

Equipment Solution of Digital Geography Classroom

About

“Specifications for the Equipment of Special Classrooms for Geography of Middle School”

And

“Education Industry Equipment Standard of the People's Republic of China”

By

The Ministry of Education

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I. Normative reference standards

- ◆ “Specifications for the Equipment of Special Classrooms for Geography of Middle School” by the Ministry of Education
- ◆ JY/T 0386-2006 “Standard of Junior Middle School Science Teaching Instrument”
- ◆ JY/T 0385-0385 “Standard of Primary and Secondary School Science Teaching Instrument”
- ◆ JY/T 0406-2010 “Standard of High School Science Teaching Instrument”

In combination with the characteristics of geography courses and science education and the development trend and trend of information technology, the following ideas are followed in the design of digital geography classrooms:

1. Focus on practical teaching, give consideration to research-based learning, school-based curriculum development and interest group activities;
2. Highlight the frontier of geography and education characteristics of science, and highlight the combination of natural geography and human geography;
3. Make full use of modern education technology, take "digitalization" as the leading role, break through the limitation of time and space, provide more high-quality and updated scientific information for students, and timely integrate the latest achievements into the teaching process;
4. Meet students' different geographical learning needs, establish diversified and selective geographical teaching environment, and meet students' different learning needs of exploring natural mysteries, understanding social living environment and mastering modern geographical science, technology and methods;
5. Support and prop up the transition from the lecture-based teaching mode relying on traditional classrooms and traditional media and technology in the past to the developmental teaching mode relying on independent learning and collaborative learning in the digital information technology environment.

II. Functions and requirements

2.1 design requirements

In order to facilitate students to access a variety of geographical information data such as dynamic environmental data, remote sensing and telemetry data and data of geographical cases involved in each standard course and textbook, facilitate students to carry out practical activities, and create conditions for exploratory learning and subject experimental activities; Create conditions for heuristic, inquiry-based, discussion and participatory teaching; Infiltrate the frontier of geographical science development into the course teaching.

2.2 functional requirements

It can meet the requirements of geography education teaching and facilitate students to be familiar with, touch and operate conventional geographical teaching instruments and modern geographic information technology. Learn to use the globe and digital planet system to locate and obtain information about people, regions and the environment; Ability to use and build maps; Learn to select and use appropriate graphic skills to present maps and evidence in diagrams; Learn how to select and use indirect evidences -- satellite remote sensing images and other data (instruments, models, specimens, etc.) for learning; Learn how to use modern geographic information technology to obtain dynamic geographic change information, master 3S technology to process, present and analyze geographical evidence; Understand how to create virtual real 3d geospatial environment and analyze geographical problems.

2.3 building requirements

- a) Floor: the floor of special classrooms and corridors shall not be equipped with steps. The ground should be dustproof and easy to clean, wear-resisting and skidproof;
- b) Doors and windows: the front and back doors shall be installed, the width of the doorway shall not be less than 1200 mm, observation window shall be set on the door fan, and daylighting and ventilation window shall be set on the upper part of the door frame. The window sill height of the special classroom should be 900mm ~ 1000mm, and the width of the window wall

of the special classroom should not be greater than 1200mm. Doors and Windows should not affect the use of indoor space and corridor access to the convenience and safety;

c) Walls: the three walls of the dedicated classroom shall be solid and flat, so as to facilitate the situational layout.

d) Integrated wiring system: the main control valve shall be installed for indoor power supply. Indoor power socket and lighting power should be designed and controlled separately. The vertical through well and equipment location of the integrated wiring system should be reserved for the newly built classrooms.

e) Power load: the power distribution lines and equipment power capacity of special classrooms shall have a margin to meet the needs of constantly adopting modern teaching methods and gradually increasing teaching equipment.

2.4 Environmental requirements

Project	Category	Requirements
Daylighting	Basic requirements	The best orientation of the dedicated classroom should be ensured to avoid direct sunlight; The main lighting should be on the left side of the student seat.
Lighting	Basic requirements	The average illumination of the student desktop should meet the relevant requirements of GB 50034, should not be less than 300lx, and its illumination uniformity should not be less than 0.7.
	Planning advice	<p>1. The writing board shall be provided with local lighting. The average illumination of the writing board shall meet the relevant requirements of GB 50034, shall not be less than 500lx, and the illumination uniformity shall not be less than 0.7.</p> <p>2. If a drawing table is designed, it shall refer to the requirements of the copy table, install lighting under the table surface, and pass light through the smooth ground glass surface for tracing, drawing and charting.</p>

