AUTOMATED QUIZ GENERATOR

Part B – Fill in the Blanks

1) (Fill-in-the-Blank) _____ physical approach to image formation are based on conservation of energy.themostimportantincomputergraphicsisradiosity.thismethodworks 4.thismodelofimageformationwasusedbyleonardodavinci500yearsago .
Answer: other

2) (Fill-in-the-Blank) 1.7 _____ architecture ononesideoftheapiistheapplicationprogram.ontheothersideissomecom- bination of hardware and software that implement the functionality of the api .
Answer: graphic

3) (Fill-in-the-Blank) _____ the location of the center of projection , the location 1.6 theprogrammersinterface 21 figure1.18 imagingwiththesyntheticcamera .
Answer: given

4) (Fill-in-the-Blank) 1.2 _____ 5 1.1.4 user interface our interaction with computer ha become dominated by a visual paradigm that includes window , icon , menu , and a pointing device , such a a mouse .
Answer: agraphicssystem

5) (Fill-in-the-Blank) _____-generatedimagesaresyntheticorartificial , inthesensethattheob- jects being imaged may not exist physically .
Answer: computer

6) (Fill-in-the-Blank) _____ plate 13 show a scene from a computer-generated video .
Answer: color

7) (Fill-in-the-Blank) for _____ , if three vertex specify a triangle filled with a solid color , the rasterizer mustdeterminewhichpixelsintheframebufferareinsidethepolygon.wediscuss this rasterization (or scan-conversion) process in chapter 8 for line segment and polygon .
Answer: example

8) (Fill-in-the-Blank) _____ providespositionalinformationtothesystem , and_____usuallyisequippedwithone ormorebuttonstoprovidesignalstotheprocessor.oftencalledpointingdevices , thesedevicesallowausertoindicateaparticularlocationonthedisplay.westudy thesedevicesinchapter3 .
Answer: each

9) (Fill-in-the-Blank) 22 chapter1 _____ figure1.20 interfaceforapaintingprogram .
Answer: graphicssystemsandmodels

10) (Fill-in-the-Blank) _____ , aftermultiplestagesoftransformation , thegeometryistransformed byaprojectiontransformation.inchapter5 , weseethatwecanimplementthisstep using 4 4 matrix , and thus projection fit in the pipeline .
Answer: eventually

11) (Fill-in-the-Blank) in _____ , we want to keep three-dimensional information a long a possible , a object pas through thepipeline.consequently , theprojectiontransformationissomewhatmore_____ than the projection in section 1.5. in addition to retaining three-dimensional in- formation , thereisavarietyofprojectionsthatwecanimplement.wewillseethese projectionsinchapter5 .
Answer: general

12) (Fill-in-the-Blank) a _____ can be thought of a a potential pixel that carry with it information , including it color and location , that is used to update the corresponding pixel in theframebuffer._____scanalsocarryalongdepthinformationthatallowslater stage to determine if a particular _____ lie behind other previously rasterized _____sforagivenpixel .
Answer: fragment

13) (Fill-in-the-Blank) _____ flight simula- torshaveprovedtoincreasesafetyandtoreducetrainingexpenses.theuseofspe- cial vlsi chip ha led to a generation of arcade game a sophisticated a flight simulator .
Answer: graphical

14) (Fill-in-the-Blank) _____-timegraphics , weusually aresatisfiedwithimagesthatlookreasonableratherthanimagesthatarephysically correct.suchisnotthecasewithimagesthatarenonreal-time , suchasthosegen- eratedforafeaturefilm , whichcanusehoursofcomputertimeforeachframe.with theincreasedspeedofpresenthardware , wecangetclosertophysicallycorrectimages inreal- timesystems.consequently , wewillreturntotheseapproachesinchapter13 .
Answer: giventhetimeconstraintsinimageformationbyreal

15) (Fill-in-the-Blank) _____ in the middle of the range , around 520 nm , are seen a green ; thosenear450nmareseenasblue ; andthosenear650nmareseenasred.just aswitharainbow , lightat_____sbetweenredandgreenweseeasyellow , and _____sshorterthanbluegeneratevioletlight .
Answer: wavelength

16) (Fill-in-the-Blank) she _____ a possible design , test it , and then us the result a the basisforexploringothersolutions .
Answer: generates

17) (Fill-in-the-Blank) _____ , the development of many physical devicesincluding camera , microscope , andtelescopeswastiedtothedesiretovisualizespatialre-lationshipsamongobjects.hence , therealwayshasbeenafundamentallinkbetween thephysicsandthemathematicsofimageformationonethatwecanexploitinour developmentofcomputerimageformation .

Answer: likewise

18) (Fill-in-the-Blank) for _____ , there wa only one lighting model for howtocomputeashadeusingthespecifiedlightsourcesandmaterials .

Answer: example

19) (Fill-in-the-Blank) we are _____ sensitive to green light , and least sensitivetoredandblue .

Answer: most

20) (Fill-in-the-Blank) 1.3.3 _____ formation model there are multiple approach to how we can form _____ from a set of object , thelight-reflectingpropertiesoftheseobjects , andthepropertiesofthelightsources inthescene.inthissection , weintroducetwophysicalapproaches.althoughthese approachesarenotsuitableforthereal-timegraphicsthatweultimatelywant , they willgiveusinsightintohowwecanbuildausefulimagingarchitecture .

Answer: image

21) (Fill-in-the-Blank) 1.6 the _____ interface there are numerous way that a user can interact with a graphic system .

Answer: programmer

22) (Fill-in-the-Blank) 20 chapter1 _____ figure1.16 imagingsystem .

Answer: graphicssystemsandmodels

23) (Fill-in-the-Blank) _____ this book , our approach stress the relationship between computer graphic and imageformationbyfamiliarmethods , suchasdrawingbyhandandphotography.we willseethattheserelationshipscanhelpustodesignapplicationprograms , graphic library , andarchitecturesforgraphicssystems .

Answer: throughout

24) (Fill-in-the-Blank) _____ wavelengths.therearethreetypesofconesandasingletypeofrod.whereasintensity is a physical measure of light energy , brightness is a measure of how intense we 1.5 thesynthetic-cameramodel 19 perceivethelightemittedfromanobjecttobe.thehumanvisualsystemdoesnot have the same response to a monochromatic (single-frequency) red light a to a monochromatic green light .

Answer: thesensorsinthehumaneyedonotreactuniformlytolightenergyatdifferent

25) (Fill-in-the-Blank) 1.9 _____ characteristic therearetwofundamentallydifferenttypesofprocessinginourpipelinearchitec- ture .
Answer: performance

26) (Fill-in-the-Blank) 1.6.4 the _____ paradigm inmanysituationsespeciallyincadapplicationsandinthedevelopmentofcom- pleximages , suchasformovieswecanseparatethemodelingofthescenefromthe productionoftheimage , ortherenderingofthescene.hence , wecanlookatim- ageformationasthetwo- stepprocessshowninfigure1.27.althoughthetasksare thesameasthosewehavebeendiscussing , thisblockdiagramsuggeststhatwemight implementthemodelerandtherendererwithdifferentsoftwareandhardware.for example , considertheproductionofasingleframeinananimation.wefirstwantto designandpositionourobjects.thisstepishighlyinteractive , andwedonotneed toworkwithdetailedimagesoftheobjects.consequently , weprefertocarryoutthis steponaninteractiveworkstationwithgoodgraphicshardware.oncewehavede- signedthescene , wewanttorenderit , addinglightsources , materialproperties , and avarietyofotherdetailedeffects , toformaproduction-qualityimage.thisstepre- quiresatremendousamountofcomputation , soweprefertouseahigh-performance clusterorarenderfarm.notonlyistheoptimalhardwaredifferentinthemodeling andrenderingsteps , butthesoftwarethatweusealsomaybedifferent .
Answer: modelingrendering

27) (Fill-in-the-Blank) _____ host to analog figure1.28 earlygraphicssystem .
Answer: digital

28) (Fill-in-the-Blank) one _____ style arranges the phosphor in triangular groupscalledtriads , eachtriadconsistingofthreephosphors , oneofeachprimary .
Answer: common

29) (Fill-in-the-Blank) the _____ the aperture of the lens , the more light the lens can collect .
Answer: larger

30) (Fill-in-the-Blank) the rod and _____ (so named because of their appearance when magnified) are light sensor and are located on theretina.theyareexcitedbyelectromagneticenergyintherangeof350to780nm .
Answer: cone

31) (Fill-in-the-Blank) _____ have taken various approach to developing architecture to support graphicsapis .
Answer: researcher

32) (Fill-in-the-Blank) 26 chapter1 _____ 4. filmplane thebackofthecamerahasaheightandawidth.onthebellows camera , andinsomeapis , theorientationofthebackofthecameracanbe adjustedindependentlyoftheorientationofthelens .
Answer: graphicssystemsandmodels

33) (Fill-in-the-Blank) a we can see _____ figure 1.2 , each pixel corresponds to a location , or small area , in 1.althoughpersonalcomputersandworkstationsevolvedbysomewhatdifferentpaths , presently , thereisvirtuallynofundamentaldifferencebetweenthem.hence , weusethetermspersonalcom-puterandworkstationsynonymously .
Answer: from

34) (Fill-in-the-Blank) _____- gram such a maya and lightwave are used interactively to build character using wireframesorunlitpolygons.finalrenderingcantakehoursperframe .
Answer: itisalsothestandardmethodusedintheanimationindustrywhereinteractivepro

35) (Fill-in-the-Blank) she can _____ act a part of a computer-generated scene , limited only by the image-generation ability of the computer .
Answer: then

36) (Fill-in-the-Blank) _____ 1.5 show a generic flat-panelmonitor.thetwooutsideplatescontainparallelgridsofwiresthatareoriented perpendiculartoeachother.bysendingelectricalsignalstotheproperwireineach grid , theelectricalfieldatalocation , determinedbytheintersectionoftwowires , can be made strong enough to control the corresponding element in the middle plate .
Answer: figure

37) (Fill-in-the-Blank) _____ apis provide curve and surface a primitive ; h often , however , thesetypesareapproximatedbyaseriesofsimplerprimitiveswithin the application program .
Answer: some

38) (Fill-in-the-Blank) in a _____ or progressive display , the pixel are displayed row by row , or scanlinebyscanline , attherefreshrate.inaninterlaceddisplay , oddrowsandeven rowsarerefreshedalternately.interlaceddisplaysareusedincommercialtelevision .
Answer: noninterlaced

39) (Fill-in-the-Blank) _____ (vr) hasopenedmanynewhorizons.ahumanviewer canbeequippedwithadisplayheadsetthatallowshertoseeseparateimageswithher righteyeandherlefteye , whichgivestheeffectofstereoscopicvision.inaddition , herbodylocationandposition , possiblyincludingherheadandfingerpositions , are trackedbythecomputer.shemayhaveotherinteractivedevicesavailable , including force-sensing glove and sound .
Answer: thefieldofvirtualreality

