

savoir sans frontieres

UMWOBO WIRABURA

Yohani-Petero Petit

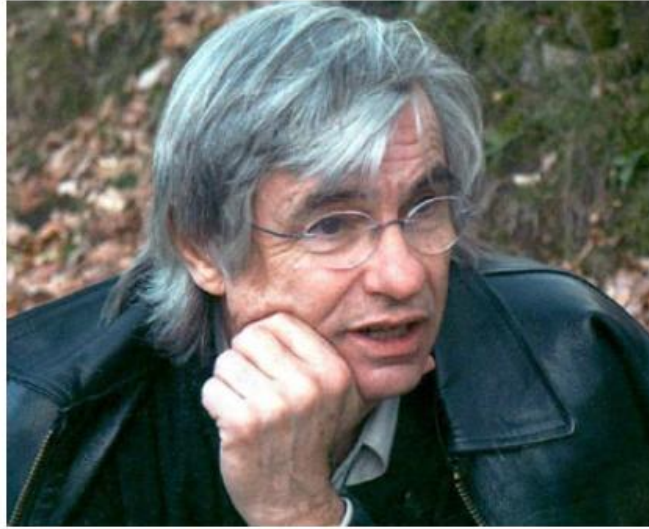


Byahinduwe na: Mohamed Abdel Aziz Kamanzi

<http://www.savoir-sans-frontieres.com>

Ubumenyi butagira Imipaka

Itegeko ryo mu 1901 rigenga amashyirahamwe



Jean-Pierre Petit, Perezida w'iri Shirahamwe

Uyu Jean-Pierre Petit, Peresida w'iri shyirahamwe ry'Ubumenyi butagira Imipaka, yahoze ari diregiteri w'ubushakashatsi mu kigo cy'inzobere cya CNRS, mu Bufaransa. Akaba kandi inzobere ihanitse muri Fizike y'inyenyeri (Asitorofizike); yahimbye uburyo bushyashya by'inyandiko bita: *Ibitabo by'amashusho by'ubumenyi*. "Ubumenyi butagira Imipaka" ni ishyirahamwe ryahimbwe mu 2005 n'abagabo babiri, Jean-Pierre Petit na mugenzi we Gilles d'Agostini. Iri shyirahamwe ryihaye intego yo gukwirakwiza kw'isi hose ubumenyi ku buntu harimwo n'ubumenyi bwa tekhnike, ubukorikori n'ikoranabuhanga. Iri shyirahamwe ribeshejweho n'inkunga rihabwa. Izo nkunga nizo ziriha abantu bahindura inyandiko mu zindi ndimi. Buri nyandiko (igitabo cy'amashusho cy'ubumenyi) ihindurirwa mu rundi rurimi ku mafaranga angana n'amayero 150 (150 euros) kuva mu 2007 kugeza ubu. Iri shyirahamwe rinariha amafaranga ajyanye n'iyoherezwa ucishije muri banke ry'ayo mafaranga y'ihinduranya mu zindi ndimi. Abahinduranyi b'indimi bagiye bongera, buri munsu, umubare w'ibyo bitabo bisomwa hose k'ubuntu. (Nko kugeza mu 2007, hari hamaze kuboneka ibitabo magana abiri (200) bikurwa kuri interineti k'ubuntu kandi byanditse mu ndimi makumyabiri n'umunani (28) harimwo ikinyarwanda n'ururimi rwo muri Lawosi).

Biremewe ko iki gitabo gikopororwa cyangwa gifotorwa, cyose cyangwa igice; kinakoreshwa n'abarimu mu masomo ariko mu buryo butari uburya inyungu z'amafaranga. Gishobora gushyirwa mu masomero y'uturere, y'amashuri cyangwa ya za kaminuza, cyanditse ku mpapuro cyangwa cya shyizwe mu miyoboro y'imbuga z'ikoranabuhanga zigose (intranet).

Uyu mwanditsi w'ibi bitabo yatangiye kwandika ibindi byo byoroshye kandi bigenewe abana bato (bari mu rugero rw'imyaka 12). Ibindi biriho bikorwa n'ibitabo by'amajwi avuga, bigenewe abatazi gusoma cyangwa abashaka kwiga urundi rurimi rutari urwo bakuriyemwo.

Iri shyirahamwe rishaka buri gihe abahinduranyi b'inyandiko bazishyira mu ndimi zabo zakavukire ariko bafite ubuhanga buhagije bwo gutanga inyandiko mpiduranyi nziza z'ibitabo basomye.

Ushatse kugira icyo ubaza cyangwa ugeze kuri iri shyirahamwe, wajya ku rubuga rwaryo ku interinete aha hakurikira: <http://www.savoir-sans-frontieres.com>

Iranga-konti mu Bufaransa → Inyandiko ngaragaza mutungo muri (RIB)

Ikigo	Umwanya wo kwakiriramwo amafaranga	Nimero ya konti	Urufunguzo rwa RIB
20041	01008	1822226V029	88

Aho ikorera: Banki ya Posita
Hagati y'Umujyi wa Marseille
13900 Marseille CEDEX 20
Mu Bufaransa

Mu bindi bihugu → Ibanki Mpuzamahanga (International Bank) Nimero ya Konti (IBAN):

IBAN
FR 16 20041 01008 1822226V029 88

→ N' Inyandikobanga ya banki (BIC) :

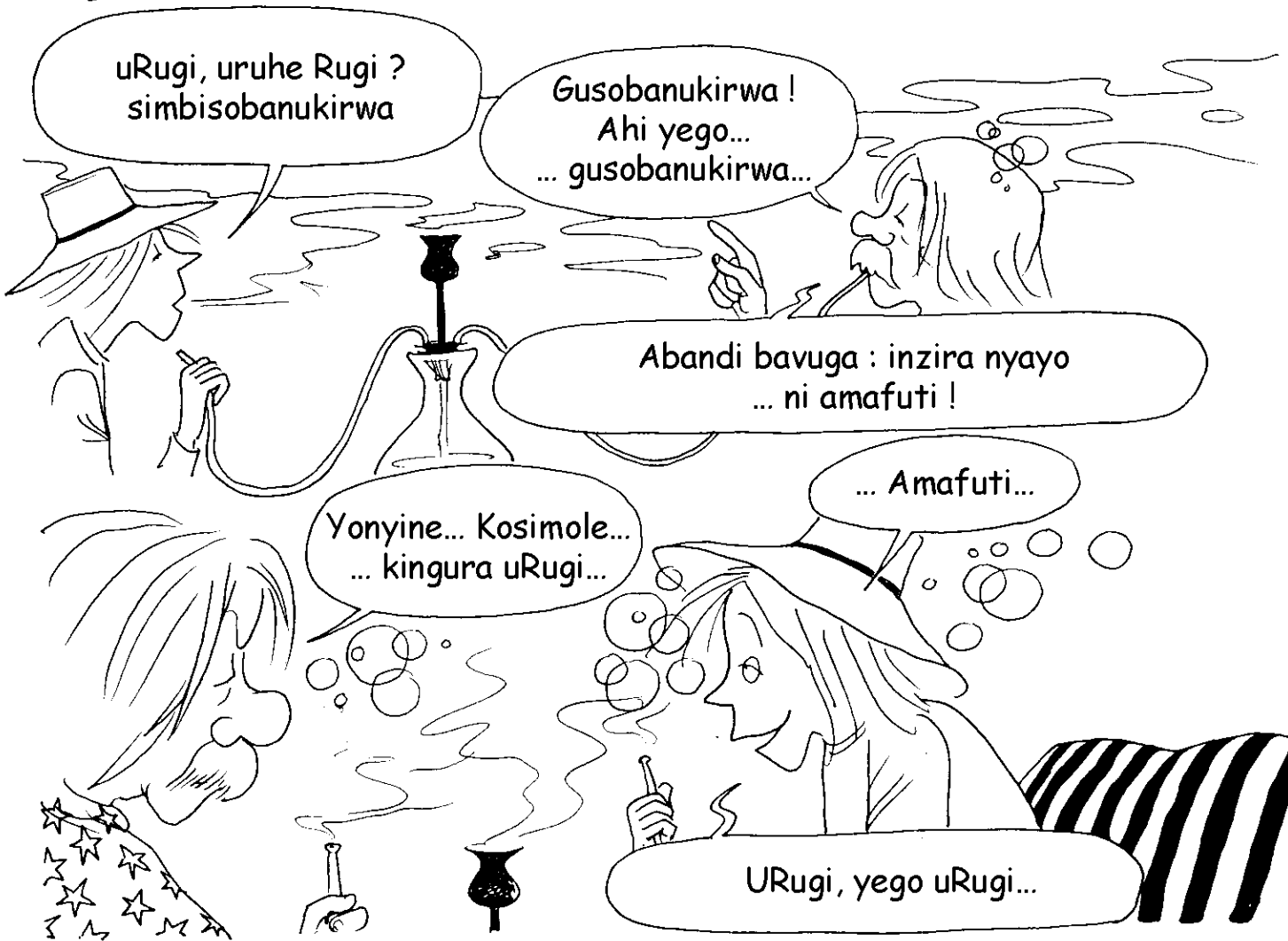
BIC
PSSTFRPPMAR

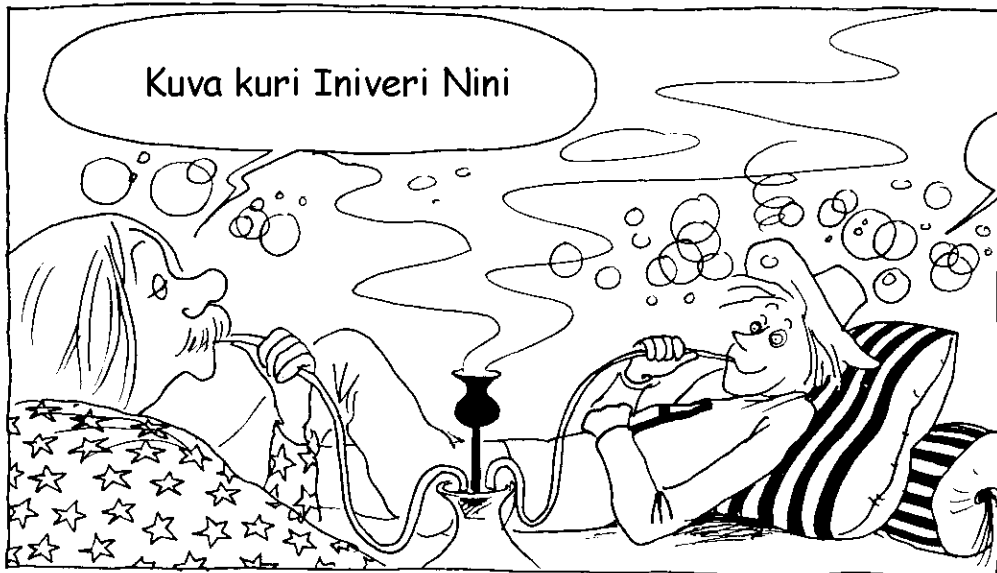
Amategako agenga iri shyirahamwe agaragara ku rubuga rwa yo kuri interineti. Imibare ngaragaza mutungo nayo irahari kandi ihora ishyirwa ku gihe. Iri shyirahamwe nta mafaranga na make rikura ku nkunga rihawe uretse ayo kohereza, bicishijwe muri banki, ahemba abahinduranyi b'indimi ku buryo babona abagenewe yose. Nta munyamuryango w'iri shyirahamwe n'umwe rihemba kuko bose ari abakoranabushake.

Abanyamuryango ubwabo nibo barihira amafaranga ishyirahamwe rikoresha ngo ribeho nk'ayo kwishyura no gukoresha urubuga rwa yo rwo kuri interineti kuko ayo atarihwa n'ishyirahamwe.

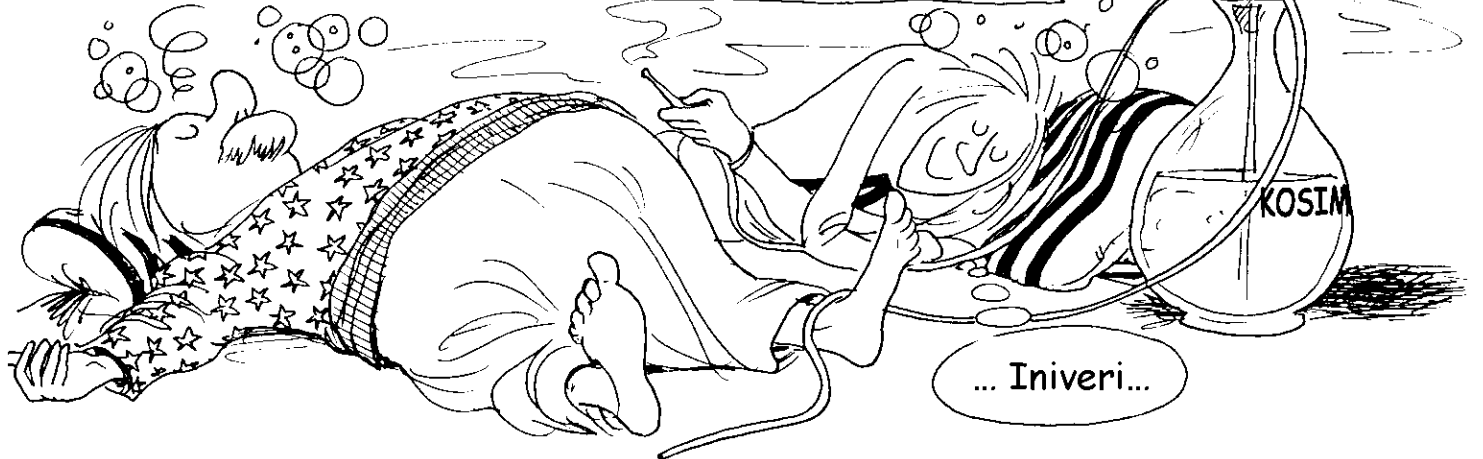
Bityo mugaragarizwa neza uko umutungo w'ishyirahamwe ukoresheka kandi mukibonera ikizere ko, muri icyo "mirimo y'ubwitange mfashamuco", inkunga yose mutanga ikoresheka neza mu kwishyura abahindura ibitabo mu zindi ndimi.

Dushyira ku rubuga rwa interineti buri kwezi, ugereraniye, nk'ibitabo cumi bihinduwe mu zindi ndimi.

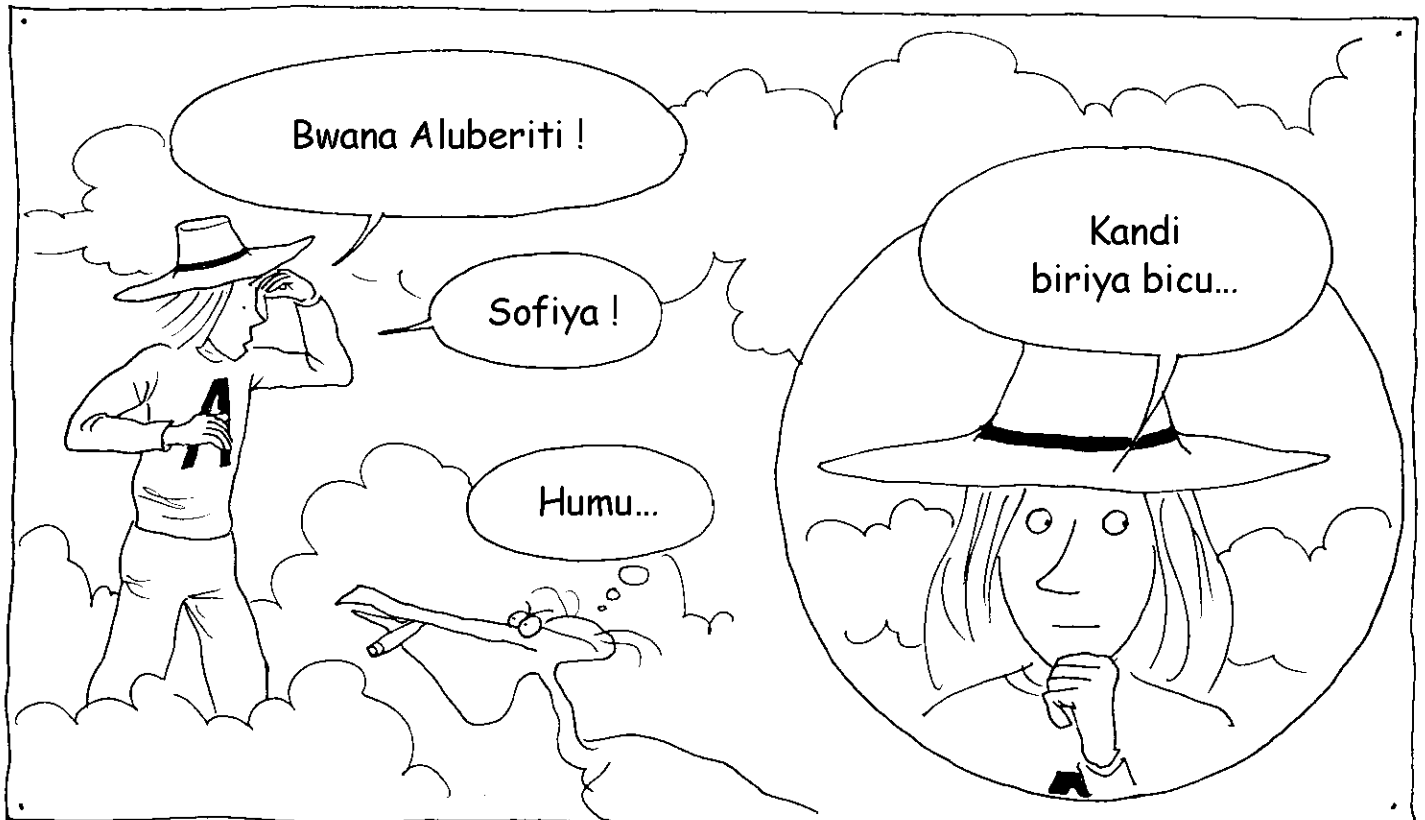




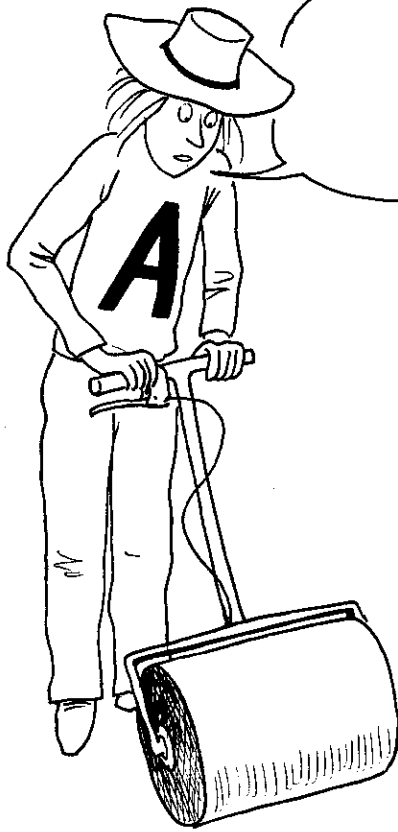
... Iniveri...



... Iniveri...



Ku nshuro yindi kandi, Anselimi agiye gushakisha imibumbe y'amasi nyabicu.



Dore ye, icyo kintu ni iki ?
Wagirango ni ikizingo cy'ikibuga cya tenisi,
cyangwa ubwoko bw'ikizingo cy'amarangi.

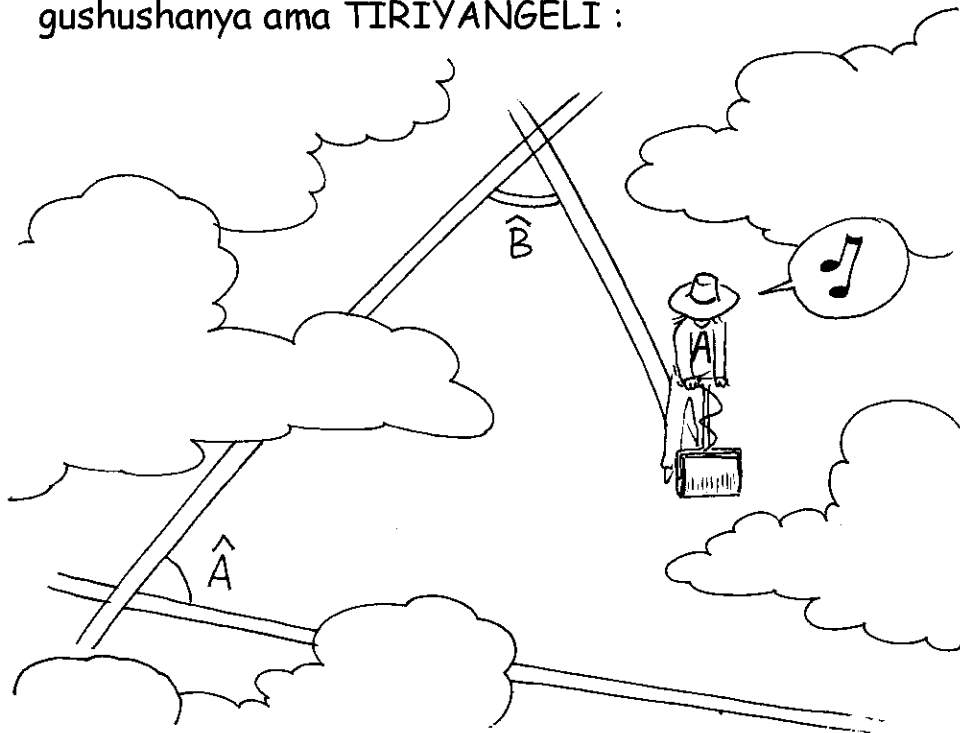


Umuntu ashobora ku
kigizayo ukomeje INTUMBERO
IGOROROTSE IMBERE
Yawe, nta zindi mbaraga.
Ariko kandi, ntushobora
guhindukira na gato i BURYO
cyangwa i BUMOSO.



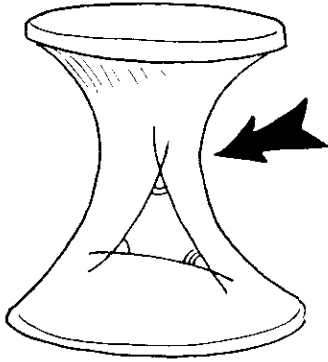
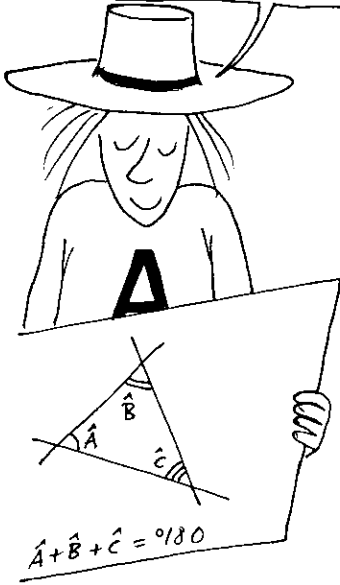
ESE icyo
kiganza kimara iki ?
Dore ye, gikuraho
imatana kandi rimwe na
rimwe gituma nshobora
guhindura intumbero.

Yifashishije iki gikoresho, anselimi ashobora
guca ama JEWODEZIKYE ya sirifase. Akoresheje
jewodezikye eshatu, Anselimi ashobora
gushushanya ama TIRIYANGELI :



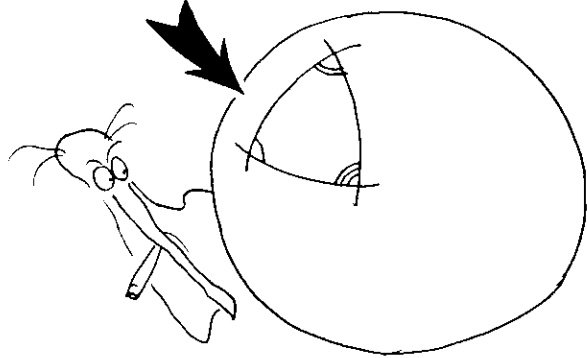
Sirifase ni ESIPASE NYADIMANSIYO EBYIRI. Ni ukuvuga ko hakwiye IBIPIMWA
BIBIRI kugirango ugere ku kicaro cy'akadomo runaka, ibyerekezo bibiri.

Turebe, iyo esipase ari NYAYEKILIDE, interanyo y'ibipimo by'imfuruka za tiriyanjyeri yanjye ingana na $^{\circ}180$.

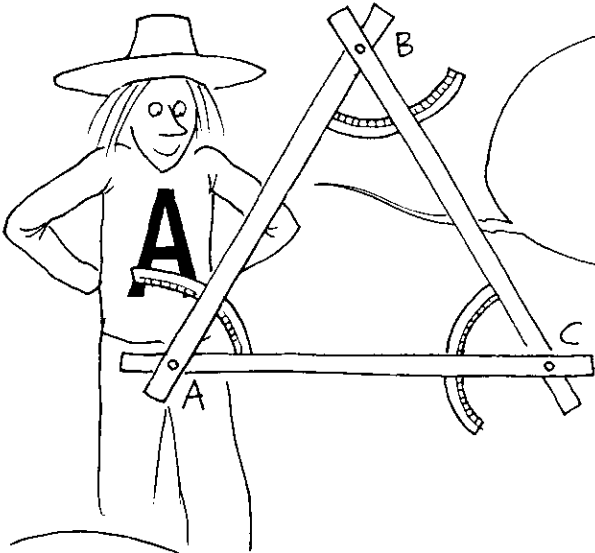


Iyo esipase ifite ubuhetame bwa negatifu, icyo giteranyo kiba ari GITO kuri dogere 180

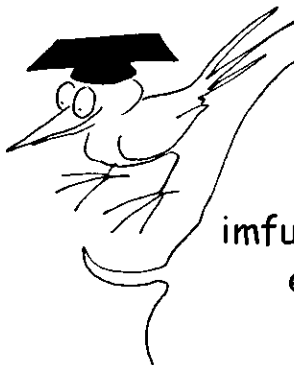
Muri esipase y'ubuhetame bwa POZITIFU, igiteranyo kiba KININI kuri dogere 180.



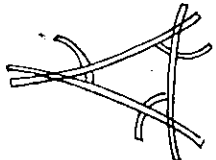
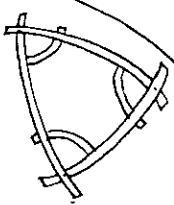
ESIPASE Z'UBUHETAME BUHINDAGURIKA:



Navumbuye kuruvimetero. Igizwe n'uturahure dutatu dukweduca dushobora kuzenguruka uko twishakiye iruhande y'udushyitsi dutatu A, B, C.



Nta kindi gisabwa uretse kuyomeka kuri sirifase noneho ugapima imfuruka wifashishije raporuteri eshatu kugirango umenye **UBUHETAME BW' AHO HANTU.**

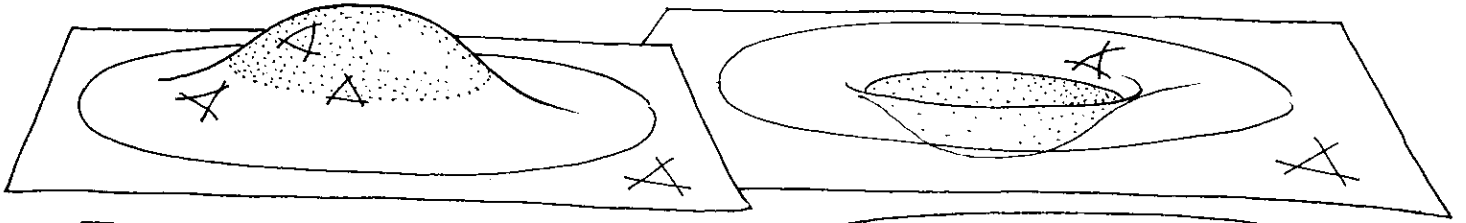


UBUHETAME BWA NEGATIFU

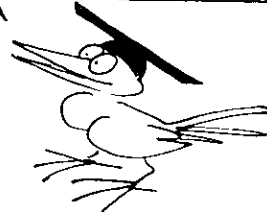
UBUHETAME BWA POZITIFU

(*) Ku bindi bisobanuro birambuye, reba JEWOMETIRIKONI, y'umwanditsi umwe, Icapiro BELINI.

