

Eel izbar el izbaraSvil i

Kkartografia

(sal eqcio kursi)

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1. kartografiis sagani da misi kavSiri sxva diswipl inebTan

kartografia aris geografiul mecnerebaTa diswipl ina, romel ic Seiswavl is rukis Sedgenas. kartografiis sagans warmoadgens geografiul i rukebi da sxva kartografiul i nawarmoebebi (gl obusi, rel iefuri ruka), maTi Tvissebebi, Seqmnis da gamoyenebis meTodebi. Rukis Sedgena rTul i procesia da Seicavs TviT gamosaxul ebis agebas, gaformebas da gamravl ebas.

Kartografia moicavs ramodenime diswipl inas: rukaTmcodneoba, maTematikuri kartografia, rukis Sedgena da redaqtireba, rukis gaformeba, gamocema da kartometria (rukaTmzomel oba).

rukaTmcodneoba Seiswavl is kartografiis Teorias, geografiul i rukebis Taviseburebebs, istorias, el ementebs da saxeobebs.

maTematikur kartografiaSi ganxil eba geografiul i rukebis maTematikuri safuZveli, kerZod dedamiwis el ifsoyidan sibrtyeze gadasvl is xerxebi.

rukis Sedgenis da redaqtirebis mizania rukis original is kameral uri Seqmnis procesi. rukis gaformeba Seiswavl is misi Sinaarsis grafikul i da Seferadebul i gadmocemis sakiTxebis. rukis gamocema gul isxmobs maT meqanikur gamravl ebas. kartometriaSi ganxil eba rukis saSual ebiT sigrZeebis, farTobebis, kuTxeebis, mocul obebis da a.S. gazomvis meTodebi. kartometriasTan mWidro kavSirSia topografia, romel ic ganxil avs topografiul i rukebis Sedgenis sakiTxebis. amisTvis gamoiyeneba, rogorc adgil ze gazomvebi, ise fotogadaReba, an aerofototopografia TviTmfrinavi dan.

Kkartografia mWidrod ukavSirdeba agreTve geodezias. Ees aris diswipl ina, romel ic

Seiswavi is dedamiwis formis gansazRvris meTodebs da dedamiwis zomebs.

2.geografiul i rukis Sedgenis mokl e istoria

rukam da gegmam, vidre miiRebda Tanamedrove saxes, saukuneebis manZil ze gairaxangrZlivi da rTul i ganviTarebis gza. Aarqeol ogiuri gaTxrebi gvarwmunebs, rom sqematuri naxazebi da naxatebi iqmneboda jer kidev Soreul warsul Si-pirvel yofili Temuri wyobil ebis pirobebSi, rodesac Temebi ecnobodnen did teritoriebs. yvelaze uZvel es rukad miCneulia Cvens wel TaRricxvamde 2500 wels babilonSi Tixis filaze Sesrulebuli naxazi. Mmasze xazebis saSual ebiT gamosaxulia mdinareebi, rgol ebiT-qal aqebi, aRniSnulia agreTve mTebi.

uZvel es droSi rukebi Seiqmna agreTve egipteSi, mogvianebiT-CineTSi. Mmagram mecniერul ad ramdenadme dasabuTebuli rukebi Seiqmna antikur saberZneTsa da Zvel romSi. Uukve mexuTe saukuneSi Cvens wel TaRricxvamde antikur saberZneTSi Cveulebrivi ambavi iyo geografiuli rukebiT sargebl oba.

cnobil ma berZenma mecniერma aristotel em Cvens wel TaRricxvamde me-4 saukuneSi pirvel ma daamtkica dedamiwis sferosebureba, xolo igive berZenma mecniერma erastofenem me-3 saukuneSi pirvel ma gamosaxa rukaze paralel ebi da meridiანebi. Cvens wel TaRricxvamde me-2 saukuneSi hiparxma Semoitana cnebebi ganedisa da grZedis Sesaxeb. Cveni wel TaRricxviT pirvel -me-2 saukuneebSi cnobil ma berZenma maTematikosma, astronomma da kartografma ptolomeim daamuSava rukis Seqmnis maTematikuri xerxebi, maT Soris kartografiuli proeqciebi. Mman Seadgina 90 ruka, maT Soris msoflioruka.

Ramdenadme gansxvavebuli rukebi Seiqmna romis imperiaSi, faqtiurad isini sqemebs ufro

emsgavseboda. cifrebiT aRiniSneboda manZil i 2 wertil s Soris.

Sua saukuneebi (me-5-me-17 ss) saerTod xasiaTdeba mecnierul i azrovnebis SeferxebiT, rac dakavSirebul ia qristianobis gavr cel ebasTan. yvel a movl enis gamomwvevi RmerTi miaCndaT. Am dros iqmneboda e.w. saekl esio rukebi. isini uaryofdnen dedamiwis sferoseburebas. rukebi umTavresad gamosaxavdnen samoTxes da agreTve fantastikur monacemebs. magal iTad gansaxl ebis rukaze gamosaxavdnen adami anismsgavs arsebebs didi yurebiT an frTebiT da a.S. kartografiis saerTo dacemis fonze aRiniSneboda garkveul i warmatebani c. kerZod, me-11- me-13 saukuneebSi evropasi naosnobis ganvitarebam dRis wesrigSi daayena geografiul i rukis aucil ebl oba. im droisaTvis ukve arsebobda kompasi da rukebze zustad gamosaxavdnen mimarTul ebebs.

Kkartografiis ganvitarebaze didi roli Seasrula me-15- me-16 saukuneebis geografiul ma aRmoCenebma. Uukve me-17- me-18 saukuneebidan rukebi mecnierul ad dasabutebul i, masStaburad gamarTul i iqmneboda. Seiqmna pirveli mecnierul i geografiul i rukebi saqarTvel oSic. Aam mxriv didi damsaxureba ekuTvnis gamoCenil qarTvel mogzaurs, istorikoss da geografis vaxusti bagrations. Mman Seqmna naSromi "aRwera samefosa saqarTvel osi", sadac Setanilia mTel i rigi special uri rukebi, romlebic warmodgenas gvaZl even saqarTvel os bunebis, fl oris da faunis Sesaxeb.

3. geografiul i ruka da misi mniSvel oba. rukaTa saxeebi

kacობრიობის განვითარებასთან ერთად იცვლება რუკათა სინარსი. თავდაპირველად რუკაზე გამოსახვდნენ ადგილის ობიექტებს-მდინარე, ტბა, მთა

da a.S. Semdeg daiwyes mosaxl eobis gamosaxva, maTi meurneobis gamoxatva. mogvianebiT Seiqmna rukebi, roml ebic gamosaxavdnen bunebis movl enebis, magal iTad aminds, qariss mimarTul ebas da a.S.

amrigad dReisaTvis ruka warmoadgens dedamiwis zedapirze arsebuli obieqtebis erTdrouli mimoxilvis saSual ebas. Ees aris rukis ZiriTad niSani. Magram mas gaaCnia sxva niSnebic. isini upirvel es yovl isa ukavSirdeba masStabs, gamosaxatav simbol oebis, e.i. niSnebs, maTematikur meTodebs, roml ebic gamoiYeneba rukis Sedgenisas da sxv.