40) (Fill-in-the-Blank) _____ architecture dominate the graphic field , especially where real-time performance is of importance .
Answer: pipeline

41) (Fill-in-the-Blank) in _____ , after the userproducesapossibledesign , othertoolsanalyzethedesignanddisplaytheanaly-sisgraphically.colorplates9and10showtwoviewsofthesamearchitecturaldesign .
Answer: addition

42) (Fill-in-the-Blank) _____- agesusingacomputer.thefieldbeganhumblyalmost50yearsago , withthedisplay ofafewlinesonacathode-raytube (crt) ; now , wecancreateimagesbycomputer that are indistinguishable from photograph of real object .
Answer: computergraphicsisconcernedwithallaspectsofproducingpicturesorim

43) (Fill-in-the-Blank) the _____ performance of a system is characterized by how fast we can move geometric entity through the pipeline and by how many pixel per second wecanalterintheframebuffer.consequently , thefastestgraphicsworkstationsare characterizedbyoneormoregeometricpipelinesatthefrontendsandparallelbit processor at the back end .
Answer: overall

44) (Fill-in-the-Blank) 12 chapter1 _____ c b (a) (b) (c) figure1.6 imageseenbythreedifferentviewers . (a) asview .
Answer: graphicssystemsandmodels

45) (Fill-in-the-Blank) _____ , throughwhichaviewer , locatedatthecenterofpro- jection , see the world .
Answer: thisrectangleactsasawindow

46) (Fill-in-the-Blank) 1.6.2 _____-dimensional apis thesynthetic-cameramodelisthebasisforallthepopularapis , includingopengl , direct3d , andopenscenegraph.ifwearetofollowthesynthetic-cameramodel , we needfunctionsintheapitospecifythefollowing : object aviewer 1.6 theprogrammersinterface 25 lightsources y materialproperties object are usually defined by set of vertex .
Answer: three

47) (Fill-in-the-Blank) _____ that all p p pointsalongthelinebetween (x , y , z) and (x , y , d) projectto (x , y , d) sothat p p p p wecannotgobackwardfromapointintheimageplanetothepointthatproduced it.inouridealizedmodel , thecoloronthefilmplaneatthispointwillbethecolorof thepoint (x , y , z) .thefield , orangle , ofviewofourcameraistheanglemadebythe largestobjectthatourcameracanimageonitsfilmplane.wecancalculatethefield ofviewwiththeaidoffigure1.14.5ifhistheheightofthecamera , thentheangleof view is 2tan 1 h .
Answer: note

48) (Fill-in-the-Blank) inaninterlaceddisplayoperatingat60hz , _____ 30timespersecond , althoughthevisualsystemistrickedintothinkingtherefresh rateis60hzratherthan30hz.viewerslocatednearthescreen , however , cantellthe differencebetweentheinterlacedandnoninterlaceddisplays.noninterlaceddisplays arebecomingmorewidespread , eventhoughthesedisplaysprocesspixelsattwicethe rateofinterlaceddisplays .

Answer: thescreenisredrawninitsentiretyonly

49) (Fill-in-the-Blank) _____ , wecanfollowamoretraditionalpaththatiscorrectwhenweareoperat-ingwithsufficientlyhighlightlevelsandatascalewherethewavenatureoflightisnot asignificantfactor.geometricopticsmodelslightsourcesasemittersoflightenergy , eachofwhichhaveafixedintensity.modeledgeometrically , lighttravelsinstraight line , fromthesourcestothoseobjectswithwhichitinteracts.anidealpointsource emitsenergyfromasinglelocationatoneormorefrequenciesequallyinalldirec-tions.morecomplexsources , suchasalightbulb , canbecharacterizedasemitting lightoveranareaandbyemittingmorelightinonedirectionthananother.apartic-ularsourceischaracterizedbytheintensityoflightthatitemitsateachfrequencyand bythatlightsdirectionality.weconsideronlypointsourcesfornow.morecomplex source often can be approximated by a number of carefully placed point source .

Answer: instead

50) (Fill-in-the-Blank) _____ , theremaybeonlyoneprocessor , thecentralprocessingunit (cpu) ofthesystem , whichmustdoboththeNormalprocessingandthegraphical processing.themaingraphicalfunctionoftheprocessoristotakespecificationsof graphical primitive (such a line , circle , and polygon) generated by application program and to assign value to the pixel in the frame buffer that best represent theseentities.forexample , atriangleisspecifiedbyitsthreevertices , buttodisplay it outline by the three line segment connecting the vertex , the graphic system mustgenerateasetofpixelsthatappearaslinesegmentstotheviewer.theconver-sionofgeometricentitiestopixelcolorsandlocationsintheframebufferisknown asrasterization , orscanconversion.inearlygraphicssystems , theframebufferwas partofthestandardmemorythatcouldbedirectlyaddressedbythecpu.today , vir-tuallyallgraphicssystemsarecharacterizedbyspecial-purposegraphicsprocessing unit (gpus) , custom-tailoredtocarryoutspecificgraphicsfunctions.thegpucan beeitheronthemotherboardofthesystemoronagraphicscard.theframebuffer isaccessedthroughthegraphicsprocessingunitandmaybeincludedinthegpu .

Answer: inasimplesystem

51) (Fill-in-the-Blank) 1.2 _____ 9 blue gun triad green red green gun blue red gun shadow mask figure1.4 shadow-maskcrt .

Answer: agraphicssystem

52) (Fill-in-the-Blank) it is _____ to confuse image and object .
Answer: easy

53) (Fill-in-the-Blank) for _____ , the type gllinestrip us the vertex to define two connected line segment , whereas the type glpoints us the same vertex to define three w point .
Answer: example

54) (Fill-in-the-Blank) _____ animated moviescannowbemadebycomputersatacostlessthanthatofmoviesmadewith traditionalhand-animationtechniques.theuseofcomputergraphicswithhandan-imationallowsthecreationoftechnicalandartisticeffectsthatarenotpossiblewith eitheralone.whereascomputeranimationshaveadistinctlook , wecanalsogenerate photorealisticimagesbycomputer.oftenimagesthatweseeontelevision , inmovies , andinmagazinesaresorealisticthatwecannotdistinguishcomputer-generatedor computer-alteredimagesfromphotographs.inchapters6and9 , wediscussmany of the lighting effect used to produce computer animation .
Answer: entire

55) (Fill-in-the-Blank) the _____ technologyforgames , bothintheformofthe_____sprocessingunitsthatareon _____scardsinpersonalcomputersandingameboxessuchasthexboxandthe playstation , isbeingusedforsimulationratherthanexpensivespecializedhardware .
Answer: graphic

56) (Fill-in-the-Blank) _____ , cad , and virtual reality application have all generated the need for inputdevicesthatprovidemorethantwo-dimensionaldata.three-dimensionallo-cationsonareal-worldobjectcanbeobtainedbyavarietyofdevices , includinglaser rangefindersandacousticsensors.higher-dimensionaldatacanbeobtainedbyde-vicessuchasdatagloves , whichincludemanysensors , andcomputervisionsystems .
Answer: game

57) (Fill-in-the-Blank) _____.inmod- ernsystems , however , wewanttoexploitthecapabilitiesofthesoftwareandhardware to create realistic image of computer-generated three-dimensional objectsa task thatinvolvesmanyaspectsofimageformation , suchaslighting , shading , andprop-ertiesofmaterials.becausesuchfunctionalityissupporteddirectlybymostpresent computergraphicssystems , weprefertosetthestageforcreatingtheseimageshere , ratherthantoexpandalimitedmodellater .
Answer: thisapproachworkedwellforcreatingsimpleimagesofsimpleobjects

58) (Fill-in-the-Blank) _____ , within this stage of the pipeline , we must assemble set of verticesintoprimitives , suchaslinesegmentsandpolygons , beforeclippingcantake place.consequently , theoutputofthisstageisasetofprimitiveswhoseprojections canappearintheimage .
Answer: thus

59) (Fill-in-the-Blank) 1.1.3 _____ and animation once graphic system evolved to be capable of generating sophisticated image in real time , engineer and researcher began to use them a simulator .
Answer: simulation

60) (Fill-in-the-Blank) _____ , astructurethatcanmovethepenin twoorthogonaldirectionsacrossthepaper.theplottercanraiseandlowerthepenas requiredtocreatethedesiredimage.penplottersarestillinuse ; theyarewellsuited for drawing large diagram , such a blueprint .
Answer: ducesimagesbymovingapenheldbyagantry

61) (Fill-in-the-Blank) a _____ light source ha a color determined by the energy that it emits at various wavelength .
Answer: given

62) (Fill-in-the-Blank) in _____ , just a the image show incremental change in the rendering , the programsareincrementallydifferentfromoneanother .
Answer: addition

63) (Fill-in-the-Blank) 6 chapter1 _____ frame processor buffer memory figure1.1 agraphicssystem .
Answer: graphicssystemsandmodels

64) (Fill-in-the-Blank) the _____ component of the visual figure 1.15 the human systemareshowninfigure1.15.lightenterstheeyethroughthelensandcornea , visualsystem .
Answer: major

65) (Fill-in-the-Blank) _____-formationparadigms , eachofwhichhasapplica-bilityincomputergraphics.thesynthetic-cameramodelhastwoimportantconse-quencesforcomputergraphics.first , itstressestheindependenceoftheobjectsand thevieweradistinctionthatleadstoagoodwayoforganizingthefunctionsthat willbeinagraphicslibrary.second , itleadstothenotionofapipelinearchitecture , inwhicheachofthevariousstagesinthepipelineperformsdistinctoperationson geometricentities , thenpassesonthetransformedobjectstothenextstage .
Answer: wedescribedmultipleimage

66) (Fill-in-the-Blank) 1.4 _____ system wenowintroducetwophysical_____systems : thepinholecameraandthehuman visualsystem.thepinholecameraisasimpleexampleofan_____systemthatwill enableustounderstandthefunctioningofcamerasandofotheropticalimagers.we emulateittobuildamodelofimageformation.thehumanvisualsystemisextremely complexbutstillobeysthephysicalprinciplesofotheroptical_____systems.we introduce it not only a an example of an _____ system but also because under- standing it property will help u to exploit the capability of computer-graphics system .
Answer: imaging

67) (Fill-in-the-Blank) (a) for _____ application , such a page layout in the printing industry , system builtonthismodelworkwell.forexample , thepostscriptpage-descriptionlanguage , asophisticatedextensionoftheseideas , isastandardforcontrollingtypesettersand printer .
Answer: certain

68) (Fill-in-the-Blank) _____ (x , y , z) isonthefilmplane zd.using the fact that the two triangle shown in figure 1.13 are similar , we find that the y coordinateoftheimageisaty , where p y y .
Answer: calculatewheretheimageofthepoint