Power supply	Basic requirements	Install residual current and overload protector with reliable grounding protection.
Shading	Basic requirements	Special classroom should set shade ventilated curtain.
	Planning advice	Special classroom appropriate sets double deck curtain, inside layer is shade ventilated shade, outer layer is chromatic spray paint a variety of geographical situation picture.
Ventilation	Basic requirements	The number of air changes of special classroom should accord with GB 17226 relevant requirement, should not be less than 4 times/hour, appropriate to take all sorts of organized natural ventilation measures, make indoor carbon dioxide concentration is less than 1.5‰.
Environmental protection	Basic requirements	<p>1. Indoor environmental noise shall not be greater than 65dB.</p> <p>2. When building, rebuilding or expanding special classrooms and ancillary rooms, formaldehyde, benzene and other harmful gases and radioactive pollution of monitors shall meet the limits set in relevant standards.</p>
Safety	Basic requirements	Should be equipped with effective fire (fire, moisture, theft, etc.) facilities.

II. Introduction to special classrooms for digital geography

Digital geographic special classroom program follows "Construction Specification of Special Middle School Geography Classroom " by the Ministry of Education, integrates the latest achievements of modern geography education technology, dominated by "digital", creating good environment for school geography teaching, to facilitate students to consult and kinds of geographic information data such as dynamic environment data, remote sensing data and the curriculum teaching material related to geographic data, convenient for students to practice, create conditions for exploratory study and experiment on activity; To create conditions for heuristic, inquiry-based, discussion and participatory teaching, and to infiltrate the frontier of geographical science development into the course teaching.

2.1 functional objectives

It can meet the requirements of geography education teaching, facilitate students to be familiar with, contact and operate conventional geographical teaching instruments and modern geographic information technology, learn to use the globe and digital planet system to locate and obtain information about people, regions and the environment; Learn how to select and use indirect evidences -- satellite remote sensing images and other data (instruments, models, specimens, etc.) for learning; Learn how to use modern geographic information technology to obtain geographic dynamic change information, master how to use 3S technology to process, present and analyze geographical evidence, understand how to create virtual and real three-dimensional geographical space environment, and analyze geographical problems.

2.2 design ideas

1. Provide advanced digital teaching environment for geography teaching, popular science activities and environment education through the combination of digital planet system and plane projection.

2. Use the form of the surface projection display by the annulus system, play video data such as the universe and the earth, and geological disasters, the effect of play was very impressive in curriculum implementation. Curriculum import part is often the key for a class to attract students' interest to learn. Annulus system build an unbroken feeling to the audience, incarnate the changes of the vast universe and the changes of the world by time.

3. Through the demonstration system of the linkage between digital three-dimensional terrain and digital planet, elaborate the integrity and difference of natural geographical environment. Reflect that the earth is well rounded, and the relationship between local and global, the impact of local geographical environmental changes on the overall environmental changes, which greatly improves students' sense of space.

4. By demonstrating digital three-dimensional terrain, can let the students understand the distribution of the land and sea and continent terrain, geographical features, mountain river, and the global climate characteristics, the main distribution area of climate type, let the students analyze latitude location, sea and land distribution, the influence on climate, and can be further explained with examples the negative impact of human activities on the atmospheric environment and the importance of the protection of atmospheric environment.

5. By observing China's political district map, China's political district Mosaic combination model and other products, we can understand China's territory and sea areas, China's border with neighboring countries and China's administrative division, and we can form a more intuitive understanding of China's provinces, municipalities


and autonomous regions through practical Mosaic.

6. Make reasonable use of space to provide necessary conditions for daily teaching, open class, course evaluation and collective lesson preparation.

7. Create the overall geographical discipline environment atmosphere, the overall design is teaching-oriented, with the spatial design techniques, to achieve the discipline characteristics of the digital geography special classroom, and artistic characteristics!

III. Teaching instruments and equipment

1. Audio-visual equipment and special instruments

No.	Device name	Specifications	Quantity	Unit	Remark
01	Multimedia ball screen projection demonstrator	<p>I. Hardware requirements:</p> <p>1.1 Equipment composition: including seamless spherical screen, fish-eye lens, projection base (including high-definition engineering projection system), remote control;</p> <p>Monomer 360 degree investment technology, easy to assemble, easy to use; Provide standard VGA input interface for computer connection;</p> <p>1.2. The diameter of the ball curtain is 72CM, forming without patchwork; Special coating ensures uniform brightness, anti-glare and radiation;</p> <p>1.3 Fish-eye lens: length: 24.5cm; Diameter: 11.6cm; The field of view is 180 degrees.</p> <p>1.4 The projection system brightness is 5000lm;The resolution is 1920*1200;Contrast 1000:1, display technology 3LCD,</p> <p>1.5 Base: length * width * height (625mmx400mmx905mm), alloy steel;</p> <p>1.6. Provide the remote control, which can switch on</p>	1	Set	

and off the projector power of the multimedia ball-screen projection demonstrator and set brightness and contrast, etc.;