Yyovelive amis gaTvaliswinebiT rukis sruli ganmarteba SeiZl eba Camovayal iboT Semdegnairad: geografiuli ruka ewodeba dedamiwis zedapiris Semicrebul da ganzogadoebul gamosaxul ebas sibrtyeze pirobiTi niSnebiT, Seqmnils garkveuli garkveuli maTematikuri kanonebis safuZvelze, romelic gviCvenebs bunebis movl enebis da sazogadoebis ganlagebas, Tvissebs da urTierTkavSirs.

geografiuli ruka ar SeiZl eba arc teqstiT, arc sityiT. rukas aqvs didi praqtikuli mniSvneloba (magal iTad naosnobaSi, aviaciaSi, kosmosis aTvisებაSi, soflis meurneobaSi, teqnikaSi da sxv.).

rukebs ganasxvaveben Semdegi niSnebiT:

1. teritoriis mixedviT. magal iTad msoufl ios, kontinentebis, maTi calkeuli nawil ebis, okeanebis, zRvebis, saxel mwi foebis, ol qebis, Statebis, raionebis da a.S. rukebi.
2. Sinaarsis mixedviT. Gganasxvaveben zogadgeografiul da Tematur rukebs. zogadgeografiuli ruka gamosaxavs dedamiwis zogad saxes. Mmasze aRniSnulia mdinareebi, qal aqebi, gzebi da a.S. Tematuri

- ruka ufro detal uria da gamosaxavs konkretul movl enas, magal iTad miwisZvras, kl imats, niadagebs da a.S.
3. masStabis mixedviT. Gganasxvaveben msxvil masStabian (1:200 000 da ufro msxvil i), saSual omasStabian (1:200 000-dan 1:1 000 000-mde) da wvril masStabian (1:1 000 000 da ufro wvril i) rukebs.

4. rukis maTematikuri safuZvl ebi

imisaTvis, rom dedamiwis zedapiridan gadavideT brtyel kartografiul gamosaxul ebaze, saWiroa maTematikuri Tval sazrisiT 3 operaciis Catareba:

1. dedamiwis fizikuri zedapiris proeqcireba pirobiTi el ifsoidis zedapirze.
2. am proeqciis Semcireba mimoxil viT zomebamde.
3. proeqciis gaSl a el ifsoidis zedapiridan sibrtyeze.

Ppirveli operaciis Catareba ganpirobebul ia rukis geodeziuri safuZvl iT, meore- rukis masStabiT, mesame- kartografiul i proeqciiT. Eseni warmoadgenen rukis maTematikuri safuZvl is el ementebs. Ganvmartod TiToeul i maTgani.

rukis geodeziuri safuZvel i dakavSirebul ia dedamiwis formasa da zomebTan. Ddedamiwis formis garkveul i miaxl oebaa el ifsoidi, rac ganpirobebul ia dedamiwis Tavisi RerZis garSemo brunvis Sedegad. Bbrunvis Sedegad warmoqmnil i centridanul i Zal is moqmedebiT dedamiwis forma iRebs el ifsoidis saxes. Ees iniutonma daamtka j er kidev me-17 saukuneSi. Aamave dros dedamiwaze moqmedebs simZimis Zal a, ris gamoc is ar aris ideal uri el ifsi. Aamitomac dedamiwis formic yvel aze zust saxed miRebul ia goidi. Mmiuxedavad

amisa pirveli operaciis Catarebisas iTval iswineben dedamiwis el ifsoidis zedapirs, radganac geoidi ar aris maTematikurad swori da martivi figura.

Nnebismieri monakveTi dedamiwis zedapiridan el ifsoidze gadmotanisas mcirdeba.

Mmeore operacia gul isxmobs dedamiwis el ifsoidis Semcirebas saWiro zomebamde, e.i. gul isxmobs masStabis SerCevas. Am masStabs inarCuneben mTel zedapirze, mas uwodeben mTavar masStabs.

mesame operacia gul isxmobs dedamiwis sibrtyeze gaSI as. am dros mTavari masStabis SenarCuneba ver xdeba yvel gan Tanabrad da warmoiqmneba damaxinj ebebi.

dedamiwis el ifsoididan sibrtyeze gadasvl a Zal ze rTul i maTematikuri amocanaa, radganac am dros warmoiqmneba geografiul i obieqtetebis formebs, sxvadasxva manZil ebis da a.S. damaxinj ebebi. mokl ed ganvixil od es damaxinj ebebi.

gamoviyenoT Cveul ebrivi gl obusi. garkveul i sizustiT CavTval oT, rom is warmoadgens dedamiwis model s, romel ic miRebul ia geoidis proeqcirebiT el ifsoidis zedapirze da misi garkveul masStabamde SemcirebiT. anu Catarebul ia pirveli ori operacia. warmovidginoT gl obusi gaWrili meridianebis gaswvriw vvril segmentebad. gavSal oT segmentebi sibrtyeze. vnaxavT, rom ekvatorTan segmentebi erTmaneTs exebian, xol o ekvatoridan daSorebiT, gansakuTrebiT pol usebTan, sakmaod scil debian. e.i. segmentebis Soris warmoiSveba sicariel e, rasac xel ovnurad avseben da warmoiSveba damaxinj ebebi. damaxinj ebebi sxvadasxva saxisaa: sigrZeebis, kuTxeebis, farTobebis, geometriul i formebs. damaxinj ebaTa aRmosafxvrel ad mimarTaven kartografiul proeqciebs: tol kuTxas, tol farTs, nebismiers da sxv.

5. rukis Sinaarsis ZiriTadi Taviseburebani

rukis gaaCnia misi Sinaarsis el ementebi. isini gansxvavebul ia sxvadasxva rukisaTvis. zogadgeografiul i rukisaTvis Sinaarsis el ementebia rel iefi, dasaxl ebul i punqtebi, wyl ebi, gzebi, mcnareul oba, pol itikur-administraciul i el ementebi, ekonomikisa da kul turis el ementebi. Sinaarsis sxva el ementebi gaaCnia geol ogiur, kl imatur da a.S. rukebs.

ganvixil oT kartografiul aRniSvnaTa saxeobani, anu pirobiTi niSnebi. zogierTi obieqti rukaze gamoisaxeba Tavisi masStabiT, magal iTad tye gamoisaxeba Sesabamisi farTobiT. zogi obieqti ki ar gamoisaxeba masStabiT. magal iTad qal aqi. mas uwodeben masStabgareSe kartografiul gamosaxul ebas. mesameni warmoadgenen wagrZel ebul obieqtebs- gzebi, sazRvrebi, mdinareebi da sxv. isini masStabSi gamoisaxebian mxol od sigrZiT. rac Seexeba siganes, is rukis masStabSi ar gamoisaxeba. aseT SemTxvevaSi kartografiul gamosaxul ebas uwodeben xazovans.

saerTod rukis Sedgenisas iTval iswineben, rom kartografiul i gamosaxul eba SeZl ebisdagvarad inarCunebdes 2 ZiriTad Tvisebas: geometriul sizustes da geografiul Sesabamisobas.

geometriul i sizuste gul isxmobs, rom TiToeul i obieqti gamoisaxeba rukaze swored im adgil as, sadac is imyofeba sinamdvil eSi, Tavisi zomebiT masStabis Sesabamisad.

geografiul i Sesabamisoba moiTxovs, rom SenarCunebul i iyos teritoriis mTliani geografiul i saxe.

6. manZil ebisa da farTobebis gazomva rukaze

ganvixil oT manZil ebisa da farTobebis gazomva topografiul rukaze. topografiul i ruka ewodeba dawvril ebiT zogadgeografiul rukas, romel ic gadmogvcems adgil is ZiriTad Taviseburebebs.

topografiul i ruka ZiriTadad iqmneba teritoriis aerofotogadaRebebis safuZvel ze, iSviaTad uSual o gazomvebis Sedegad.

rukis qvmod aTavseben masStabs. is SeiZl eba gamosaxul iqnas wil adis saxiT, rac miuTiTebis imaze Tu ramdenjer aris Semcirebul i gamosaxul eba sibrtyeze gadmotanisas. aseT masStabs uwodeben ricxviTs. masStabi SeiZl eba gamoisaxos sityvierad, magal iTad 1sm-Si 10km-ia. aseT masStabs uwodeben saxel dobil s. arsebobs agreTve xazovani masStabi, romel ic rukis masStabs gamoxatavs xazze (wrfenze) danayofebis saSual ebiT.

topografiul rukaze dedamiwis simrude ar aris gaTval iswinebul i, amitom manZil ebisa da farTobebis gazomva masStabis saSual ebiT xorciel deba didi sizustiT. gazomvebis gansakuTrebiT mcirea cdomil eba vake teritoriebisaTvis, xol o mTebSi cdomil eba ramdenadme metia.

manZil is gasazomad SeiZl eba gamoviyenoT cirkul i, kurvimetri, Zafi.

farTobis zusti gazomvisaTvis mTel teritorias yofen patara teritoriebad, ufro xSirad kvadratebad, angariSoben TiToeul i maTganis farTobs da Semdeg kreiben.