69) (Fill-in-the-Blank) _____.con- siderthesceneillustratedinfigure1.10 ; itisilluminatedbyasinglepointsource.we includetheviewerinthefigurebecauseweareinterestedinthelightthatreachesher eye.theviewercanalsobeacamera , asshowninfigure1.11.arayisasemi-infinite linethatemanatesfromapointandtravelstoinfinityinaparticulardirection.be-causelighttravelsinstraightlines , wecanthinkintermsofraysoflightemanatingin alldirectionsfromourpointsource.aportionoftheseinfiniterayscontributestothe figure1.10 scenewithasinglepointlightsource .
Answer: wecanstartbuildinganimagingmodelbyfollowinglightfromasource

70) (Fill-in-the-Blank) _____.asthechassispassesdown the line , a series of operation is performed on it , each using specialized tool and worker , untilattheend , theassemblyprocessiscomplete.atanyonetime , multiple carsareunderconstructionandthereisasignificantdelayorlatencybetweenwhen achassisstartsdowntheassemblylineandthefinishedvehicleiscomplete.however , thenumberofcarsproducedinagiventime , thethroughput , ismuchhigherthanif asingleteambuilteachcar .
Answer: pipeliningissimilartoanassemblylineinacarplant

71) (Fill-in-the-Blank) one way to _____ the specification for the camera location and orientation us a series of coordinate-systemtransformations.thesetransformationsconvertobjectpositionsrepresented inacoordinatesystemthatspecifiesobjectverticestoobjectpositionsinacoordinate systemcenteredatthecop.thisapproachisuseful , bothforimplementingandfor gettingthefullsetofviewsthataflexiblecameracanprovide.weusethisapproach extensively , startinginchapter5 .
Answer: develop

72) (Fill-in-the-Blank) in _____ system , therefreshrateisdeterminedbythefrequencyofthepowersystem,60cyclespersec- ondor60hertz (hz) intheunitedstatesand50hzinmuchoftherestoftheworld .
Answer: older

73) (Fill-in-the-Blank) the _____ and engineer who created thissceneusedcommerciallyavailablesoftware.theplatedemonstratesourability togenerateralisticenvironments , inthiscaseaweldingrobotinsideafactory.the sparksdemonstratetheuseofproceduralmethodsforspecialeffects.wewilldiscuss thesetechniquesinchapter11.theimagesincolorplate31showanotherexample oftheuseofcomputergraphicstogenerateaneffectthat , althoughitlooksrealistic , couldnothavebeencreatedotherwise.theimagesincolorplates23and24alsoare realisticrenderings .

Answer: artist

74) (Fill-in-the-Blank) 1.7.7 _____ processing thefinalblockinourpipelinetakesinthe_____sgeneratedbytherasterizerand updatesthepixelsintheframebuffer.iftheapplicationgeneratedthree-dimensional data , some _____ may not be visible because the surface that they define are behind other surface .

Answer: fragment

75) (Fill-in-the-Blank) _____ acrtwasrecognizedbyivansutherlandmorethan40yearsago.today , theuseof interactivegraphicaltoolsincomputer-aideddesign (cad) pervadesfieldsinclud- ingasarchitecture , mechanicalengineering , thedesignofvery-large-scaleintegrated (vlsi) circuit , and the creation of character for animation .

Answer: thepoweroftheparadigmofhumansinteractingwithimagesonthescreenof

76) (Fill-in-the-Blank) the _____ of a fragment may be altered by texture mapping or bump mapping a shown in _____ plate 6 and 7. the _____ of the pixel that correspondstoafragmentcanalsobereadfromtheframebufferandblendedwith the fragment _____ to create translucent effect .

Answer: color

77) (Fill-in-the-Blank) for _____ , a surgical intern might be trained to do an operation in this way , or an astronaut might be trained to work in a weightless environment .

Answer: example

78) (Fill-in-the-Blank) the _____ nerve is connected to the rod and cone in an extremely complex arrangement that ha manyofthecharacteristicsofasophisticatedsignalprocessor.thefinalprocessing is done in a part of the brain called the visual cortex , where high-level function , suchasobjectrecognition , arecarriedout.wewillomitanydiscussionofhigh-level processing ; instead , wecanthinksimplyintermsofanimagethatisconveyedfrom therodsandconestothebrain .

Answer: optic

79) (Fill-in-the-Blank) 1.4 _____ 17 y (y , z) z (y , (cid:3) d) p d figure1.13 sideviewofpinholecamera .

Answer: imagingsystems

80) (Fill-in-the-Blank) _____ clipper and fragment _____ rasterizer pixel processor primitive assembler processor figure1.31 geometricpipeline .
Answer: vertex

81) (Fill-in-the-Blank) _____ provides access to the frame buffer , curve , and surface .
Answer: opengl

82) (Fill-in-the-Blank) the _____ the viewer to produce a two-dimensional image is the essence of image formation , andwewillstudyitindetail .
Answer: processbywhichthespecificationoftheobjectiscombinedwiththespecificationof

83) (Fill-in-the-Blank) _____ plate 16 is a frame from an interactive game , showing a robot warrior , that us hierarchical method (chapter 10) , procedural method for smoke and fire (chapter11) , andnoisetexturesforlandscapes (chapter11) .theenginethatdrives thegameusesscenegraphsthatwepresentinchapter10 .
Answer: color

84) (Fill-in-the-Blank) _____ recently , million of people have become internet user .
Answer: more

85) (Fill-in-the-Blank) _____ principle used by most optical system .
Answer: theinitialprocessingoflightinthehumanvisualsystemisbasedonthesame

86) (Fill-in-the-Blank) _____ , they use interactive modeling soft-ware.becausewemusthaveatleastasimpleimageofourobjectstointeractwitha modeler , mostmodelersusethesynthetic-cameramodeltoproducetheseimagesin realtime .
Answer: rather

87) (Fill-in-the-Blank) _____ grid light emitting element horizontal grid figure1.5 genericflat-paneldisplay .
Answer: vertical

88) (Fill-in-the-Blank) a _____ is produced a an arraythe rasterof _____ element , or pixel , within the graphic system .
Answer: picture

89) (Fill-in-the-Blank) in _____ chapter , we make minimal use of mathematics .
Answer: this

90) (Fill-in-the-Blank) _____ source are defined by their location , strength , color , and directionality .
Answer: light

91) (Fill-in-the-Blank) 1.3 _____ : physical and synthetic the traditional pedagogical approach to teaching computer graphic ha been fo- cused on how to construct raster _____ of simple two-dimensional geometric en- tities (for example , point , line segment , and polygon) in the frame buffer .
Answer: image

92) (Fill-in-the-Blank) 1.1.1 _____ of information classicalgraphicstechniquesaroseasamediumtoconveyinformationamongpeo- ple.althoughspokenandwrittenlanguagesserveasimilarpurpose , thehumanvi- sualsystemisunrivaledbothasaprocessorofdataandasapatternrecognizer.more than 4000 year ago , the babylonian _____ed floor plan of building on stone .
Answer: display

93) (Fill-in-the-Blank) 1.1 _____ 3 supercomputer now allow researcher in many area to solve previously in- tractableproblems.thefieldofscientificvisualizationprovidesgraphicaltoolsthat helptheseresearchersinterpretthevastquantityofdatathattheygenerate.infields suchasfluidflow , molecularbiology , andmathematics , imagesgeneratedbyconver- sionofdatatogeometricentitiesthatcanbedisplayedhaveyieldednewinsightsinto complexprocesses.forexample , colorplate19showsfluiddynamicsinthemantle oftheearth.thesystemusedamathematicalmodeltogeneratethedata.thefieldof informationvisualizationusescomputergraphicstoaidinthediscoveryofrelation- shipsindatasetsinwhichthereisnophysicaltiebetweenthedataandhowtheyare visualized.wepresentvariousvisualizationtechniquesasexamplesthroughoutthe restofthetext .
Answer: applicationsofcomputergraphics

94) (Fill-in-the-Blank) in _____ 5 , we discussthisprocessindetailandderivetherelevantmathematicalformulas .
Answer: chapter

95) (Fill-in-the-Blank) 1.3 _____ : physicalandsynthetic 15 b c d a figure 1.11 ray interaction .
Answer: image

96) (Fill-in-the-Blank) _____ plate 4 illustrates smooth shading of the polygon that approximate the object ; it show that the object is three dimensional and give the appearance of a smoothsurface.wedevelopshadingmodelsthataresupportedbyopenglinchap- ter6.theseshadingmodelsarealsosupportedinthehardwareofmostrecentwork- station ; generating the shaded image on one of these system take approximately thesameamountoftimeasdoesgeneratingawireframeimage .
Answer: color

97) (Fill-in-the-Blank) ray a _____ camera directly .
Answer: enters

98) (Fill-in-the-Blank) _____ , however , canalsomakeitdifficulttogeta desired image .
Answer: havingmanyparameterstoadjust

99) (Fill-in-the-Blank) _____ of the problem lie with the synthetic-camera model .
Answer: part

100) (Fill-in-the-Blank) for our _____ , in this chapter , we can work with a pinhole camera whose cornea retina focallengthisthedistancedfromthefrontofthecameratothefilmplane.likethe pinholecamera , computergraphicsproducesimagesinwhichallobjectsareinfocus .
Answer: purpose

101) (Fill-in-the-Blank) cop _____ that read and write pixel .
Answer: someapislettheuserworkdirectlyintheframebufferbyprovidingfunctions

102) (Fill-in-the-Blank) _____ the data were collected by a medical imaging system , computer graphicsproducedtheimagethatshowsthestructuralinformation .
Answer: although

103) (Fill-in-the-Blank) _____.electromagneticenergytravelsas wavesthatcanbecharacterizedbyeithertheirwavelengthsortheirfrequencies.3the electromagnetic spectrum (figure 1.9) includes radio wave , infrared (heat) , and a portionthatcausesaresponseinourvisualsystems.thisvisiblespectrum , which haswavelengthsintherangeof350to780nanometers (nm) , iscalled (visible) light .
Answer: lightisaformofelectromagneticradiation

104) (Fill-in-the-Blank) 18 chapter1 _____ y (cid:4) h z d figure1.14 angleofview .
Answer: graphicssystemsandmodels

105) (Fill-in-the-Blank) the _____ form an image on a two-dimensional structure called the retina at the back of the eye .
Answer: lens

106) (Fill-in-the-Blank) our _____ ha made a case for using such anarchitecturetoimplementthehardwareinasystem.commoditygraphicscards incorporatethepipelinewithintheirgpus.cardsthatcostlessthan100canrender millionsofshadedtexture-mappedpolygonspersecond.however , wecanalsomake asstrongacaseforpipeliningbeingthebasisofacompletesoftwareimplementation ofanapi.thepowerofthesynthetic-cameraparadigmisthatthelatterworkswell inbothcases .
Answer: presentation

107) (Fill-in-the-Blank) _____.material property are characteristic , or attribute , of the object , and such property are specified through a series of function call at the time that each object is defined .