1.7 the remote control has the lens displacement button, which can adjust the image horizontally and vertically;

1.8 special computer: CPU :i3-4130, motherboard: Intel B75 chipset, hard disk: 500G, graphics card: NV GT625, memory: 4GB 19LCD

II. Software requirements:

2.1 With the cooperation of the control software and hardware system, the 2D image can be displayed as 360° 3D images on the spherical screen to simulate various celestial bodies, stars and spheres realistically. The maximum resolution of the image is 2048*1024. 3D animation is displayed on the spherical screen to simulate and demonstrate various dynamic processes;

2.2 As the drive program of multimedia ball screen projection demonstrator, it is responsible for 3D processing of star animation, and display on the ball screen of multimedia ball screen projection demonstrator;

2.3 As the control program of the multimedia ball screen projection demonstrator, it controls the animation, rotation, reversal of the poles and other actions of the multimedia ball screen projection demonstrator;

2.4 As the content management program of multimedia ball-screen projection demonstrator, it supports users to add their own demonstration contents;

2.5 As the setting management program of multimedia ball screen projection demonstrator, it sets various parameters of multimedia ball screen projection demonstrator;

2.6 As the service program of multimedia ball screen projection demonstrator, it provides users with the software interface of PowerPoint, FLASH and HTML files for secondary development, so that the files in these formats can be invoked and controlled through the software interface to display the content and mode of multimedia ball screen projection demonstrator.

2.7 Remote control function

The remote control can be used in the classroom to select the display content closely related to teaching, control the rotation direction and speed, flip and restore the direction of the poles, control the animation play/pause and play speed, which is convenient for teachers' interactive or mobile teaching.

III. Course resources:

3.1 The course package provided shall include courses conforming to the standards of junior and senior high school geography course. To meet the dual needs of teachers' teaching

and students' independent learning and inquiry learning, in addition to geography subject content, it should include relevant contents of popular science and environment education.

It should include: 01. The earth and the globe; 02. Longitude, latitude and longitude network; 03. World topography; 04. Land and sea distribution; 05. Changes of land and sea; 06. The rotation of the earth; 07. Antarctic region; 08. Africa; 09. The world's land and sea distribution; 10. Re-read the warp and weft mesh; 11. Languages and religions of the world; 12. Expansion of countries and cities; 13. The position of the earth in the universe; 14. Internal force action of surface morphological changes; 15. Air pressure belt and wind belt; 16. Influence of air pressure belt and wind belt on climate; 17. Influence of land and sea distribution on atmospheric circulation; 18. Common weather systems; 19. Global climate change; 20. Seawater movement; 21. Traditional industry and new industry; 22. Application of modern technology in territorial control; 23. Weather systems and meteorological disasters; 24. Regional types of world agriculture; 25. The impact of the natural environment on the city; 26. Geographical differences of the same natural disaster; 27. Application of high school system geography knowledge in regions; 28. The outbreak of

world war II and other courses. At the same time should include solar system, sun, moon, Mars and other popular science and elective course modules.

Vendors should have a dedicated multimedia ball screen projectors website that provides course packages and material updates for download.

★IV. Short focus lens:

1. Provide supporting short focal length lens for dome demonstration, focal length: 12.04; F value: 2.0; Lens diameter (mm) : 117.4; Lens weight (KG) : 1.9; Projection ratio: 0.4:1; The longitudinal view Angle: 86 °; Horizontal viewing Angle: 103 °; Transmittance: greater than 79%.

V. Fish-eye lens:

1. Provide the ball screen lens used in conjunction with the ball screen and projection system, with the focal length of 3.58mm, the aperture of 1.85NA, and the image surface diameter of 10.6mm; Exit pupil position: distal center; Transfer function (36 line pairs /mm) : 0.60(within 0.3 field of view) 0.4(full field of view); Lateral chromatic aberration: 15 μ m; Relative illumination: 0.85; Distortion: plus or minus 0.5%; Viewing Angle: 180 °; Total length of optics: 245mm.

VI. Qualification requirements

Provide the authorization of the original manufacturer, provide the three-year warranty of the original manufacturer, and

warranty commitment of software 1 year free upgrade when bidding.



