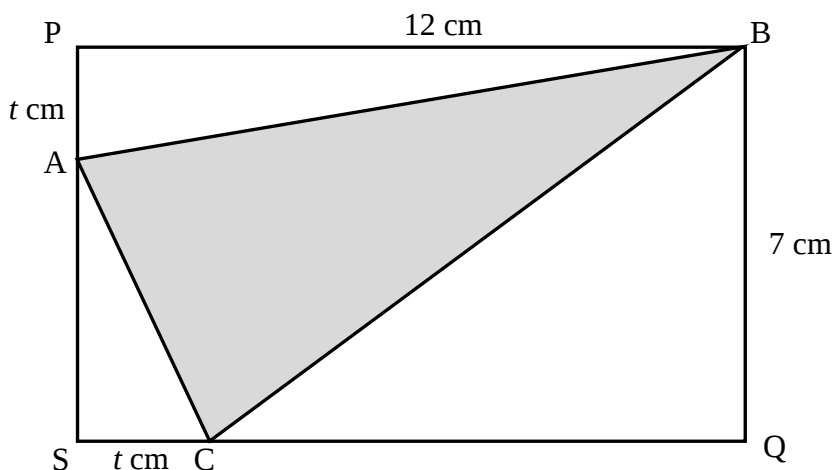


- 8.1 Ngola fatshe di coordineite tsa C. (1)
- 8.2 Bala di coordineite tsa D, E le F. (6)
- 8.3 Fumana boleng ba x moo f e leng konkave fatshe. (4)
- 8.4 Fumana boleng ba x moo $f'(x) \leq 0$. (4)

[15]

POTSO YA 9

Setshwantsho/dayagramo se ka tlase se bontsha traenkele ABC e takilweng ka mokgwa oo vertices di robetseng ho rektenkele PBQS, jwale ka ha ho bontshitshwe. $PA = SC = t$ cm. $PB = 12$ cm and $BQ = 7$ cm.



Calculate/Bala dipalo ho fumana area e nyane ya $\triangle ABC$.

[6]**POTSO YA 10**

St Johns High School, ho entswe patlisitswe ho bontsha palo ya baithuti ba kereiti 12 ba etsang Mathematics (M), Physical Sciences (P) and Accounting (A). Tlhahisoleseding (data) e ile ya bokellwa:

- Baithuti ba 135 ba entse patlisiso
- Baithuti 5 ba entse Mathematics and Accounting but not Physical Sciences
- Baithuti 12 ba entse Mathematics and Physical Sciences empa e seng Accounting
- Baithuti ba 24 ba entse Physical Sciences and Accounting empa e seng Mathematics
- Baithuti ba y ba e ntse Physical Sciences fela
- Baithuti ba x ba e ntse thuto tse tharo
- Baithuti y ba e ntse Accounting fela
- Baithuti ba $2y + 3$ learners ba e ntse Mathematics fela
- Baithuti ba 60 ba e ntse Accounting
- Palo ya bana ba e tsang Mathematics ba lekana le palo ya ban aba e tsang Physical Sciences

10.1 Taka(teroha) tlhahisoleseding e kahodimo ho Venn-dayagramo. (4)

10.2 Bontsha boleng ba x le y . (4)

10.3 Etsa dipalo tsa probability tseo moithuti a di kgethileng ka mogwa o random ho Mathematics kapa/ ka bobedi Physical Sciences le Accounting. (3)

[11]

POTSO YA 11

Lwazi le Cwenga ke di hloho tsa prefekts tsa sekolo sa bona. Ba ekeleditswe di prefekts tse 3 tsa basheemane le tse 2 tsa bananyana. Kaofela ha bona ba tshwanela ho dulela difoto moleng o kapele.

11.1 Fotong ya bona ya pele, tatellano ha e bohlokwa. Ekaba le ka dula ba dula ka mekgwa e me kae? (2)

11.2 Fotong ya bona ya bobedi, Lwazi le Cwenga ba ka dula meleng ya boraro le wa bohlano.
Fumana hore probability yah ore setula sa ho qetal se tlabe se dutswe ke moshemane kapa ngwanana na moleng wa bone. (4)
[6]

MATSHWAO KAOFELA: 150

INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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