Answer: apisprovideasetoffunctionstospecifytheseparametersforeachsource

108) (Fill-in-the-Blank) _____-purposecomputerswiththestandardvon neumannarchitecture.suchcomputersarecharacterizedbyasingleprocessingunit thatprocessesasingleinstructionatatime.asimplemodeloftheseearlygraphics system is shown in figure 1.28. the display in these system wa based on a calli-graphiccrtdisplaythatincludedthenecessarycircuitrytogeneratealinesegment connectingtwopoints.thejobofthehostcomputerwastoruntheapplicationpro-gramandtocomputetheendpointsofthelinesegmentsintheimage (inunitsofthe display) .thisinformationhadtobesenttothedisplayataratehighenoughtoavoid flickeronthedisplay.intheearlydaysofcomputergraphics , computersweresoslow thatrefreshingevensimpleimages , containingafewhundredlinesegments , would burdenanexpensivecomputer .

Answer: earlygraphicssystemsusedgeneral

109) (Fill-in-the-Blank) _____ , weintroduceaparticulargraphicssoftwaresystem , opengl , which hasbecomeawidelyacceptedstandardfordevelopinggraphicsapplications.fortu- nately , opengliseasytolearn , anditpossessesmostofthecharacteristicsofother populargraphicssystems.ourapproachistop-down.wewantyoutostartwriting , asquicklyaspossible , applicationprogramsthatwillgenerategraphicaloutput.af- teryoubeginwritingsimpleprograms , wewilldiscusshowtheunderlyinggraphics libraryandthehardwareareimplemented.thischaptershouldgiveasufficientover-viewforyoutoproceedtowritingprograms .

Answer: inthisbook

110) (Fill-in-the-Blank) _____ , and (b) a projection we are much more interested , however , in the three-dimensional world .

Answer: square

111) (Fill-in-the-Blank) in _____ 2 and 3 , we will show you how to generate image composed of simple geometric objectspoints , line segment , and polygon .

Answer: chapter

112) (Fill-in-the-Blank) _____ that the image of the object is flipped relative to the object .

Answer: note

113) (Fill-in-the-Blank) 1.4.1 the _____ camera the_____camerashowninfigure1.12providesanexampleofimageformation thatwecanunderstandwithasimplegeometricmodel.a_____cameraisabox withasmallholeinthecenterofonesideofthebox ; thefilmisplacedinsidethebox onthesideoppositethe_____.initially , the_____iscovered.itisuncoveredfor ashorttimetoexposethefilm.supposethatweorientourcameraalongthez-axis , withthe_____attheoriginofourcoordinatesystem.weassumethattheholeis sosmallthatonlyasinglerayoflight , emanatingfromapoint , canenterit.thefilm planeislocatedadistancedfromthe_____asideview (figure1.13) allowsusto x x (x , y , z)

114) (Fill-in-the-Blank) in _____ graphic , where we deal withsyntheticobjects , weformobjectsbyspecifyingthepositionsinspaceofvarious geometricprimitives , suchaspoints , line , andpolygons.inmostgraphicssystems , asetoflocationsinspace , orofvertices , issufficienttodefine , orapproximate , most objects.forexample , alinecanbespecifiedbytwovertices ; apolygoncanbespecified byanorderedlistofvertices ; andaspherecanbespecifiedbytwoverticesthatgiveits centerandanypointonitscircumference.oneofthemainfunctionsofacadsys- temistoprovideaninterfacethatmakesiteasyforausertobuildasyntheticmodel oftheworld.inchapter2 , weshowhowopenglallowsustobuildsimpleobjects ; inchapter11 , welearntodefineobjectsinamannerthatincorporatesrelationships amongobjects .

Answer: computer

115) (Fill-in-the-Blank) _____.aswesaw , notallobjects canbeimagedontothepinholecamerasfilmplane.theangleofviewexpressesthis limitation.inthesyntheticcamera , wecanmovethislimitationtothefrontbyplac- ingaclippingrectangle , orclippingwindow , intheprojectionplane (figure1.19) .

Answer: wemustalsoconsiderthelimitedsizeoftheimage

116) (Fill-in-the-Blank) 16 chapter1 _____ bestforsurfacesthatscattertheincominglightequallyinalldirections.eveninthis case , radiosityrequiresmorecomputationthancanbedoneinrealtime .

Answer: graphicssystemsandmodels

117) (Fill-in-the-Blank) 1.8 _____ pipeline graphic architecture have gone through multiple cycle in which the importance of special-purpose hardware relative to standard cpu ha gone back and forth .

Answer: programmable

118) (Fill-in-the-Blank) 1.7.2 _____ architecture themajoradvancesingraphicsarchitecturescloselyparalleltheadvancesinwork- stations.inbothcases , theabilitytocreatespecial-purposevlsichipswasthekey enablingtechnologydevelopment.inaddition , theavailabilityofinexpensivesolid- statememoryledtotheuniversalityofrasterdisplays.forcomputer-graphicsappli- cation , themostimportantuseofcustomvlsicircuitshasbeenincreating_____ architecture .

Answer: pipeline

119) (Fill-in-the-Blank) _____-emittingdiodesthatcanbeturned onandoffbytheelectricalsignalssenttothegrid.inanlcddisplay , theelectrical fieldcontrolsthepolarizationoftheliquidcrystalsinthemiddlepanel , thusturning onandoffthelightpassingthroughthepanel.aplasmapanelusesthevoltageson thegridstoenergizegasesembeddedbetweentheglasspanelsholdingthegrids.the energizedgasbecomesaglowingplasma .

Answer: themiddleplateinanledpanelcontainslight

120) (Fill-in-the-Blank) _____ various flat-panel technology are now more popular , the basic functioning of the crt ha much in common with these newer display .
Answer: although

121) (Fill-in-the-Blank) 1.6 _____ 27 1.6.3 a sequence of image inchapter2 , webeginourdetaileddiscussionoftheopenglapithatwewilluse throughoutthisbook.theimagesdefinedbyyouropenglprogramswillbeformed automaticallybythehardwareandsoftwareimplementationoftheimage-formation process .
Answer: theprogrammersinterface

122) (Fill-in-the-Blank) 1 2 chapter1 _____ 1.1 application of computer graphic thedevelopmentofcomputergraphicshasbeendrivenbothbytheneedsoftheuser communityandbyadvancesinhardwareandsoftware.theapplicationsofcomputer graphicsaremanyandvaried ; wecan , however , dividethemintofourmajorareas : 1. displayofinformation 2. design 3. simulationandanimation 4. userinterfaces althoughmanyapplicationsspantwoormoreofthesеareas , thedevelopmentofthe fieldwasbasedonseparateworkineach .
Answer: graphicssystemsandmodels

123) (Fill-in-the-Blank) we _____ , located inotherplaces , willseethesameobjectdifferently.figure1.6 (a) showstwoviewers observingthesamebuilding.thisimageiswhatisseenbyanobserverawhoisfar enoughawayfromthebuildingtoseeboththebuildingandthetwootherviewers , bandc.fromasperspective , bandcappearasobjects , justasthebuildingdoes .
Answer: usuallyseeanobjectfromoursingleperspectiveandforgetthatotherviewers

124) (Fill-in-the-Blank) y y _____ (y , z) (y , z) projector (y p , d) object z z cop (y , (cid:3) d) p (a) (b) figure1.17 equivalentviewsofimageformation .
Answer: camera

125) (Fill-in-the-Blank) we _____ train pi- lotswithsimulatedairplanes , generatinggraphicaldisplaysofavirtualenvironment inrealtime.feature-lengthmoviesmadeentirelybycomputerhavebeensuccessful , bothcriticallyandfinancially.massivemultiplayergamescaninvolvetensofthou-sandsofconcurrentparticipants .
Answer: routinely

126) (Fill-in-the-Blank) for _____ complex object , theremaybemultiplewaysofdefiningtheobjectfromasetofvertices.acir- cle , forexample , canbedefinedbythreepointsonitscircumference , orbyitscenter andonepointonthecircumference .
Answer: more

127) (Fill-in-the-Blank) _____ we overview graphic system and imaging .
Answer: then

128) (Fill-in-the-Blank) _____ , wecanstartwiththearrangementshownin figure1.8 , whichshowsasimplephysicalimagingsystem.again , weseeaphysical objectandaviewer (thecamera) ; now , however , thereisalightsourceinthescene .
Answer: takingamorephysicalapproach

129) (Fill-in-the-Blank) _____ raster system can fill the interior of polygon with a solid color in approxi- matelythesametimethattheycanrenderawireframeimage.althoughtheobjects arethreedimensional , eachsurfaceisdisplayedinasinglecolor , andtheimagefailsto showthethree-dimensionalshapesoftheobjects.earlyrastersystemscouldproduce imagesofthisform .
Answer: most

130) (Fill-in-the-Blank) p zd the _____ (x , y , d) is called the projection of the _____ (x , y , z) .
Answer: point

131) (Fill-in-the-Blank) _____ , afewmilliseconds after the phosphor is excited by the electron beam .
Answer: atypicalcrtwillemitlightforonlyashorttimeusually

132) (Fill-in-the-Blank) 1.1.2 _____ professionssuchasengineeringandarchitecturearеconcernedwith_____.starting withasetofspecifications , engineersandarchitectsseekacost-effectiveandesthetic solutionthatsatisfiesthespecifications._____isaniterativeprocess.rarelyinthe realworldisaproblemspecifiedsuchthatthereisauniqueoptimalsolution._____ problemsareeitheroverdetermined , suchthattheypossessnosolutionthatsatisfies all the criterion , much less an optimal solution , or underdetermined , such that they have multiple solution that satisfy the _____ criterion .
Answer: design

133) (Fill-in-the-Blank) if we _____ the type parameter , gl polygon , we can use the same vertex to define a different geometric primitive .
Answer: change

134) (Fill-in-the-Blank) _____ light source and material property depend on the model of lightmaterial interactionssupportedbytheapi.wediscusssuchmodelsinchapter6 .
Answer: both

135) (Fill-in-the-Blank) 1.3.1 _____ and viewer weliveinaworldofthree-dimensional_____s.thedevelopmentofmanybranches of mathematics , including geometry and trigonometry , wa in response to the de- siretosystematizeconceptuallysimpleideas , suchasthemeasurementofthesizeof _____sandthedistancebetween_____s.oftenweseektorepresentourunderstand- ing of such spatial relationship with picture or image , such a map , painting , and photograph .
Answer: object

136) (Fill-in-the-Blank) _____ a device is known a the random-scan , calligraphic , or vector crt , because the beam can be moved directly from any positiontoanyotherposition.iftheintensityofthebeamisturnedoff , thebeamcan bemovedtoanewpositionwithoutchanginganyvisibledisplay.thisconfiguration wasthebasisofearlygraphicssystemsthatpredatedthepresentrastertechnology .
Answer: such

137) (Fill-in-the-Blank) 14 chapter1 _____ emitsenergyoverarangeoffrequencies.fortunately , incomputergraphics , except forrecognizingthatdistinctfrequenciesarevisibleasdistinctcolors , werarelyneed todealwiththephysicalpropertiesoflight , suchasitswavenature .
Answer: graphicssystemsandmodels

138) (Fill-in-the-Blank) we _____ these image a an increasingly more complex series of rendering of the same object .
Answer: present