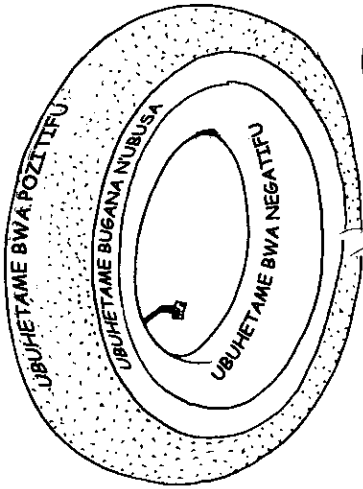
Iryo pfupfu ryashyiswe mu kibyatarare kigizwe n'akarere ko hagati k'ubuhetame bwa pozitifu, bukikijwe n'akarere k'ubuhetame bwa negatifu.



Ushingiye k'UBUHETAME, Ikinogo kimeze kimwe n'IPFUPFU.

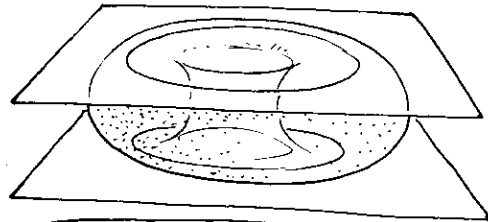


Uretse kwibeshya, iyi ni iNGATA.



Yego, hari umuhora w'ubuhetame bwa pozitifu, n'uwundi w'ubuhetame bwa negatifu, bitandukanijwe n'urubibe aho ubuhetame bungana n'ubusa.

Aho hanyuma hashobora kugaragara ushyize ingata hagati y'ibibyatarare bibiri.

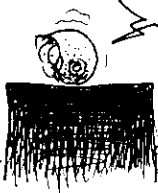
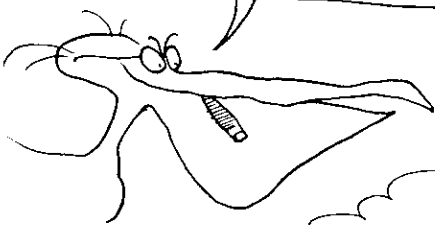


Muvandimwe wanjye Tireziasy, washoboye kubonako kiriya gishishwa cyanyu cyari esipase nyadimansiyo-ebiyiri y'ubuhetame buhindagurika ?


Lewo, rekera Tireziasy amahoro !



Mi !..



UTUDOMO NYAKONE



Ugiye kureba, Anselimi,
hari ibintu bindi bitangaje kandi.

Banguka, Tireziyasi,
mfite inyota yo kumenya...

Ntegereza !

Urareba, Tireziyasi, ngiye KIJISHA sirifase yanjye nsobekeranya
za jewodezikye, ibyo bizatanga amatsinda ya za tiriyanjyeri

Igishishwa cy'ubuhetame
bunuranye... ntacyo bimbwiye,
jyewe !!...

Noneho rero aho, ntacyo
ngisobanukirwamwo na busa ! ni iki kibera
iruhande y'ako kadomo P ?

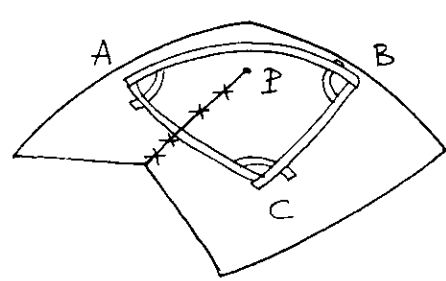
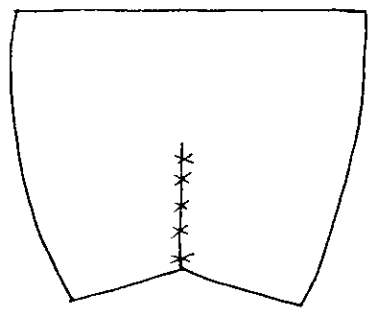
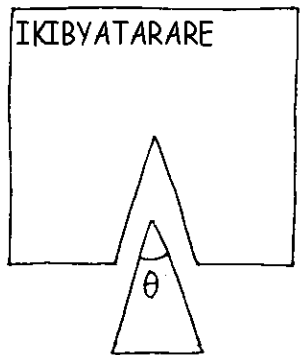
Wakoresheje se gusa
kuruvimetero ya we.

Hanyuma se, Sofi, ni iki cyabaye ? Niba tiriyaneri ya kuruvimetero itarimwo ako kadomo P, yerekana ubuhetame bungana n'ubusa.



Ariko niba akadomo P kari muri tiriyaneri, ubwo rero harahetamye !

Ni akadomo nyakone. Dore, reba, nimfata ikibyatarare, ngaKURAMWO segiteri y'imfuruka θ noneho nkahadoda.



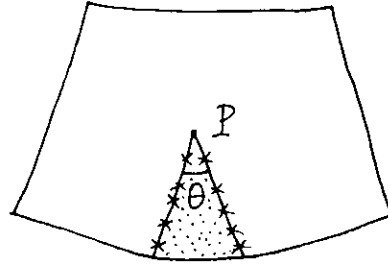
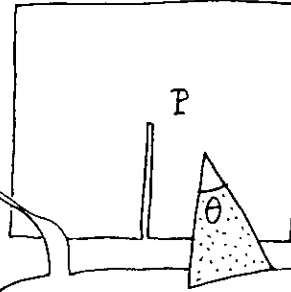
$$\hat{A} + \hat{B} + \hat{C} = 180 + \theta$$

Mbona ikone tuzita POZIKONE



Ushobora kubinyomoza, ukoresheje ikarito. Ikidongi cy'urupapuro rumatana kizagufasha kugaragaza jewodezikye mu buryo bworoheje.

Byiza, noneho rero, niba tiriyangeri yanjye irimwo isonga rya kone, igiteranyo cy'imfuruka zayo kiruta buri gihe $^{\circ}180$!

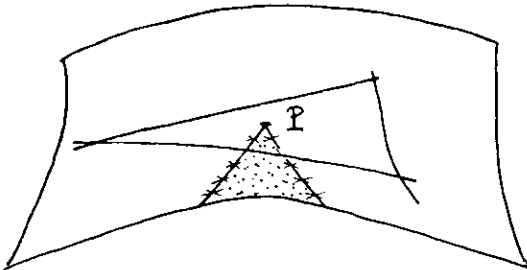


Nta kwihuta birtyo ! Ninshyiramwo igihato mu kibyatarare cya nje ubwo ahubwo nzaba **NONGEYEMWO** isegiteri y'imfuruka θ .

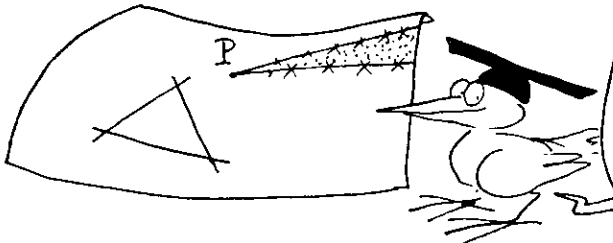
Noneho rero... Bizatanga Inegakone ?



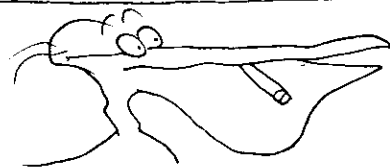
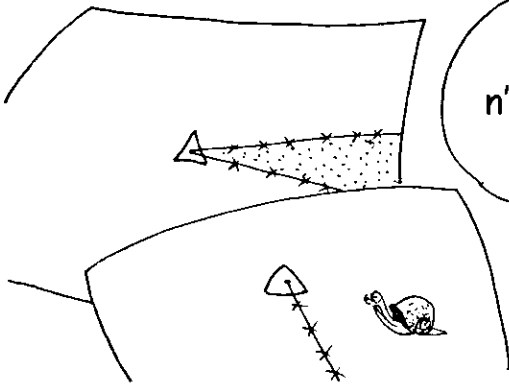
Ubu bwo, iyo tiriyangeri izengurutse akadomo P, igiteranyo cy'imfuruka kingana na $^{\circ}180 - \theta$!



Ariko, noneho kandi, iyo akadomo kari hanze ya tirinyangeri, igiteranyo kiba kingana na $^{\circ}180$.



Iki kiranga cy'amakone nta sano kigirana n'ubungane bwa tiriyangeri, naho iyi ngiyi yaba akunzugurunya cyangwa se nini cyane.





Ariko... nyabuneka !.. Kirahetamye cyangwa ntigihetamye ?

Akadomo nyakonikye, Anselimi, ni ubuhetame butsingiranye.

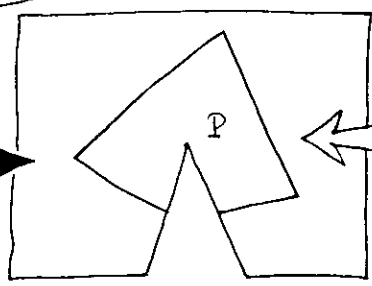
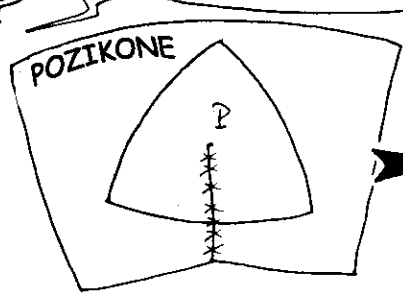


Hagati y'utudomo nyakonikye, esipase ni nyayekilide, iba ari ntabuhetame.

Imfuruka θ ni igipimo cy'ubungane bw'ubwo buhetame.

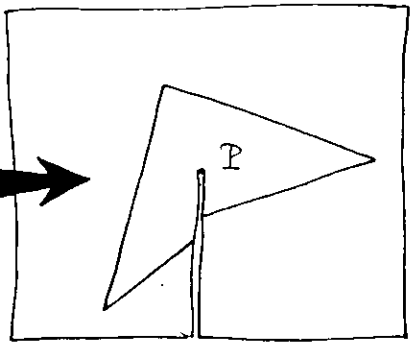
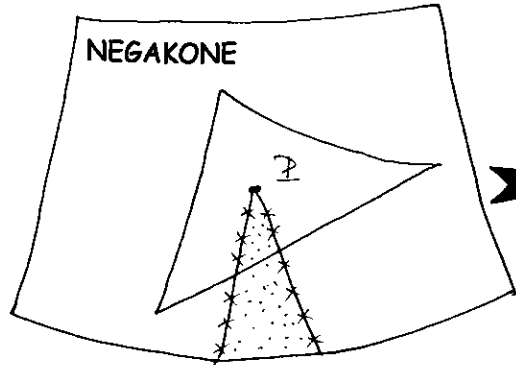
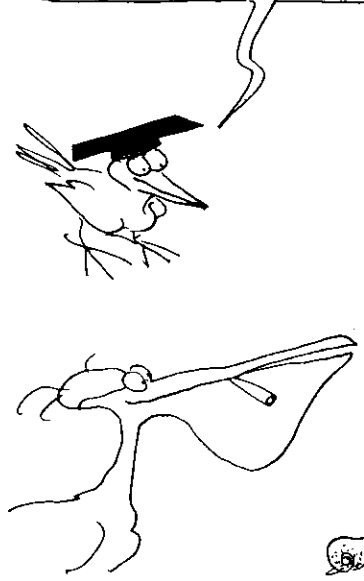


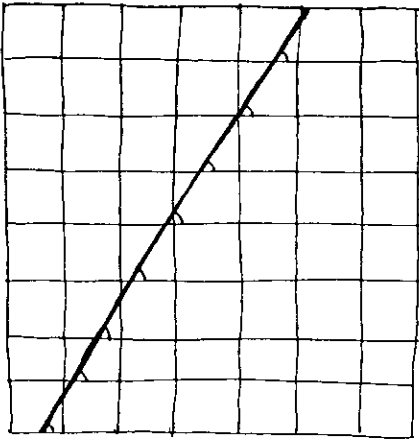
Hambura kone yawe hanyuma uyiramburire hasi



Dore ibitangwa n'icyo gikorwa, cyatunganijwe na Anselimi, mu birebana na kone y'ubuhetame pozitifu.

Naho se mu birebana na kone y'ubuhetame negatifu.





Dufate sirifase IBYATARAYE noneho tuyijishe dukoresheje za jewodezikye zirema ikinyanguni ennye zingana. Hazavugwako iyo sirifase ya SHASHWEHO amakare yose angana. Niba dukurikiye INZIRA, URUGENDO, nk'uko ukata impande z'amakare akurikirana ukurikiye imfuruka imwe, urwo rugendo ruzakorwa hakurikijwe ijewodezikye ya sirifase.

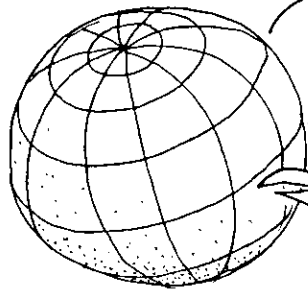
Ubuyobozi.

Ariko se,
kuki ibyo bitakorwa
kuri siferi ?

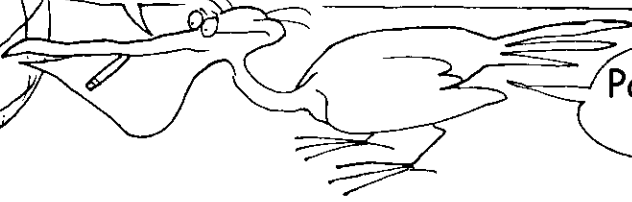
Ubwa mbere,
tugerageze GUSASIRA
siferi dukoresheje za kare,
zegeranye neza, uzambwira
amakuru yabyo.

Amameridiye ya siferi niyo
jewodezikye zi iyi ngiyi. Urugendo
rwahuranya izo meridiye hakurikijwe
imfuruka idahinduka, itandukanye
na 90° , ruzaganisha ntampinduka
n'imwe kuri imwe muri za POLE !

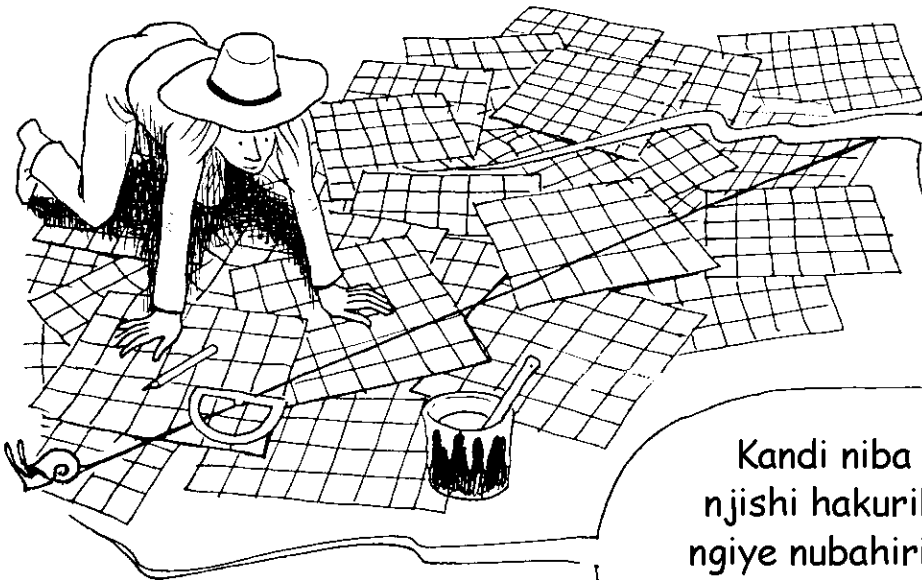
Itsimburanya hakurikijwe
intumbero idahinduka
riganisha... kuri pole !



Uramutse ukase za meridiye za siferi hakurikijwe intumbero ya 90° , wagendera ku ntumbero ya za paralele.

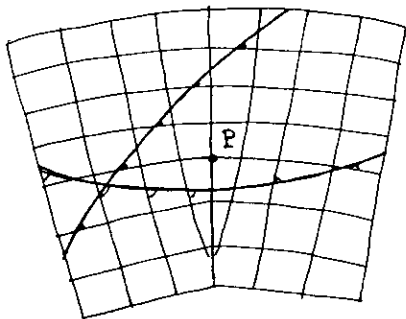


Paralele zitari jewodezikye. Byarizwe ! (*)

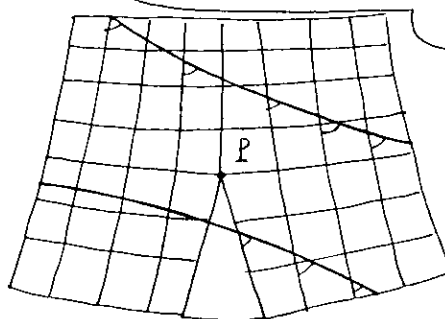


Nshobora gutwikira isirifase ibyataraye, nyayekilide, nkoreshaje ibintu bibyataraye bya kwadiliye.

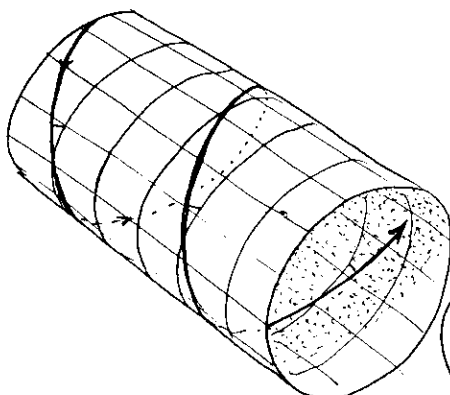
Kandi niba ngenze nambukiranya izo njishi hakurikijwe imfuruka idahinduka, ngiye nubahiriza indodo, bya hafi na hafi, nzagera kuri jewodezikye.



POZIKONE



NEGAKONE

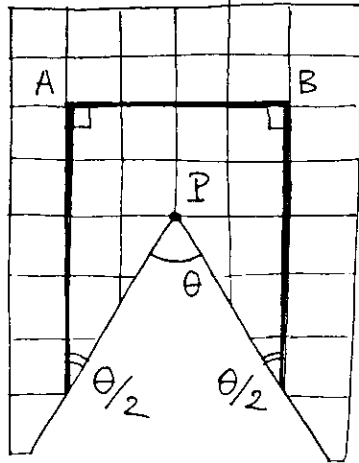
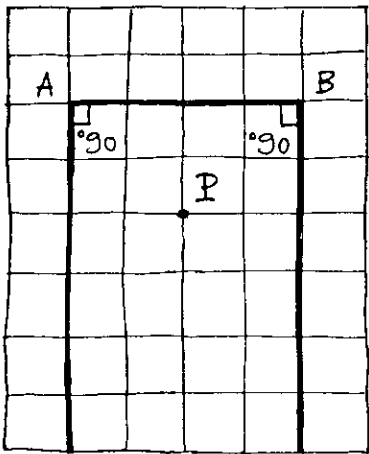


Ubwo buryo bworoshye butanga nabwo jewodezikye za sirenderi, ziri mw'iforoma ya rosoru ya budine.

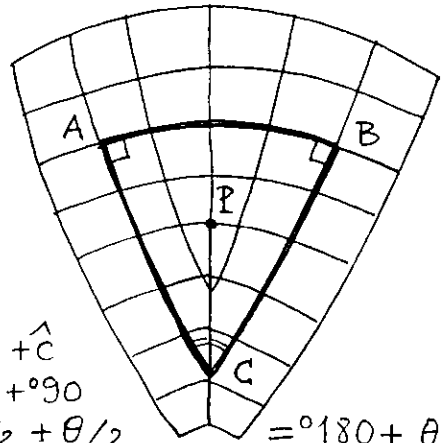


(*) ntibishoboka kuzishushanya, kuri siferi, ukoresheje akenda kamatana (cyeretse ekwateri).

Dore impamvu igiteranyo cy'imfuruka za tiriyanjeri, kuri pozikone, kiyongeraho imfuruka y'ubukatiro θ :



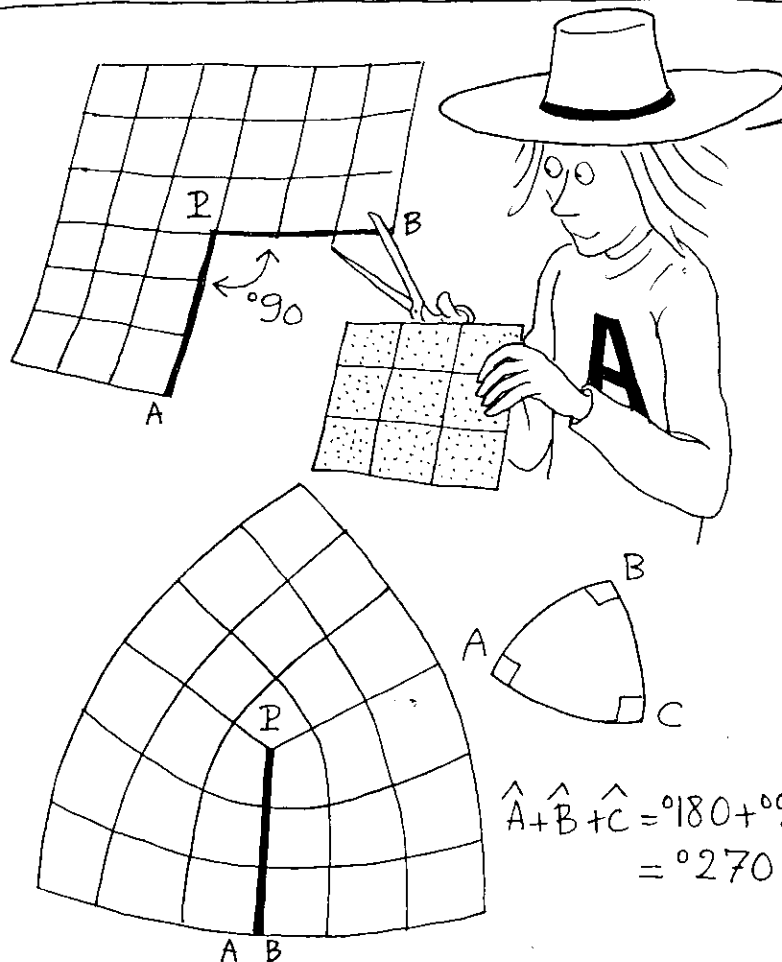
$$\hat{A} + \hat{B} + \hat{C} = 90^\circ + 90^\circ + \theta/2 + \theta/2$$



$$= 180^\circ + \theta$$

Anselimi ubu agiye kubaka za kone z'umwihariko, aho ubumerakimwe bw'ijishwa bushobora kubahirizwa.

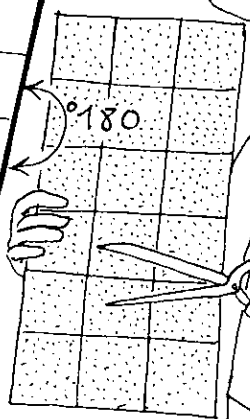
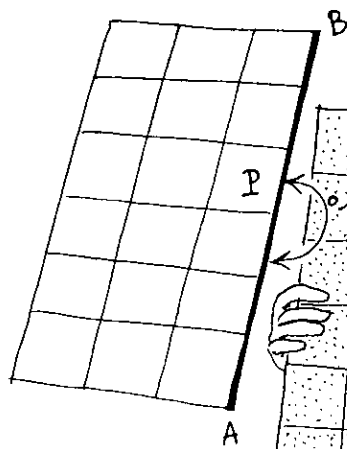
Ubuyobozi



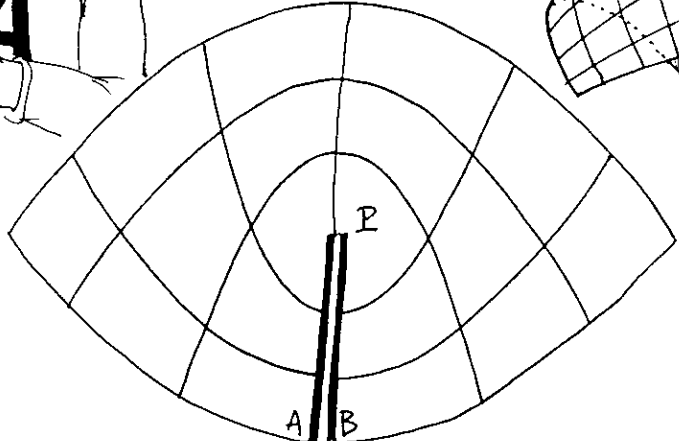
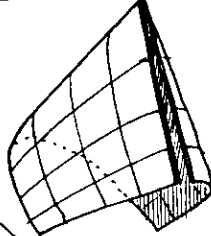
$$\hat{A} + \hat{B} + \hat{C} = 180^\circ + 90^\circ = 270^\circ$$

Hariya, ndakuramwo 90° .

Kuri kone nk'iriya, ushobora gushushanyaho za tiriyanjeri regitangeri nganyampande.



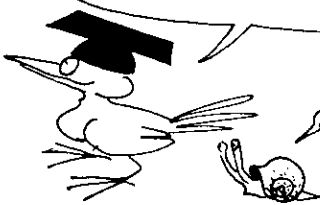
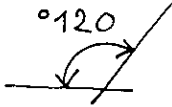
Ubu ngubu, nkuyeho segiteri ya $^{\circ}180$.



Kuri kone nki yo, igiteranyo cy'imfuruka za tiriyangeri kingana na $^{\circ}360$.



Bivuzeko bishoboka gushushanya ho, ukoresheje jewodezikye zayo, tiriyangeri ifite imfuruka eshatu zingana na $^{\circ}120$, rero zagutse.



Kandi izafungwa ibyaribyo byose ?

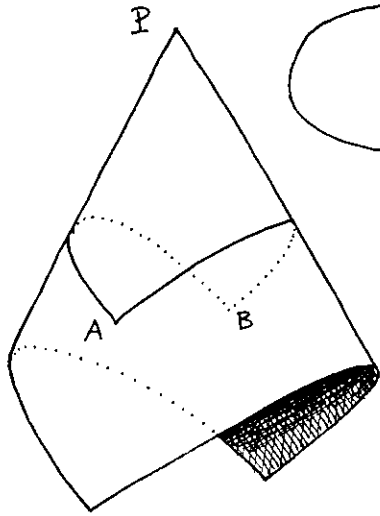


By'ukuri, nshuti yanjye Tirezizasi, ni mwebwe mufungiranye!

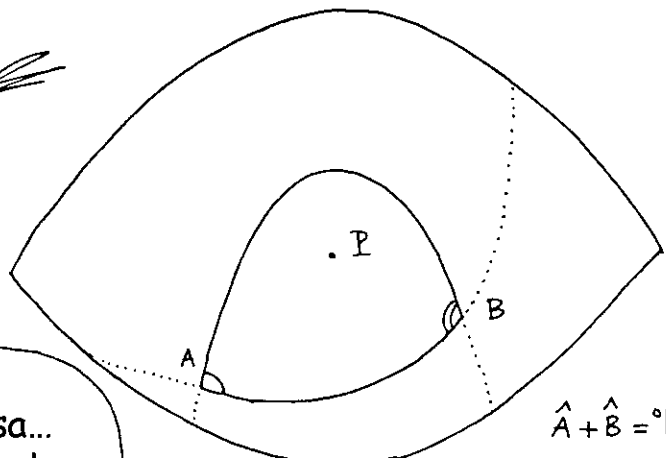


mi !





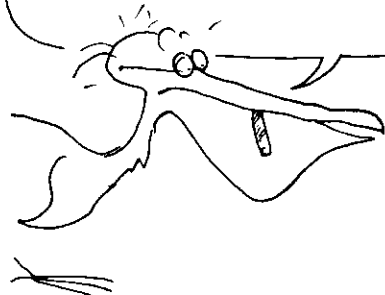
Kuri iyo kone, hashoborwa gushushanywaho za mfuruka-ebiyiri, z'igiteranyo kingana na $^{\circ}180$.



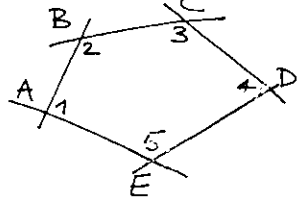
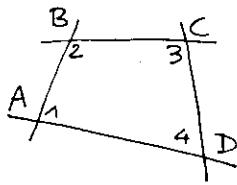
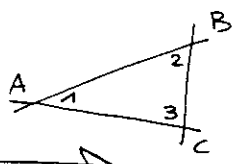
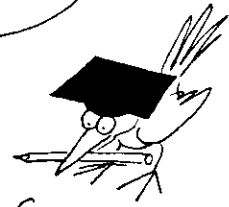
$$\hat{A} + \hat{B} = ^{\circ}180$$

KONE IREBEWE HEJURU

Buretse ! aho, sinsobanukirwa na busa... Bavuga ko ari za tiriyanjeri. Dore noneho za MFURUKA-EBYIRI. Kuki se, ubutaha, za... mfuruka-imwe ?!?!..