Copy of inspection report issued by the Education Equipment Research and Development Center of the Ministry of Education (original copy for reference) shall be provided when bidding.

Copy of copyright certificate of multimedia ball screen projection demonstrator (original copy for reference) shall be provided when bidding.

VII. Presentation requirements

This product needs to provide on-site prototype, to demonstrate the following functions:

1. Demonstrated at least 3 courseware resources related to middle school geography on site, and matched with the subject knowledge of middle school.
2. Live demonstration of the resource center website about the teaching of this system, including spherical resources, course resources, etc.
3. On-site demonstration supports the extension and development demonstration of relevant courses in the later stage
4. Through the control software or software interface, select the content of the demonstration, control the playback of animation, rotation of spherical image or animation, rotation of longitude and dimension direction, reversal of poles or

		restoration of the scene demonstration			
02	Astronomical demonstration dome	Glass fiber reinforced plastic molding, white matte coating on the surface, 3 meters in diameter on the bottom, 0.5 meters in height from the bottom to the top, used to demonstrate various astrographic changes, dome background decoration.	1	Set	
03	Digitized stereotopography	<p>I. Hardware composition:</p> <p>1.1 China's three-dimensional terrain size: 1.7m*1.2m, the world's three-dimensional terrain size: 1.7m*1.2m, imported composite materials;</p> <p>1.2 Push-pull whiteboard: size 1.7m*1.2m, aluminum alloy frame;</p> <p>1.3 projector resolution: 1024*768, brightness: 2600lm, display technology: 3lcd;</p> <p>1.4 Complete set of computer: CPU: Intel i3, motherboard: PH67S - C43 (B3), hard disk: 1 TB, graphics card: GTS440 D5, 1G memory: 4GB 1.5 interaction module: support double screen, light sensitive chip type: 1/3 inch high-speed CMOS chip, sensitivity: 0.77V/Lux-sec, the infrared camera x2, luminescent wavelength of 850 nm, 850 nm infrared pen, anchor point number: single 9 points, positioning accuracy (bias) : ≤ 2 (pixels), system average latency: 25 ms, frame rate: 80 frames/s</p>	1	Set	

II. Software platform

Interactive digital platform application, dual-channel interactive software, can achieve dual-screen interactive function, make the main screen and auxiliary screen switch between each other, customized Smart Pointer; EfeeFlashPlayer supports multi-point calibration, flash play and control, Chinese 3d topography and world 3d topography play courseware. Can independently demonstrate the Chinese terrain and the world terrain multimedia courseware content; China/the world terrain and electronic whiteboard linkage demonstration (such as in the terrain demonstration courseware, whiteboard is to show the detailed content of courseware);Linkage demonstration of electronic whiteboard in digital terrain and multimedia ball screen projection demonstrator (PPT calls and controls multimedia ball screen projection demonstrator)

III. Course package:

The history of China

The history of the world

Geography courses of junior high school includes: 1.

The vast territory 2. Many people 3. The big family of many nationalities 4. Diverse climate 5. Significant monsoon climate

6. Rivers and lakes 7. Land resources 8. Adjust measures to local conditions to develop the agriculture 9. The distribution and development of industries 10. Divided four geographic regions 11. The earth and the globe 12. The Earth's movement 13. Continents and oceans 14. The change of the land and sea 15. The climate of the world 16. Precipitation and distribution of the precipitation 17. Population and races 18. Languages and religions in the world.

High school geography courses include: 1. China's terrain 2. Northwest area 3. Pressure belt and belt 4. Common weather systems movement 5. Seawater movement 6. Mountain formation 7. The difference of the natural geographical environment 8. Space change of the population 9. Regional agricultural type of mainly planting 10. Regional agricultural type of mainly animal husbandry 11. Traditional industrial and emerging industrial area 12. The influence of geographical environment on the regional development 13. The development of energy resources 14. Comprehensive development of river basin 15. The development of regional agriculture 16. Allocation of the resources across regions 17. Industry transfer 18. The seas and oceans on the earth 19. The temperature and salinity of sea water 20. El nino and la Nina phenomena.