139) (Fill-in-the-Blank) 30 chapter1 _____ display host processor display list figure1.29 display-processorarchitecture .
Answer: graphicssystemsandmodels

140) (Fill-in-the-Blank) _____ , the human visual system ha a back end much more complex than that of a camera or telescope .
Answer: however

141) (Fill-in-the-Blank) pen-_____-dimensionalgraphicssystems.for example , if we wish to use the pen-plotter model to produce the image of a three- dimensionalobjectonourtwo-dimensionalpad , eitherbyhandorbycomputer , then wehavetofigureoutwhereonthepagetoplacetwo-dimensionalpointscorrespond- ing to point on our three-dimensional object .
Answer: plottermodeldoesnotextendwelltothree

142) (Fill-in-the-Blank) _____-colorsystems , thereare24 (ormore) bitsperpixel.suchsystemscandisplay sufficientcolorstorepresentmostimagesrealistically.theyarealsocalledtrue-color system , or rgb-color system , because individual group of bit in each pixel are 1.2 agraphicssystem 7 assigned to each of the three primary colorsred , green , and blueused in most display .
Answer: infull

143) (Fill-in-the-Blank) _____ that are outside do not and aresaidtobeclippedout.objectsthatstraddletheedgesoftheclippingvolumeare partlyvisibleintheimage.efficientclippingalgorithmsaredevelopedinchapter7 .
Answer: those

144) (Fill-in-the-Blank) the two _____ function of this block are to carry out coordinate transformation and to computeacolorforeachvertex .
Answer: major

145) (Fill-in-the-Blank) _____ , thebeamwilltrace a straight line , visible to a viewer .
Answer: ifthevoltagessteeringthebeamchangeataconstantrate

146) (Fill-in-the-Blank) in a _____ application , such a the painting program showninfigure1.20 , theuserseesmenusandiconsthatrepresentpossibleactions .
Answer: typical

147) (Fill-in-the-Blank) _____-panel monitor are inherently raster .
Answer: flat

148) (Fill-in-the-Blank) _____ about 10 year ago , there wa a clear distinction between front- and back-end processing and there were different component and boardsdedicatedtoeach.now , commoditygraphicscardsusegpusthatcontainthe summaryandnotes 35 entirepipelinewithinasinglechip.thelatestcardsimplementtheentirepipelineus- ingfloating-pointarithmeticandhavefloating-pointframebuffers.thesegpusare sopowerfulthattheyarebeingusedforpurposesotherthangraphicsapplications .
Answer: until

149) (Fill-in-the-Blank) _____ , processinginvolvesadirectmanipulationofbitsintheframebuffer.thisback-end processingisfundamentallydifferentfromfront-endprocessing , andweimplement it most effectively using architecture that have the ability to move block of bit quickly .
Answer: beginningwithrasterizationandincludingmanyfeaturesthatwediscusslater

150) (Fill-in-the-Blank) _____ plate 22 show one frameofavrsimulationofasimulatedpatientusedforremotetrainingofmedical personnel .
Answer: color

151) (Fill-in-the-Blank) _____ the perspective of the writer of an 1.6 theprogrammersinterface 23 applicationprogram , thefunctionsavailablethroughtheapishouldmatchthecon- ceptualmodelthattheuserwishestoemploytospecifyimages.7 1.6.1 the pen-plotter model historically , mostearlygraphicssystemsweretwo-dimensionalsystems.theconcep- tualmodelthattheyusedisnowreferredtoasthepen-plottermodel , referencingthe outputdevicethatwasavailableonthesesystems.apenplotter (figure1.22) pro- figure1.22 penplotter .
Answer: from

152) (Fill-in-the-Blank) _____ with a real camera , we would simply flip the film to regain the original orientation of the object , withoursyntheticcamerawecanavoidtheflippingbyasimpletrick.wedraw anotherplaneinfrontofthelens (figure1.17 (b)) , andworkinthreedimensions , a showninfigure1.18.wefindtheimageofapointontheobjectonthevirtualimage planebydrawingaline , calledaprojector , fromthepointtothecenterofthelens , or thecenterofprojection (cop) .notethatallprojectorsareraysemanatingfromthe centerofprojection.inoursyntheticcamera ,

153) (Fill-in-the-Blank) _____ , therehasbeenamajoradvanceinpipelinearchitectures.boththever- tex processor and the fragment processor are now programable by the application program.oneofthemostexcitingaspectsofthisadvanceisthatmanyofthetech- niquesthatformerlycouldnotbedoneinrealtimebecausetheywerenotpartofthe fixed- functionpipelinecannowbedoneinrealtime .

Answer: recently

154) (Fill-in-the-Blank) _____- ducedbythemodelerthatdescribestheobjectsandthatcontainsadditionalinfor- mation important only to the renderer , such a light source , viewer location , and materialproperties.pixarsrendermaninterfacefollowsthisapproachandusesafile interface file modeler renderer figure1.27 themodelingrenderingpipeline .

Answer: theinterfacebetweenthemodelerandrenderercanbeassimpleasafilepro

155) (Fill-in-the-Blank) _____ commodity computer and specialized hardware box .

Answer: thegraphicstodriveinteractivevideogamesmakeheavyuseofbothstandard

156) (Fill-in-the-Blank) _____.theirisopensandclosestoadjustthe amount of light entering the eye .

Answer: atransparentstructurethatprotectstheeye

157) (Fill-in-the-Blank) _____ , cartographershavedevelopedmapstodisplaycelestialandgeo- graphicalinformation.suchmapswerecrucialtonavigatorsasthesepeopleexplored theendsoftheearth ; mapsarenolessimportanttodayinfieldssuchasgeographic informationsystems.now , mapscanbedevelopedandmanipulatedinrealtimeover theinternet .

Answer: forcenturies

158) (Fill-in-the-Blank) 1.7 _____ 29 format that allows modeler to pas model to the renderer in text format .

Answer: graphicsarchitectures

159) (Fill-in-the-Blank) the _____ of the rasterizer is a set of fragment for each primitive .

Answer: output

160) (Fill-in-the-Blank) _____ apissuch a logo and postscripthavetheiroriginsinthismodel.althoughtheydifferfromoneanother , theyhaveacommonviewoftheprocessofcreatinganimageasbeingsimilartothe processofdrawingonapadofpaper.theuserworksonatwo-dimensionalsurface ofsomesize.shemovesapenaroundonthissurface , leavinganimageonthepaper .

Answer: various

161) (Fill-in-the-Blank) _____ crt are still the most common display device , they are rapidly be- ing replaced by flat-screen technology .

Answer: although

162) (Fill-in-the-Blank) _____ , theimportanceofthepipelinearchitecturehasremainedregardlessofthis cycle.noneoftheotherapproachesraytracing , radiosity , photonmappingleads toreal-timeperformance.hence , thecommoditygraphicsmarketisdominatedby graphicscardsthathavepipelinesbuiltintothegraphicsprocessingunit.allofthese 34 chapter1 graphicssystemsandmodels commodity card implement the pipeline that we have just described , albeit with moreoptions , manyofwhichwewilldiscussinlaterchapters .

Answer: however

163) (Fill-in-the-Blank) we _____ , however , to use anapithatallowsuserstoworkdirectlyinthedomainoftheirproblemsandtouse computerstocarryoutthedetailsoftheprojectionprocessautomatically , withoutthe usershavingtomakeanytrigonometriccalculationswithintheapplicationprogram .

Answer: prefer

164) (Fill-in-the-Blank) if _____ two light were to emit the same energy , they would appear to u to have different brightness , because of the unequal response of the cone to red and green light .

Answer: these

165) (Fill-in-the-Blank) an _____ raster-based , but still limiting , two-dimensional model relies on writingpixelsdirectlyintoaframebuffer.suchasystemcouldbebasedonasingle functionoftheform writepixel (x , y , color) (b) wherex , yisthelocationofthepixelintheframebufferandcolorgivesthecolor figure1.23 outputofpen-tobewrittenthere.suchmodelsarewellsuitedtowritingthealgorithmsforrasteri- plotter program for (a) a zationandprocessingofdigitalimages .

Answer: alternate

166) (Fill-in-the-Blank) figure1.7showsacamerasystemviewingabuilding._____ both the object and the viewer exist in a three-dimensional world .

Answer: herewecanobservethat

167) (Fill-in-the-Blank) _____.astan- dard graphic workstation can generate million of line segment or polygon per secondataresolutionofupto12801024pixels.suchaworkstationcanshadethe polygonsusingasimpleshadingmodelandcandisplayonlyvisiblesurfacesatthis rate.however , realisticimagesmayrequirearesolutionofupto40006000pixels

Answer: themodelingrenderingparadigmisbecomingincreasinglyimportant

168) (Fill-in-the-Blank) _____-level-lightsensorsthataccountforournightvisionandarenot colorsensitive ; theconesareresponsibleforourcolorvision.thesizesoftherods andcones , coupledwiththeopticalpropertiesofthelensandcornea , determinethe resolutionofourvisualsystems , orourvisualacuity.resolutionisameasureofwhat sizeobjectswecansee.moretechnically , itisameasureofhowclosewecanplacetwo pointsandstillrecognizethattherearetwodistinctpoints .

Answer: therodsarelow

169) (Fill-in-the-Blank) _____ , the pixel are stored in a part of memory called the frame buffer.theframebuffercanbeviewedasthecoreelementofagraphicssystem.its resolutionthe number of pixel in the frame bufferdetermines the detail that youcanseeintheimage.thedepth , orprecision , oftheframebuffer , definedasthe numberofbitsthatareusedforeachpixel , determinespropertiessuchashowmany colorscanberepresentedonagivensystem.forexample , a1-bit-deepframebuffer allows only two color , whereas an 8-bit-deep frame buffer allows 28 (256) color .

Answer: collectively

170) (Fill-in-the-Blank) _____ : moveto (x , y) lineto (x , y) executionofthemovetofunctionmovesthepentothelocation (x , y) onthepaper withoutleavingamark.thelinetofunctionmovesthepento (x , y) anddrawsa line from the old to the new location of the pen .

Answer: wecandescribesuchagraphicssystemwiththefollowingdrawingfunctions

171) (Fill-in-the-Blank) in _____ case , the viewer is a bellow camera.6 the image is formed on the film plane at the back of thecamera.sothatwecanemulate_____processtocreateartificialimages , weneedto identifyafewbasicprinciples .

Answer: this

172) (Fill-in-the-Blank) _____ , the designer work iteratively .

Answer: thus

173) (Fill-in-the-Blank) _____ , the specification of the object is independent of the specification of the viewer.hence , weshouldexpectthat , withinagraphicslibrary , therewillbeseparate functionsforspecifyingtheobjectsandtheviewer .

Answer: first

174) (Fill-in-the-Blank) for a _____ to see a steady , flicker-free image on most crt display , the same path must be retraced , or re- freshed , by the beam at a sufficiently high rate , the refreshrate .

Answer: human

175) (Fill-in-the-Blank) 1.7.6 _____ the primitive that emerge from the clipper are still represented in term of their vertex and must be further processed to generate pixel in the frame buffer .