7. rel iefis gamosaxva topografiul rukaze

rel iefi geografiul i garemos umniSvnel ovanesi el ementia. is gavlenas axdens siTbosa da tenis gadanawil ebaze, niadagis da mcenareul obis gavr cel ebaze. amrigad rel iefis agebul eba

arxebiTad gansazRvravs teritoriis l andSaftur Taviseburebbs. meores mxriv, rel iefze mniSvnel ovnad aris damokidebul i dasaxl ebul i punqtebis ganl ageba, avto da sarkinigzo magistral ebi, energetikul i nagebobebi, sasofi o-sameurneo warmoebis pirobebi. aqedan gamomdinare didi mniSvnel oba eniWeba rel iefis gamosaxvas.

rukaze rel iefis gamosaxvisaTvis iyeneben sxvadasxva xerxebbs. erT-erTi mecnierul ad dasabuTebul i aris horizontal ebis xerxi. amitom Tanamedrove topografiul rukebze rel iefs gamoxataven horizontal ebis saSual ebiT.

horizontal i ewodeba rTul mruds, roml is yvel a wertil s gaaCnia erTi da igive absol uturi simaRI e. absol uturi simaRI is qveS igul isxmeba simaRI e zRvis donedan. or mezobel horizontal s Soris simaRI eTa sxvaobas rel iefis kveTis simaRI e ewodeba.

rel iefis daxasiaTebisaTvis didi mniSvnel oba aqvs monacemebs mwverval ebis, Rrmul ebis, tbaTa donebis da sxva gansakuTrebul i wertil ebis Sesaxeb. am wertil ebs moniSnaven rukaze, uwodeben simaRI ebriv niSnebs da aRniSnaven cifrebiT (simaRI e).

dedamiwis zedapiris rel iefi Sedgeba ferdobebisagan. isini xasiaTdebian sxvadasxva formiT da daxril obiT. ferdobi SeiZl eba iyos swori, amozneqil i an Cazneqil i. Sesabamisad maTi gamosaxul eba sibrtyeze gansxvavebul ia.

ori ferdobis SeerTebisas warmoiqmneba gadaRunvis xazi. is SeiZl eba iyos wyal gamyofi, an wyal Semkrebi.

8. adgil is gegmis saxeobani. gegmiuri agegmva

adgil is agegmva xorciel deba, rogorc uSual o gazomvebis Sedegad, agreTve aerofotogadaRebaTa

masal ebis damuSavebis safuZvel ze. amitom ganaxvaveben miwispira topografiul agegmvas da aerofototopografiul agegmvas.

Tavis mxriv agegmva SeiZl eba iyos gegmiuri, maRI ivi da gegmiur-maRI ivi. gegmiuri agegmva iZl eva adgil is gamosaxul ebas misi simaRI ebrivi daxasiaTebis gareSe. maRI ivi agegmva iZl eva vertikal ur profil s, anu reliefis gamosaxul ebas horizontal ebiT. gegmiur-maRI ivi agegmva iTval iswinebs rogorc erT, ise meore pirobas, amitomac is aris ufro srul yofil i.

ganvixil oT gegmiuri agegmvis xerxebi. gegmiuri gamosaxul eba ar iTval iswinebs reliefs. is iTval iswinebs mxol od wrfiv da kuTxur gansazRvrebeps. kuTxis gansazRvra Sesazl ebel ia 2 gziT. pirveli-kuTxis uSual o gazomviT, xol o me-2-horizontal ur sibrtyeze, an mimarTul ebebis gamoxazviT. es gavrcelebul ia ufro savel e pirobebSi. amrigad gegmiuri agegmva 2 saxebisaakuTxeTa gamzomi da kuTxeTa gamoxazviT. kuTxeTa gazomviT agegmvas miekuTvneba busol uri, anu kompasuri, Teodol ituri da ekerul i agegmvebi.

kimpasis saSual ebiT xdeba gagneba, magnituri isari yovel Tvis magnituri meridianis sibrtyeSi Cerdeba.

ekerul i agegmva gamoiyeneba mcire farTobebisaTvis SedarebiT martivi situaciis pirobebSi. ekeri special uri xel sawyoa, romel zec damontaJebul ia sarke. sarkidan arekvl is xerxebiT gamoisaxeba kuTxeebi da xdeba agegmva.

gansakuTrebiT gavrcelebul ia agegmva Teodol itis saSual ebiT. Teodol iti zustad axdens kuTxeTa gazomvas. Teodol iti, rogorc wesi magrdeba samfexaze. misi ZiriTadi nawil ia horizontal uri wre., anu limbi, alidal uri wre, mxedvel obiTi mil i da vertikal uri wre.

saerTod kuTxemzomi agegmvis dros adgil is gegma iqmneba kameranur pirobebSi savel e gazomvebis monacemebis gamoyenebiT. misgan gansxvavebiT kuTxeTa gazomviT agegmva saSual ebas iZl eva miviRoT kartografiul i gamosaxul eba uSual od vel ze. am xerxiT agegmvas esaWiroleba horizontal uri magida da qaRal di, anu e.w. pl anSeti, da agreTve saxazavi. kuTxeTa xazvis agegmvaTa saxeobebs miekuTvneba menzul uri da vizual uri agegmva.

menzul uri agegmva warmoebs special uri xel sawyos menzul is saSual ebiT.

vizual uri agegmva warmoebs sakuTari Tval Taxedvis saSual ebiT. mas mimarTaven, rodesac saswrafod sWirdebaT mocemul i adgil is msxvil masStabiani gegma. amisaTvis gamoiyeneben pl anSets, special ur saxazavs da kompass. kompass daamagreben pl anSetis zeda nawil Si da axdenen horizontis mxareebis dadgenas. Semdeg SearCeven masStabs. manZil ebs zomaven Tval iT, miaxl oebiT.

9. maRI ivi agegmva

wertil is mdebareoba dedamiwis zedapirze ganisazRvreba 2 koordinatiT da simaRI iT. geografiul koordinatTa sistemaSi 2 koordinatis rol s asrul ebs geografiul i ganedi da grZedi, xolo simaRI isa-absol uturi simaRI e. rukaze, rogorc wesi, wertil is mdebareoba absol uturi simaRI iT, e.i. zRvis donedan simaRI iT ganisazRvreba. agegmvis dros ki ar aris aucil ebel i, rom yvel a wertil i davukavSiroT zRvis dones. iReben raime pirobiT dones da xSirad ganixil aven SefardebiT simaRI es. aseT samuSaoebs uwodeben nivel irebas. ganasxvaveben nivel irebis 3 saxeobas: geometriul s, trigonometriul s da fizikurs.

geometriul i nivel ireba saSual ebas iZl eva martivad ganvsazRvroT simaRI eTa sxvaoba 2 wertil s Soris. amisaTvis xel sayrel ia saskol o nivel iris gamoyeneba. cnobil ia agreTve fizikuri nivel ireba, rac emyareba atmosferul i wnevis cvl il ebas simaRI is mixedviT.