Ibyo bintu byose ni za POLIGONE

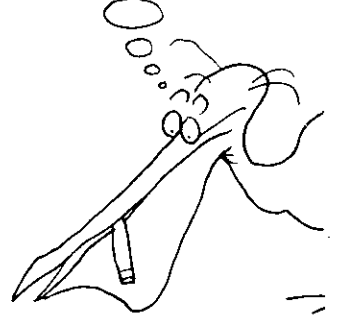


MU KIBYATARARE :

- Tiriyanjeri kingana na $^{\circ}180$
- Kwadarangeli kingana na $^{\circ}180 + ^{\circ}180 = ^{\circ}360$
- Petangeli kingana na $^{\circ}180 + ^{\circ}180 + ^{\circ}180 = ^{\circ}540$

Etc...

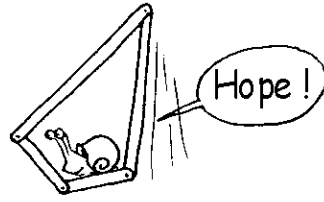
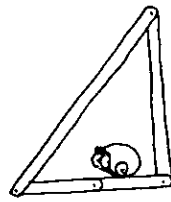
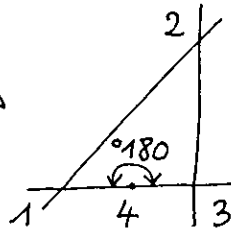
Ndapayutse...



Naho iyo ari MFURUKA-EBYIRI, yahindutse umurongo, icyo giteranyo kingana n'ubusa.



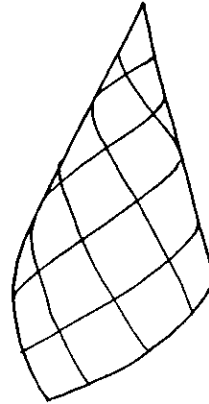
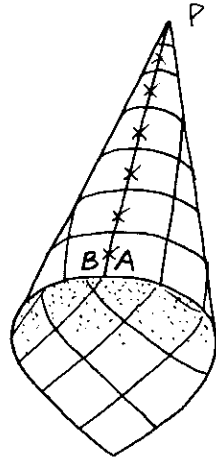
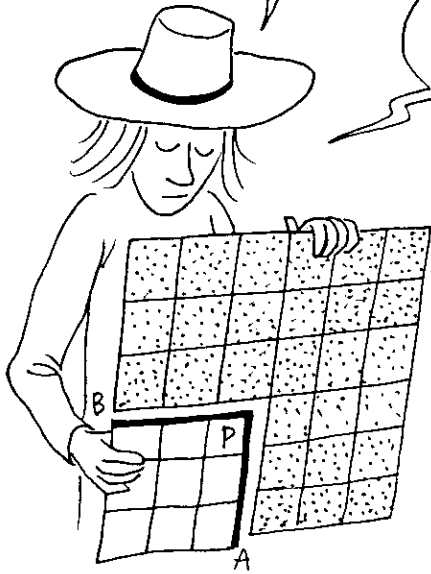
Kuki $^{\circ}180$ ziyongeraho buri gihe twongeyeho isonga ?



Ibi byagombye kutumurikira

Byiza, dukomeze...

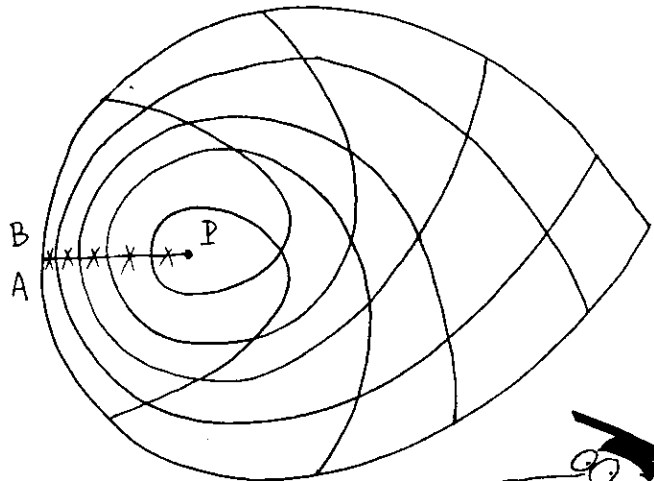
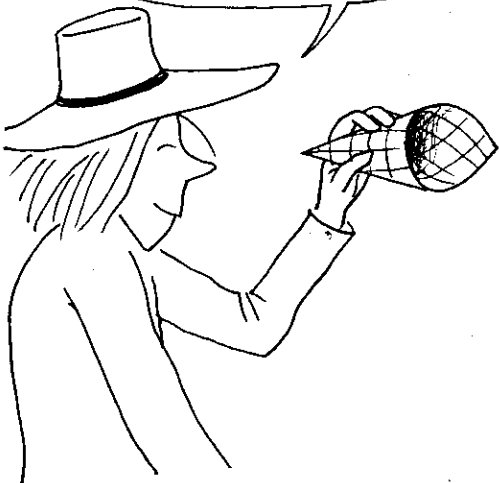
Ubu ngiye gukuraho bitatu bya kane by'ikibyatarare.



Wagirango ni seriviyete yo ku meza.



Kandi iyo nyirebye ntangiriye ku musozo



Anselimi abona ibi

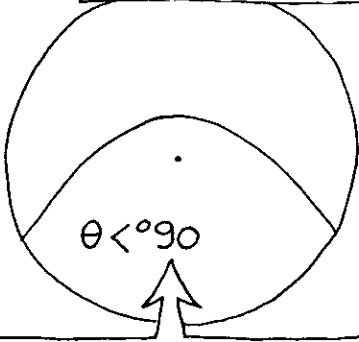


Kuri iyi kone, jewodezikye zose zinyuranamwo ubwazo (zinyuraniramwo hano zikurikije imfuru yemye). Umuntu yayishushanyaho imfuruka za mpandimwe.

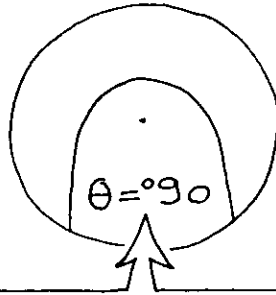
Rero byari byo !



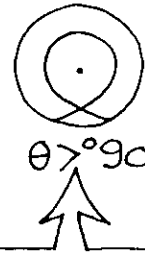
Byose biterwa n'imfuruka θ ya kone.



Jewodezikye ntizifungiranaho



Injyanaruhande ntarengwa



Za jewodezikye zifungiranaho

ZA POLE

Ese iyaba narinkuyemwo... byose ?

Gute byose ?!?



Yego, ese iyaba narinkuyemwo urebye ikibyatara CYOSE

Byiza, reba kone yanjye

Icyo mucyita kone ?

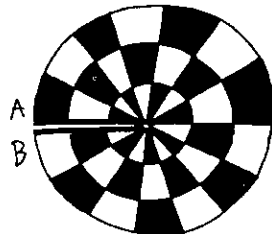
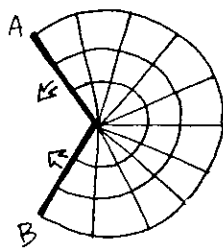
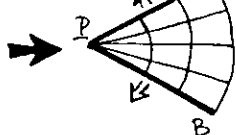
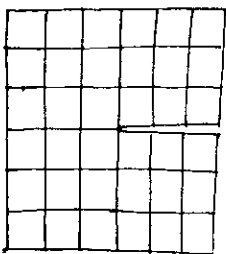
Amagorwa...



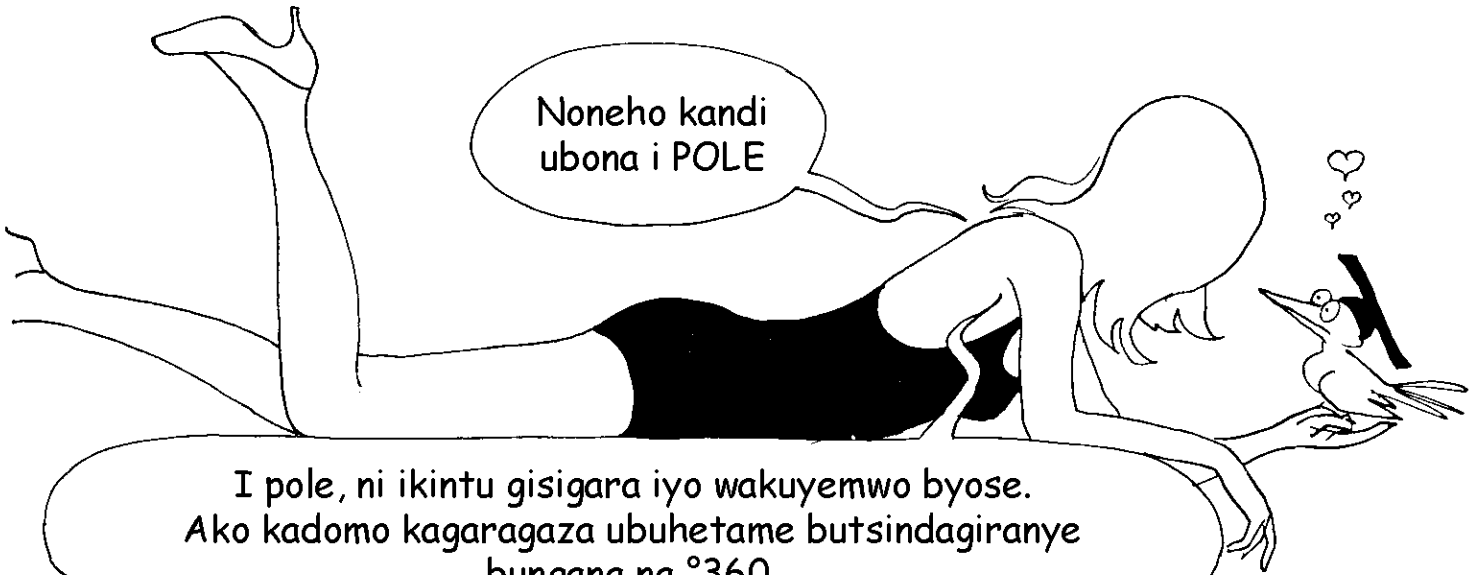
Mu by'ukuri, INJISHI zagezweho na Anselmi zashoboraga kuba zarakozwe hakweduwe ibikoresho.



Ukuyemwo nk'ikibyatarare cyose noneho kandi ugashyira mu bikorwa ubwo buryo, wagera kuri iki :



Noneho kandi ubona i POLE

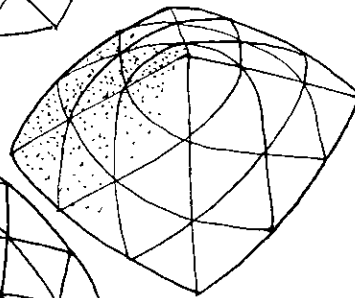
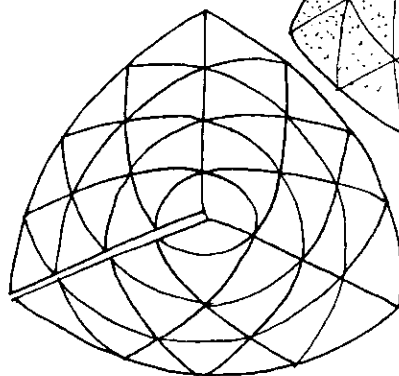
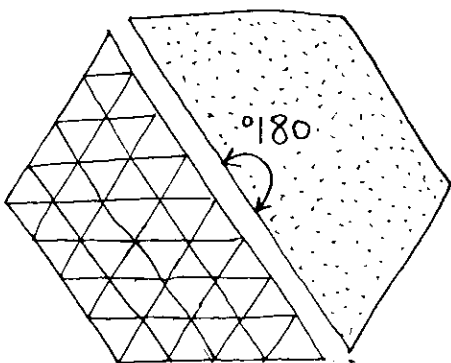
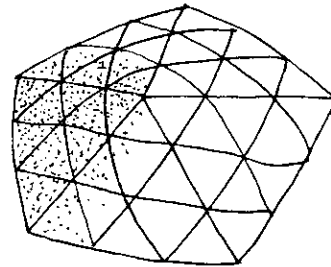
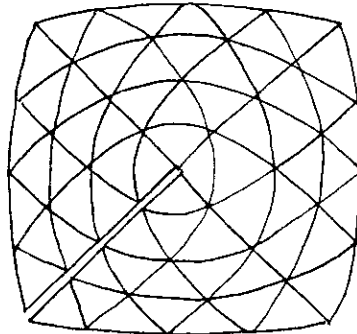
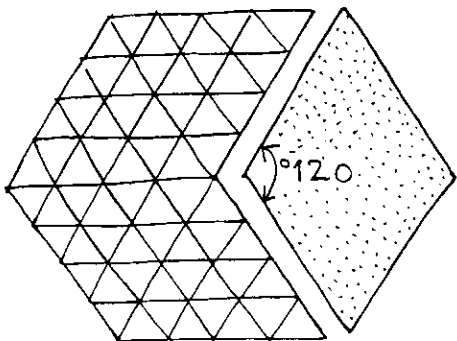
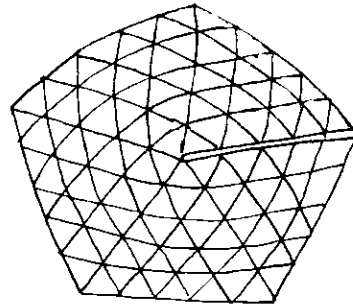
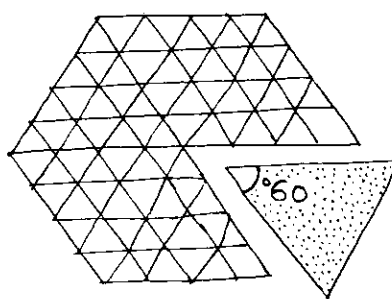
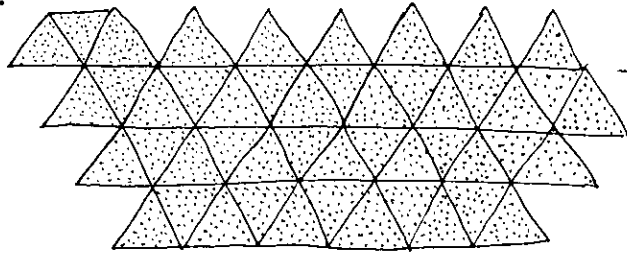


I pole, ni ikintu gisigara iyo wakuyemwo byose. Ako kadomo kagaragaza ubuhetame butsingiranye bungana na °360.

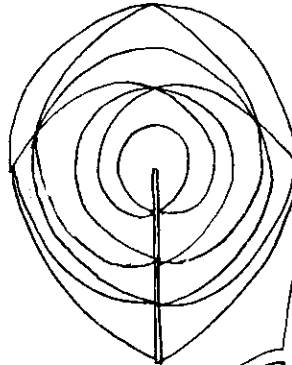
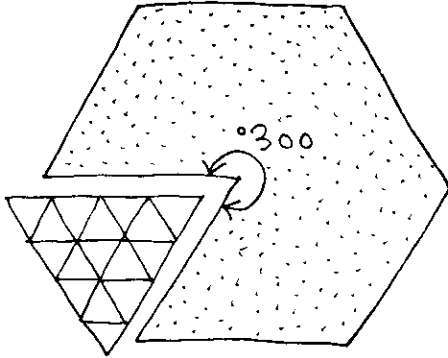
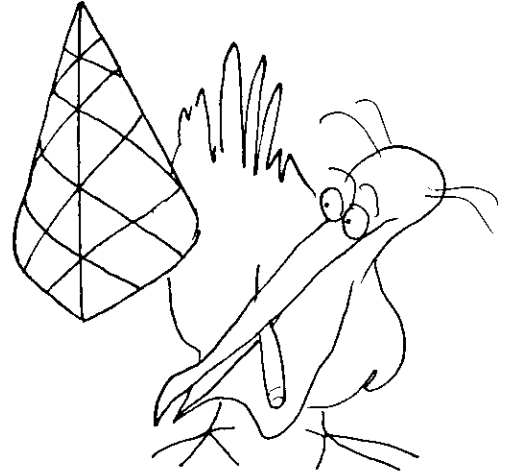
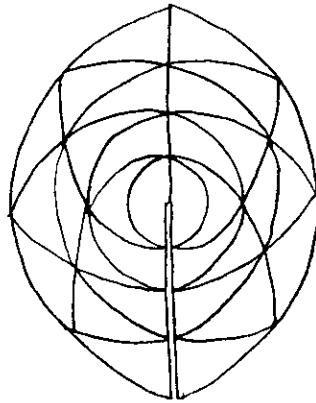
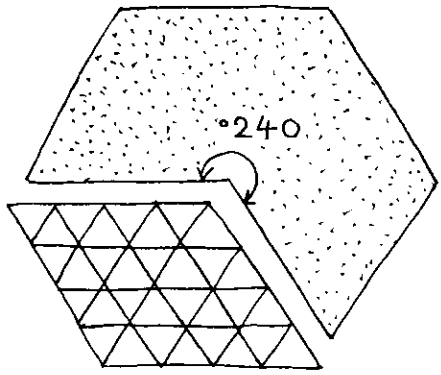
Mu kanya gashize, nari nometse esipase za dimansiyo ebyiri (amasirifase) nkoresheje mfurukennye. Ariko kandi nari no gushobora kubikora nifashishiye amatiriyangeri.



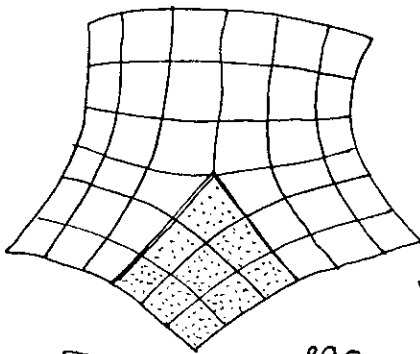
Cyangwa na za hezagone.



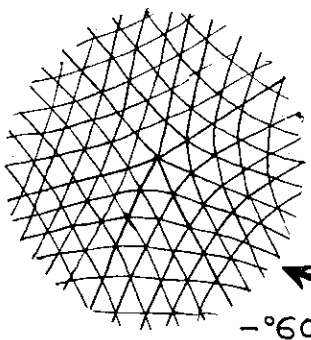
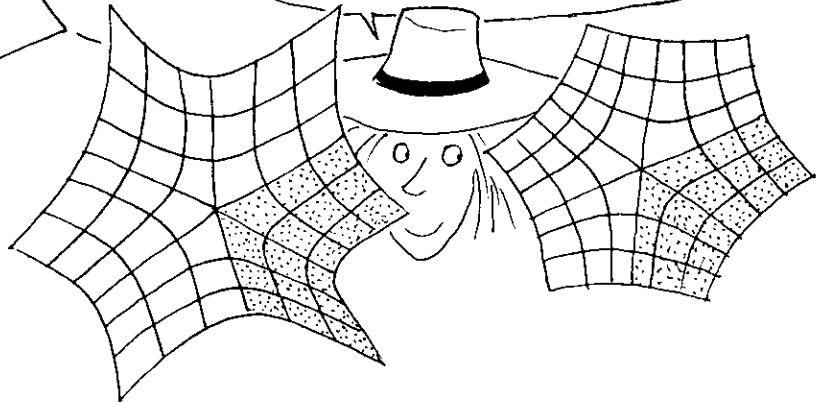
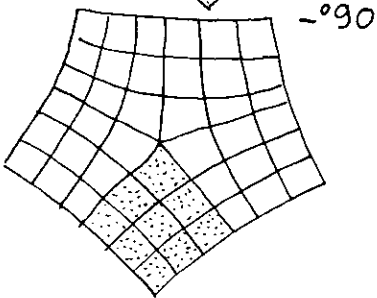
Izo njishi z'amatiriyangeri ndeshyampande zituma hakorwa kone z'imfuruka za 60° , 120° , 180° , 240° na 360° .



mpasemwo segiteri y'imfuruka θ , mba mparemye ubuhetame bwa negatifu $-\theta$, butsingiraniye mw'isonga ry'iyo negakone.



Ubugane bw'ubuhetame ntsindagirane = $-\theta$, etc...



Unashobora kandi gukora negakone nziza ukoresheje injishi nyatiriyangeli.



IGIPIMO CY'UBUHETAME

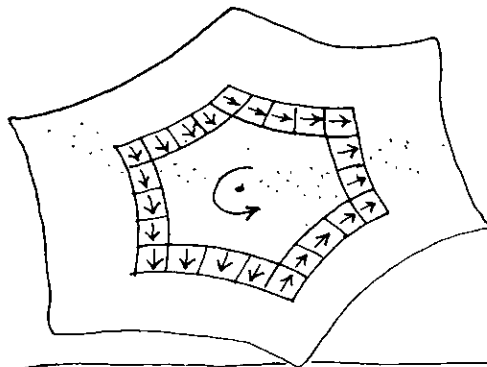
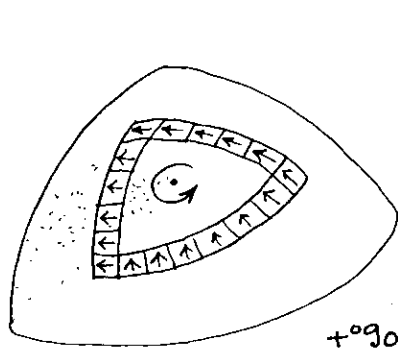
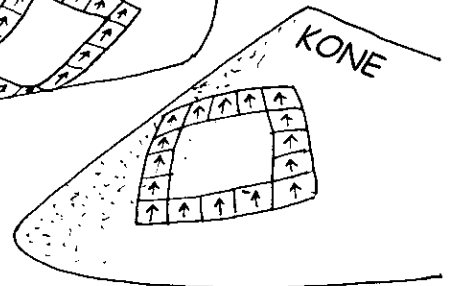
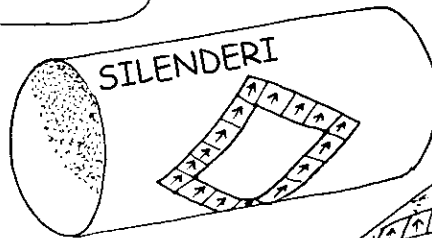
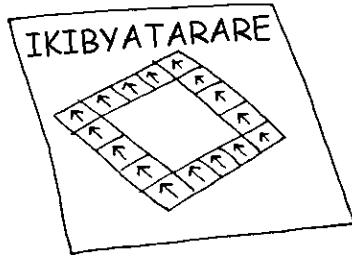
Dore Anselimi ahugiye cyane gukina ikibariko cy'ubwoko bushya.

Uwo mukino ushingiyeye mu gukikiza akadomo k'itsindagirana ry'ubuhetame ukoresheje amakaro unubahiriza intumbero y'imyambi. Iyo urangije gukora umuzenguruko w'akadomo P, imfuruka y'aho umwambi wahindukiye itanga igipimo nyacyo cy'ubuhetame θ .

Hakwiye ko amakaro yanjye yegerana neza

Ingero zimwe na zimwe :

Ikibyatarare,
silenderi, kone
(utazengurutse isonga) :
Iqipimo cy'ubuhetame :
ubusa



-180
NEGAKONE - 180



Tuzenguruke akadomo dukurikije inzira iyariyo yose.
Niba umwambi uhindukira mu ntumbero imwe, ubwo tuzaba dufite pozikone.
Niba uhindukira mu ntumbero inyuranye, tuzaba dufite negakone.

Ngiye gukora amapozikone afite buri imwe yose imfuruka nto cyane θ

Mu yindi mvugo,
ama atome y'ubuhetame...

Hanyuma rero
nzomekanye.



Mbona isirifase ngiye gushushanyaho
amatiriyangeli akozwe na za jewodezikye,
twakoze hifashishijwe akenda kamatana.

Igiteranyo cy'imfuruka za tiriyangeli cyasumbye $^{\circ}180$ ho agaciro kangana n'igiteranyo cy'imfuruka za makone mato y'amasonga abarizwa muri iyo tiriyangeli.

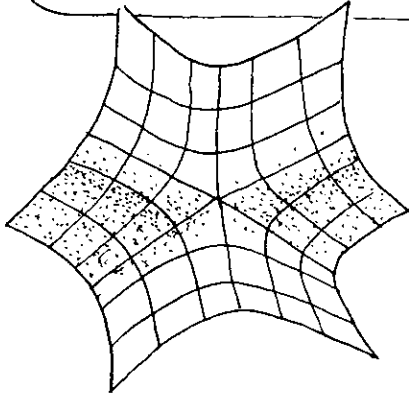
Ubuyobozi.

Icyo twita mu busanzwe isirifase
ihetanye ishobora gufatwa nk'igiteranyo
cy'umubare munini wa twa kone tunzugunya
duteranyijwe hamwe

Tushobora kandi gufatanya udu KONE
TUNZUGUNYA, cyangwa ama POZIKONE
n'ama NEGAKONE. Muri iyo nyanaruhande,
igiteranyo cy'imfuruka za tiriyangeri kingana na $^{\circ}180$,
wongeyeho ubungane bw'ubuhetame itwikiriye,
bubazwe mu buryo bwa alijebure.

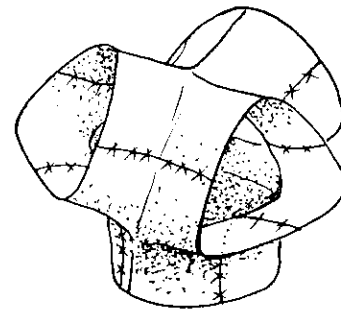
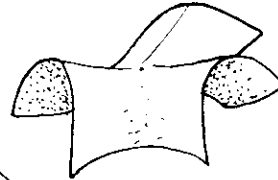
AKAZI K'IBIREMO

Sofi, haraba iki nimfatanya ama NEGAKONE ?

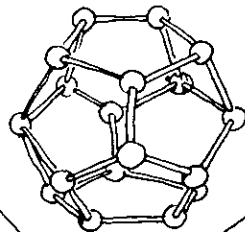


Urugero
ama negakone
ya $\theta = -^{\circ}180$.

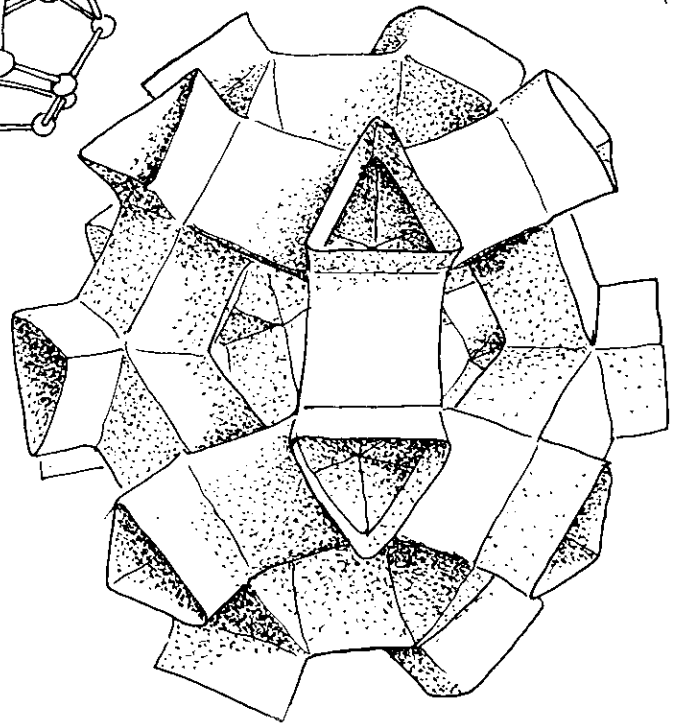
Umuzenguruko wazo
uhwanye na hegizagone
yaba ifite imfuruka zayo
esheshatu zemye.