Answer: rasterization

176) (Fill-in-the-Blank) _____ speci- ficationsarecalledtheapplicationprogrammersinterface (api) .theapplication programmersmodelofthesystemisshowninfigure1.21.theapplicationprogram-merseesonlytheapiandisthusshieldedfromthedetailsofboththehardwareand thesoftwareimplementationofthegraphicslibrary.thesoftwaredriversarerespon-sibleforinterpretingtheoutputoftheapiandconverting_____datatoaformthat is understood by the particular hardware .

Answer: these

177) (Fill-in-the-Blank) _____ two-dimensional point are , aswesawinsection1.5 , theprojectionsofpointsinthree-dimensionalspace.the mathematicalprocessofdeterminingprojectionsisanapplicationoftrigonometry .
Answer: these

178) (Fill-in-the-Blank) _____ 1 1 chapter graphic system and model perhapsthedominantcharacteristicofthisnewmillenniumishowcomputerand communicationtechnologieshavebecomedominantforcesinourlives.activi- tiesaswide-rangingasfilmmaking , publishing , banking , andeducationcontinueto undergorevolutionarychangesasthesetechnologiesalterthewaysinwhichwecon-ductourdailyactivities.thecombinationofcomputers , network , andthecomplex humanvisualsystem , throughcomputergraphics , hasledtonewwaysofdisplaying information , seeingvirtualworlds , andcommunicatingwithpeopleandmachines .
Answer: module

179) (Fill-in-the-Blank) _____ crt have three different _____ed phosphor (red , green , and blue) , ar- ranged in small group .
Answer: color

180) (Fill-in-the-Blank) in all _____ applica- tions , the graphic are used in a number of distinct way .
Answer: these

181) (Fill-in-the-Blank) _____ raster-graphics system became available , wireframe image were the only type of computer-generated image that we could produce .
Answer: before

182) (Fill-in-the-Blank) colorplate8showsasmallareaoftherenderingoftheobjectusinganenviron-_____.theimageontheleftshowsthejaggedartifactsknownasaliasingerrors thatareduetothediscretenatureoftheframebuffer.theimageontherighthasbeen renderedusingasmoothingorantialiasingmethodthatwewillstudyinchapters7 and8 .
Answer: mentmap

183) (Fill-in-the-Blank) 1.7.4 _____ processing in the first block of our pipeline , each _____ is processed independently .
Answer: vertex

184) (Fill-in-the-Blank) overthepast150years , _____ for generating plot that aid the viewer in understanding the information in a set ofdata.now , wehavecomputerplottingpackagesthatprovideavarietyofplotting techniquesandcolortoolsthatcanhandlemultiplelargedatasets.nevertheless , it is still the human ability to recognize visual pattern that ultimately allows u to interprettheinformationcontainedinthedata.thefieldofinformationvisualiza-tionisbecomingincreasinglymoreimportantaswehavetodealwithunderstanding complexphenomenafromproblemsinbioinformaticstodetectingsecuritythreats .
Answer: workersinthefieldofstatisticshaveexploredtechniques

185) (Fill-in-the-Blank) 1.5 the _____-camera model our model of optical imaging system lead directly to the conceptual foundation formodernthree-dimensionalcomputergraphics.welookatcreatingacomputer-generatedimageasbeingsimilartoforminganimageusinganopticalsystem.this paradigmhasbecomeknownasthe_____-cameramodel.considertheimaging system shown in figure 1.16. again we see object and a viewer .

Answer: synthetic

186) (Fill-in-the-Blank) in _____ plate 6 and 7 , we add surface texture to our object ; texture is one of the effect that we discus in chapter 8. all recent graphic processor support 28 chapter1 graphicssystemsandmodels texturemappinginhardware , sorenderingofatexture-mappedimagerequireslittle additionaltime.in_____plate6 , weuseatechniquecalledbumpmapping thatgives theappearanceofaroughsurfaceeventhoughwerenderthesameflatpolygonsasin theotherexamples._____plate7showsanenvironmentmapappliedtothesurfaceof theobject , whichgivesthesurfacetheappearanceofamirror.thesetechniqueswill bediscussedindetailinchapters8and9 .

Answer: color

187) (Fill-in-the-Blank) we _____ to establish a paradigmforcreatingimagesandtopresentacomputerarchitectureforimplement-ingthatparadigm.detailsarepresentedinsubsequentchapters , wherewewillderive therelevantequations .

Answer: want

188) (Fill-in-the-Blank) _____ specification can be satisfied in various way .

Answer: these

189) (Fill-in-the-Blank) _____ viewing technique , such a the one used in architecture , stress the relationship betweentheobjectandtheviewer , ratherthantheindependence thatthesynthetic- cameramodelemphasizes.thus , the_____two-pointperspectiveofacubeshown infigure1.26isatwo-point perspectivebecauseofaparticularrelationshipbetween theviewerandtheplanesofthecube (seeexercise1.7) .althoughtheopenglapi allowsustosettransformationswithcompletefreedom , italsoprovideshelpfulextra functions.forexample , considerthefollowingfunctioncalls : glulookat (copx , copy , copz , atx , aty , atz , upx , upy , upz) ; glperspective (fieldofview , aspectratio , near , far) ; thefirstfunctioncallpointsthecamerafromacenterofprojectiontowardadesired point (theat point) , withaspecifiedupdirectionforthecamera.thesecondselects a lens for a perspective view (the field of view) and how much of the world that thecamerashouldimage (theaspectratioandthenear andfar distance) .however , noneoftheapisbuiltonthesynthetic-cameramodelprovidefunctionsfordirectly specifyingadesiredrelationshipbetweenthecameraandanobject .

Answer: classical

190) (Fill-in-the-Blank) _____ there are multiple technology available , including light-emitting diode (led) , liquid-crystaldisplays (lcd) , andplasmapanels , alluseatwo-dimensional grid to address individual light-emitting element .
Answer: although

191) (Fill-in-the-Blank) the _____ not only loosely follows the order in whichwepresentrelatedtopicsbutalsoreflectshowgraphicssystemshavedeveloped overthepast30years .
Answer: sequence

192) (Fill-in-the-Blank) 2d _____ : everypointwithinitsfield ofviewisinfocus , regardlessofhowfaritisfromthecamera.theimageofapoint isapoint.thepinholecamerahastwodisadvantages.first , becausethepinholeis sosmallitadmitsonlyasinglerayfromapointsourcealmostnolightentersthe camera.second , thecameracannotbeadjustedtohaveadifferentangleofview .
Answer: theidealpinholecamerahasaninfinitedepthoffield

193) (Fill-in-the-Blank) _____ , the image that they definewhat we find on the film planeis two dimensional .
Answer: however

194) (Fill-in-the-Blank) the _____ of vertex color can be a simple a the program specifying a colororascomplexasthecomputationofacolorfromaphysicallyrealisticlighting model that incorporates the surface property of the object and the characteristic lightsourcesinthescene.wewilldiscusslightingmodelsinchapter6 .
Answer: assignment

195) (Fill-in-the-Blank) for _____ , in a vlsi design , thegraphicsprovideaninteractiveinterfacebetweentheuserandthedesign package , usually by mean of such tool a menu and icon .
Answer: example

196) (Fill-in-the-Blank) one of the _____ advantage of this approach is that it allows u to develop modeler that , althoughtheyusethesamerenderer , aretailoredtoparticularapplications.likewise , differentrendererscantakeasinputthesameinterfacefile.itisevenpossible , atleast inprinciple , todispensewiththemodelercompletelyandtouseastandardtexteditor togenerateaninterfacefile.foranybutthesimplestscenes , however , userscannot edit list of information for a renderer .
Answer: other

197) (Fill-in-the-Blank) p zd _____ , usingatopview , yield x x .
Answer: asimilarcalculation

198) (Fill-in-the-Blank) _____ , most textbook discussed how to define two- and three-dimensional mathematical 2.outsidetheunitedstates , thepalandsecamsystemsdisplaymorelinesbutusealowerframe rate .
Answer: next

199) (Fill-in-the-Blank) _____ effect will be covered in chapters8and9 .
Answer: these

200) (Fill-in-the-Blank) 1.3.2 _____ and image theprecedingdescriptionofimageformationisfarfromcomplete.forexample , we haveyettomention_____.iftherewereno_____sources , theobjectswouldbedark , andtherewouldbenothingvisibleinourimage.norhaveweindicatedhowcolor entersthepictureorwhattheeffectsofthesurfacepropertiesoftheobjectsare .
Answer: light

201) (Fill-in-the-Blank) _____ , before we discus themechanicsofwritingprogramstogenerateimages , wediscussthewayimagesare formedbyopticalsystems.weconstructamodeloftheimage-formationprocessthat wecanthenusetounderstandanddevelopcomputer-generatedimagingsystems .
Answer: hence

202) (Fill-in-the-Blank) of _____ , someone ha to develop the code for these application , and many ofus , despitethesophisticationofcommercialproducts , stillhavetowriteourown graphicsapplicationprograms (andevenenjoydoingso) .
Answer: course

203) (Fill-in-the-Blank) but _____ is just whatwedoincomputergraphics , wherelargesetsofverticesmustbeprocessedin thesamemanner .
Answer: that

204) (Fill-in-the-Blank) _____.human color-vision capability are due to the different sensitivity of the three type of cones.themajorconsequenceofhavingthreetypesofconesisthatinsteadofhaving toworkwithallvisiblewavelengthsindividually , wecanusethreestandardprimaries toapproximateanycolorthatwecanperceive.consequently , mostimage-production system , includingfilmandvideo , workwithjustthreebasic , orprimary , colors.we discusscolorindepthinchapter2 .
Answer: brightnessisanoverallmeasureofhowwereacttotheintensityoflight

205) (Fill-in-the-Blank) _____ system use a variety of technology , includingcrtsanddigitallightprojection (dlp) .fromauserperspec- tive , theyactasstandardmonitorswithsimilarresolutionsandprecisions.hard-copy device , suchasprintersandplotters , arealsorasterbasedbutcannotberefreshed .
Answer: these

206) (Fill-in-the-Blank) _____ (glpolygon) ; glvertex3f (0.0 , 0.0 , 0.0) ; vertex a glvertex3f (0.0 , 1.0 , 0.0) ; vertex b glvertex3f (0.0 , 0.0 , 1.0) ; vertex c glend ( ) ; thefunction_____specifiesthetypeofprimitivethattheverticesdefine.each subsequentexecutionofglvertex3fspecifiesthex , y , z coordinatesofalocation inspace.thefunctionglendendsthelistofvertices.notethatbyaddingadditional vertex , we can define an arbitrary polygon .

Answer: glbegin

207) (Fill-in-the-Blank) a _____.theseprimitives x are usually those that can be displayed rapidly on the hardware .