10. gegmiur-maRI ivi agegmva

gegmiur-maRI ivi agegmva warmoadgens agegmvis kompl eqsur saxes. am saxeobis agegmvis dros miReba adgil is wertil ebis rogorc gegmiuri mdebareoba, ise simaRI eebi. am SemTxvevaSi agegmvisaTvis gamoiyeneben Teodolit-taqometers, menzul as da zogjer- barometr-aneroids. aseTi agegmva, bunebrivia, iTval iswinebs horizontal ebis miRebas.

11. gradusTa bade dedamiwaze

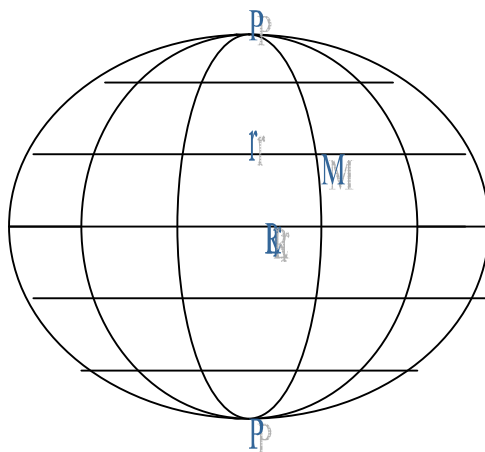
Tu davakvirdebiT geografiul rukas, an gl obuss SevamCnevT, rom isini daseril ia xazebiT. es xazebi qmnan gradusTa bades. gradusTa bades didi praqtikul i mniSvnel oba aqvs. misi saSual ebiT Sesazl ebel ia dedamiwaze movnaxoT nebsmieri wertil i da gamovsaxoT geografiul i koordinatebis saSual ebiT.

dedamiwas gaaCnia warmosaxviTi RerZi, roml is garSemoc is brunavs. im adgil ebs dedamiwis zedapirze, sadac gadis warmosaxviTi RerZi **pol usebi** ewodeba. amrigad gvaqvs 2 pol usi-Crdil oetis da samxretis.

pol usebidan Tanabar manzil ze gavlebul wrexazs **ekvatori** ewodeba. is dedamiwas 2 naxevarsferod yofs-Crdil oet da samxret. ekvatoris paralel urad gavlebul wrexazebs **paralel ebi** ewodeba, Tvit ekvatoric paralel ia da ugrZesia maT

Soris (40 000 km), xol o yvel aze mokl e paral el i pol usebTan axl os aris ganl agebul i.

pol usebis SemaerTebel wrexazebS **meridiane**bi ewodeba. sigrZiT yvel a meridiani tol oa. amitom, rom ganasxvaon isini, sawyis meridianad pirobiTad arCeul ia meridiani, romelic gaviL is Londonis maxl obl ad grinviCis observatoriaze. mas sawyis, nul ovan an grinviCis meridians uwodeben. is agreTve 2nawil ad yofs dedamiwas-aRmisavl eT da dasavl eT.



nax.. gradusTa badis el ementebi: P-pol usebi, R-ekvatori, L-paral el i, M-meridiani

gradusTa bades ukavSi rdeba cnebebi geografiul i ganedisa da grZedis Sesaxeb. **geografiul i ganedi** ewodeba manZil s ekvatoridan Crdil oetIT an samxreTIT mocemul wertil amde, gamosaxul s gradusebSi. imisda mixedviT, Tu romel naxevarsferoSi mdebareobs wertil i, ganasxvaveben Crdil oetis da samxreTis ganedebS. **geografiul i grZedi** ewodeba manZil s sawyisi meridianidan aRmosavl eTIT an dasavl eTIT mocemul wertil amde,

agretve gamosaxul s gradusebSi. ganasxvaveben aRmosavl eTis da dasavl eTis grZedebS. geografiul ganedis da grZeds **geografiul koordinatebs** uwodeben.

gradusTa badeze manZil ebi gamoisaxeba gradusebSi. imisaTvis, rom ganvsazRvrot 1 gradusis sigrZe ekvatoris garSemowirul oba, anu 40 000 km unda gavyot 360 gradusze, Sedegad miviRebT 111 km-s. amrigad ekvatorzr 1 gradusis sigrZe 111 km-ia. maRal ganedebSi, anu pol usebisaken paral el ebis sigrZis SemcirebasTan erTad is mcirdeba. 1 gradusis sigrZis damokidebul eba geografiul ganedze gamoisaxeba Semdegi formul iT:

$$L=111,2\cos f,$$

sadac f -geografiul i ganedia, xol o L - 1 gradusis Sesabamisi sigrZea.

12 cneba kartografiul i proeqciis Sesaxeb

kartografiul i proeqcia ewodeba dedamiwis el ifsoidis sibrtyeze gamosaxvis xerxs, anu dedamiwis el ifsoidis geografiul rukad gardaqmnis xerxs.

mecnierebis ganvitarebis sxvadasxva periodebSi dedamiwis el ifsoidan sibrtyeze gadasvl is dros gamoiyeneboda sxvadasxva metodebi. Tumca es xerxebi SemuSavda ara uSual od dedamiwis el ifsoidisaTvis, aremed ciuri sferosaTvis- cis varskvl avTa rukis Sesadgenad. amisaTvis antikur saberZneTSi dawyebul i Cvens wel TaRricxvamde me-6 saukunidan daiwyes e.w. perspeqtiul i proeqciebis gamoyeneba. im dros mecnierebi cdil obdnen ciuri sfero ramenairad gadmoetanad rukaze, xol o mis sizustesa da maTematikur uzrunvel yofaze nakl ebad figrobdnen. es gasagebicaa, radganac im dros maTematikur macnierebas jer ar SeeZl o amgvari proeqciebis

agebis yvel a niuansi. perspeqtiul i proeqcia warmoadgens gamosaxvis martiv geometriul xerxs. is SemdgomSi gamoiyenes dedamiwis zedapiris gamosaxatavad. erT-erTi aseTia mkveTi stereografiul i proeqcia, rodesac dedamiwis naxevarsferos yvel a wertil i gadaitaneba am sferosadmi gavlebul Semxeb sibrtyeze.

antikuri periodis dasasrul s, Cveni wel TaRricxviT me-2 saukuneSi, SemuSavebul i iyo axali meTodebi, romlebic iTval iswinebdnen damxmare geometriul i zedapirebis gamoyenebas. aseTi zedapiri dedamiWis sferosagan gansxvavebiT advil ad iSl eba sibrtyeze. maT miekuTvneba cilindriskonkonusis gverdiTi zedapirebi. meridianebi da perel el ebi dedamiwis zedapiridan gadaitaneba aRniSnul figuraTa zedapirze da Semdeg isini advil ad iSl ebian.

zemod ganxilul i proeqciebi mainc ar iZl evian ama Tu im teritoriis zust suraTs. kerZod isini xSirad ar akmayofil eben erT-erT an yvel a ZiriTad pirobas: uwyvetobas, cal saxobas da sasrul obas.

pirveli maTgani gul isxmobs, rom geografiul i ruka unda warmoadgendes uwyvet gamosaxul ebas. meore miuTiTebis imaze, rom yovel wertil s dedamiwis el ifsoidze unda Seesabamebodes mxol od erTi wertil i rukaze. mesame piroba moiTxovs, rom dedamiwis el ifsoidis nebismieri el ementi rukaze unda gamoisaxebodes sasrul i sididis zomebSi. am sami pirobis daucvel obis gamo rukaze warmoiqmneba damaxinjebebi.