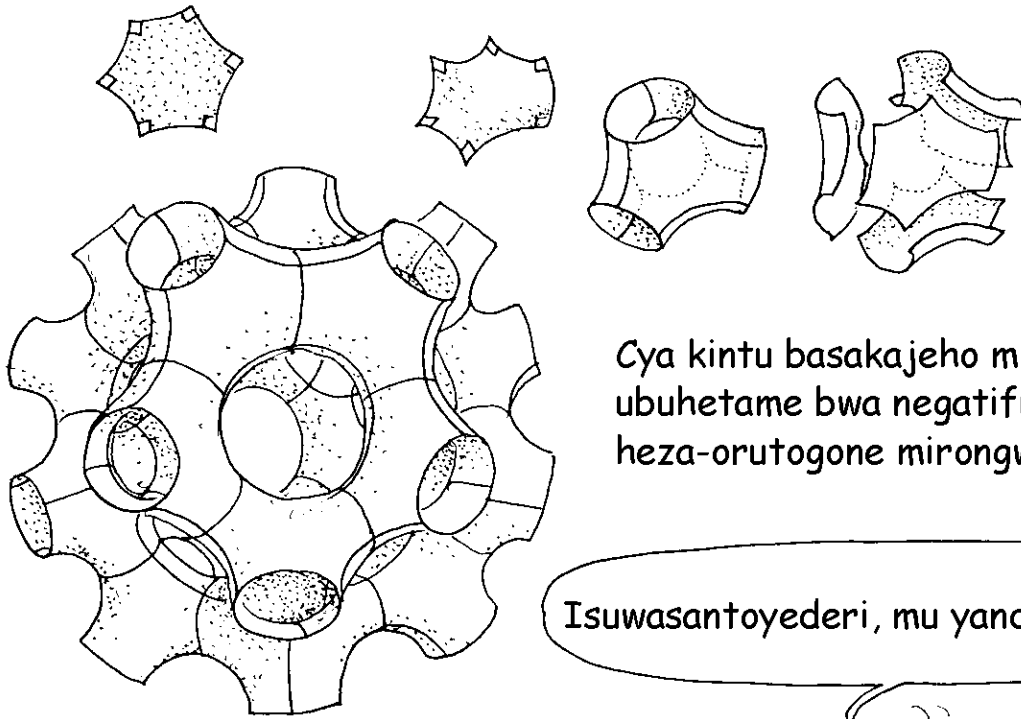
Dushobora
ubwambere kuzifatanya
ennye kuri ennye.



Uramutse
ufataniye
makumyabiri,
ubona iki gice cya
sirifase gifite
ubuhetame bwa negatifu,
bumwe bwaserukiye
kw'isonga rimwe muri
makumyabiri ya
DODEKAYEDERI(*)



(*) Mu Kigiriki DODEKA = Cumi na kabiri + EDRA = INDIBA.



Cya kintu basakajeho mu buryo bungana ubuhetame bwa negatifu. Kigizwe na heza-orutogone mirongwitandatu.

Isuwasantoyederi, mu yandi magambo...

Wagirango n'ingingomugongo ya DODEKAYEDORODONI



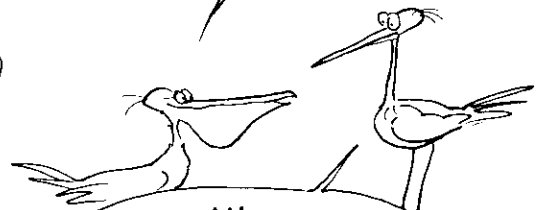
Iyaba mwari umwometsi w'amakaro, kandi iyaba mwakoreshaga amakaro nya heza-orutogono, dore uko hasi mu nsu waba wometse hasa.



Nshuti yanjye, naremeye mbwirwa ko uwahindura umuragebuvuke tw'igishorobwa, byashoboka ko igishishwa cya yo ...

Uru rugero rwerekana ukuntu ikwirakwiza ry'ubuhetame rishobora kugira icyo rimara mw'ihinduka ry'iforoma y'ibintu.

!!!



Mbega amarorerwa !!!

DIMANSIYO ESHATU

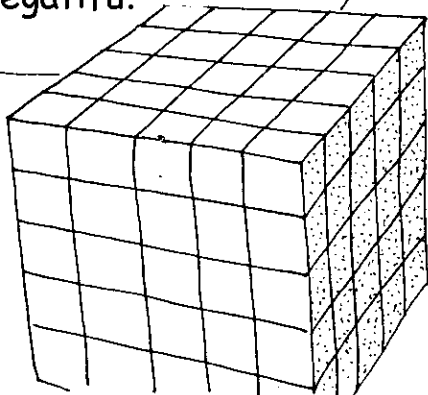
Sofi, ese dushobora KUBONA ubuhetame bwa esipase yacu ya dimansiyo ESHATU ?

Biraruhije, kuko uyituyemwo

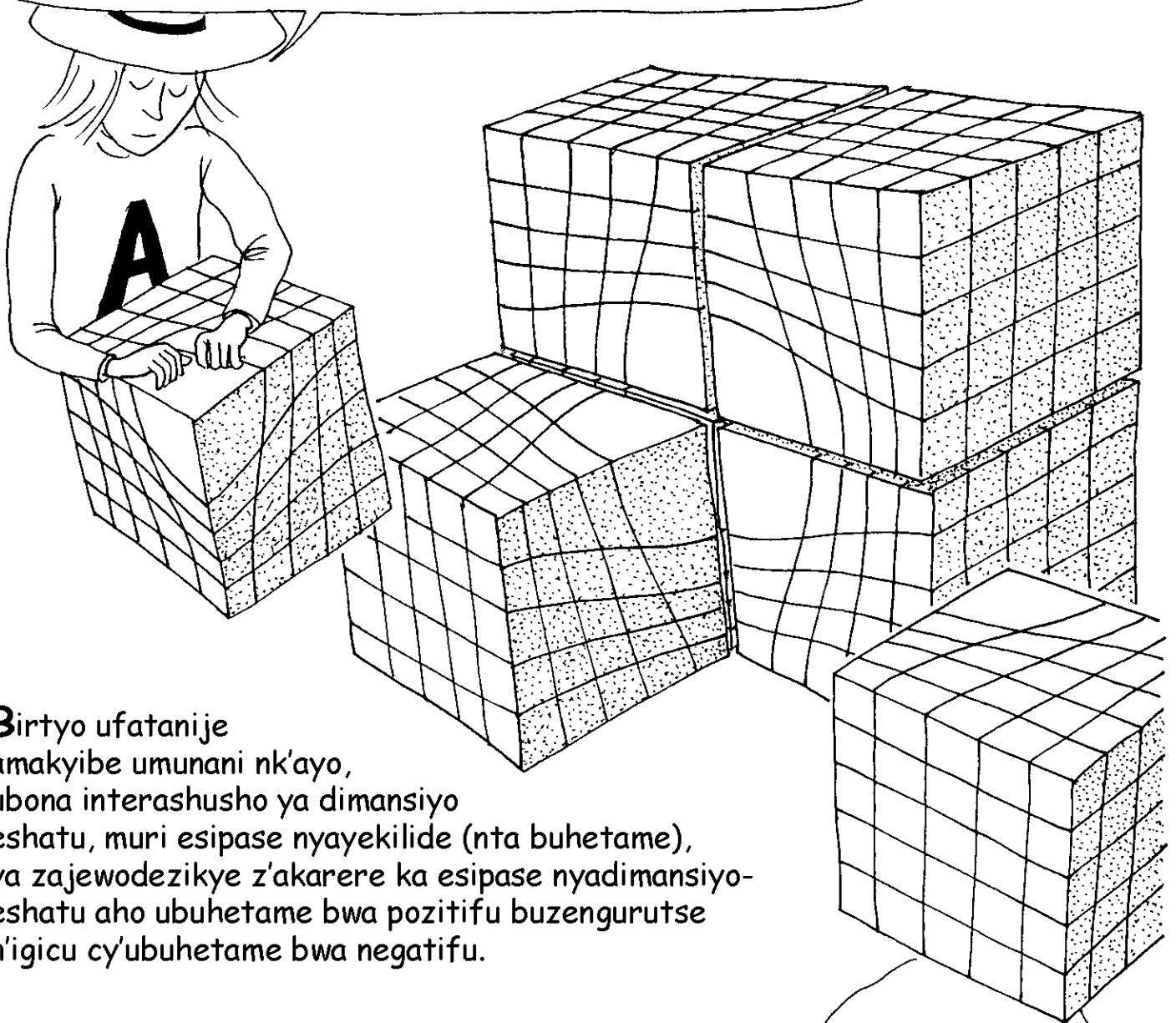
Turebe, nabonyeko umuntu ashobora gutega igicucu cy'amajewodezikye y'isirifase (ya dimansiyo ebyiri) ku kiyatarare (dimansiyo 2)

Iri « pfupfu » riranga intsindagirane y'ubuhetame bwa pozitifu, bukikijwe n'igicu cy'ubuhetame bwa negatifu.

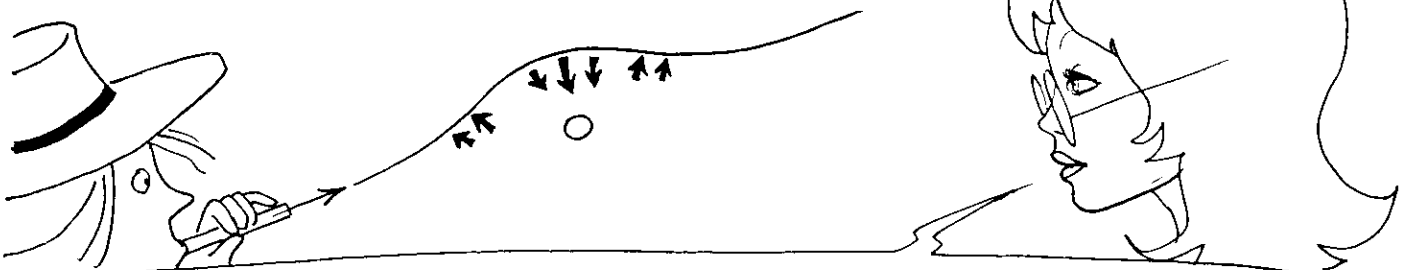
Reba ubungubu icyibe yambaye hakoreshejwe umugozi.



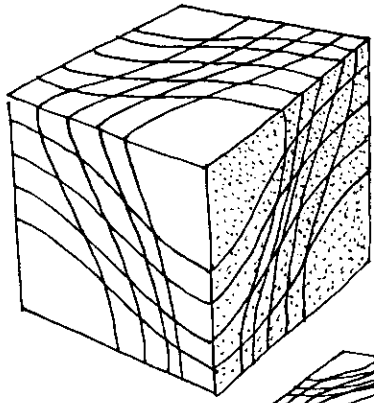
Ubungubu, ngiye kunyereza imigozi nk'uku nguku :



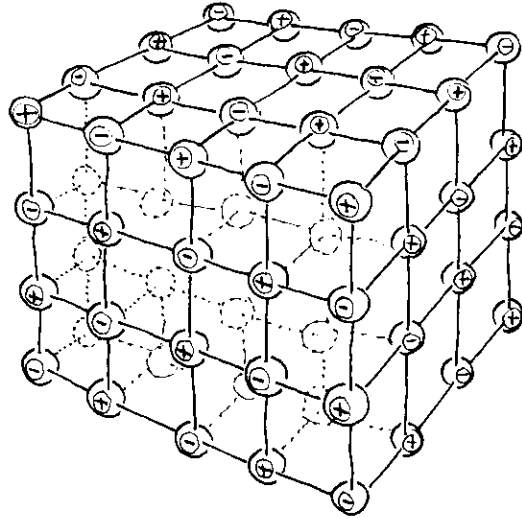
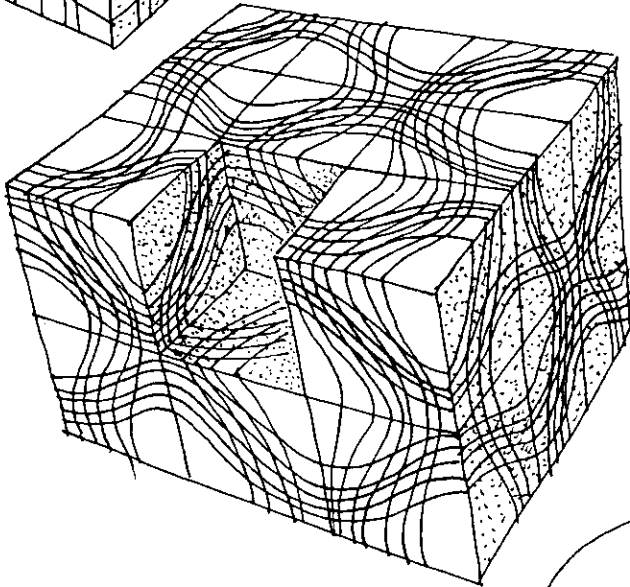
Biryo ufatanije amakyibe umunani nk'ayo, ubona interashusho ya dimansiyo eshatu, muri esipase nyayekilide (nta buhetame), ya zajewodezikye z'akarere ka esipase nyadimansiyo-eshatu aho ubuhetame bwa pozitifu buzengurutse n'igicu cy'ubuhetame bwa negatifu.



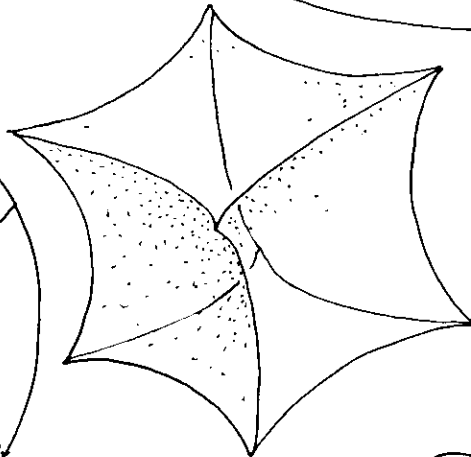
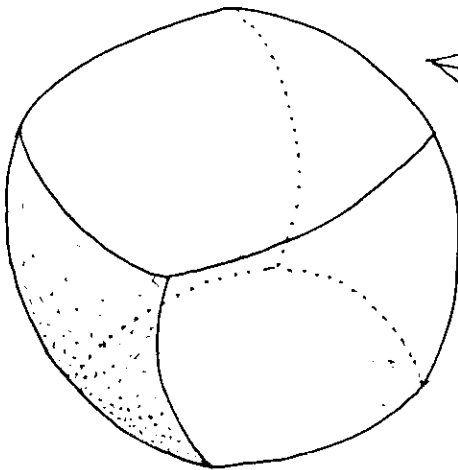
Usanishije izo jewodezikye n'ama YIRA, wabona ubwambere na mbere iyigizayo, nyuma yaho, ikururana, hanyuma kandi iyigizayo.



Ugiye unyereza imigozi muri ubu buryo noneho
kandi ugafatanya uko bikwiye ama kyibe,
wakora igishushanyo cy'isi ituwe n'ubuhetame
bwa pozitifu na negatifu :



Iyo ubirebeye hafi,
usanga ari amahinduraforoma
akora kuri za KYIBE zuzuye
esipase nyadimansiyo eshatu.

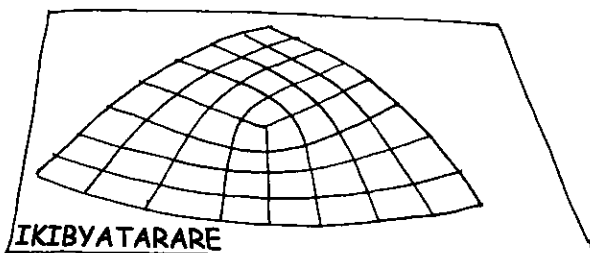
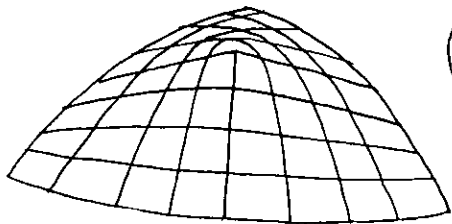


Dore, biteye amatsiko,
nshobora kurundanya ayo makyibe yose
adasobanutse noneho nkuzuza esipase.

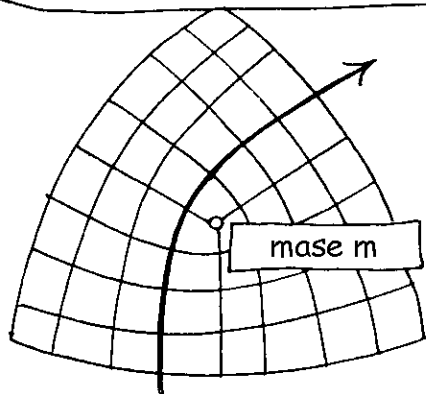


INTERAMASHUSHO

Nshobora gutera ishusho
y'amajewodezikye ya kone ku kibyatarare



Iyi mirongo yose ihetamye,
ibyobyerekana ama YIRA



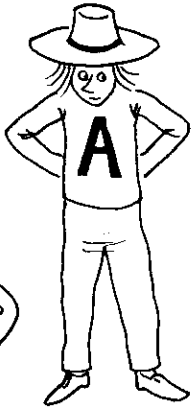
Byo pe !

Igitekerezo shingiro
cya RELATIVITE RUSANGE gishingiye
ku gusanisha ama MASE n'impinduka
z'ubuhetame bwaho bwa esipase.

Murashaka kuvuga
ko mase ari imfuruka ?!?

Hi Hi !..
nshyiriramwo iya $\pi/8$...

Yego, mu mitekerereze igira iti
za mase ni intsindagirane z'ubuhetame



Muri make, icyo mushaka kuvuga bwana Aluberiti, ni uko imihindukire y'inzira, itewe n'IMBARAGA, ari gusa igikorwa cy'INTERAMASHUSHO, mw'isi yacu y'inkirigito, ry'inzira yaciwe ku yindi sirifase, kandi ari JEWOZEZIKYE y'iyi ngiyi.

Metafizikye kandi !

Ariko oya,
ni jewometiri


Ngiye kuguha urugero.
Tekereza ko turi mu cyumba muri esipase,
tuzenguruka Isi.

Ubwo rero nta rukuruzi nimwe yaba itugeraho

Ahi oya !

mi !

Tugiye gukina umukino
usa nka billard

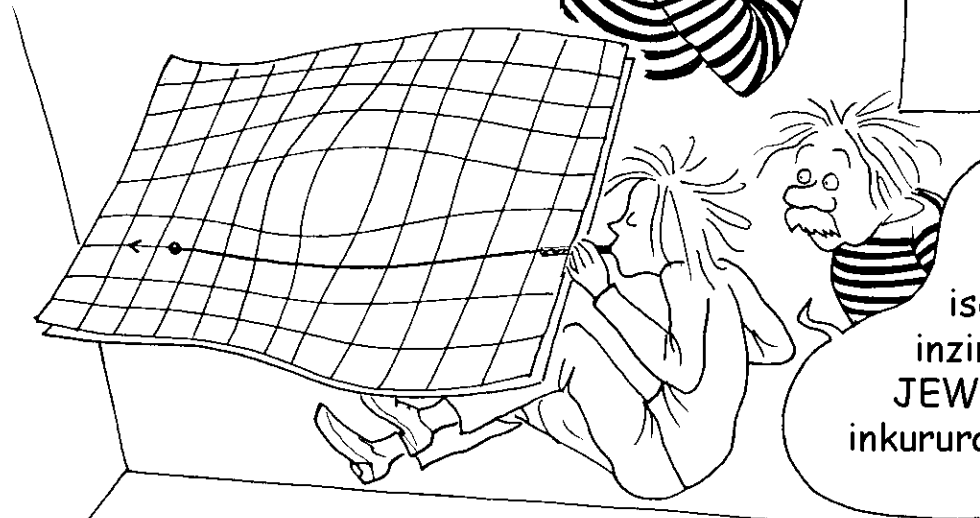


Bigaragara ko icyo kintu kigizwe na sirifase ebyiri zibonerana, zuzuye iminkanyari, imihiro, ariko isa kandi imwe yegeyanye n'iyindi.

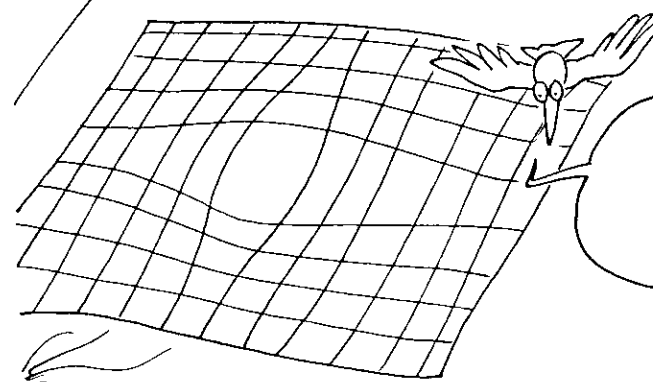
Ibyo bituma haterwa utubiye duto hagati yazo kandi inzira zatwo zikitegerezwa.

Izo nzira ntizihindurwa n'umuvuduko ntangiriro udahinduka muri urwo rugendo rwose.


Ubuyobozi



Muri icyo nnyanaruhande isobanutse, hagaragarako inzira zose zishoboka ari za JEWODEZIKYE (iyaba hari inkurura, ibyo ntibyabaye byo).



Ohu, reba, itara riratera ishusho y'inzira hasi ya kapusile nyasipase yacu.



Umuntu wabona ayo mashusho yatekereza ko ibintu bigendagenda kuri icyo KIBYATARARE biri mu MURIMA w'IMBARAGA NKURURA. Ahubwo ari uko icyo ari ikibazo cy'ubuhetame bwa sirifase.

Biryo rero, iyo nitegereje inzira nkurikizwa y' i komete izenguruka Izuba, twemejeko ikorwa muri esipase ya dimansiyo eshatu nyayekilide, nta buhetame, ikiri cyo ni uko iyo komete igendera kuri JEWODEZIKYE y'ubwoko bwa esipase aho.... igenda YEMYE RWOSE !!!

Tubona ibicucu by'ibintu.

Ibyo muvuga, nshuti yanjye Tireziyasi, bijyanye n'inyakuri ya palatoni pe.

Nta kundi ushobora kugenda uretse WEMYE RWOSE !

uRUMURI rugendera ku iJEWODEZIKYE.

Dore, birashimishije, ama jewodezikye, iyo uteye amashusho yayo ukurikije iyindi mfuruka, ntabwo agira na busa umutwe umwe !

?!?

Tireziyasi !

Byiza, byiza...

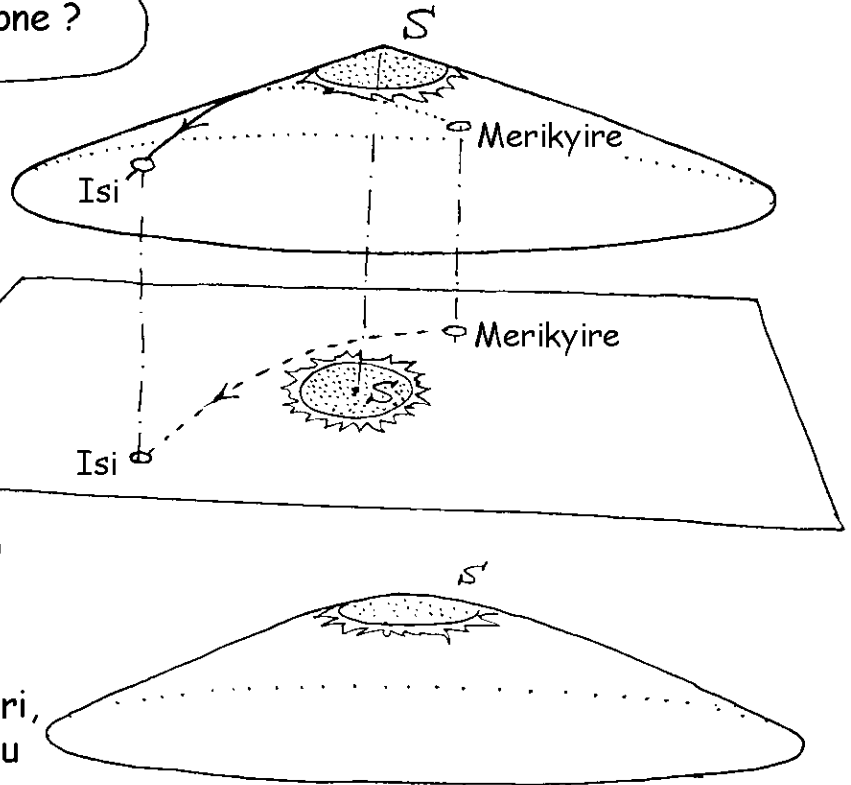


MASE- MATSIYERI

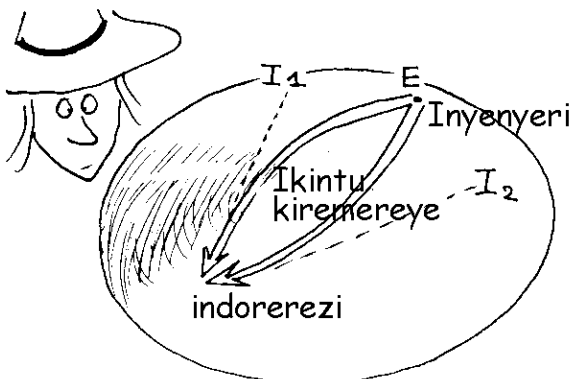
Ariko rero, i Zuba ni i... nyakone ?



Turabizi ko Izuba riyobya imirasire y'urumuri ituruka kuri Merikyire



Twemera ko esipase, mu buturanyi bw'IZUBA, IBYATARAYE. Mu by'ukuri, uriya mubumbe w'izuba, urebeye no ku buremere bwawo bw'inshi, ugaragaza ubuhetame bufatika runaka. Ariko, nk'uko Izuba atari mase nyakadomo, twakagombye kugaragaza iyo ntara ya esipase twifashishije kone isenye kw'isonga:



Ibintu biremereye cyane bishobora kugonda esipase k'uburyo indorerezi ishobora kubona ishusho EBYIRI I1 na I2 z'inyenyeri imwe E : Ni inkurikizi za LANTIYE NYAGARAVITE, yagejejwe ahagaragara vuba n'ukwitegereza.

Mase y'ama atome, y'ama paritikyile,
agize ubuhetame rusange bwa Iniveri.

Duha
MASSE igisobanuro
NYAJEWOMETIRIKYE

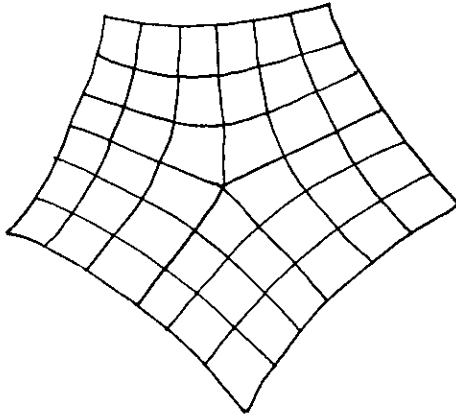
Ariko, hagati y'ama
atome hariho... UBUSA ?

cyangwa rero nta
nakimwe nsobanukiwe...