IV. Qualification requirements:

		<p>Provide the original manufacturer authorization, provide three years of quality assurance, the original manufacturer warranty letter of commitment for software 1 year free upgrade when bidding.</p> <p>Copy of inspection report issued by the Education Equipment Research and Development Center of the Ministry of Education (original copy for reference).</p> <p>Provide the copy of relevant invention patent certificate or notification of acceptance of application.</p> <p>V. Demonstration requirements</p> <p>This product requires on-site demonstration of courseware and software functions, to demonstrate the following functions:</p> <ol style="list-style-type: none"> 1. Live demonstration of dual-screen interactive function. 2. On-site demonstration of multi-point control, control and playback of the courseware of China 3D terrain and the world 3D terrain 3. On-site demonstration of at least two courseware resources related to Chinese or world topography, which match with the subject knowledge of middle school. 4. Compatible with history courseware demonstration. 5. On-site demonstration of at least two courseware resources that can interact with multimedia ball screen demonstrator match with the subject knowledge of middle school. 			
07	Ceiling speakers	Connect with the computer and other equipment, and absorb the top speaker: 24 cm full range of high sound quality	1	Set	

	and amplifiers	speakers, 4 speakers with a total power of 100W input, sensitivity of 88db, frequency response of 110-13000HZ. Power amplifier system: advanced high-efficiency power amplifier circuit, high/low frequency control, total volume control and independent volume control, with output short circuit, overload, overheating and other protection and warning functions. AV amplification distributor: adopts high quality components and advanced circuit technology design, each independent amplification output, high isolation, strong anti-interference ability			
08	Multimedia platform (built-in central control system)	<p>I. Multimedia lectern size : 1500*700*870mm.</p> <p>1. The main part of the cabinet is made of high-quality cold-rolled steel plate with a material thickness of 1.0mm, which is formed by CNC punch, edge folding and laser cutting in one time. Easy to operate and durable. Computer display (the screen is located in the middle of the table and facing up for the convenience of the teacher) and computer vertical host are placed inside the cabinet body, and the video display booth is placed on the right side (guide rail can be moved to pull).</p> <p>2. The cabinet body is designed with a 45-degree arc around it, and there is a threading hole inside the cabinet body to facilitate equipment connection. The multimedia central control panel can be placed inside the cabinet body on the left (the opening size is determined separately), and the threading</p>	1	Set	

	<p>hole is left inside the cabinet body for the convenience of equipment connection. The back panel of cabinet body is provided with heat dissipation hole of equipment.</p> <p>3. The mesa is with environmental-friendly fire prevention board face, 25 mm thick molding table (base material for hot resin impregnated paper high-pressure decorative laminated board, the color is grey). Display window glass is 5 mm tempered glass.</p> <p>4. The metal surface is treated with oil phosphating coating by pickling. The surface is sprayed with resin powder and the color is matt gray.</p> <p>5. Scope of application: computer display, host, central control, video booth, DVD, audio.</p> <p>II. Central control system: Function requirements of central control system: use wireless touch screen to independently control multimedia ball screen projection demonstrator, digital terrain, projector, special computer, volcano eruption demonstration model, sun, earth, moon movement meter, one-button switch machine of lighting system. The function is practical, convenient and flexible. (1) adopt 32-bit embedded processor with main frequency up to 667MHz, ARM11 CPU, 256M memory and 1G Flash</p>			
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	<p>memory;</p> <p>(2) fully programmable, open interface and strong extensibility;</p> <p>(3) 16-channel independent programmable RS-232/422/485 control interface</p> <p>(4) interface of 8-channel weak current relay; 8-channel digital input/output IO interface;</p> <p>(5) support network communication: TCP/IP;</p> <p>(6) USB2.0 programming communication interface; Easy for users to download and upload programs;</p> <p>(7) built-in infrared learning device of the host machine, convenient for adjustment and maintenance;</p> <p>(8) support centralized management of large networking; Support multiple local and remote control modes;</p>			
Sub-Total				

2. Instruments

No.	Instrument Name	Specifications	Quantity	Unit
1	Geographical science knowledge curtain	Imported photo cloth, HD photo, sun protection, high temperature resistance, durable color fastness;25 square meters; Under the basic function of shading, students can learn more knowledge of geography subjects and fully create the overall atmosphere of the geography classroom.	1	Set
2	Wall light box	It includes 4 sets of light boxes, size: 60cm*60cm customized, openable ultra-thin	1	Set