13. rukaze damaxinj ebaTa saxeebi

wina paregrafSi Cven ganvixileT proeqcia cilindriskonkonusis zedapiris gamoyenebiT. am proeqciis mixedviT dedamiwis poluss, anu erT wertil s dedamiwis zedapirze, cilindriskonkonusis zedapirze

Seesabameba mTel i wrfe. es bunebrivia warmoqmniis garkveul damaxinj ebebs. ra saxeobisa SeiZl eba iyos damaxinj ebebi?

vTqvaT gvsurs el ifsoidi gavSal od sibrtyeze. pirobiTad davWrad gl obusi meridianebis gaswvriw segmentebad da gavSal oT sibrtyeze. Cven vnaxavT, rom segmentebis Soris warmoiqmneba sicariel e, anu wyveta. geografiul i rukis pirobidan gamomdinare ki is unda iyos uwyveti. es imas niSnavs, rom ruka unda iZl eodes uwyvet gamosaxul ebas. amito meridianebi xel ovnurad unda gavaTanabroT da arsebul i sicariel eebi CavrToT rukis fargl ebSi. aseTi gziT miviRebT rukis uwyvet gamosaxul ebas. magram, warmoiqmna gamaxinj eba, pol usi erTi wertil is nacvl ad warmodgenil ia wrfed. moxda kuTxeTa damaxinj ebani. bunebrivia, rom aseTi gawel va imoqmedebis kontinentebis, da ara marto kontinentebis, farTobsa da formaze.

amrigad SegviZl ia davaskvnaT, rom dedamiwis el ifsoididan sibrtyeze gadasvl isas maxinj deba sigrZeebi, kuTxeebi, farTobebi da formebi.

sigrZeTa damaxinj eba mdgomareobs imaSi, rom sigrZeTa masStabi rukaze icvl eba, ar aris mudmivi. magal iTad ekvatorze sxvagvaria, pol usebTan -sxva. farTobebis damaxinj eba agreTve masStabs ukavSirdeba. geometriul i formebi dedamiwis el ifsoidze da sibrtyeze ra Tqma unda gansxvavebul ia, rac maT damaxinj ebaze miuTiTebis. da bol os, kuTxeTa damaxinj eba gamoixateba imaSi, rom kuTxeebi rukaze ar udris imave kuTxebs el ifsoidze.

14. kartografiul proeiciaTa saxeebi

rogorc vnaxeT, rukaze damaxinj ebaTa 4 ZiriTadi saxeobaa: sigrZeTa, farTobTa, formaTa da kuTxeTa. maT aRmosafxvrel ad mimarTaven maTematikur

meTodebs e.w. kartografiul proeqciebs. kartografiul proeqciebs yofen 3 j gufad: tol kuTxa, tol didi (tol farTi) da nebismieri.

tol kuTxa proeqciebSi rukaze SenarCunebul ia kuTxeTa tol oba, samagierod damaxinj ebul ia sigrZeebi, farTobebi da formebi.

tol did proeqciebSi dacul ia farTobebis tol oba, samagierod adgil i aqvs sxva damaxinj ebebs.

nebismieri proeqcia iTval iswinebs yvel a saxis damaxinj ebis ramdenadme Semcirebas, magram ara srul ad aRmofxvras.

amave dros ar arsebobs proeqciis saxeoba, romel ic srul yofil ad aRmofxvrides yvel a saxis damaxinj ebas.

aq warmodgenil i kartografiul i proeqciebis kl asifikaciis garda, cnobil ia agreTve proeqciebis kl asebad dayofa meridianebisa da paral el ebis badis Sesabamisad:

1. cil indrul i proeqciebi. meridianebi warmoadgenen Tanabari manZil iT daSorebul vertikal ur paral el ur wrfeebis, xol o paral el ebi- maT marTobul horizontal urad ganl agebul wrfeebis, roml ebic ar aris aucil ebel i, rom Tanabari manZil ebiT iyvnen erTmaneTisagan daSorebul ni.
2. fsevdocil indrul i proeqciebi. paral el ebi warmoadgens horizontal urad ganl agebul paral el ur wrfeebis (zogad SemTxvevaSi ar aris aucil ebel i Tanabari manZil iT daSoreba). saSual i meridiani paral el ebis marTobul i wrfea, danarCeni meridianebi mrudebia.
3. konikuri proeqciebi. paral el ebi warmoadgenen koncentrirebul i wrewirebis rkal ebs, xol o meridianebi wrfeebia, roml ebic gamodian am wrewirebis saerTo centridan.
4. fsevdokonikuri proeqciebi. normal uri badis paral el ebi warmoadgenen koncentrirebul i

- wrewirebis rkal ebs. saSual o meridiani wrfea, xol o danarCeni meridianebi mrudebia.
5. pol ikonikuri proeqciebi. paral el ebi eqscentrirebul i wrewirebis rkal ebia. Sua meridiani wrfea, xol o danarCeni meridianebi mrudebia.
 6. azimuthuri proeqciebi. paral el ebi warmoadgenen srul koncentrirebul wrewirebs, xol o meridianebi-wrfebs, roml ebic gamodian wrewirebis saerTo centridan.
 7. pirobiTi proeqciebi. ar miekuTvnebian arc erT semod ganxil ul kl ass. maT SeiZi eba gaaCndes paral el ebisa da meridianebis ganl agebis sxva saxeebi.

15. ZiriTadi kartografiul i proeqciebi

ganvixil oT zogierTi yvel aze xSirad gavrcel ebul i kartografiul i proeqcia. tol kuTxa proeqciebs Soris gansakuTrebul i adgil i miekuTvneba merkatoris proeqcias. is warmoadgens normal uri cilindrul i proeqciebis j gufs. proeqcia daamuSava merkatorma me-16 saukuneSi. mas Semdeg is farTod gamoiyeneboda msofi io rukebis Sesaqmnel ad, gansakuTrebiT 20-30-ian wl ebSi. dResac mas farTod gamoiyeneben sazRvao kartografiaSi.

merkatoris proeqcias safuZvl ad udevs masStabebis tol oba paral el isa da meridianis gaswziv. meridianebi Tanabari manZil ebiT arian daSorebul ni erTmaneTisagan, xol o paral el ebs Soris manZil ebi izrdeba ekvatoridan daSorebisas.

me-19 saukunis dasasrul s d.aitovma wamoayena msofi io rukisaTvis erTi naxevarsferos badis gardaqmnis meTodi. meTodi martivia, sakmarisia naxevarsferoze gavavl oT meridianTa 2-jer meti

raodenoba, rom miviRoT mTel i sfero. es idea ganaviTara e.hamerma l ambertis azimuthuri proeqciisaTvis da mas aitov-hameris proeqcia ewoda.

aitov-hameris proeqciaSi ekvatori da sawyisi meridiani urTierT marTobul i wrfedia. maTi gadakveTis wertil Si damaxinjeba ar aris, mas nul ovani damaxinjebis wertil s uwodeben. aitov-hameris proeqcia sworad gadmoscems kontinentebis, kunZul ebis, zRvebis da sxva obieqtebis farTobebis Tanafardobas. magram es xdeba kuTxeTa da saerto moxazul obaTa mniSvel ovani damaxinjebis xarj ze. amitom am Tval sazrisiT upiratesoba eniWeba merkatoris proeqcias.

50-ian wl ebSi moskovSi special ur institutSi g.ginzburgis mier SemuSavda nebismeri pol ikonikuri proeqciebi, romelic farTo gamoyenebaSia gansakuTrebiT 60-ani wl ebidan. am proeqciaSi ekvatori da central uri meridiani agreTve urTierTmarTobul ni arian.

naxearsferoebis rukebisaTvis cnobil ia l ambertis ganivi azimuthuri proeqcia, romelic damuSavebul i iyo misi avtoris mier me-18 saukuneSi. dawyebul i 1938 wl idan ssrk-Si yvel a naxearsferoebis ruka aigeba am proeqciebSi. l ambertis proeqcia tol didia.

me-16 dan me-19 saukunemde farTod gamoiyeneboda j er kidev Cvens wel TaRricxvamde me-2 saukuneSi hiparxis mier damuSavebul i ganivi stereografiul i proeqcia. cnobil ia agreTve sxva saxis proeqciebi.