Ariko oya, nshuti yanjye, ririya
hangana rishaje hagati ya matsiyeri
n'ubusa ryataye rwose agaciro;
hasigaye gusa... jewometiri

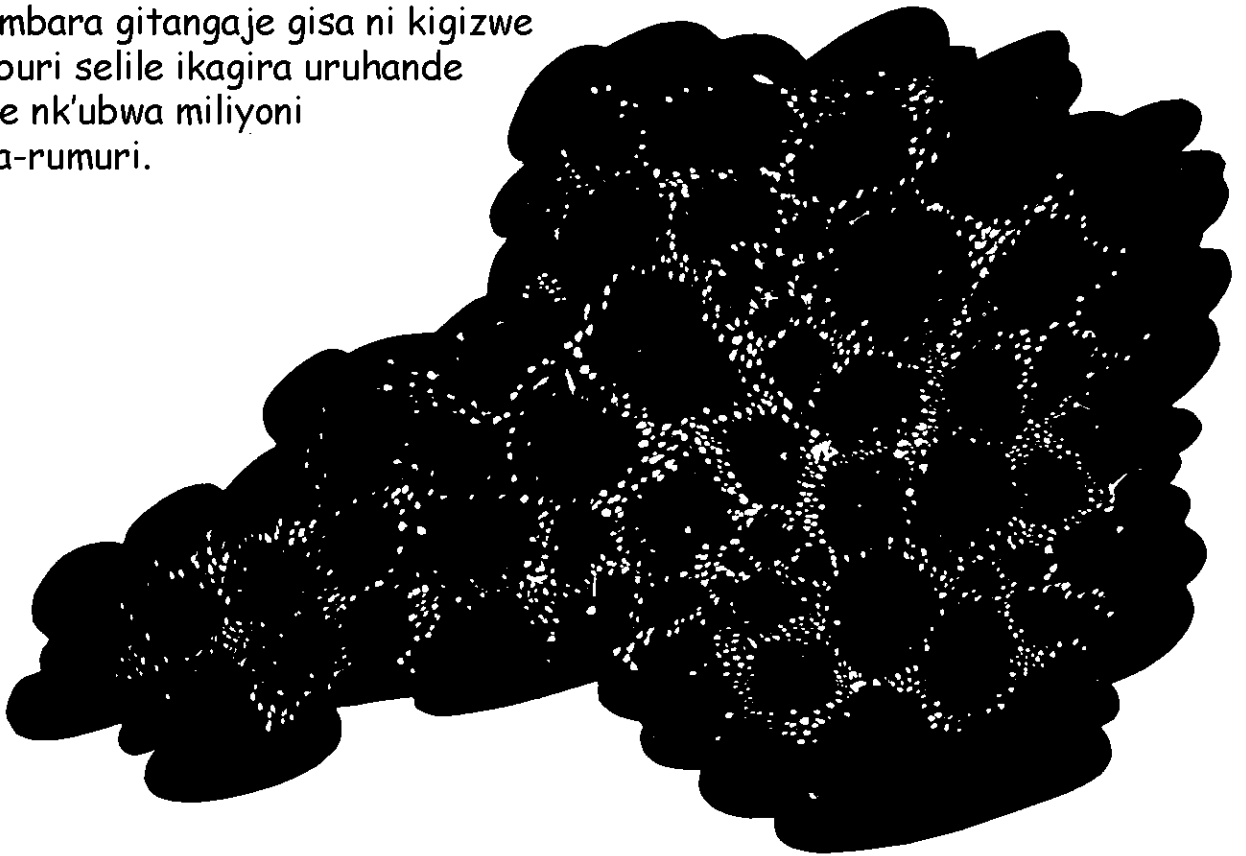
Birenze jewometiri !!?!

Naho se za negakone ?



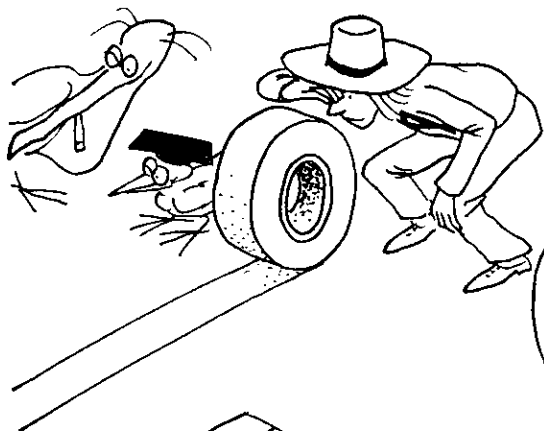
Zivuga kuri "mase negatifu", zibyara imbaraga nsunika. Iniveri yuzuyemwo mase negatifu yaba itangaje. Aho kubyara za galagisi, inyenyeri, yaba ituwemwo n'amafuro, n'imyanya-busa minini:

Birtyo rero niko amatsinda ya za galagisi yikwirakwiza, yubaka igitambara gitangaje gisa ni kigizwe n'amaselile, buri selile ikagira uruhande rw'uburebure nk'ubwa miliyoni 200 z'imyaka-rumuri.

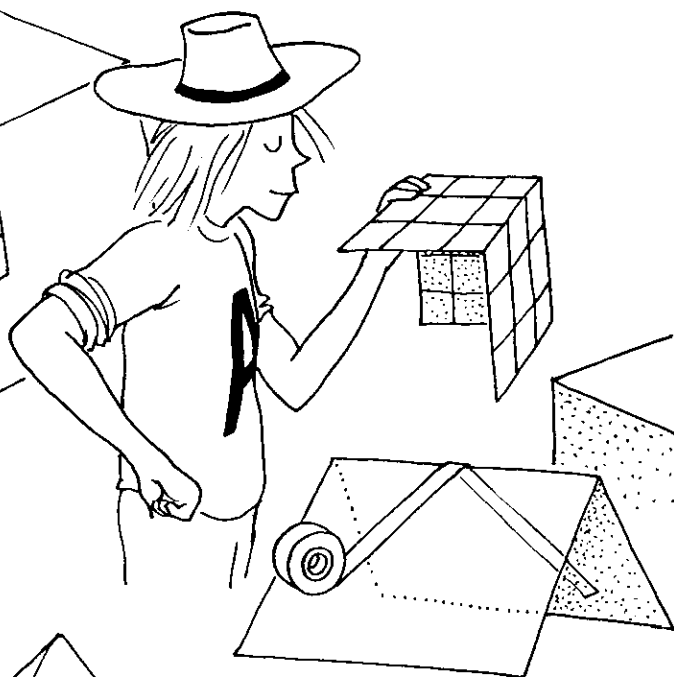
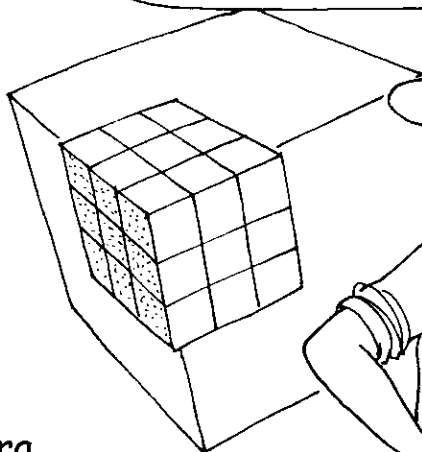
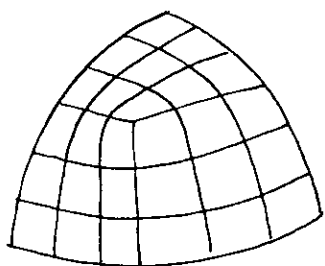


Imbaraga nyagaravite, birtyo, zishobora kwigaragaza nka nsunika ku mirambi miremire cyane.

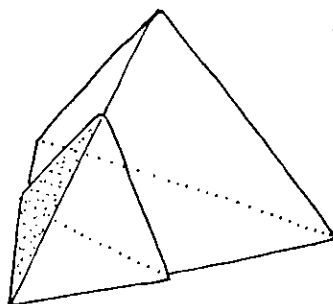
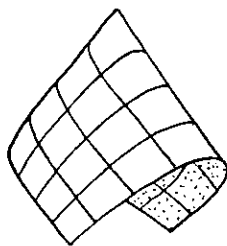
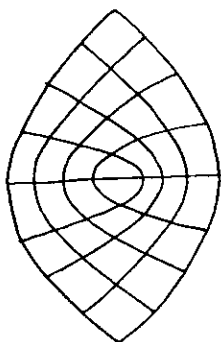
POLIYEDERI



Anselimi, ugiye kugaragaza amajewodezikye ya sirifase ukoresheje, nk'urugero, akenda kamatana.



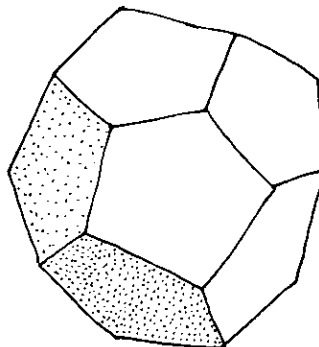
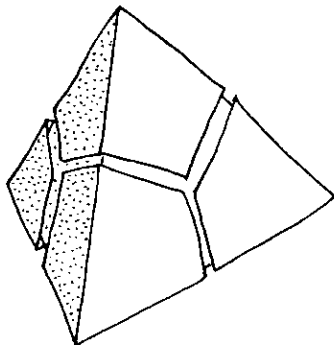
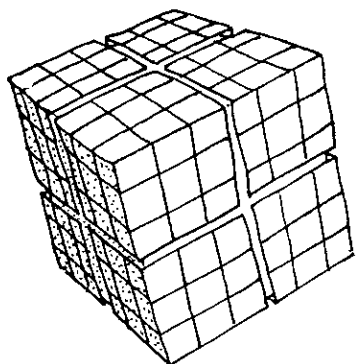
Igikorwa cyo guhina iyo kone ($\theta = 90^\circ$), nta na kimwe gihindura kuri za jewodezikye, kandi rero gihuye neza n'isonga rya kyibe.



Nk'uko rero, ushobora gukora imihoro itatu kuri iyo kone ($\theta = 180^\circ$) kugirango ushobore kuyihuza n'isonga rya tetarayedereri y'impande zingana.



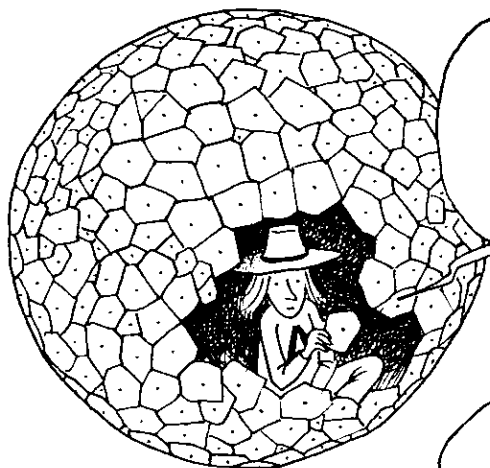
BiSABAKO ESIPASE IBA IFUNGUYE CYANGWA IFUNZE



Kone umunani ($\theta = 90^\circ$)
zituma gukora i KYIBE ya
 $90 \times 8 = 720$
bishoboka

Kone ennye ($\theta = 180^\circ$)
zituma gukora i
TETARAYEDERI ya
 $180 \times 4 = 720$
bishoboka

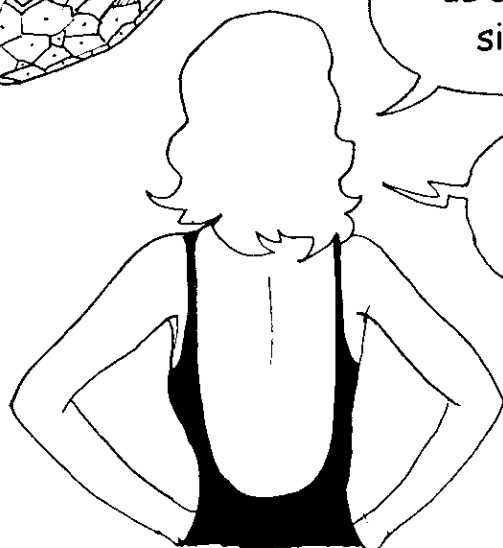
Kone makumyabiri
($\theta = 36^\circ$) zituma gukora
i DODEKAYEDERI ya
 $36 \times 20 = 720$
bishoboka



Ngiye wegeranya mu buryo buhwanye
neza kandi bushoboka umubare N wa za
mikorokone z'imfuruka θ , mbona ko igihe
 $N \times \theta = 720$, mbona siferi !

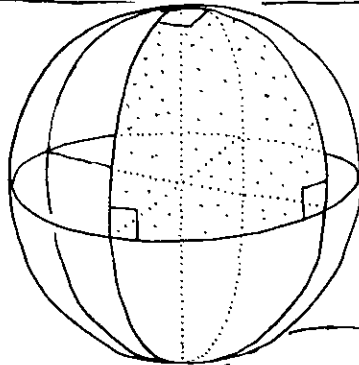
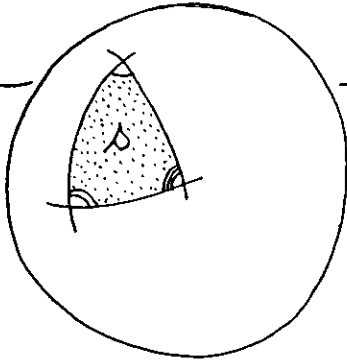
Ni ibisanzwe kuko
uBUHETAME BWOSE bwa
siferi bungana na 720

Ubu rero,
nshuti yanjye,
sohoka aho ngaho



Kuri siferi, ubuhetame busakaye mu buryo bungana hose.
 Birtyo igiteranyo cy'imfuruka za tiriyanjeri ishushanyije kuri siferi kingana
 na $^{\circ}180 + ^{\circ}720 \times s/S$. Aho s ari ubuso bwa tiriyanjeri naho S ari ubwa siferi.
 Igihimba cya kabiri: $720 \times s/S$ kigaragaza uBUNGANE bw'UBUHETAME
 buri muri tiriyanjeri.

Ubuyobozi (*)



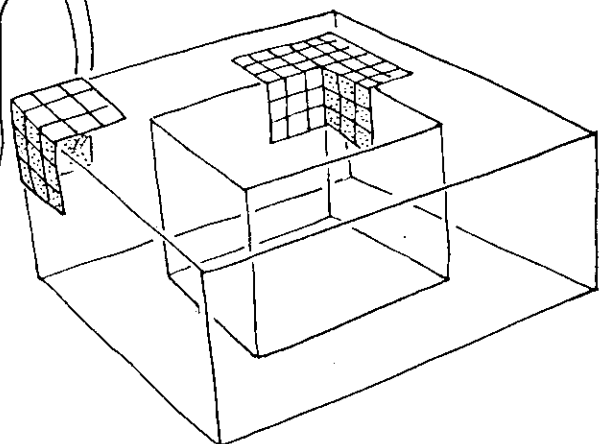
Akarorero; iyo tiriyanjeri iri mu
 gitereko kigana n'igice kimwe
 cya munani cy'ubuso bwa siferi
 $\hat{A} + \hat{B} + \hat{C} = ^{\circ}180 + ^{\circ}720/8 = ^{\circ}270$.

Biratangaje !..

Kubera impamvu zisa n'izo,
 niba indemere yo hagati na hagati muri
 esipase nyadimansiyo eshatu (ni ukuvuga
 ubungane bw'ubuhetame ku gipimo cya
 volime) gisumba garamu 10^{-29} /cm³ iyo
 esipase IZIFUNGIRA kuriyo ubwanyo.

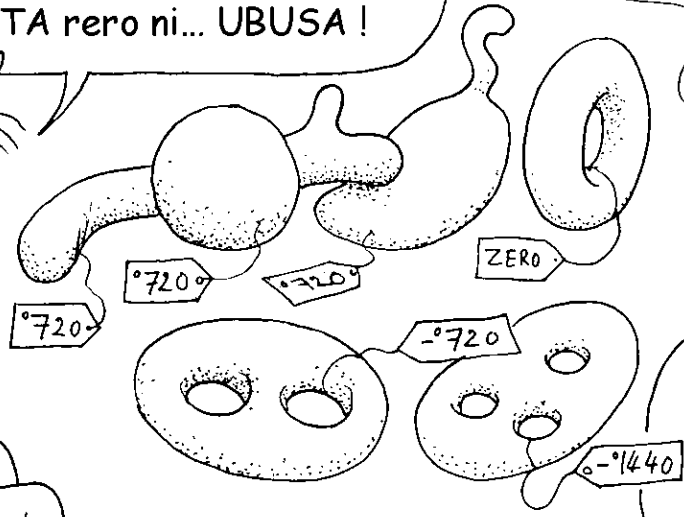
Vuga, bwana Aluberiti,
 ubuhetame bwose bw'
 INGATA, bungana n'iki ?

Biroroshye, Anselimi,
 yigaragaze gusa urtya : wifashishije
 posikones umunani ($\theta = +^{\circ}90$)
 Na ngakones umunani ($\theta = -^{\circ}90$)



(*) Ihame dukesha GAWUSI.

Igiteranyo cy'imfuruka cumi n'esheshatu, cy'ubuhetame cumi na butandatu, kingana n'ubusa. UBUHETAME BWOSE bw'INGATA rero ni... UBUSA !



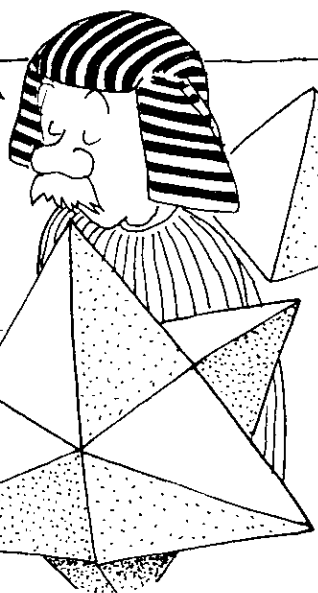
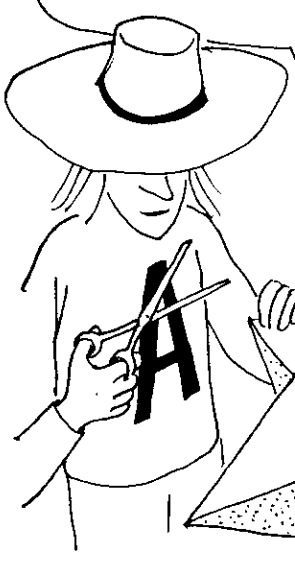
Ehee yego...



Ikintu cyose cy' iforoma ya siferi gifite UBUHETAME BWOSE bungana na 720 , ni ukuvuga 4π .

Ingata y'imyobo N, IFUGASE (*), izagira ubuhetame bwose bungana na $-4\pi(N-1)$ (dukuramwo 4π kuri buri mwobo).

Naho iyo ukoze ikintu kifungiyeho ubwacyo mw'iforoma ya poliyederi, ugateranya ubuhetame bwitsindagiriye mu masonga, ugomba kubona ubuhetame bwose.



Tireziyasi, muzehe wanjye urakora iki ?

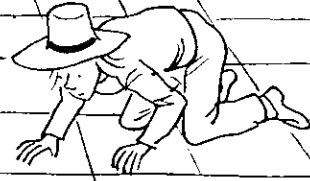


Ndashaka ubuhetame bwose bwanjye

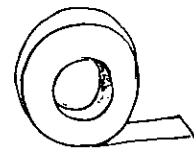
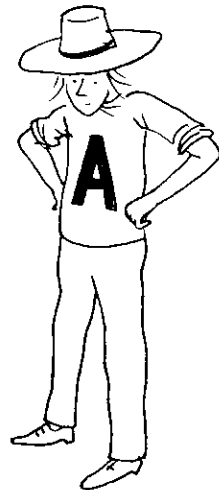
(*) i FUGASE ni ubwoko bw'umukati ukorerwa mu majyepfo y'u Bufaransa, aho uyu mwanditsi atuye.

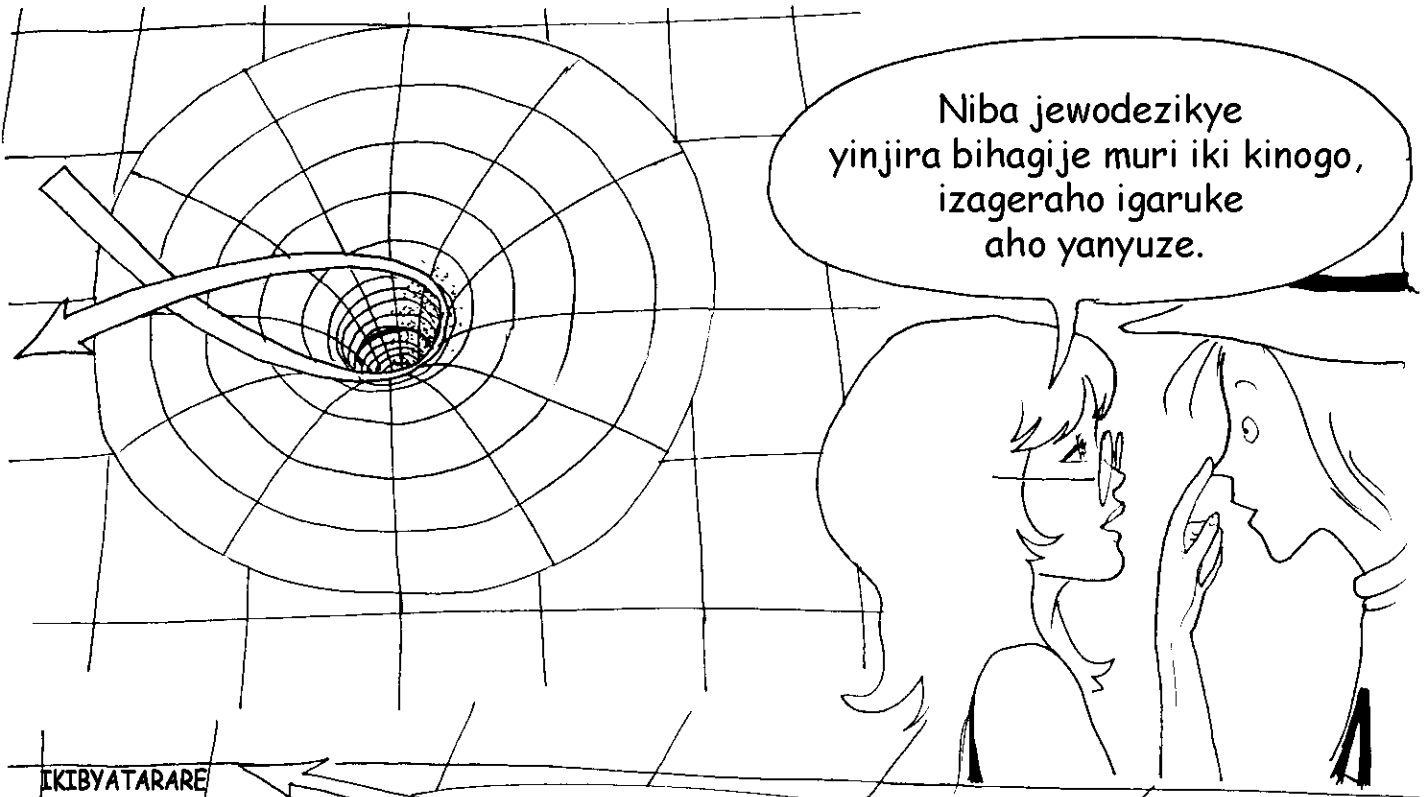
IMYEGERERE YA MBERE Y'UMWOBO WIRABURA

Icyo kinyagwa
ni bwoko ki ?

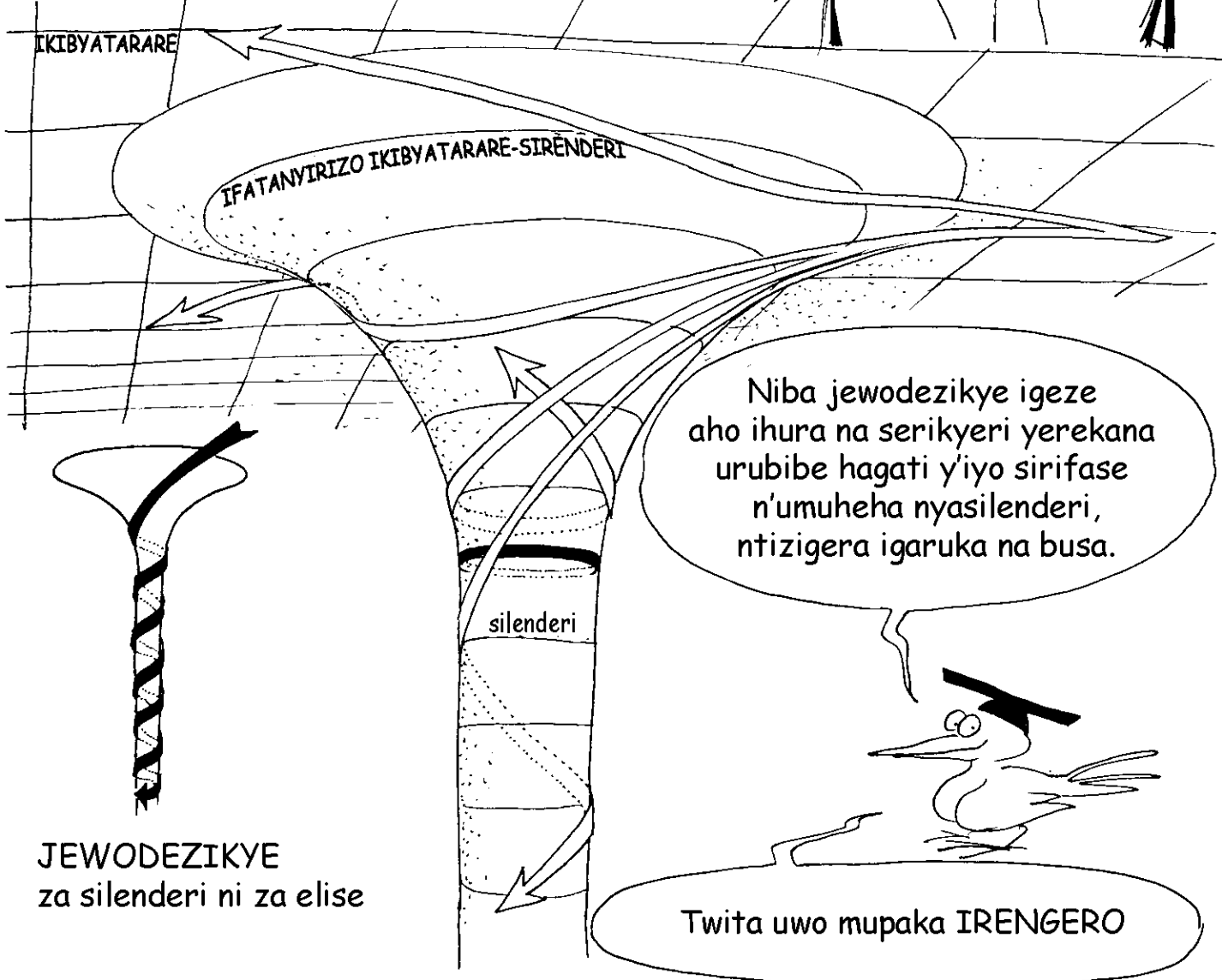


Nifashishi je akenda kamatana,
naciye za jewodezikye zimwe na
zimwe z'iriya nyagwa ya sirifase.





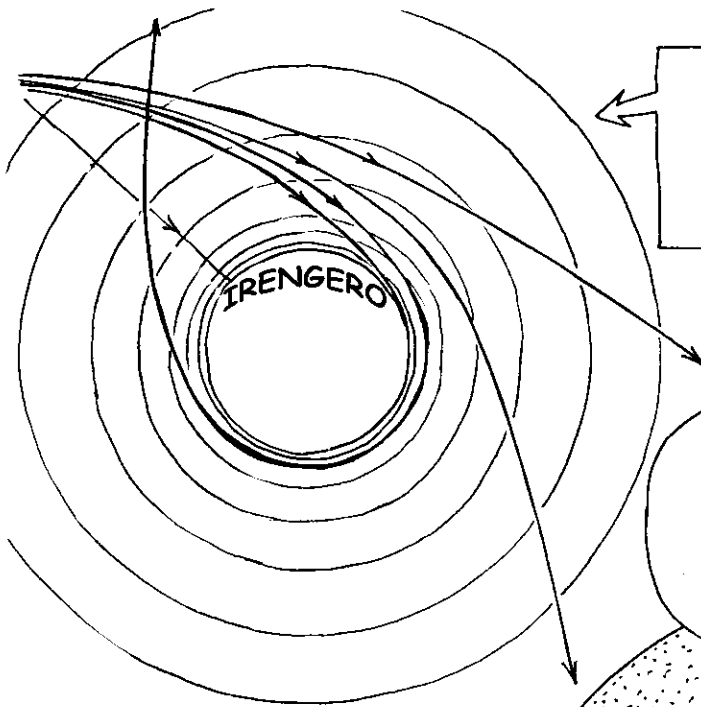
Niba jewodezikye yinjira bihagije muri iki kinogo, izageraho igaruke aho yanyuze.



Niba jewodezikye igeze aho ihura na serikyeri yerekana urubibe hagati y'iyi sirifase n'umuheha nyasilenderi, ntizigera igaruka na busa.