Answer: mostapisprovidesimilarsetsofprimitiveobjectsfortheuser

208) (Fill-in-the-Blank) the _____ of pipelining is illustrated in figure 1.30 for a simple arithmetic calculation.inourpipeline , thereisanadderandamultiplier.ifweusethisconfigu- rationtocomputea (bc) , thenthecalculationtakesonemultiplicationandone additionthe same amount of work required if we use a single processor to carry outbothoperations.however , supposethatwehavetocarryoutthesamecomputa- 1.7 graphicsarchitectures 31 a b c figure1.30 arithmeticpipeline .

Answer: concept

209) (Fill-in-the-Blank) we _____ process all theseverticesinasimilarmannertoformanimageintheframebuffer.ifwethinkin termsofprocessingthegeometryofourobjectstoobtainanimage , wecanemploy theblockdiagraminfigure1.31 , whichshowsthefourmajorstepsintheimaging process : 1. vertexprocessing 2. clippingandprimitiveassembly 3. rasterization 4. fragmentprocessing 32 chapter1 graphicssystemsandmodels insubsequentchapters , wediscussthedetailsofthesesteps.herewearecontentto overviewthesestepsandshowthattheycanbepipelined .

Answer: must

210) (Fill-in-the-Blank) 1.3 _____ : physicalandsynthetic 11 objectsinthecomputerand_____themwiththesetoftwo-dimensionalrasterized primitive .

Answer: image

211) (Fill-in-the-Blank) in _____ 4 and 5 , youwilllearnhowtotransformobjectsinthreedimensionsandhowtoobtaina desiredthree- dimensionalviewofamodel , withhiddensurfacesremoved .

Answer: chapter

212) (Fill-in-the-Blank) to a _____ degree , game drive the development of graphic hardware .

Answer: large

213) (Fill-in-the-Blank) the _____ set in- cludepoints , linesegments , polygon , andsometimestext.openglprogramsdefine c primitive through list of vertex .
Answer: usual

214) (Fill-in-the-Blank) for _____ geometric object b such a line segment , rectangle , and polygonsthere is a _____ relationship be- tween a list of vertex , or position in space , and the object .
Answer: simple

215) (Fill-in-the-Blank) _____ , b , andc.now , themultipliercanpassontheresultsofits calculationtotheadderandcanstartitsnextmultiplicationwhiletheaddercarries outthesecondstepofthecalculationonthefirstsetofdata.hence , whereasittakes thesameamountoftimetocalculatetheresultsforanyonesetofdata , whenweare workingontwosetsofdataatonetime , ourtotaltimeforcalculationisshortened markedly.heretherateatwhichdataflowsthroughthesystem , thethroughputofthe system , hasbeendoubled.notethatasweaddmoreboxestoapipeline , thelatency ofthesystemincreasesandwemustbalancelatencyagainstincreasedthroughputin evaluatingtheperformanceofapipeline .
Answer: tionwithmanyvaluesofa

216) (Fill-in-the-Blank) _____ iris rod and cone 1.4.2 the human visual system ourextremelycomplexvisualsystemhasallthecomponentsofaphysicalimaging optic nerve system , such a a camera or a microscope .
Answer: lens

217) (Fill-in-the-Blank) _____ ray can interact with the object surface in a vari- etyofways.forexample , ifthesurfaceisamirror , areflectedraymightdepending ontheorientationofthesurfaceenterthelensofthecameraandcontributetothe image.othersurfacesscatterlightinalldirections.ifthesurfaceistransparent , the light ray from the source can pas through it and may interact with other object , enterthecamera , ortraveltoinfinitywithoutstrikinganothersurface.4figure1.11 showssomeofthepossibilities .
Answer: these

218) (Fill-in-the-Blank) we can _____ pipeline for more complex arithmetic calculation that will affordevengreaterincreasesinthroughput.ofcourse , thereisnopointinbuilding a pipeline unless we will do the same operation on many data set .
Answer: construct

219) (Fill-in-the-Blank) _____ graphic application library driver mouse program (api) display figure1.21 applicationprogrammersmodelofgraphicssystem .
Answer: keyboard

220) (Fill-in-the-Blank) highdynamicrangeapplicationsrequiremorethan24-_____-resentationsofrgbcolors.somerecentframebuffersstorergbvaluesasfloating-pointnumbersinstandardieeeformat.hence , thetermtruecolor shouldbeinter-pretedasframebuffersthathavesufficientdepthtorepresentcolorsintermsofrgb valuesratherthanasindicesintoalimitedsetofcolors.wewillreturntothistopic inchapter2 .
Answer: bitfixedpointcolorrep

221) (Fill-in-the-Blank) _____ a user perspective , windowing system such a the x window system , microsoft window , and the macintosh o x differ only in detail .
Answer: from

222) (Fill-in-the-Blank) _____ plate 5 show a more sophisticated wireframe model constructed using nurbssurfaces , whichweintroduceinchapter12.suchsurfacesgivetheapplica- tion programmer great flexibility in the design process but are ultimately rendered usinglinesegmentsandpolygons .
Answer: color

223) (Fill-in-the-Blank) _____ access is through graphical network browser , suchasfirefoxandinternetexplorer , thatusethesesameinterfacetools .
Answer: their

224) (Fill-in-the-Blank) _____ enablefastredisplayofthecontentsoftheframebuffer.insoftware-basedsystems , such a those used for high-resolution rendering or for generating complex visual effect that can not be produced in real time , the frame buffer is part of system memory .
Answer: theframebufferusuallyisimplementedwithspecialtypesofmemorychipsthat

225) (Fill-in-the-Blank) _____ thepipeline.thus , wecanimplementavarietyoflight-materialmodelsorcreatenew kindsofprojections.fragmentprogramsallowustousetexturesinnewways.bump mapping , which is illustrated in color plate 6 , is but one example of an algorithm thatisnowprogrammablethroughtexturemappingbutformerlycouldonlybedone off-line.chapter9isdevotedtothesenewmethodologies .
Answer: vertexprogramscanalterthelocationorcolorofeachvertexasitflowsthrough

226) (Fill-in-the-Blank) 2. _____ once we have positioned the camera , we can place a camera coordinate system with it origin at the center of projection .
Answer: orientation

227) (Fill-in-the-Blank) 24 chapter1 _____ lineto (1 , 0) ; moveto (1 , 1) ; lineto (1,5,1.866) ; we would have the image of a cube formed by an oblique projection , a shown in figure1.23 (b) .
Answer: graphicssystemsandmodels

228) (Fill-in-the-Blank) _____ , theframebufferholdsonlythecoloredpixelsthatare displayedonthescreen.inmostsystems , theframebufferholdsfarmoreinforma- tion , suchasdepthinformationneededforcreatingimagesfromthree-dimensional data.inthesesystems , theframebuffercomprisesmultiplebuffers , oneormoreof whicharecolorbuffersthatholdthecoloredpixelsthataredisplayed.fornow , we canusethetermsframebufferandcolorbuffersynonymouslywithoutconfusion .
Answer: inaverysimplesystem

229) (Fill-in-the-Blank) 1.2.3 _____ device mostgraphicssystemsprovideakeyboardandatleastoneother_____device.the most common _____ device are the mouse , the joystick , and the data tablet .
Answer: input

230) (Fill-in-the-Blank) the _____ of the interaction between light and the surface of the object determine how much light enters the camera .
Answer: detail

231) (Fill-in-the-Blank) _____ , theimageisformedonthebackoftheeye.inacamera , the image is formed in the film plane .
Answer: inthehumanvisualsystem

232) (Fill-in-the-Blank) in _____ chapter , we argue that the pre- ferredmethodtoformcomputer-generatedimagesissimilartotraditionalimaging method , such a camera and the human visual system .
Answer: this

233) (Fill-in-the-Blank) 1.2 a _____ system a computer _____ system is a computer system ; a such , it must have all the componentsofageneral-purposecomputersystem.letusstartwiththehigh-level viewofa_____ssystem , asshownintheblockdiagraminfigure1.1.therearefive majorelementsinoursystem : 1. inputdevices 2. processor 3. memory 4. framebuffer 5. outputdevices thismodelisgeneralenoughtoincludeworkstationsandpersonalcomputers , inter- active game system , and sophisticated image-generation system .
Answer: graphic

234) (Fill-in-the-Blank) _____ , whererealismisimportant , othertypesofrendererscanperformbet-terattheexpenseofrequiringmorecomputationtime.pixarsrendermaninterface wascreatedtointerfacetheiroff-linerenderer.physicallybasedtechniques , suchas raytracingandradiosity , cancreatephotorealisticimageswithgreatfidelity , butnot inrealtime .
Answer: however

235) (Fill-in-the-Blank) _____ all the component , withthepossibleexceptionoftheframebuffer , arepresentinastan- dardcomputer , itisthewayeachelementisspecializedforcomputergraphicsthat characterizesthisdiagramasaportraitofagraphicssystem .

Answer: although

236) (Fill-in-the-Blank) a _____ console might have multiple button , a joystick , anddials.devicessuchasthenintendowiiarewirelessandcansenseaccelerations inthreedimensions .

Answer: typical

237) (Fill-in-the-Blank) _____ , thesepipelinearchitectureshadafixedfunctionality.although the application program could set many parameter , the basic operation available within the pipeline were fixed .

Answer: formanyyears

238) (Fill-in-the-Blank) 10 chapter1 _____ most projection system are also raster device .

Answer: graphicssystemsandmodels

239) (Fill-in-the-Blank) one of the _____ important us ha been in the training of pilot .

Answer: most

240) (Fill-in-the-Blank) at the _____ end , there is geometric processing , based on processing vertex throughthevarioustransformations , vertexshading , clipping , andprimitiveassem- bly.thisprocessingisideallysuitedforpipelining , anditusuallyinvolvesfloating- point calculation .

Answer: front

241) (Fill-in-the-Blank) incolorplate3 , _____.certain surfacesarenotvisiblebecausethereisasolidsurfacebetweenthemandtheviewer ; these surface have been removed by a hidden-surfaceremoval (hsr) algorithm .

Answer: thesameobjecthasbeenrenderedwithflatpolygons

242) (Fill-in-the-Blank) 1.8 _____ 33 weobtaintheequivalentpropertyinthesyntheticcamerabyconsideringaclip- pingvolume , suchasthepyramidinfrontofthelensinfigure1.18.theprojections of object in this volume appear in the image .

Answer: programmablepipelines

243) (Fill-in-the-Blank) 1.3 _____ : physicalandsynthetic 13 figure1.8 acamerasystemwithanobjectandalightsource .

Answer: image

244) (Fill-in-the-Blank) a _____ picture of a crt is shown in figure 1.3. when electron strike the phosphorcoatingonthetube , lightisemitted.thedirectionofthebeamiscontrolled bytwopairsofdeflectionplates.theoutputofthecomputerisconverted , bydigital- to-analogconverters , tovoltagesacrossthex andy deflectionplates.lightappears 8 chapter1 graphicssystemsandmodels y deflect electron gun x deflect phosphor focus figure1.3 thecathode-raytube (crt) .