16. rukebis kl asifikacia

rukebis kl asifikacias safuZvl ad sxvadasxva niSani udevs.

1. masStabi. ganasxvaveben msxvil masStabian (1:200 000 da msxvil i), saSual omasStabian (1:200 000-

dan 1:1 000 000-mde) da wvriil masStabian (1:1 000 000 da wvriil i) rukebs.

2. teritoriis mocul oba:

1. msfliio rukebi, roml ebic moicaven msfliios mTel teritorias;

2. naxevarsferoebis rukebi. SeiZl eba warmodgenil i iyos dasavl eTi an aRmosavl eTi, an Crdil oeT da Dasavl eT naxevarsfero;

3. kontinentebis an okeaneebis rukebi. moicaven Sesabamisad cal keul kontinentebis an okeaneebs;

4. regionebs, saxel mwifoebis an misi cal keul i raionebs rukebi da a.S.

3. Sinaarsi. ganasxvaveben zogadgeografiul da Tematur rukebs. zogadgeografiul s miekuTvneba ruka, romel ic gamoxatavs teritoriis zogad suraTs- bunebriv pirobebs, dasaxl ebul punqtebs, satransporto gzebs, sameurneo da kul turul obieqtebs.

Tematuri ewodeba geografiul rukas, romel zedac didi siRrmiT da detal urobiT aris naCvenebi romel ime bunebrivi an social ur geografiul i el ementi. Tematuri ruka SeiZl eba gamoxatavdes agreTve 2 an ramodenime kompl eqsis urTierTkavSirs. Tematuri rukebis detal uri kl asifikacia warmodgenil ia cxril Si:

cxril i. Tematuri rukebis kl asifikacia Sinaarsis mixedviT

rukaTa kl asi	rukaTa j gufi	rukaTa saxeoba
Ffizikur-geografiul i	zogadi Ffizikur-geografiul i	Ffizikuri, bunebrivi zonebis, geografiul i sartyel ebis
	geoqimiuri	l iTogeoqimiuri, niadagebis geoqimiuri
	l iTosferos	Geol ogiuri,

		teqtonikuri, vulkanizmi, geomorfologია, მორფომეტრული და ა.შ.
	atmosferos	კლიმატი, ტემპერატურა, წვიმა, ნალექები, ჰაერის, მზის რადიაცია, სინოტიკა
	hidrosferos	ოკეანოლოგია, გამყინებების და სხვ.
	biosferos	ნიადგების, მცენარეულობა, ცხოვეთათმცოდნეობა, გეობოტანიკა, ზოოგეოგრაფია
	geofizikuri	დედამიწის მაგნიტიზმი, გრავიტაცია, სეისმოლოგია
	kompleksuri	ლიანდაკები
socialურ- გეოგრაფია	მოსახლეობა	რაოდენობა, სიმჭიდროვე, მიგრაცია, სამაგნიტობა
	ekonomikuri	ზოგადეკონომიკა, მრეწველობა, სოფლის მეურნეობა, ტრანსპორტი, საყოფაცხოვ მეურნეობა, ბუნებრივი რესურსები
	politikuri	პოლიტიკა, პოლიტიკურ- ადმინისტრაცია
	kulturnis	მეცნიერება, განათლება, ხელოვნება,

		j anmrTel obis dacvis
	istoriul i	svadasxva Sinaarsis, periodebis, omebis msvl el obebis

4. **gamoyeneba.** gamoyenebis Tval sazrisiT ganasxvaveben kedl is, samagido da teqstur rukebs. kedl is ruka bunebrivia kedel ze gasakravia, samagido warmodgenilia atlasian danartis saxiT, xolo teqsturi ruka moTavsebulia wignSi aRwerasTan (teqstTan) erTad.

rukebis kl asifikacias axdenen agreTve sxvani Snebis mi xedvi Tac.

17. mimoxil viTi zogadgeografiul i rukebi

bunebrivi landSaftis el ementebis mxridan zogadgeografiul i mimoxil viTi rukebis Sinaarsi moicavs ZiriTadad wyl is obieqtebis da reliefis gamosaxul ebas, xolo social ur-geografiul i rukebi – dasaxlebul punqtebs, damakavSirebel gzebs da teritoriis politikur-administraciul dayofas. ganvixil oT am obieqtebis gamosaxvis Tavisebureba.

1. wyl is obieqtebis gamosaxva. msfli o okeane gamoisaxeba misi sanapiro zol iT da reliefis fskeriT. zogierT rukaze aRiniSneba agreTve okeaneTa dinebebi da sanaosno gzebi.

okeanis reliefis gamosaxaven hifsometruli xerxis saSual ebiT. es xerxi gul isxmobs okeanis fskeris reliefis warmodgenas izobaTebis saSual ebiT. izobaTebis atareben cval ebadi siRmiTi interval ebiT. 200-metriani izobaTa gamoxatavs kontinenturi meCeCis sazRvars, xolo 6000m izobaTa gamosaxavs Rrmul ebs. atareben agreTve 50m an 100m

izobaTebS, xol o did siRrmeebze interval s zrdian 200 an 1000m-mde. izobaTebS Soris sivrces aferadeben sxvadasxva intensivobiT, xol o Rrmul ebTan miuTiTeben siRrmes.

mdinareebi gamoisaxeba l urji feris xazebiT. rukaze Cans maTi zogadi konfiguracia, auzis sidide da forma, wyal gamyofebi da a.S.

2. reliefis gamosaxva. kartografiaSi damuSavebul ia reliefis gamosaxvis ramodenime xerxi. ganvixil oT zogierTi maTgani:

a). reliefis perspeqtii i gamosaxul eba. gamoiyeneba uZvel esi droidan, Sua saukuneebidan da dResac ar daukargavs Tavisi mniSvel oba. is imaSi mdgomareobs, rom mTaTa qedebis zogadi suraTi gamoixateba perspeqtii i naxatis saSual ebiT. reliefis aseTi gamosaxul eba naTI ad ucvenebS ZiriTad niSnebs, magram amave dros sakmaris sizustes ver akmayofil ebs.

b). hifSometrul i xerxi. gul isxmobs horizontal ebiS gatarebas. mimoxil viT rukaze horizontal s izihifsi ewodeba. gansxvaveba maT Soris isaa, rom horizontal ebs Soris interval ebi Tanabaria, xol o izohifsebs Soris ar aris. yvel a mimoxil viT zogadgeografiul rukaze avl eben 200 metrian izohifss, romelic vakes gamohyofs maRI obisagan; 500m izohifss, romelic pirobiTi sazRvaria maRI obsa da mTas Soris. atareben agreTve 1000 da 2000m izohifsebs, roml ebiC warmoadgenen sxvadasxva simaRI is sartyl is mTebis sazRvrebs. amasTanave izohifsebs Soris interval i SeiZl eba iyos sxvadasxva, magram simaRI is gazrdiT interval i izrdeba. izohifsebs Soris sivrces aferadeben.

g). fotoreliefi. miReba adgil is reliefis fotografirebiT. ukanasknel periodSi mas didi mniSvel oba eniWeba, gansakuTrebiT kosmosuri fotografirebis ganviTarebis gamo.