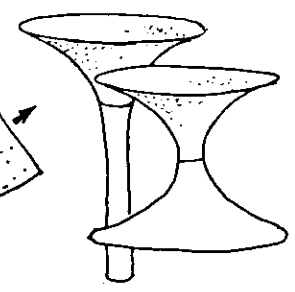
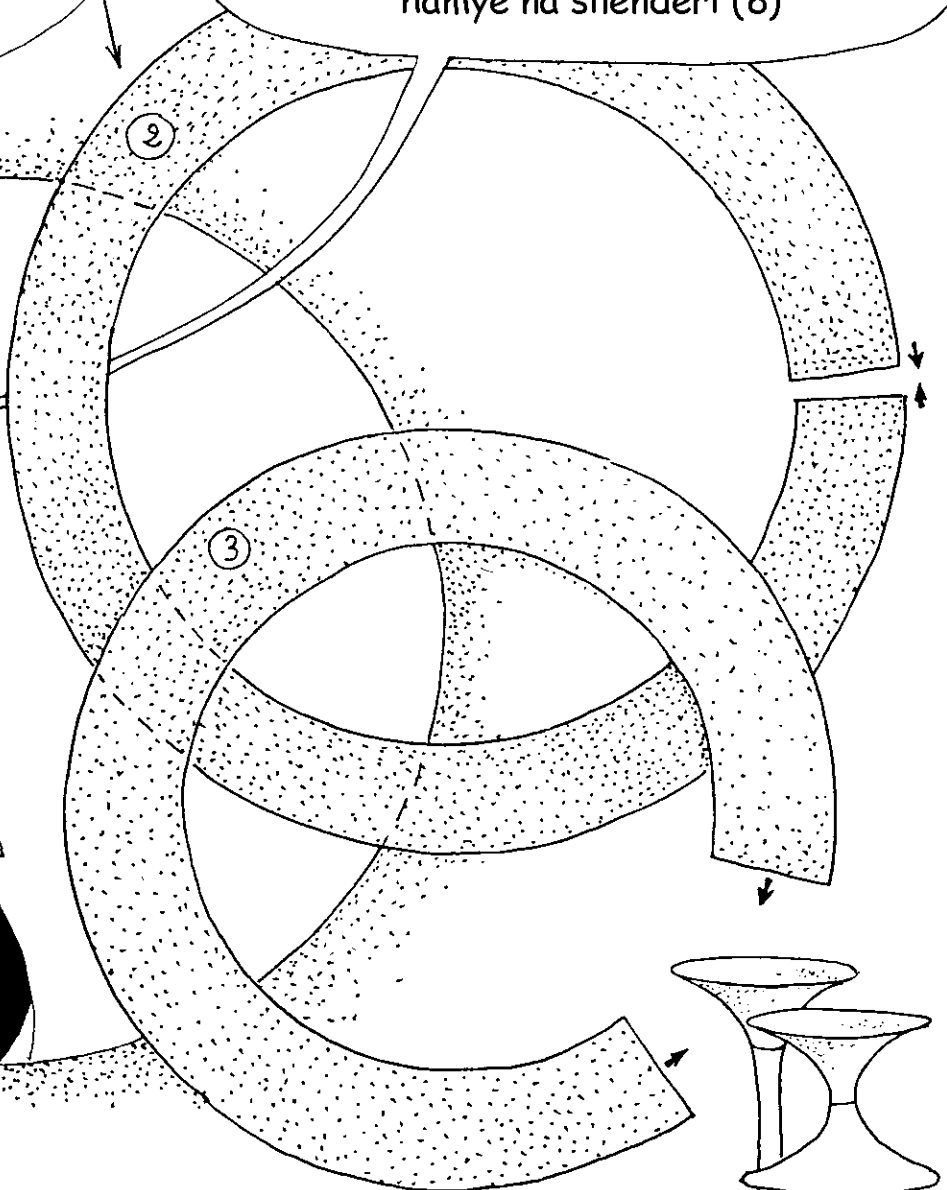
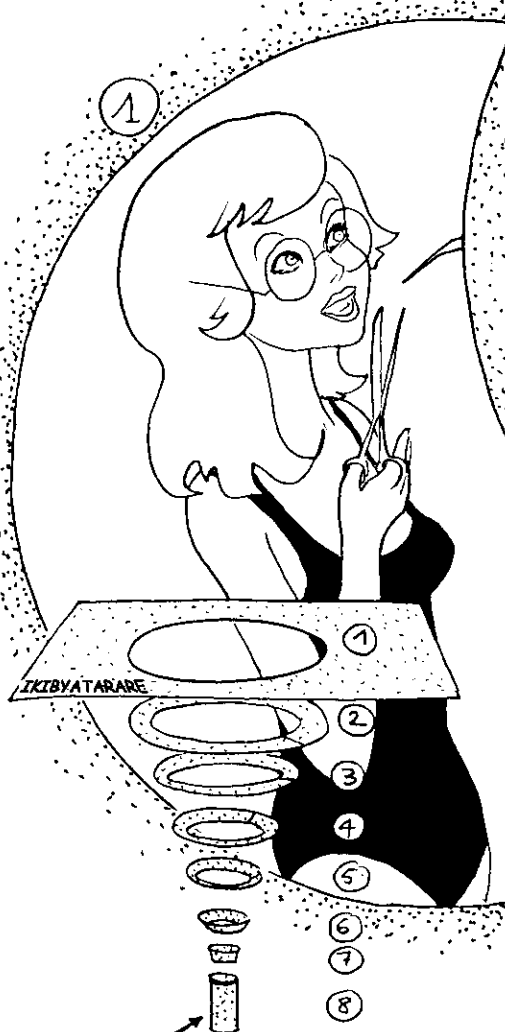
JEWODEZIKYE za silenderi ni za elise

Twita uwo mupaka IRENGERO

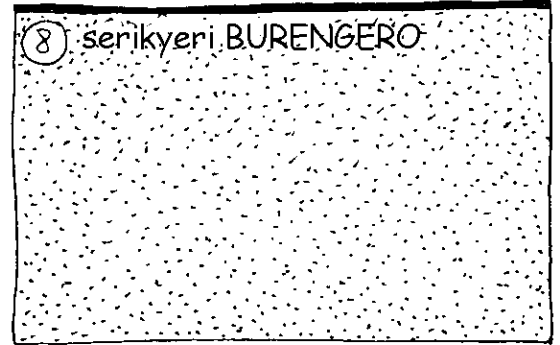
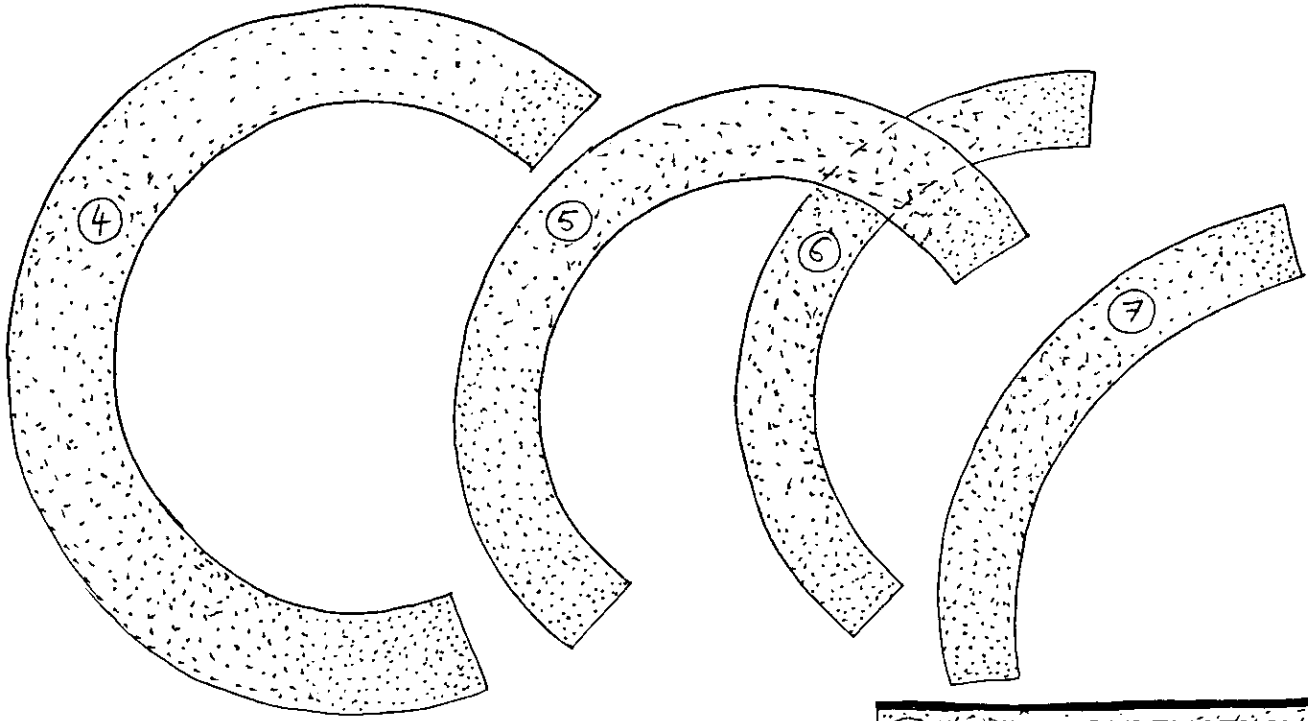


Uwaba agifite ukwibeshya ko aba mw'isi IBYATARARE yatekereza injyendo muri ubu buryo.

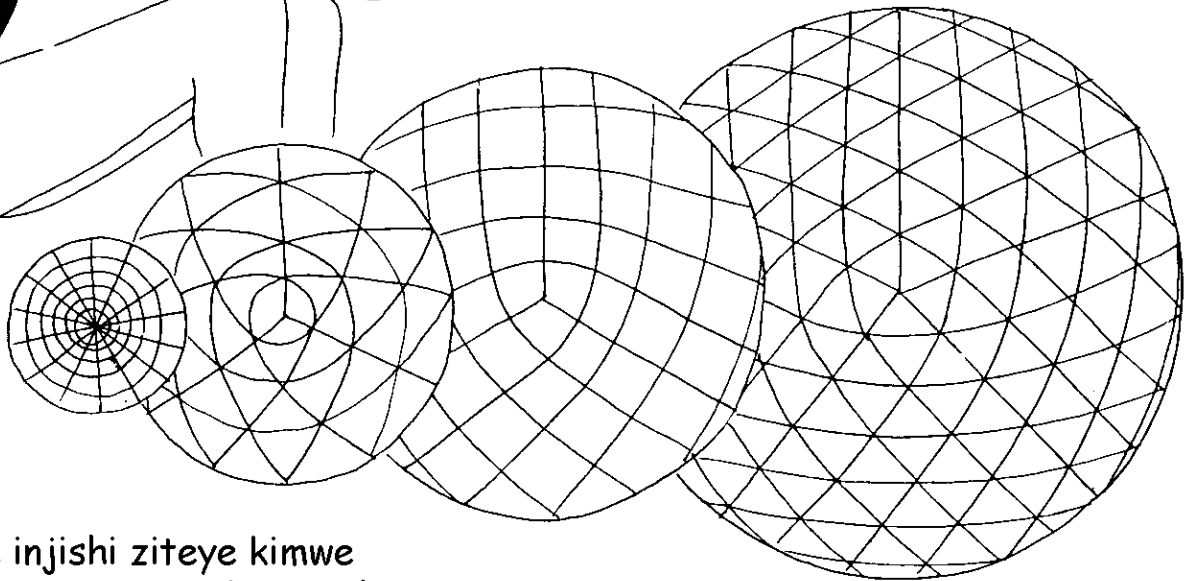
Nimukore umwobo wanyu wirabura mwifashishije ikibyatarare gifite umwobo (1), ingiga esheshatu za kone (ni ugufatanya umusozo ku wundi) hamye na silenderi (8)



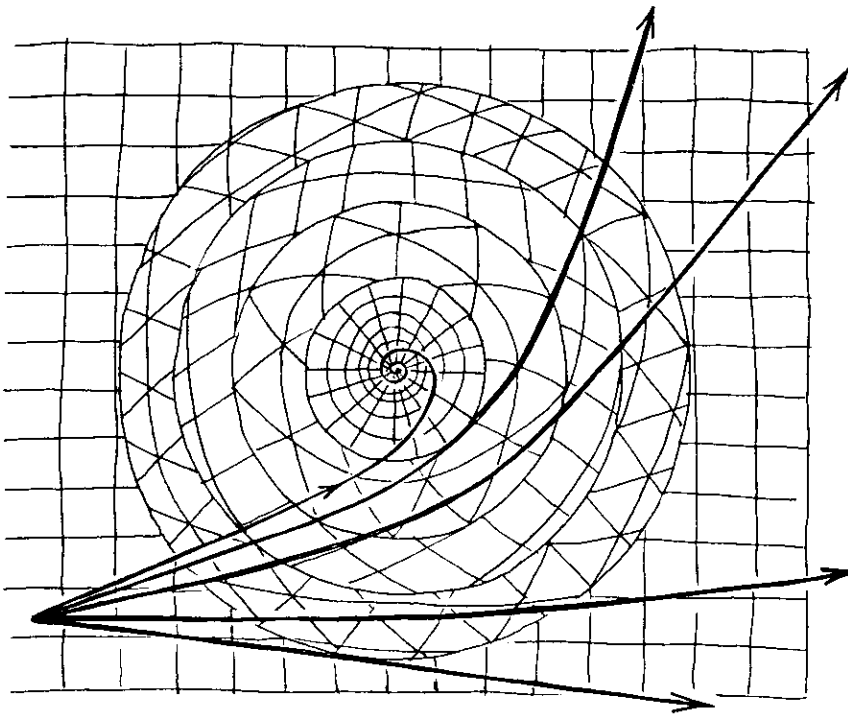
IBIHINDUKA



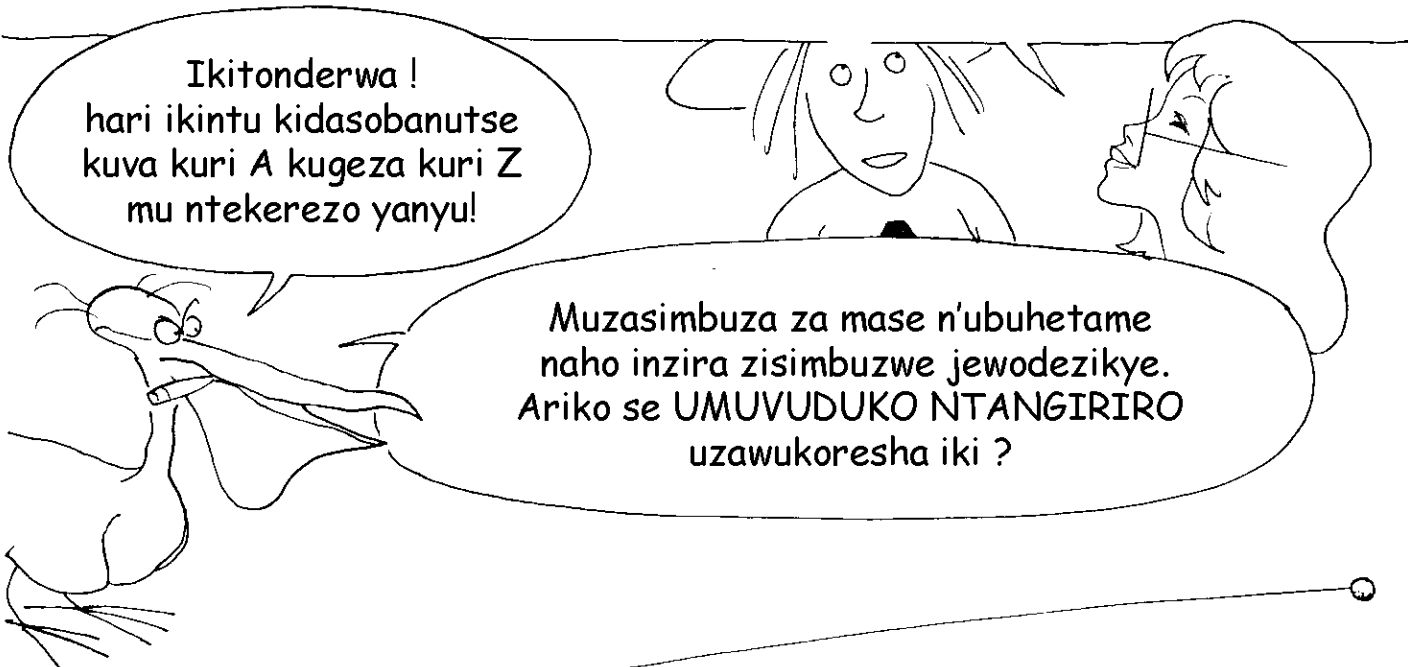
Dore ubundi buryo bwo kwerekana
UMWOBO WIRABURA, wifashishiye injishi.



Twafashe injishi ziteye kimwe
kubera gusa impamvu z'umurimbo.

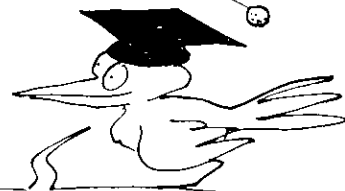
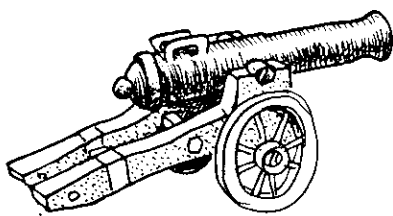


Itegeko ry'umukino rigena ko ari uguca izo njishi zikurikiranye hakurikijwe imfuruka idahinduka, k'uburyo hasanwa, mu bukurikirane, kuri buri mupaka nyaserikyeri. Uko wegera umwobo wirabura ni nako inkurure irushaho kwiyongera. Hagati ya SERIKYERI BURENGERO, inzira irinzinga nk'igishorobwa. Twagaragaza ko injishi yo hagati, nyapole, ishobora gufatwa nk'injishi ya silenderi hakoreshejwe jewodezikye, birebewe mu bw'itarure.



Ikitonderwa ! hari ikintu kidasobanutse kuva kuri A kugeza kuri Z mu ntekerezo yanyu!

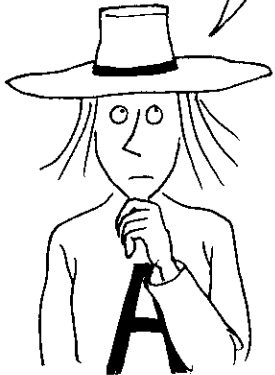
Muzasimbuza za mase n'ubuhetame naho inzira zisimbuzwe jewodezikye. Ariko se UMUVUDUKO NTANGIRIRO uzawukoresha iki ?



Inzira y'ikintu mu murima w'imbaraga waremwe na mase imwe cyangwa nyinshi, ugengwa mu mihindukire n'umuvuduko w'ibanze V_0 .

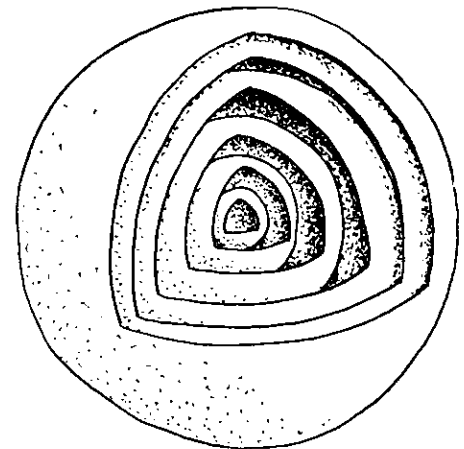
Urugero : igisasu kiraswa na kano n'inkurure y'isi.

Noneho rero, ibishushanyo byo mu mwanya ushize byari bihwanye n'agaciro kihariye k'umuvuduko w'ibanze V_0 .



MU MWIBIRO

Tekereza isi yubatswe nk'igitunguru, ni ukuvuga ifite ibishishwa bigerekeranya kandi bisangiye senteru. (*)

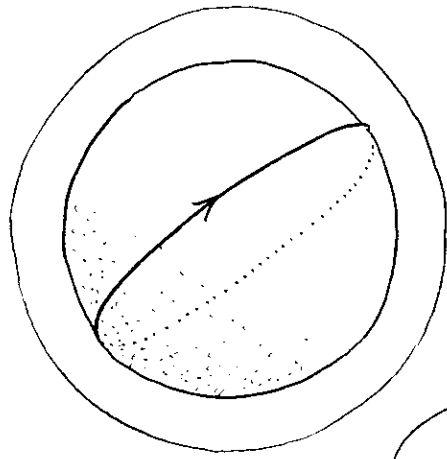


PARIKYE NYAKOSIMOSI

Kuri buri gishishwa hariho ingano V y'umuvuduko. Kandi uko wihuta, niko unajyamwo imbere.

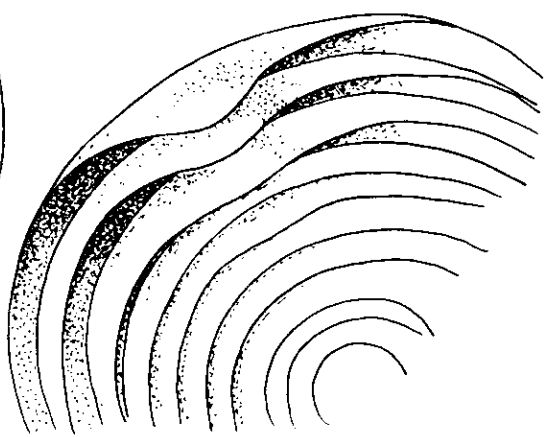
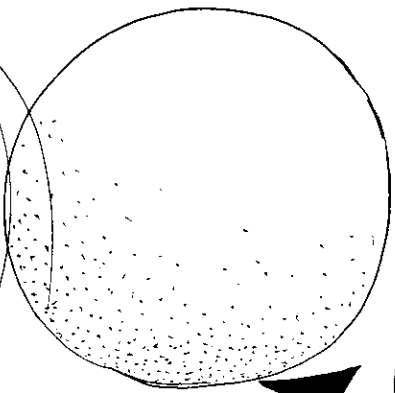
K'umuvuduko w'urumuri, uba ugeze hagati y'igitunguru.

(*) Uyu mudeli werekanwe kera muri IBINTU BYOSE BIFITANYE ISANO, kw'izina rya PARIKINGI NYAKOSIMOSI (umwanditsi umwe, icapiro BELINI).

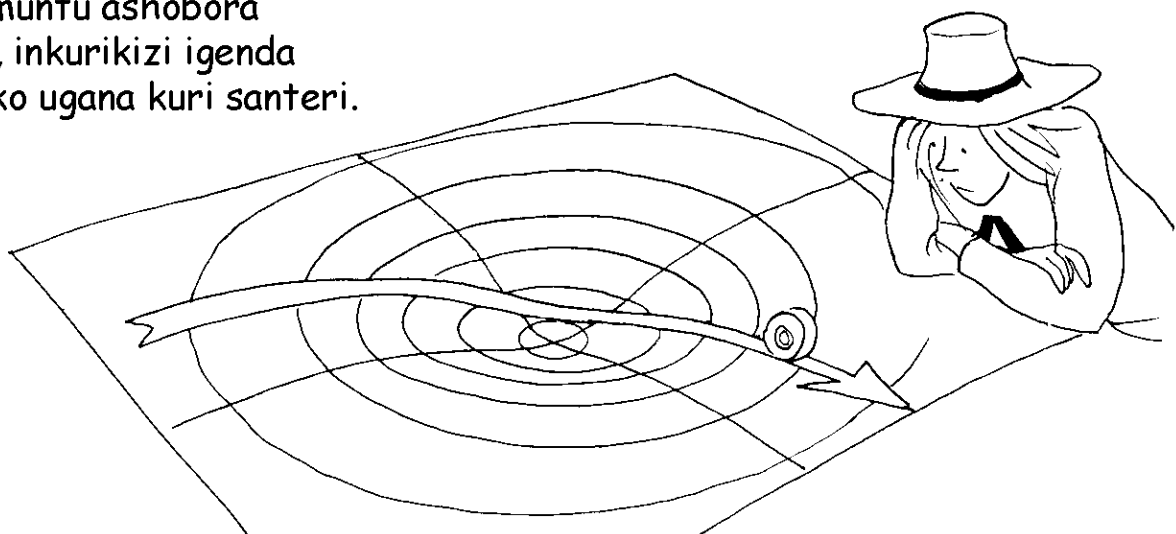


Iyo hatariho IMBARAGA, ikintu kigumana umuvuduko wacyo V (biryo kikaguma ku burebure bumwe uturutse kuri santeri y'igitunguru). Gishushanya JEWODEZIKYE ya SIFERI bihwanye, ni ukuvuga SERIKYERI NINI.

Noneho ubu murebe neza !

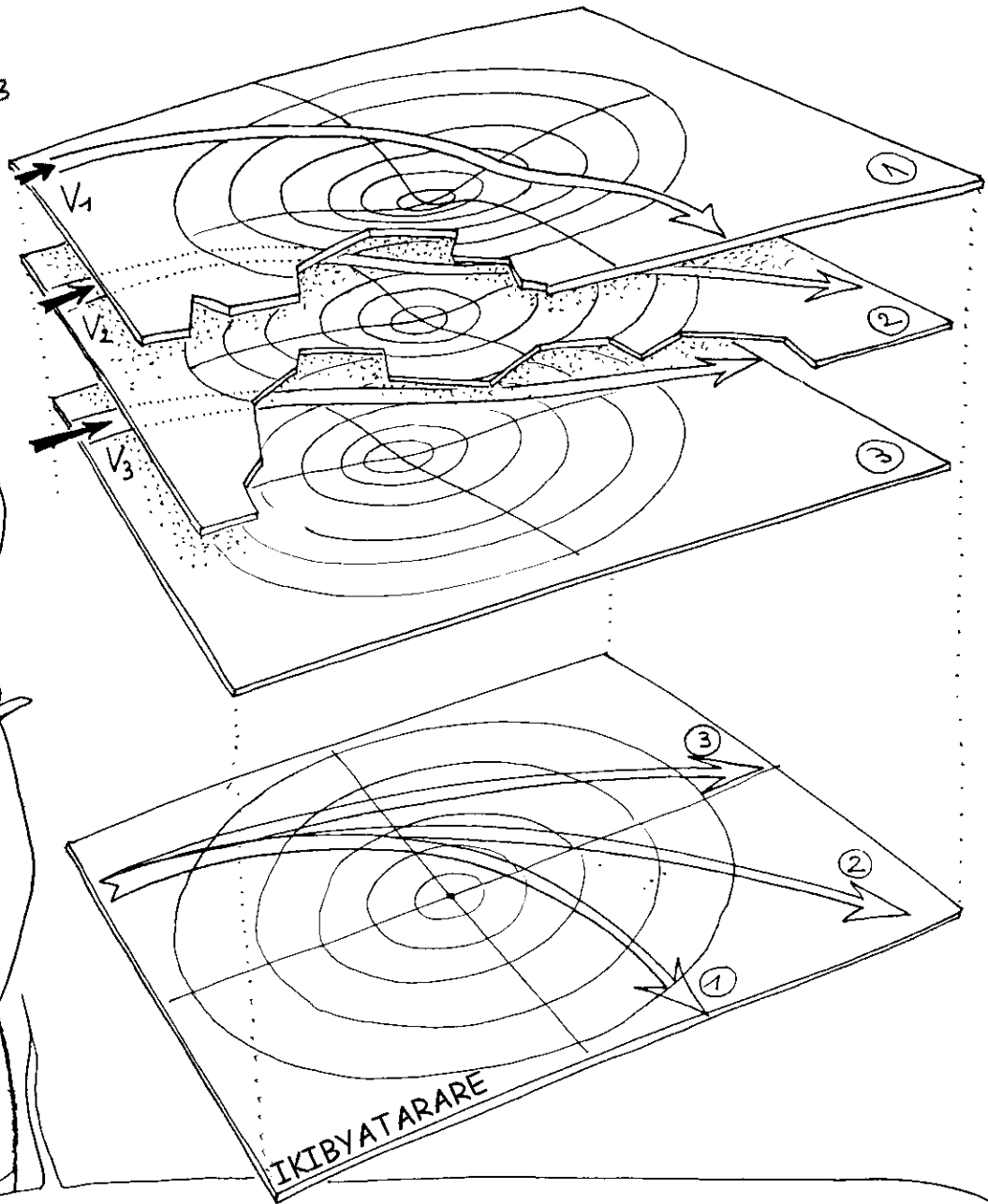


Dore ingaruka y'ihondwa ry'inyundo ya bwana Aluberiti. Nk'uko umuntu ashobora kubibona, inkurikizi igenda yoroha uko ugana kuri santeri.