		aluminum alloy shaped light box, 3cm border, surface electrostatic spraying, color is flashing silver, Led light source, 40 pieces of 60cm light box pieces, openable ultra-thin aluminum alloy shaped light box. Requirements for light box: 1440dpi high definition light box, laminated film, including (40 pieces) : Population distribution, race distribution, language category distribution, the distribution of religion, the distribution of wheat and rice, China air, China's population, the world's oil distribution, regional distribution of China's agriculture, plate, protect forest resources, the distribution of seismic zone, the east African rift valley, natural distribution, natural distribution of 30 degrees east longitude, natural distribution of 90 degrees east longitude, national level of education, the distribution of precipitation, the distribution of the volcano, industrial zone of Europe, high pressure of Siberia and Mongolia, India low pressure, air pressure, the causes of the formation of tropical desert climate, distribution of soil, subtropical monsoon, climate zone in China, temperature zone in China, the world map, the water cycle, countries with population more than a billion, huge iron ore and export countries of iron ore, circulation of high latitude, circulation of middle latitude, circulation of low latitude, new energy, Magellan route, distribution of coal resource, urbanization rate of countries, South American climate, salt temperature flow, atmosphere, celestial bodies, galaxies.		
3	Calculator	Functional type	1	Piece
4	Telescope	Binocular, 7 x 35	1	Piece
5	Digital telescope	Illumination 5lx, USB2.0, not less than 640 x 480(dpi)	1	Set
6	Thermometer bracket		1	Pair
7	Screen shelter		1	Piece

8	Instrument shelter	460×290×537mm	1	Piece
9	Instrument storage cabinet	1m x 0.5m x 2m, aluminum alloy profile frame glass cabinet	1	Piece
10	Steel tape	2000mm	1	Piece
11	Cloth tape	3000cm	1	Piece
12	World clock	Common type	1	Piece
13	Thermometer		1	Piece
14	Maximum thermometer	-16°C ~+81°C	1	Piece
15	Minimum thermometer	-52°C ~+41°C	1	Piece
16	Wet and dry bulb thermometer	-36°C ~+46°C	1	Pair
17	Ground thermometer	-36°C ~+81°C	1	Piece
18	Recording thermometer		1	Piece
19	Acidity meter (PH meter)	Measurement range: pH value 0 ~ 14, resolution :0.1	1	Piece
20	Geological compass		1	Piece
21	Compass		1	Piece

22	Aneroid barometer	800hPa ~ 1060hPa, minimum indexing value 1hPa, error is less than or equal to 2.0hPa	1	Piece
23	Barometer	Automatic and continuous recording of pressure changes	1	Piece
24	MAO published	single	1	Piece
25	Evaporator	The evaporator area is 314mm ²	1	Set
26	Rain gauge	Including rain measuring cylinder and measuring cup; The rain gauge cylinder includes a water receptacle, a water storage bottle and an outer cylinder; The inner diameter of the water inlet is 200mm	1	Set
27	Rain gauge	Siphon type or tilting type, inner diameter of water inlet 200mm	1	Piece
28	Light table	Portable anemometer, 3 cups	1	Piece
29	Electrical wind direction anemometer	It includes sensors, indicators and recorders	1	Piece
30	Sunshine recorder		1	Piece
31	Simple sunshine meter	Additional thermometer	1	Piece
32	Noise meter		1	Piece
33	Dust meter	Detection of air pollution	1	Piece
34	Almanac	Check the length of day and night, the height of the sun and so on	25	Piece
35	Transparency meter		1	Piece
36	Conductivity meter		1	Piece
37	Simple colorimeter		1	Piece

38	Sun, earth and moon moving instrument	Diameter 1 m	1	Piece
39	Water Flow demonstration device	It should be possible to demonstrate the running water action process through a simulated experimental device	1	Set
40	Crustal movement demonstrator	The process of crustal movement should be demonstrated by means of a simulated experimental device	1	Set
41	Atmospheric circulation tester	It should be possible to demonstrate the atmospheric circulation formation process by means of simulation experiment equipment	1	Piece
42	Atmospheric dust monitor		1	Piece
43	Cloud and fog generation tester		1	Piece
44	Acid rain automatic separator		1	Piece
45	Global positioning experimental teaching system		1	Set
46	Handheld GPS receiver	Field survey, site selection, positioning, personal navigation, with map card (with national highway grid map, city detail map), color screen, built-in thermometer, barometer, lithium battery power supply, waterproof, dustproof, shockproof	1	Piece
47	External GPS receiver		1	Set

48	Geography teaching assistant system based on geographic information system (GIS)	Including the geographic information data of the software platform and the course content, the map data can be made and edited to realize the query, statistical analysis and intuitive display of the geographical information data; Support temporal GIS, which can show the process of a certain region or ground object changing with time	1	Set
49	Research learning system based on geographic information system (GIS)	It can automatically generate various thematic maps with spatial analysis function, establish spatial analysis model in a visual way, establish the processing and analysis process of geographical data, and support secondary development. Including software application manual, training courses	1	Set
50	Geography teaching assistant system based on 3D GIS	Realize three-dimensional visualization of teaching content resources, and interact with two-dimensional information query; Support 3D space query, measurement and analysis	1	Set
51	Remote sensing spatial information teaching experiment system	Demonstration system platform; Aviation, satellite, radar, multi-resolution, multi-band course content image resources; Remote sensing tutorial; Instruction manual	1	Set
52	Virtual 3D simulation teaching system	Online teaching and data and teaching content must be updated, including teacher version and student version	1	Set
53	Plane political district globe	1 : 40 000 000	4	Piece
54	Plane topographic globe	1 : 40 000 000	4	Piece