3. dasaxl ebul i punqtebis gamosaxva. dasaxl ebul punqtebs didi sizustiT gamoxataven topografiul rukebze. magram zogad mimoxil viT rukaze es ramdenadme garTul ebul ia. am SemTxvevaSi qal aqi, sofel i da saxaxl ebul i punqti Tavisi masStabebiT da im teritoriis srul i CvenebiT, rac mas ukavia, ver gamoisaxeba. amotom dasaxl ebul punqtebs pirobiTad aRniSnaven wreebis saSual ebiT, romel Tac punsonebs uwodeben. punsoni frangul i sityvaa da aRniSnavs fol adis Reros.

imisda mixedviT Tu ra zomis, mniSvnel obis an mosaxl eobis dasaxl ebul i punqtia SeirCeva punsonis radiusi.

4. damakavSirebel i gzebis gamosaxva. mimoxil viT zogadgeografiul rukaze ZiriTadad gamosaxaven saxmel eTo, sazRvao da samdinaro gzebs, iSviaTad sahaero da mil sadens.

saxmel eTo gzebs Soris mniSvnel ovani ekonomikuri mniSvnel oba eniWeba sarkinigzo gzas, amitom upirvel es yovl isa mas aRniSnaven rukaze.

yvel a gza gamoisaxeba xazebis saSual ebiT, xSirad sxvadasxva feriT. sazRvao gzis gaswrviv miuTiTeben manZil s.

5. teritoriis pol itikur-administraciul i dayofis gamosaxva. miuxedavad teritoriis sididisa, es iqneba naxevarsferoebis, kontinentebis Tu sxva ruka, masze sazRvrebiT gamoyofen saxel mwifoebis, miaweren saxel wodebas da aRniSnaven mis dedaqal aqs.

18. Tematuri rukebi

Tematuri rukis Sinaarsi pirobiTad 2 nawil ad iyofa. pirvel s Seadgens rukis special uri Sinaarsi, romel ic gamosaxavs ama Tu im movl enis ganawil ebas sivrcesi, magaliTad temperaturis an wnevis ganawil ebas. meore nawil s Seadgens rukis geografiul i safuZvel i, raSic igul isxmeba zRvebis

mdinareebi, tbebis, dasaxl ebul i punqtebis da sxva gamosaxva. rukis geografiul i safuZvel i saWiroa upirvel es yovl isa orientirebisaTvis.

Tematuri rukebi gamosaxaven konkretul i movl enis, misi saSual o an eqstremal uri mniSvnel obebis, mimarTul ebis, droSi cvl il ebis da sxva ganawil ebas sivrceSi. yovel ive amis gamosaxavad mimarTaven kartografiis sxvadasxva xerxs: areal ebis, xarixobrivi fonis, wertil ovan, izoxazebis, niSnebis, l okal izebul i diagramebis, kartodiagramebis, kartogramebis, wrfivi da moZravi niSnebis xerxebi. mokl ed ganvixil oT TiToeul i maTgani.

1. areal ebis xerxi. area- l aTinuri sityvaa da niSnavs farTobs. farTobi, romel zec gavrcel ebul ia movl ena, gansakuTrebul i aRniSvniT gamoiyofa rukaze. magal iTad kul turul i an gareul i mcenareul obis, an cxovel ebis gavrcel ebis areal i, gl exTaj anyebis gavrcel ebis areal i da sxva.
2. xarixobrivi fonis xerxi. mdgomareobs mTel i teritoriis dayofaSi sxvadasxva nawil ebad da maTi gansxvavebaTa CvenebaSi. magal iTad is SeiZl eba gamoyenebul iqnas niadagebis Tvisobriv daraionebaSi.
3. wertil ovani xerxi. rukaze movl enas aRniSnaven wertil iT. TiToeul wertil s aniWeben wonas. magal iTad mosaxl eobis simWi drove SeiZl eba gamoisaxos 1 wertil iT, romel ic Seesabameba 1000 kacs, 2 wertil i iqneba 2000 kaci da a.S. igive meTodiT SeiZl eba gamoisaxos naTesebis farTobi, an mecxovel eobis ganl ageba da sxva. am SemTxvevaSi SeiZl eba gamoyenebul iqnas sxvadasxva ferebi. magal iTad, simindis naTesebi aRniSnos yviTel i feriT, xorbl is- mwane da a.S.

4. izoxazebis xerxi. rukaze izoxazs uwodeben iseT mruds, roml is gaswvriV movl ena ucvl el ia. sxvanairad rom vTqvaT, izoxazi aerTianebS Tanabari sididis an sixSiris movl enebS. am xerxs xSirad mimarTaven iseTi Tematuri rukebis Sedgenisas, rogoric aris temperaturis, nal eqebis, wnevis da sxva. xerxi gamoiyeneba iseTi movl enebis kartirebisaTvis, roml ebic xasiaDdebian sivrceSi uwyvetobiT.
5. niSnakebis xerxi. xerxi gamoiyeneba mcire teritoriebis SemTxvevaSi, rodesac maTi Cveneba rukis masStabSi SeuZl ebel ia. magal iTad am xerxiT axasiaTeben dasaxl ebul punqtS: mosaxl eobis raodenobas, sawarmoTa saxeobebS, kul turul -sayofacxovrebo dawesebul ebebs. kerZod kurortis simZl avre an gamtarunarianoba, rac SeiZl eba ramoisaxos Sesabamisi sididis kvadratis, an mraVal kuTxedis saxiT. isini iSviaTad gamoiyeneba bunebrivi movl enebis dasaxasiaTebI ad.
6. I okal izebul i diagramebis xerxi. am xerxis saSual ebiT gamosaxaven movl enis sidides yvel a mimarTul ebis gaTval iswinebiT. magal iTad is Zal ze xel sayrel ia qarS sxvadasxva mimarTul ebaTa ganmeoradobis, an siCqaris gamosaxvaSi.
7. kartodiagrama. umTavresad gamoiyeneba pol itikuri, an pol itikur - administraciul i daraionebis dros. magal iTad qal aqis an sofl is mosaxl eobis Sesafasebl ad. kartodiagramis pirobiT niSnebs Cveul ebriv gaaCnia wrewiris,

- kvadratis, marTkuTxedis an raime geometriul i figuris forma.
8. kartograma. gamoxatavs movl enis SefardebiT ganzomil ebas. gamoiyeneba umTavresad social ur-geografiul i movl enebis aRsawerad: mosaxl eobis simkvrive, wil i da a.S.
 9. wrfivi niSnebis xerxi. gamosaxaven gzebs, mdinareebs, arxebs, pol itikur-administraciul sazRvrebs, atmosferul frontebs da sxva.
 10. moZravi niSnebis xerxi. gamoisaxeba sxvadasxva obieqtis an movl enis sivrceSi gadaadgil eba. magal iTad eqspediciis gza, samxedro nawil is gadaadgil eba, okeaneTa dinebebi, haeris masebis moZraobis mimarTul ebebi da sxva. mimarTul ebas aRniSnaven isrit.

19. geografiul i atl asebi

geografiul i atl asi ewodeba kartografiul nawarmoebs, romelic warmoadgens saerto daniSnul ebiT gaertianebul geografiul rukebis sistemas. is iZl eva mocemul i teritoriis Rma da mraval mxriv daxasiaTebas.

geografiul i atl asis SeqmnaSi monawil eobs special istTa didi jgufi da agreTve mTel i rigi dawesebul ebebi – kartografiul i sawarmo, wamyvani samecniero-kvl eviTi dawesebul ebebi, maT Soris akademiebi, universitetebi, institutebi da sxva.

atl asebi gansxvavdebian daniSnul ebis, struqturis, rukaTa Sinaarsis da gaformebis, saerto garegani saxis mxriv.

dani Snul ebis mixedviT ganasxvaveben sacnobarō, saswavl o, samecniero, turistul , samxedro da sxva sixis atl asebs.

struqtura gansazRvravs atl asis Sedgenil obas. magal iTad, atl asis ganayofebi SeiZl eba warmodgenil i iyos Tematuri principis safuZvel ze: buneba, mosaxl eoba, meurneoba da sxva.