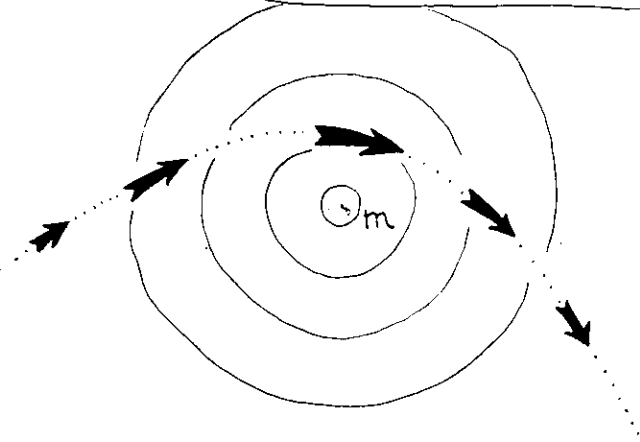


Dore icyobo (cyangwa impfupfu, ni kimwe...). Herekanwe imirongo y'ubugerweho (itari za jewodezikye !) hamwe na jewodezikye yihariye.

$$V_1 < V_2 < V_3$$



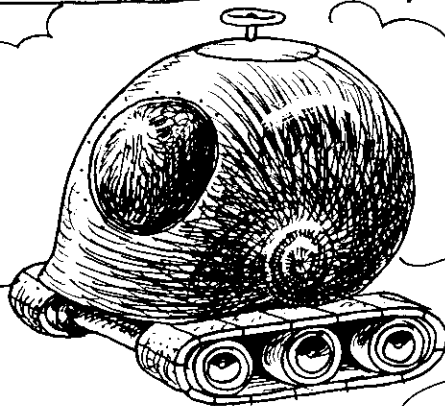
Uko umuvuduko ntangiriro ari muto, ni nako ubugonde bugaragara kandi ni nako inzira ihetama.



Kubera inkurikizi z'inkurura nyagaravite, umuvuduko w'ikintu uriyongera ubwambere, hanyuma ukagabanuka. Umuvuduko w'umurengera ugerwaho igihe uburebure hagati y'ikintu na mase nkurura ari nto cyane (periheli).

Ese icyo kinyamuvuduko ni nyabaki ?

Ni
KORONOSIKAFU



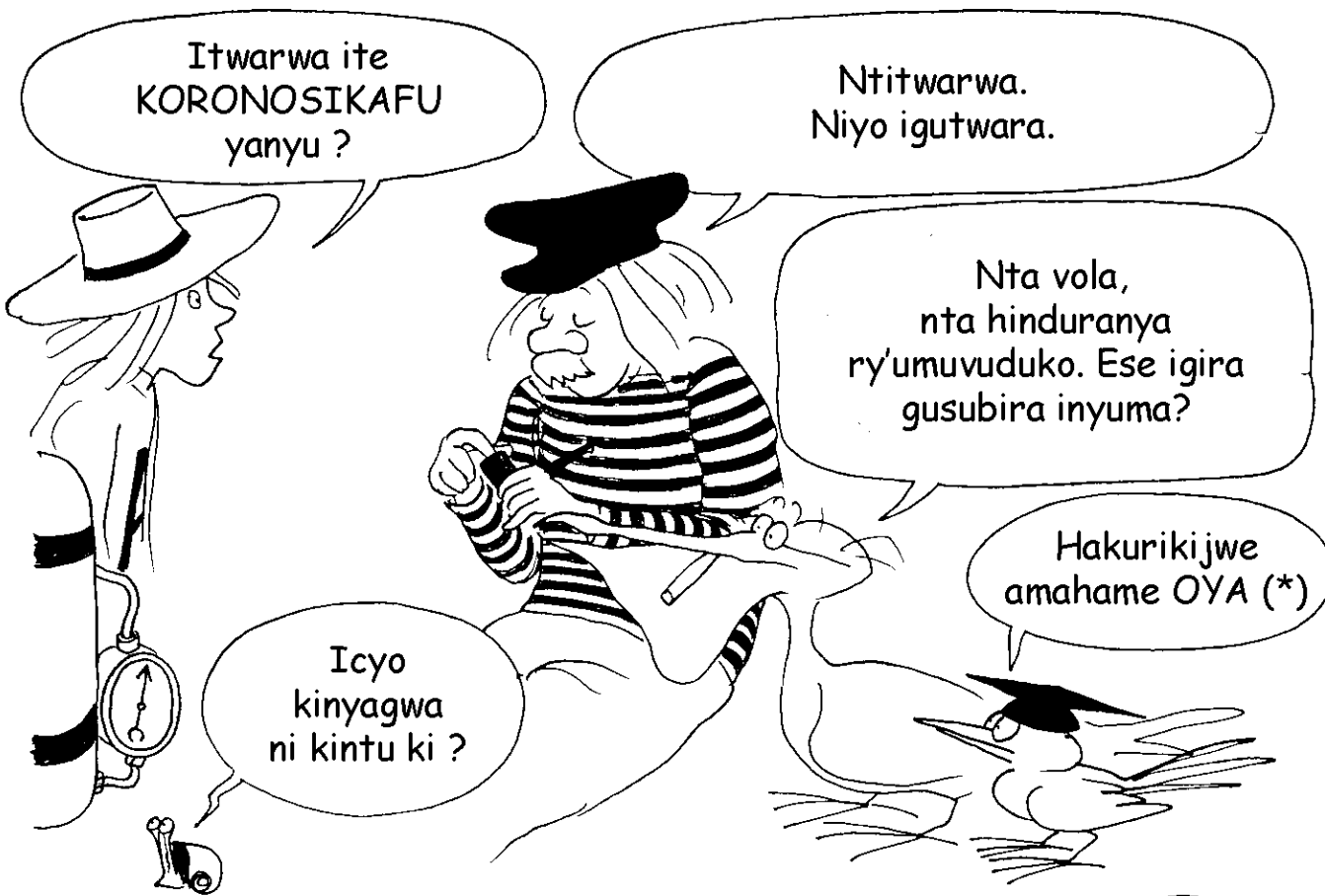
Gituma hakurikiranwa
za jewodezikye za
Parikye Nyakosimosi

Ariko kuki
kwifungirana muri
koronosikafu ?

Parikye Nyakosimosi
yose hamwe yoga
mu gitemba :
KORONOLE.

Habe na rimwe
ntawuzanyinjiza
hariya mwo
imbere !

Inzira yakurikiwe
na KORONOSIKAFU
yitwa INGENERWA.




Itwarwa ite
KORONOSIKAFU
yanyu ?

Ntitwarwa.
Niyo igutwara.

Nta vola,
nta hinduranya
ry'umuvuduko. Ese igira
gusubira inyuma?

Hakurikijwe
amahame OYA (*)

Icyo
kinyagwa
ni kintu ki ?



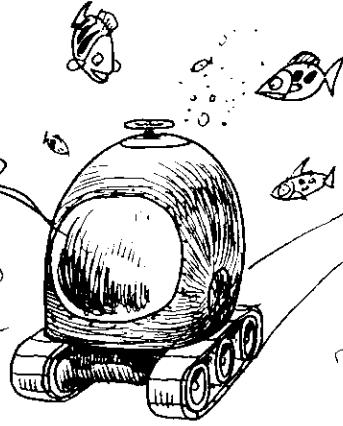
Icyo kinyagwa,
Tireziyasi ni mu
bisanzwe IGIHE.

Ibyo bikora nka KELEPUSIDERI,
isaha nyabuzi. Muri icyo rezerivuware,
ufite KORONOLE kw'isunika P_R . Hanze ya
KORONOSIKAFE haganze isunika P_E .

(*) Inyandiko z'AKAZI : IHAME RYA KABIRI ritubwirako bidashoboka gukurikira
jewodezikye za esipase-gihe (PARIKYE NYAKOSIMOSI) inzira iyobya.

Ubuyobozi

Kuko isunika P_R ari rinini kuruta P_E ,
koronolo iramanuka noneho
impimabwisukye ikagaragaza igihe.



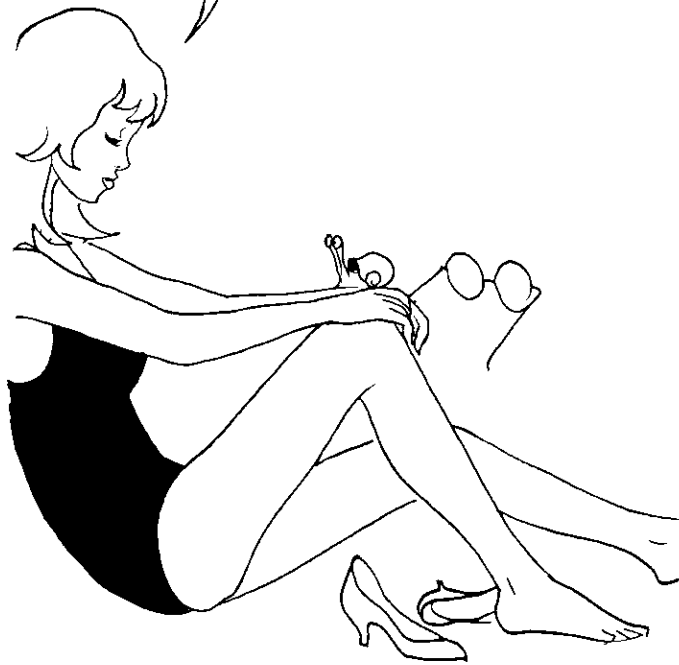
Uko umanuka muri koronolo
ni nako isunika P_R rikura. Kuko insuka
ihinduka kimwe n'igitandukanyo ($P_R - P_E$):
igihe gitamba buhoro.

Naho injyakuzimu,
NI umuvuduko. Rero uko ujya
hasi wihuta ni nako igihe
gitamba gahoro (*)

Naho iyo ugendera ku muvuduko
w'urumuri, P_E iba mu by'ukuri
INGANA na P_R , noneho igihe
kigahagarara.

Kandi ntawushobora kugendera ku muvuduko
uruta uw'urumuri, nk'uko udashobora kumanuka
ikuzimu kurusha Parikye Nyakosimosi.

Sirifase ya Parikye Nyakosimosi, ni ubutanyeganyega, uburuhuko.



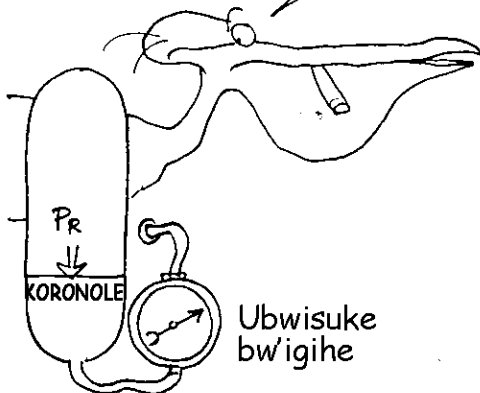
Iyo ugumye ahantu utanyeganyega usaza ningoga !



Iyo ikintu kiremereye cyane, kigonda bikabiye esipase-gihe. Bivuze ko muri ako karere, naho ikintu cyaba kiri mu buruhuko, kizaguma kijanditse muri KORONOLE y'isunika rinini. Kandi igihe cyacyo kizatamba buhoro kurusha icy'ikintu nacyo kiri mu buruhuko, ariko kiri kure ya mase iyo ariyo yose. Ibyo ni byo biba mu nkenjyero z'ikintu k'indemere y'umurengera nk'inyenyeri igizwe na za netoroni.

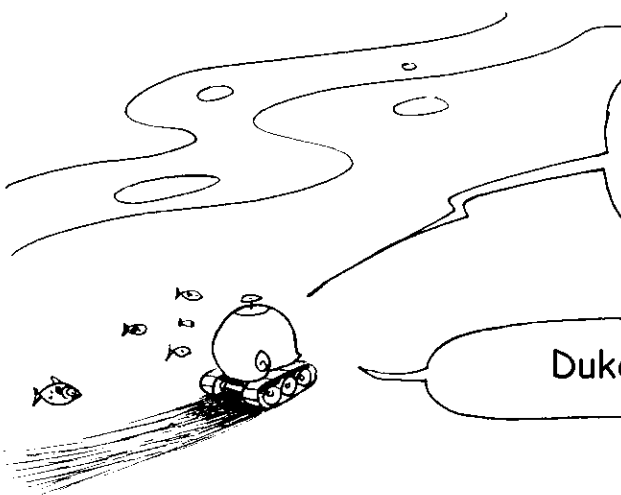
Ese byazagenda bite turamutse dusohotse vuba na vuba muri koronosikafe ?

Yenda twahura n'ubusaza bwihuse ?



Kandi iyo koronole yo muri rezoruvuri irangiye, ubwo ni... Urupfu ?..

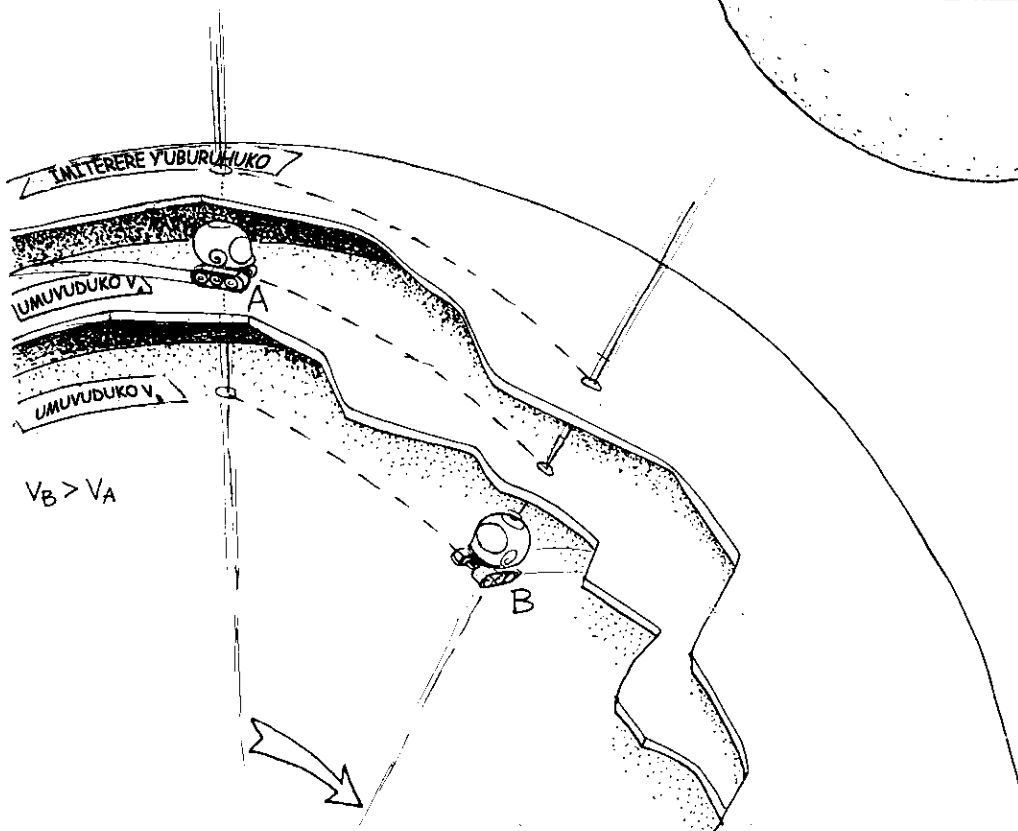
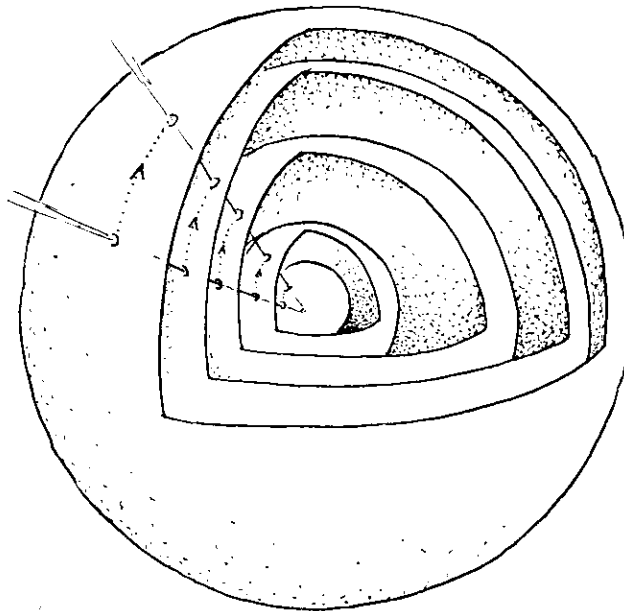
GUTANGAZA



Twebwe aha uko utubona dufungiyeye muri izi koronosikafu. Ariko se twavugana dute ?

Dukoresheje za FOTONI.

Fotoni ni nk'imishito y'amatara izenguruka imurika ibirundo byose bya Parikye Nyakosimosi k'umuvuduko nyamvuruka udahinduka.

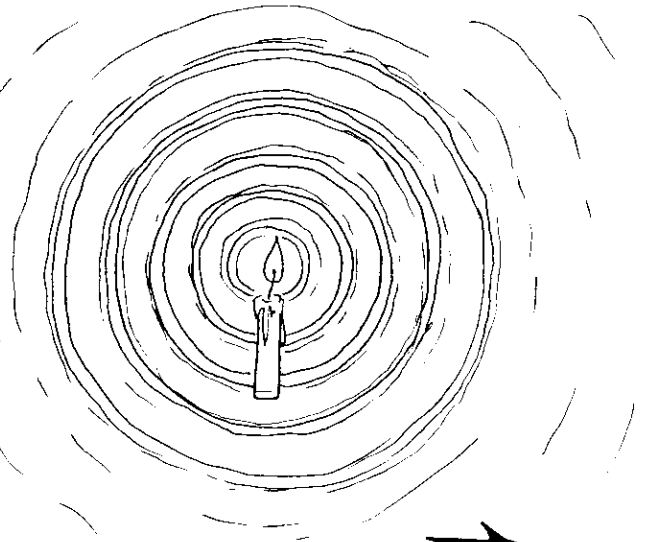
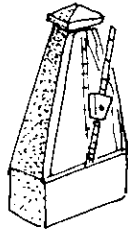


Ikintu A, kigendera ku muvuduko V_A , gishobora gutangiza urugendo rw'umwe mu mishito y'amatara mu ntumbero y'ikintu B kigendera ku muvuduko V_B .

Urumuri ni impinduka
ngarukiragihe, dushobora
guhuza na furekanse N



Kandi ibara ritangwa
n'iyi furekanse.

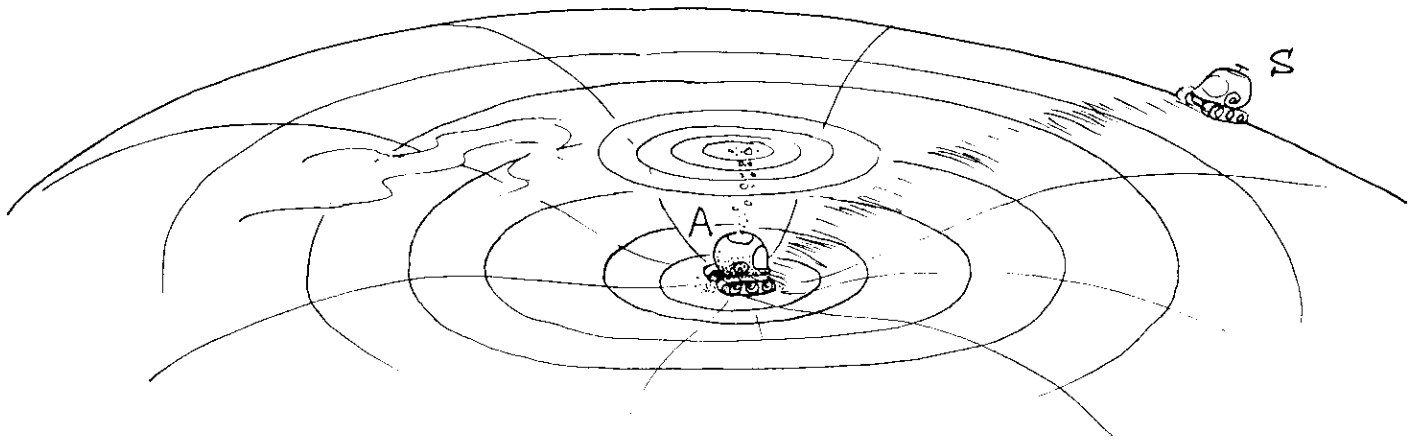


Furekanse zo hasi

IMBANZIRAMUTUKU UMUTUKU ORANJE UMUHONDO ICYATSIKIBISI UBURURU VIYOLETI INDENGERAVIYOLETI



Furekanse zihanitse



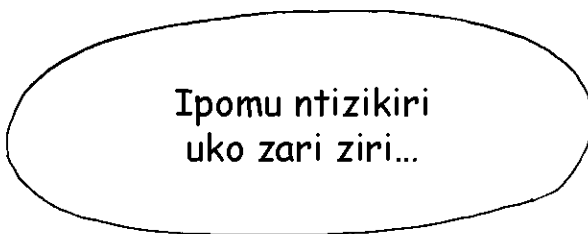
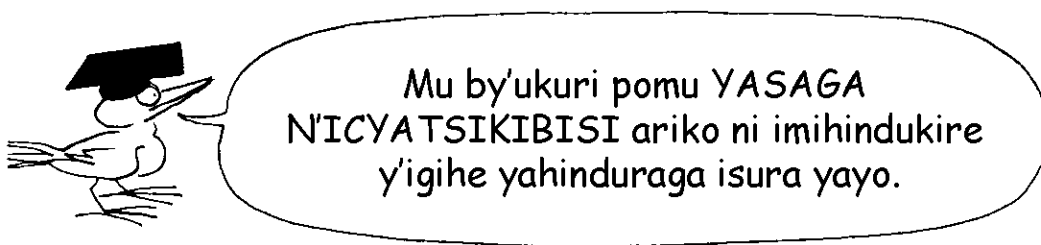
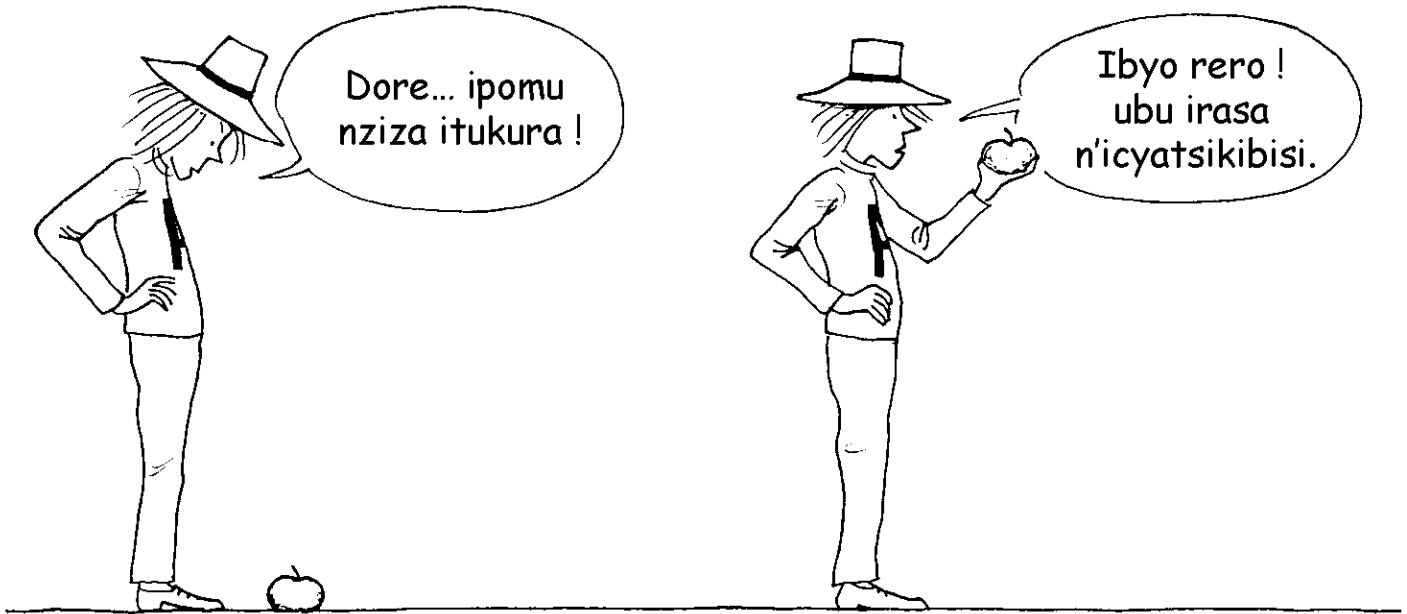
Furekanse (zoherejwe cyangwa zakiriwe) zipimwa zigereranjwe n'igihe gitambuka muri koronosikafu y'inyohereza cyangwa y'inyakira. Muri koronosikafu A, Anselimi yohereza urumuri rwa bururu. Ari mu karere ka esipase harangwa n'ubuhetame bukabiye. Urugero ari iruhande y'inyenyeri igizwe na za neteroni (iremereye by'umurengera).

Sofiya, muri koronosikafu S, yakira urwo rumuri. Ari kure y'icyo kintu kiremereye by'umurengera. Birtyo igihe cye kizahita vuba cyane kandi azapima furekanse ntoya cyane, k'uburyo urwo rumuri ruzaba, kuri we, ruganisha ku mutuku.

Ni icyo bita **INGANA MUTUKU** (iserereka riganisha ku mutuku) ry'inkomoko nyagaravite.

Anselimi ari ku nyenyeri igizwe na za netoroni.

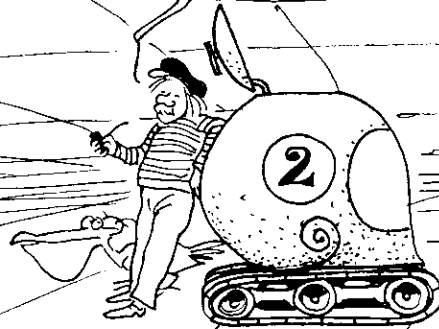
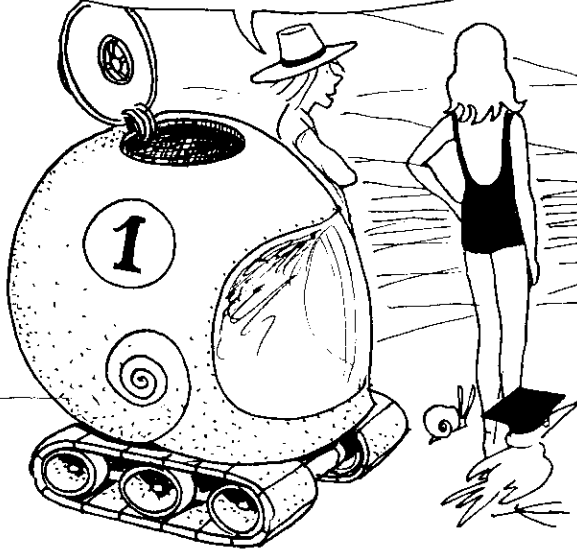
(twamusoneye imbogamizi ziturutse ku nkurura kugirango ntabyatarare ako kanya kuri sirifase yayo kubera inkurikizi ziturutse ku buremere bwe bwite).



ISUZUMA RYA KABIRI RY'UMWOBO WIRABURA

Tugiye gukomeza kwiga
parikyeye nyakosimosi

Byiza, ndazamutse na Lewo.
Jewodezikye nziza !..