55	Plane topographic globe	1 : 60 000 000	50	Piece
56	Stereographic globe	1 : 40 000 000	1	Piece
57	Longitude and latitude model	320mm	1	Piece
58	Celestial globe	Dual lighting, 320mm	1	Piece
59	Morning and evening globe	320mm	1	Piece
60	Chinese topography model	Blister filling 1: 8 000 000	1	Piece
61	Plate tectonics and surface morphology models		1	Piece
62	Fold structure and geomorphologic evolution model		1	Piece
63	Fault structure and horst graben development model		1	Piece
64	Models of the structure of the earth's interior	Diameter 1 m, fiberglass resin once molding, lotus base, can show the inner and outer core, upper and lower mantle.	1	Piece
65	18 kinds of	★Specification: 90cm x 60cm, the model is made of high quality synthetic resin, firm,	1	Set

	landscapes	<p>non-deformation, all parts of the arrangement, performance content is correct, bright color. It can be used in the teaching process of important geographical phenomena and causes related to geomorphology in geography teaching, including the description of topographic types and their cognition, various geomorphological forms under the combined action of internal force and external force, as well as the geographical phenomena related to human activities. It is an important teaching resource for students to understand the nature.</p> <p>18 kinds of landform models are respectively: 1) glacier landscape model, 2) models of danxia landform, 3) contour features, 4) model ground river landscape model, 5) groundwater topography model, 6) earthquake landscape model, 7) Weathering geomorphologic model 8) sand landform landscape model, 9) tectonic landform model, 10) coastal landscape model, 11) environment model, 12) model of loess landforms, 13) volcanic geology model, 14) karst landscape model, 15) water landscape model, 16) model of coal and oil, 17) five kinds of terrain models, 18) gravity terrain model.</p>		
66	Petromineral specimen	Three categories of rocks (magmatic rocks, metamorphic rocks, sedimentary rocks), common minerals (magnetite, wolframite, bluestone, galena, talc, quartz, mica, orthoclase, calcite, plagioclase, apatite, etc.)	1	Set
67	Soil specimen	Red soil, brick red soil, chernozem soil, purple soil, paddy soil and so on	1	Set
68	Experimental materials for geographical activities	Gouache pigment, fine wire, plasticine, gauze strip, cotton swab, cork, cardboard, fine wire, etc	1	Set

69	Geographical field practice equipment	Small geological bag (canvas double-back type), geological hammer (0.45kg or 0.65kg), compass (pocket theodolite), magnifying glass (3-10x), multi-purpose shovel (sword shaped double-blade shovel), soil specimen box (plastic multi-grid), box ruler (2000mm), one piece each	1	Set
70	Model display cabinet	The upper part is 5MM thick frame glass cabinet, the lower part is high quality high-density fireproof board veneer; Others: color matching with the overall effect of the classroom,	18	Piece

3. Student desk and chair

No.	Device name	Functional and technical requirements	Quantity	Unit
20	Interactive desk and chair	Table specification: 1. 1.2m * 1.2m (equilateral hexagon) product structure and function: aluminum wood structure. 2. Main material: the table top adopts blue 0.6mm wear-resisting, bending fireproof board, and the thickness of the board core is 25mm. The table body adopts 18E1 environment-friendly 18mm thick melamine board, with high-quality high-pressure melamine board pasted on both sides. 3. All plate sections are imported automatic hot melt sealing machine with 1.5mm thick PVC edge sealing strip hot melt sealing edge: strong adhesion, good sealing, beautiful appearance, durability and other characteristics. The experimental table is surrounded by melamine board with high quality engineering plastic footpads. 1. Material: melamine bench surface; 2.20*20*1.5 square steel tube steel frame. 2. Production process: carbon dioxide welding is adopted for steel frame, and epoxy resin is sprayed on the surface.3. Quality: reasonable structure, acid and alkali corrosion resistance, durable.	10	Set
Sub-Total				