Answer: simplified

245) (Fill-in-the-Blank) _____.thispara-digmisespeciallyusefulinunderstandingtheinteractionbetweenlightandmaterials thatisessentialtophysicalimageformation.becauseraytracingandotherphysically basedstrategiescannotrenderscenesinrealtime , wedeferfurtherdiscussionofthem untilchapter13 .

Answer: wealsointroducedtheideaoftracingraysoflighttoobtainanimage

246) (Fill-in-the-Blank) 1.7.1 _____ processor theearliestattemptstobuildspecial-purposegraphicssystemswereconcernedpri- marilywithrelievingthegeneral-purposecomputerfromthetaskofrefreshingthe _____continuously.these_____processorshadconventionalarchitectures (fig- ure1.29) butincludedinstructionsto_____primitivesonthecrt.themainad-vantageofthe_____processorwasthattheinstructionstogeneratetheimagecould be assembled once in the host and sent to the _____ processor , where they were storedinthe_____processorsownmemoryasa_____list , or_____file.the _____processorwouldthenexecuterepetitivelytheprograminthe_____list , at aratesufficienttoavoidflicker , independentlyofthehost , thusfreeingthehostfor othertasks.thisarchitecturehasbecomecloselyassociatedwiththeclientserverar-chitecturesthatwewilldiscussinchapter3 .

Answer: display

247) (Fill-in-the-Blank) the _____ opengl code fragment specifies z thetriangularpolygonshowninfigure1.24throughfivefunctioncalls : figure1.24 atriangle .

Answer: following

248) (Fill-in-the-Blank) 1.7.3 the _____ pipeline westartwithasetofobjects.eachobjectcomprisesasetof_____alprimitives.each primitivecomprisesasetofvertices.wecanthinkofthecollectionofprimitivetypes andverticesasdefiningthegeometryofthescene.inacomplexscene , theremaybe thousandseven millionsof vertex that define the object .

Answer: graphic

249) (Fill-in-the-Blank) in a _____ system , the graphic system take pixel from the frame buffer and displaysthemaspointsonthesurfaceofthedisplayinoneoftwofundamentalways .

Answer: raster

250) (Fill-in-the-Blank) x ray _____ radio (cid:2) (nm) blue green red 350 (cid:2) (nm) 780 figure1.9 theelectromagneticspectrum .
Answer: light

251) (Fill-in-the-Blank) _____ from the source strike various surface of the object , and a portion of the reflected _____ enters the camera through the lens .
Answer: light

252) (Fill-in-the-Blank) _____- tion in the television , motion picture , and advertising industry .
Answer: thesuccessofflightsimulatorsledtotheuseofcomputergraphicsforanima

253) (Fill-in-the-Blank) _____.forexample , ifthesourceisvisiblefromthe camera , someoftheraysgodirectlyfromthesourcethroughthelensofthecamera , andstrikethefilmplane.mostrays , however , goofftoinfinity , neitherenteringthe cameradirectlynorstrikinganyoftheobjects.theserayscontributenothingtothe image , althoughtheymaybeseenbysomeotherviewer.theremainingraysstrike and illuminate object .
Answer: imageonthefilmplaneofourcamera

254) (Fill-in-the-Blank) _____ recently , most display had a 4:3 width to height ratio (or aspectratio) thatcorrespondedstocommercialtelevision.indiscreteterms , displaysstartedwith vgaresolutionof640480pixels , whichwasconsistentwiththenumberoflines displayedinstandardntscvideo.2computerdisplaysmoveduptothepopularres- olutionsof1024768 (xga) and12801024 (sxga) .thenewerhighdefinition television (hdtv) standardusesa16:9aspectratio , whichisbetweentheoldertele- visionaspectratioandthatofmovies.hdtvmonitorsdisplay780or1080linesin eitherprogressive (1080p,780p) orinterlaced (1080i,780i) modes.hence , themost popularcomputerdisplayresolutionsarenow19201080and1280720 , which havethehdtvaspectratio , and19201024and1280768 , whichhavetheverti- calresolutionofxgaandsxgadisplays.atthehighend , therearenow4k (4096 2160) digitalprojectorsthataresuitableforcommercialdigitalmovies .
Answer: until

255) (Fill-in-the-Blank) on the _____ side , the revenue from video game ha surpassed the revenue for _____ film .
Answer: commercial

256) (Fill-in-the-Blank) 6. in a _____ camera , the front of the camera , where the lens is located , and the back of the camera , thefilmplane , areconnectedbyflexiblesides.thus , wecanmovethebackofthecamera independentlyofthefrontofthecamera , introducingadditionalflexibilityintheimage-formation process.weusethisflexibilityinchapter5 .
Answer: bellow

257) (Fill-in-the-Blank) _____ than 2000 year ago , the greek were able to convey their architectural idea graphically , even though the related mathematics wa not developed until the re- naissance.today , thesametypeofinformationisgeneratedbyarchitects , mechanical designer , anddraftspeopleusingcomputer-baseddraftingsystems .
Answer: more

258) (Fill-in-the-Blank) _____ completelyself-containedpackages , suchastheonesusedinthecadcommunity , a userdevelopsimagesthroughinteractions_____thedisplayusinginputdevices , such a a mouse and a keyboard .
Answer: with

259) (Fill-in-the-Blank) _____- tweenrepresentationsofobjectsindifferentcoordinatesystems.forexample , inthe syntheticcameraparadigm , amajorpartofviewingistoconverttoarepresentation ofobjectsfromthesysteminwhichtheyweredefinedtoarepresentationinterms ofthecoordinatesystemofthecamera.afurtherexampleofatransformationarises whenwefinallyputourimagesontotheoutputdevice.theinternalrepresentationof objectswhetherinthecameracoordinatesystemorperhapsinasystemusedbythe graphicssoftwareeventuallymustberepresentedintermsofthecoordinatesystem ofthedisplay.wecanrepresenteachchangeofcoordinatesystemsbyamatrix.we canrepresentsuccessivechangesincoordinatesystemsbymultiplying , orconcate- nating , theindividualmatricesintoasinglematrix.inchapter4 , weexaminethese operationsindetail.becausemultiplyingonematrixbyanothermatrixyieldsathird matrix , asequenceoftransformationsisanobviouscandidateforapipelinearchitec- ture.inaddition , becausethematricesthatweuseincomputergraphicswillalways besmall (44) , wehavetheopportunitytouseparallelismwithinthetransforma- tionblocksinthepipeline .
Answer: manyofthestepsintheimagingprocesscanbeviewedastransformationsbe

260) (Fill-in-the-Blank) 1.7.5 _____ and primitive assembly the second fundamental block in the implementation of the standard graphic pipelineisfor_____andprimitiveassembly.wemustdo_____becauseofthe limitationthatnoimagingsystemcanseethewholeworldatonce.thehumanretina hasalimitedsizecorrespondingtoanapproximately90-degreefieldofview.cameras havefilmoflimitedsize , andwecanadjusttheirfieldsofviewbyselectingdifferent lens .
Answer: clipping

261) (Fill-in-the-Blank) we _____ the mathematics of projection in chapter 5 ; understanding projection is crucial to understanding three-dimensional graphic .
Answer: develop

262) (Fill-in-the-Blank) the _____ engine developed by silicon graphic , inc. (sgi) wasavlsiimplementationformanyoftheseoperationsinaspecial-purposechip thatbecamethebasisforaseriesoffastgraphicsworkstations.later , floating-point accelerator chip put 4 4 matrix-transformation unit on the chip , reducing a matrixmultiplicationtoasingleinstruction.today , graphicsworkstationsandcom- moditygraphicscardsusegraphicsprocessingunits (gpus) thatperformmostofthe graphicsoperationsatthechiplevel.pipelinearchitecturesarethedominanttypeof high- performancesystem .

Answer: geometry

263) (Fill-in-the-Blank) colorplate1showsanimageofanartistscreationofasun-_____.color plate2showstheobjectrenderedusingonlylinesegments.althoughtheobjectcon- sistsofmanyparts , andalthoughtheprogrammermayhaveusedsophisticateddata structure to model each part and the relationship among the part , the rendered objectshowsonlytheoutlinesoftheparts.thistypeofimageisknownasawire- frameimagebecausewecanseeonlytheedgesofsurfaces : suchanimagewouldbe producediftheobjectswereconstructedwithstiffwiresthatformedaframewithno solid material between the edge .

Answer: likeobject

264) (Fill-in-the-Blank) _____.availableapisdifferin how much flexibility they provide in camera selection and in how many different methodstheyallow.ifwelookatthecamerashowninfigure1.25 , wecanidentify figure1.25 camera fourtypesofnecessaryspecifications : specification .

Answer: wecanspecifyaviewerorcamerainavarietyofways

265) (Fill-in-the-Blank) _____-analysisproblems.mod- ernimagingtechnologiessuchascomputedtomography (ct) , magneticresonance imaging (mri) , ultrasound , and positron-emission tomography (pet) generate three- dimensionaldatathatmustbesubjectedtoalgorithmicmanipulationtopro- videusefulinformation.colorplate20showsanimageofapersonsheadinwhich the skin is displayed a transparent and the internal structure are displayed a opaque .

Answer: medicalimagingposesinterestingandimportantdata

266) (Fill-in-the-Blank) _____ we add a few initialization andterminationprocedures , aswellastheabilitytochangepenstoalterthedrawing colororlinethickness , wehaveasimplebutcompletegraphicssystem.hereisa fragmentofasimpleprograminsuchasystem : moveto (0 , 0) ; lineto (1 , 0) ; lineto (1 , 1) ; lineto (0 , 1) ; lineto (0,0) ; thisfragmentwouldgeneratetheoutputshowninfigure1.23 (a) .ifweaddedthe code moveto (0 , 1) ; lineto (0.5 , 1.866) ; lineto (1.5 , 1.866) ; lineto (1.5 , 0.866) ; 7.theremaybeoneormoreadditionallayersbetweentheapiandthedriver , suchasavirtual machineorhardwareabstractionlayer.however , becausetheapplicationprogrammerseesonlythe api , shedoesnotneedtoknowthislevelofdetail .

Answer: once

267) (Fill-in-the-Blank) two _____ entity must be part of any image-formation process , be it mathe- maticalorphysical : object andviewer.theobjectexistsinspaceindependentofany image-formation process and of any viewer .

Answer: basic

268) (Fill-in-the-Blank) 1.2.2 _____ device for many year , the dominant type of display (or monitor) ha been the cathode- ray tube (crt) .

Answer: output

269) (Fill-in-the-Blank) _____ projectionsonadraftingboardorsketchingobjectsinperspective.moreimportant , userscanrelyonhardwareandsoftwareimplementationsofprojectionswithinthe implementationoftheapithatarefarmoreefficientthananypossibleimplementa-tionofprojectionswithintheirprogramswouldbe .

Answer: thatapproachshouldbeaboontouserswhohavedifficultylearningtodrawvarious

270) (Fill-in-the-Blank) 1.2.1 _____ and the frame buffer presently , almost all graphic system are raster based .

Answer: pixel

271) (Fill-in-the-Blank) the _____ between an application program and a graphic system can be specified through a set of function that resides in a graphic library .

Answer: interface