Sinaarsis mxriv ganasxvaveben zogadgeografiul , Tematur da kompl eqsur atl asebs.

teritoriis mixedviT ganasxvaveben msofil ios, kontinentebis, qveynebis an misi cal keul i raionebis da a.S. atl asebs.

20. saskol o kartografiul i nawarmoebebi

geografiis swavl ebisas skol aSi gamoiyeneba Semdegi tipis kartografiul i nawarmoebebi: geografiul i ruka, geografiul i atl asi, gl obusi, rel iefuri ruka, bl okdiagramebi da profil ebi.

geografiul i rukis, atl asis da gl obusis arsi ganvixil eT wina paragrafebSi. axl a ganvixil oT danarCeni kartografiul i nawarmoebebi.

1. rel iefuri ruka. warmoadgens dedamiwis zedapiris rel iefur gamosaxul ebas, romelic rel iefs gadmogvcems 3 ganzomil ebaSi. anu is mocul obiTi rukaa.
2. bl okdiagrama. dedamiwis qerqis cal keul i ubnebis brtyel i perspeqtul i gamosaxul ebaa, romelic gamosaxavs ara mxol od dedamiwis zedapiris, aramed misi Sinagani agebul ebis Taviseburebebs.

3. profil ebi. wadmoadgens dedamiwis zedapiris vertikal uri Wril is gamosaxul ebas. magal iTad Wril i Savi zRvidan kavkasionamde.

21. kartografiul i nawarmoebis gaformeba

rukis gaformebis umniSvnel ovanesi amocanaa kartografiis gamomsaxvel obiTi saSual ebebis damuSaveba. amisaTvis gamoiyenaba semiotikis, ferTamcodneobis, sainJinro fsiqol ogiis miRwevebi. agreTve gamoiyeneba grafikul i xel ovnebis da pol igrafiis saSual ebebi.

semiotika- berZnul i sityvaa, aRniSnavs niSans. is mecnierebaa, romelic ikvl evs niSnebis da niSanTa sistemebis Tvisebebs. kartografiaSi farTod gamoiyeneba niSnebi, rogorc sxvadasxva mobil enis gamomsaxvel i saSual eba.

ferTamcodneoba- mecnierebaa ferebis Sesaxeb. ganasxvaveben 3 dargs: ferTa fizikas, ferTa fiziologiis da ferTa fsiqil igias.

ferTa fizika Seiswavl is sxivur energias: mis gavrcel ebas, arekvl as, StanTqmas. sxivuri energiis ZiriTadi maxasiaTebi ebia sinaTl is siCqare, tal Ris sigrZe, simZl avre, simZl avreTa ganawil eba tal Ris sigrZeTa mixedvit, anu sinaTl is speqtral uri Sedgenil oba.

ferTa fiziologia Seiswavl is mxedvel obis organoSi mimdinare procesebs da kavSirs mxedvel obis organos Sedgenil obis, gamosxivebis maxasiaTebi ebs da Sesabamis ferebs Soris.

ferTa fsiqologia – ferTamcodneobis erTerTi urTulesi da nakl ebad gamokvl eul i dargia. feris fsiqologiuri aspeqto mdgomareobs imaSi, rom feri axdens ra gavlenas saerto fsiqologiur mdgomareobaze, mas SeuZlia gamoiwvios sxvadasxva xasiaTi: dawynarebul i an aRel vebul i, mxiarul i an daRonebul i,

cnobil ia Tbil i (wiTel i, narinj isferi, yviTel i) da civi (mwvane, l urji, cisferi) ferebi. dadgenil ia, rom Tbil i ferebi adamanis organizmze moqmedebs aRmaRznebl ad: uxSirebs pul ss, iRI eba Tval ebi, xol o civi ferebi asustebs moqancul obas da awynarebs mxedvel obas.

yovel ive es gaTval iswinebul i unda iyos kartografiul i nawarmoebis Sedgenisas.

22. sinaTI is optikuri SeTavsebis kanonebi

bunebaSi arsebul i ferTa mTel i mraval ferozneba sistemaSi moi yvana i. niutonma. man ferTa mTel i mwkrivi warmoadgina wrewiris saxiT, romel ic dayofil ia 7 nawil ad Semdeg ferebad: wiTel i, narinj isferi, yviTel i, mwvane, cisferi, l urji, iisferi.

dadginda, rom TiToeul i ferisaTvis arsebobs meore iseTi feri, romel Tan SeTavsebis Sedegad miiReba aqromatul i, e.i. seri, an TeTri feri. 2 aseT fers uwodeben damatebiTs, anu erTmaneTs amateben erT mTI ianamde.

damatebiTi ferTa wyvil ebia: narinj isferi- cisferi, yviTel i-l urji, mwvane (an yviTel i)- iisferi. Tu adamanis mxedvel obiT organoze erTdroul ad moqmedebs es ferebi, maSin vxedaVT ser an TeTr fers. amas ewodeba ferTa SeTavsebis pirvel i kanoni.

aradamatebiTi ferebis SeTavsebisas, roml ebic ferTa wrewirze erTmaneTis mezobl ad arian ganl agebul ni, warmoiqmneba axal i qromatul i feris SegrZneba, roml is ferTa toni moTavsebul ia SemTavsebel ferebs Soris. amas uwodeben ferTa SeTavsebis meore kanons. magal iTad wiTI is da yviTI is SeTavsebiT miiReba narinj isferi, mwvanes da l urjis

SeTavsebiT –cisferi, da a.S. aseT ferebs ewodeba gardamaval i.

erTnairi ferebis Sereva iZl eva igive fers, es aris ferTa optikuri SeTavsebis mesame kanoni. aq CamoTvl il i kanonebis eqsperimentul i dasabuTeba moaxdines maqsvel ma da hel mhol cma Taviant cdebSi.

adamiანis Tval i eqvemdebareba optikuri SeTavsebis kanonebs, amitomac sagnis TiToeul wertil s vxedavT garkveul ferSi.

23. rukis fonuri gaformeba

rukis gaformebas pirvel xarisxovani mniSvneloba aqvs misi saerto wakiTxisaTvis. rukis gaformebisas kartografma sworad unda SearCios ama Tu im obieqtis feri da foni, amisaTvis is kargad unda icnobdes ferTa kontrastebs.

rodesac 2 sxvadasxva feri ganl agebul ia erTmaneTis gverdiT, isini gavl enas axdenen erTmaneTze- sikaSkaSeze da fonze. imisaTvis, rom gavl ena minimumamde iyos dayvanil i gamformebel ma unda SearCios Sesabamisi tonebi. cxril Si naCvenebia Tu ra gavl enas axdens erTmaneTze ferebi.

ZiriTadi feri	Mmezobel i feri	moqmedeba	
		ZiriTad ferze	Mezobel ferze
wiTeli	narinjisferi	yvITl deba	Mmoseromwvano
"	mwvane	xdeba naTel i	xdeba naTel i
"	lurji	narinjisferi	mwvane
"	iisferi	narinjisferi	Aar

			icvl eba
mwvane	narinj isferi	l urj deba	yviTI deba
""	l urj i	muqdeba	iisferi
""	iisferi	yviTI deba	l urj deba
narinj isferi	l urj i		muqdeba
""	iisferi		l urj deba
iisferi	l urj i	Aar icvl eba	Aar icvl eba

ferebis SerCeva rukis gaformebisTvis ar aris nebismeri. kargi gamosaxul ebis misaRebad aucil ebel ia dacul iyos ferTamcodneobis yvel a kanoni e.i. ferebi unda iyos SerCeuli da mecniერul ad dasabuTebul i. sworad SerCeul i feri zrdis rukis informaciul tevadobas.

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