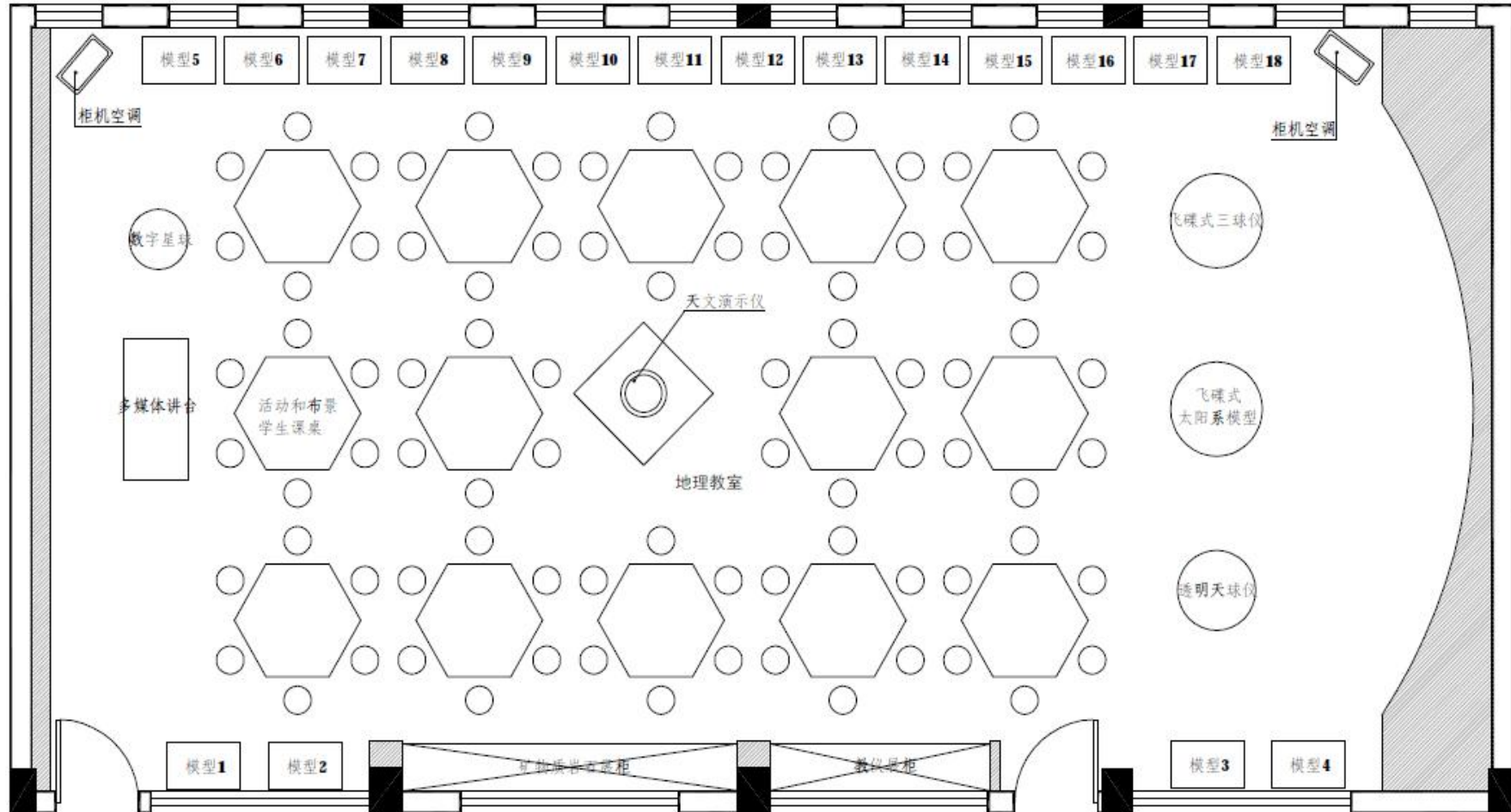
4. Foundation decoration

No.	Device name	Functional and technical requirements	Quantity	Unit
37	Basis decoration	The basic decoration part is mainly designed to the ceiling plaster ceiling, blue sky and white clouds or starry sky effect spray painting, wall painting, line transformation, lamp treatment, modeling design, garbage removal, cargo handling and other basic implementation work, the cost is determined according to the actual measured area size and requirements of the classroom.	1	Room
Sub-Total				

IV. Total project

No.	Device name	Total Amount
1	Audio-visual equipment and special instruments	
2	Geographic models and specimens	
3	Student desk and chair	
4	Foundation decoration	
Total		

V. Classroom plan (for reference)



VI. Classroom effect picture (for reference)