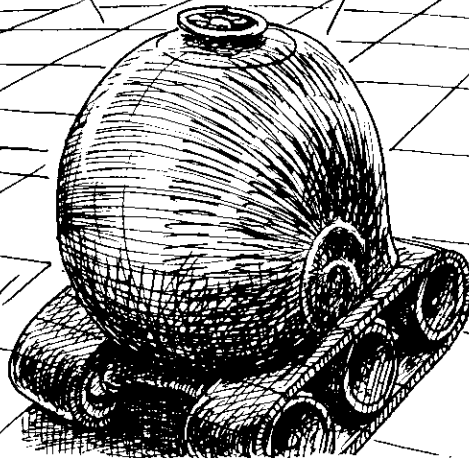


Kandi mfite
umuyoborajwi wa foni,
hakoreshejwe radiyo (*)

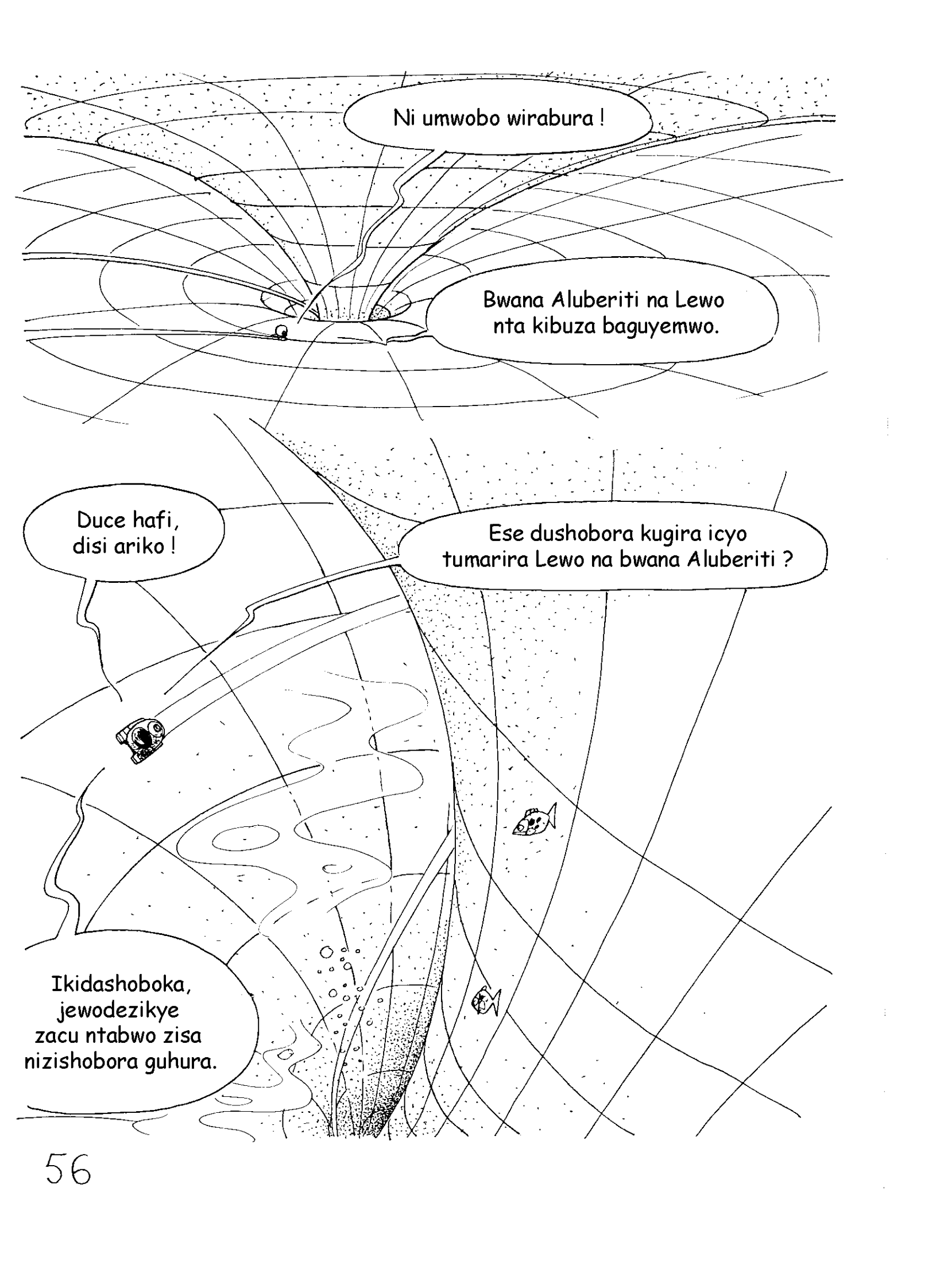
Lewo, bwana Aluberiti,
ndababona, hariya

Dore, ese icyo kinyagwa
ni nyabaki, urebeye kure

wagirango ni urushonzi



(*) Imirari nyaradiyo iri mu bwoko bumwe n'imirari nyarumuri.
Umuvuduko umwe C, ariko za furekanse zo hasi.



Ni umwobo wirabura !

Bwana Aluberiti na Lewo
nta kibuzabaguyemwo.

Duce hafi,
disi ariko !

Ese dushobora kugira icyo
tumarira Lewo na bwana Aluberiti ?

Ikidashoboka,
jewodezikye
zacu ntabwo zisa
nizishobora guhura.




Ese urababona ?


Indiba y'umwobo wirabura
isa ni iyijimye rwose.

Ndacyababona, ariko koronosikafu
yabo yafashe ibara ry'umutuku wijimye

Yewe, bwana Aluberiti,
Lewo ese muranyumva?



Nta nakimwe numva.
Ijwi rye ryahindutse rirerire
cyane kandi aravuga vuba
birengeye



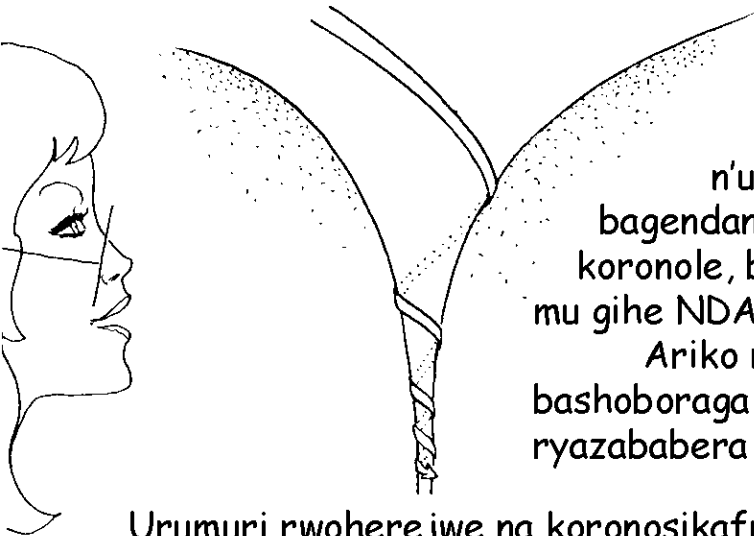
Ijwi rye riragenda ryika.
Wagirango ni disikye
iriho ihagarara !?!

AHHTEUHHH...

Ibibazo by'itumanaho, iyo muba mu
« mibumbe y'ibihe » anyuranye rwose.

IKIBAZO K'IGIHE

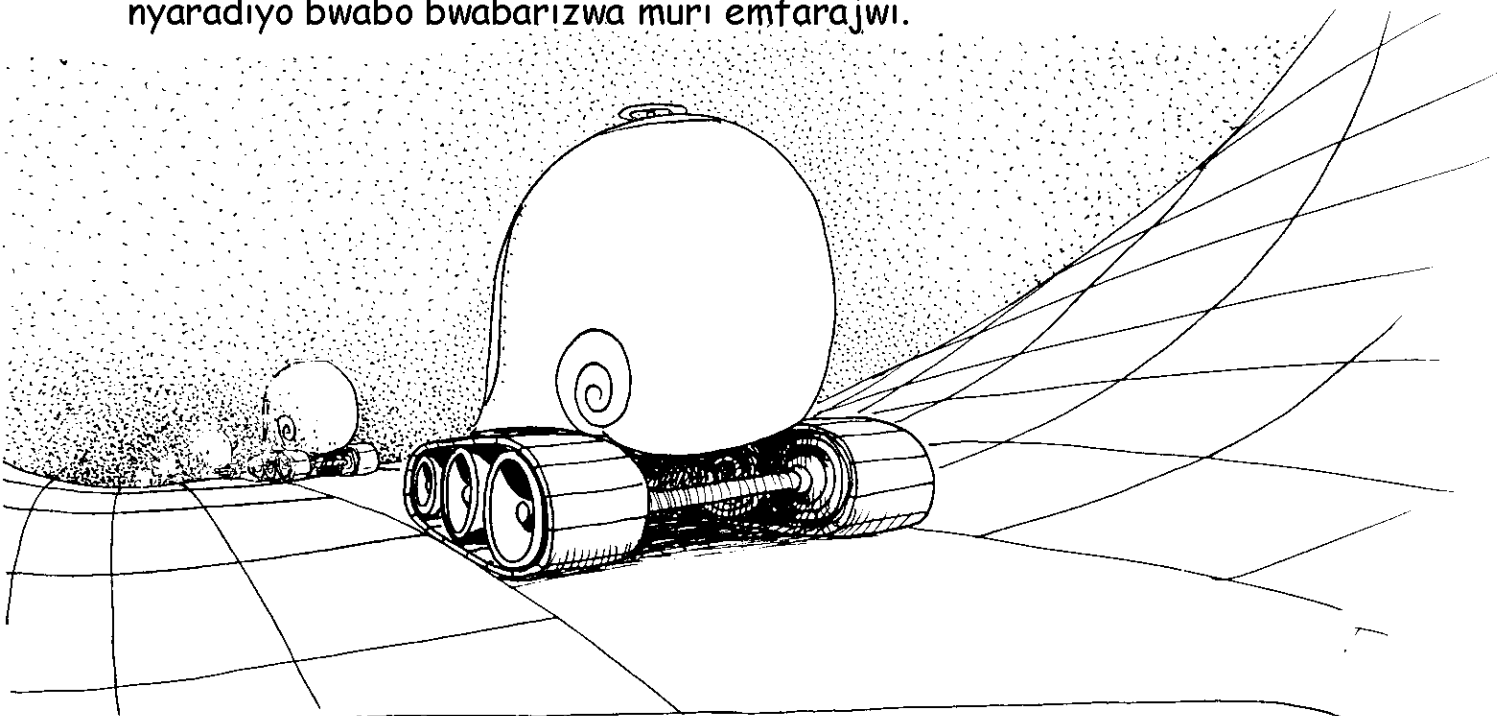
Uko Aluberiti na Lewo bakomeza kwika muri KORONOLE ni nako isunika rituruka hanze P_E ryyongera, rero ni nako kebusideri yabo isuka bicye, uko ni nako kandi igihe cyirekura muri koronosikafu yabo.



Igihe bazagerera ku ndiba y'ibintu n'umuvuduko w'urumuri, isaha yabo nyabuzi bagendana izaba yarekuye ubungane mbarwa bwa koronole, bivuze ko urwo rugendo ruzaba rwarakozwe mu gihe NDANGIRA.

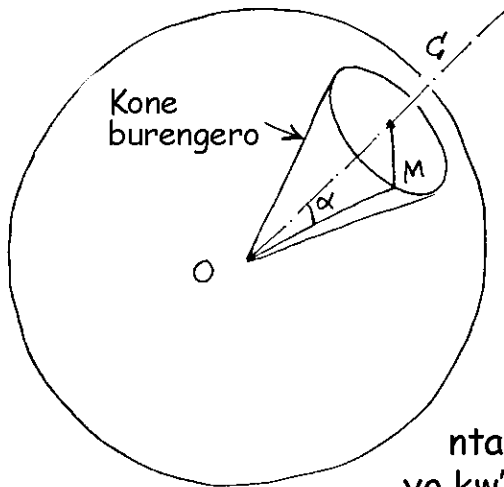
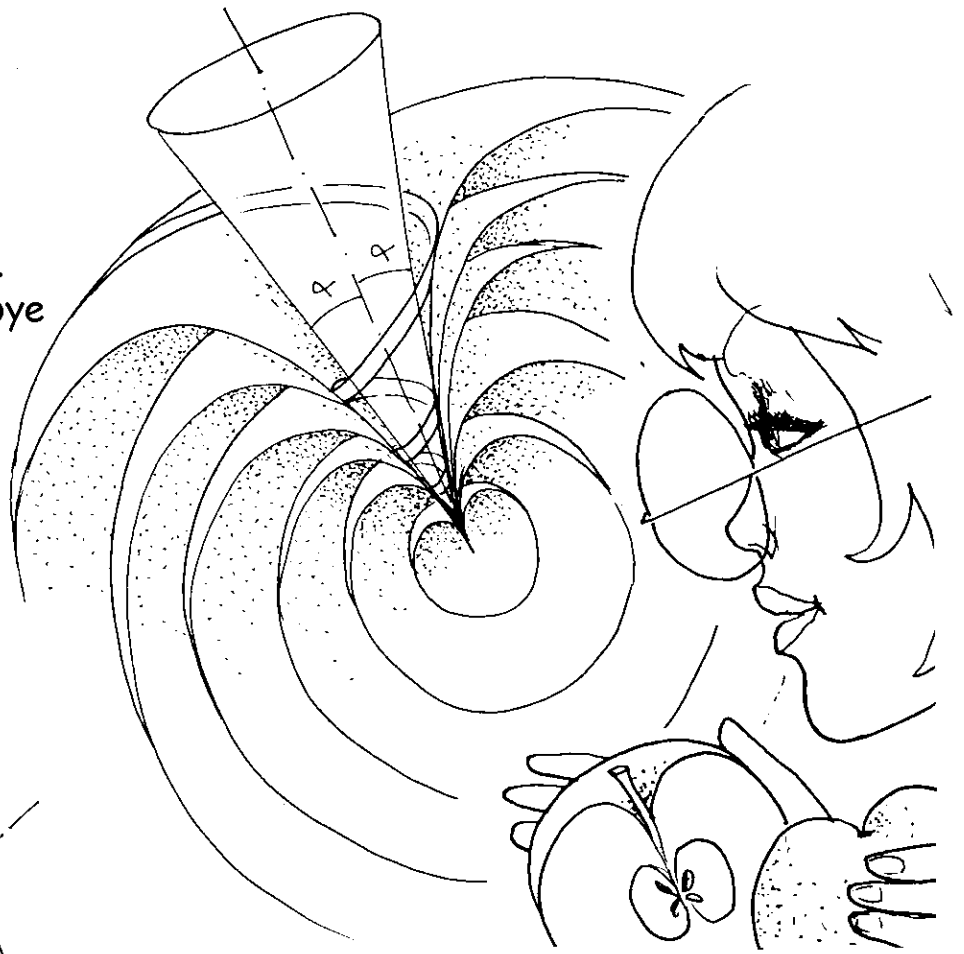
Ariko niba, Sofiya, Anselimi, Magisi na Tireziyasi bashoboraga gukomeza gukurikira ihanuka ryabo, ryazababera intarangira.

Urumuri rwoherejwe na koronosikafu yabo rurengera vuba mu cyiciro cya emfararujwe hirya y'icyiciro cy'urumuri rugaragara, naho ubutumwa nyaradiyo bwabo bwabarizwa muri emfarajwi.



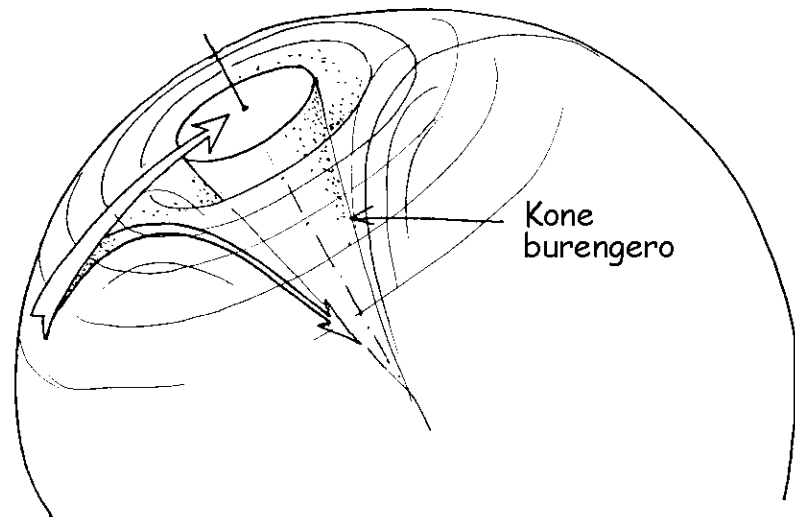
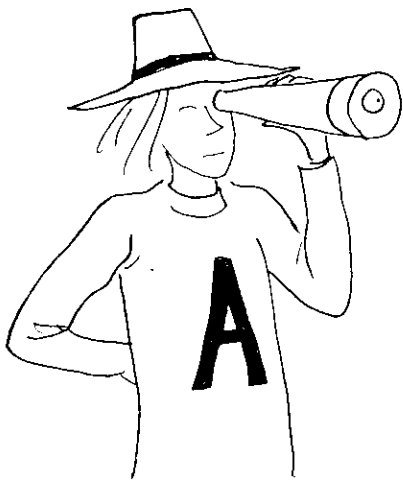
Ibyo binyibutsa imbusanye ya Ashile, ugerajyeza kwegera akanyamaswo agabanya BURI GIHE urugendo rubatandukanya na kabiri. Abigeraho mu mwanya ndangira.

Dore, muri uwo mudeli wa **PARIKYE NYAKOSIMOSI**, ishusho y'umwobo wirabura. Uruhindu rwose pe rwatoboye esipase-gihe kugera muri santeri, ahagengwa n'umuvuduko w'urumuri. Ibyicaró byose biba nkoraho kuri kone ifite icya kabiri cy'imfuruka kw'isonga ingana na α .



Muri uwo mudeli, intandukanye-rugendo ni, mu by'ukuri, iMFURUKA hagati ya reyo vegiteri ebyiri : Urugero **OM** na **OC**.

Iyo ureba igishushanyo kiri munsu, uhita ubona ko ntawinjira na rimwe mu mbere ya kone y'icya kabiri cy'imfuru yo kw'isonga ingana na α . Ku indorerezi yaba ituye k'ubuso bwa **KORONOLE**, ni ukuvuga mu gihe cy'uburuhuko, kandi yaba itihishurira ubwo buhetame bwa esipase-gihe, urwo rubibe rw'umwobo wirabura, rwitwa **IRENGERO**, ryakwigaragaza hakurikijwe **SERIKYERI** yazambukwa k'umuvuduko w'urumuri.





Ohu, dore twagarutse hafi yaho twatangiriye urujyendo, hafi ya koronosikafu n°3, yo yasigaye aho itanyeganyega.

Urugendo rwacu mu nkengero z'umwobo wirabura rwahagaritse gusaza kwacu. Iyaba umwe muri twebwe yari yasigaye muri koronosikafu iri hamwe, yari kuba yenda yumvise igaruka ryacu mu gihe cy'ibinyejana cyangwa se ibihumbi by'imyaka !

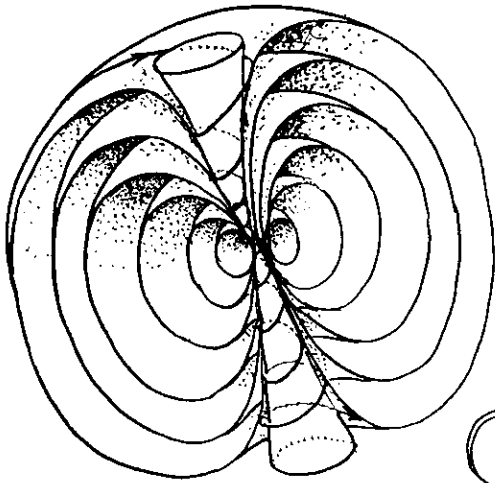
Ese inyobo yirabura ituganisha he ?

Nta muntu n'umwe ugira icyo abizi ho. Intekerezo yerekana ko indwanyamwobo wirabura ishobora kubaho.

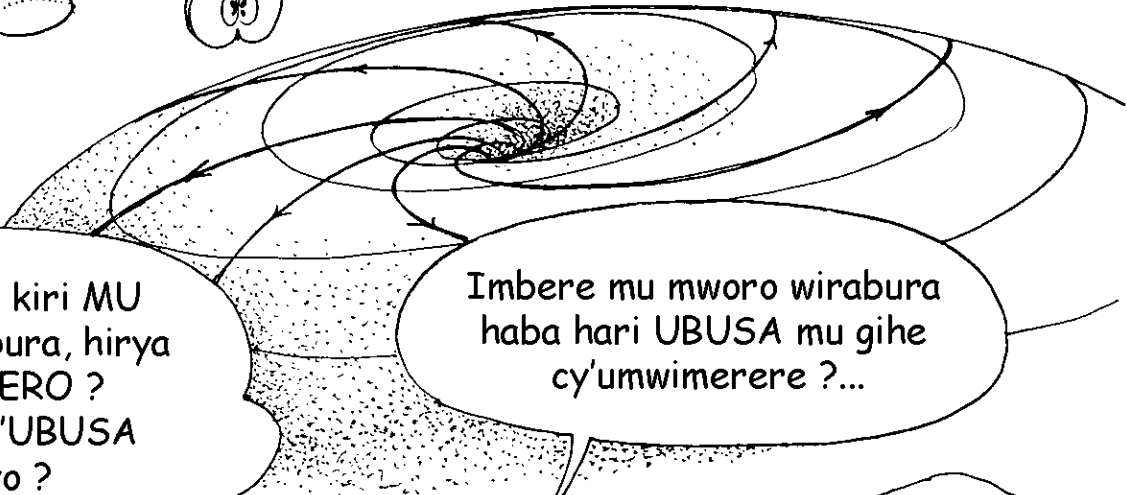
Ni ukuvuga ikintu cyo udashobora nabusa kwinjiramwo. Ushobora gusa gusohokamwo.

IRIBA RYERA

Dore, mu mudeli wa PARIKYE NYAKOSIMOSI icyaba gisa n'itsinda nyabubiri umwobo wirabura - iriba ryera

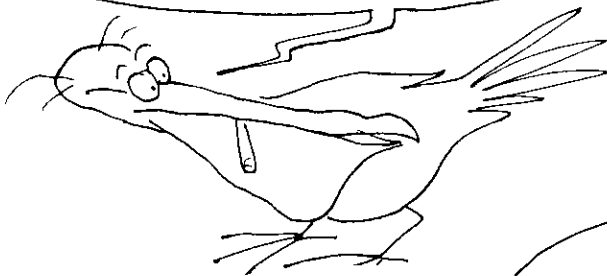


Ni ikintu KIMWE, ariko gifite intumbero ndebanyuma ya zajewodezikye.



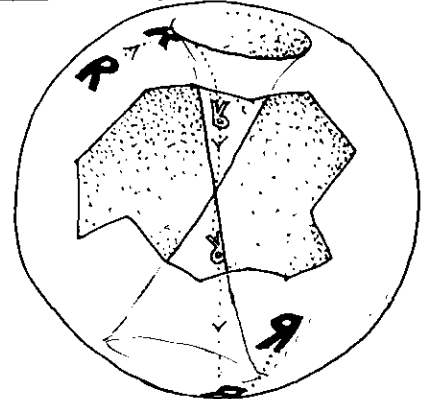
Ariko ni iki kiri MU mwobo wirabura, hirya y'IRENGERO ? Ese nta... n'UBUSA buriyo ?

Imbere mu mworo wirabura haba hari UBUSA mu gihe cy'umwimerere ?...



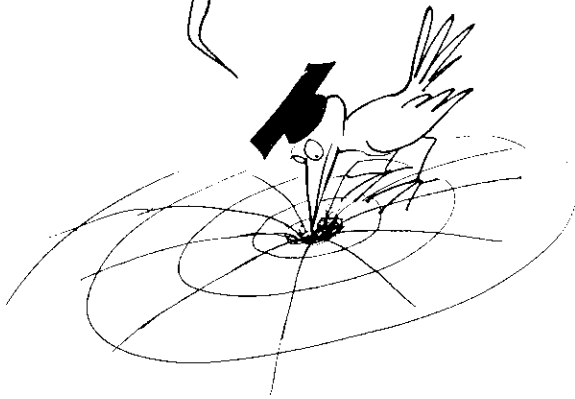
Ariko sibyo !
« Imbere » mu mwobo wirabura haba ari gusa inyuma y'iriba ryera bihujwe.

Umuntu azabona yuko, muri uwo mudeli, imiterere UMWOBO WIRABURA - IRIBA RYERA Itanga, ku mpapuro zose za Parikye Nyakosimosi, ingyendo ya za sirifase ntayoborwa, z'uruhande rumwe, «intambuko» ihindukiza ibintu. Urugero, R yisanga ari Я.

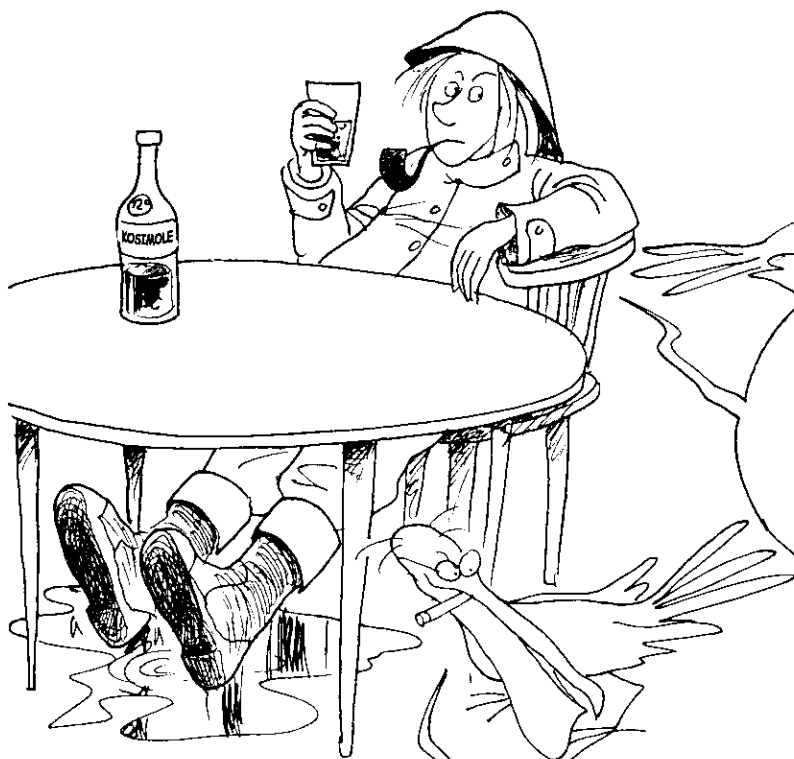


ICUPA YA WINO

Ariko hari izindi ntekerezo. Bamwe batekereza ko imyobo yirabura ihuza iniveri yacu na INIVERI Y'IMPANGA YAYO.



Cyangwa se kandi iyihuza n'iyindi si aho ibintu byose bisa n'ibyahinduwe n'indorerwamu yewe n'igihe ubwacyo.



Ibigaragara ni uko, nimba hari abashiritse ubwoba bakegera umwobo wirabura, nta n'umwe wagarutse ngo abituganirire.

Neza na neza, igishishwa cya Tireziyasi cyaba yenda ari umwobo wirabura !



Mama !

Lewo, reka Tireziyasi yiturize !

Tugende,
Tireziyasi iki ngenzi,
ni ukuhagera nyabyo,
muri iki gishishwa
neza

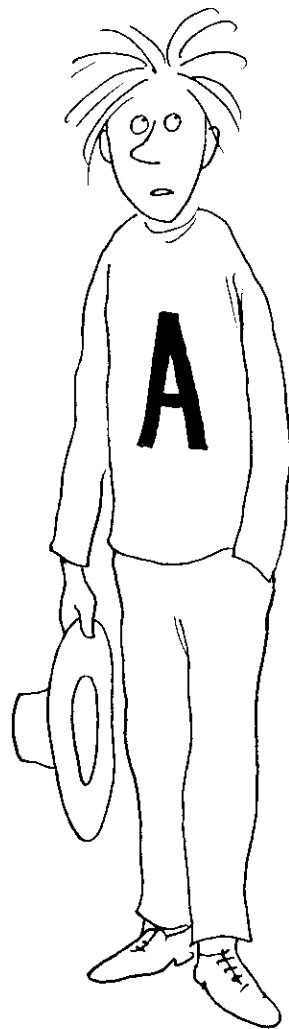
mi !

INTANGIRIRAMUSOZO


Uwu la la, kosimole !
ndaribwa mu mutwe...

Turebe.
Ubusa na matsiyeri, ni kimwe !
Esipase ishobora kwifungiranaho
ubwa yo, kandi umuntu ashobora
kugenda gusa atumbereye
imbere ye !

Niba iyi Iniveri
ariyo nziza kurusha izindi zishoboka,
ubwo se izindi zo zimeze zite ?



UMUSOZO



Amazi atemba
aturutse muri iri robine
isa ni reremba muri esipase
aturutse he ?

Humumu...

Nonese arajya
he ko ubugerwaho mu ndobo
budahinduka !

Kandi yamara,
aratemba !

