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*State Examination Questions,
1903, August 26-27-28. Incomplete
set.*

QUESTIONS
FOR
The Examination of Applicants
FOR
STATE DIPLOMAS

DENVER, COLORADO, AUGUST 26, 27 and 28, 1903.

HELEN L. GRENFELL,
Superintendent of Public Instruction.

SECOND DAY, P. M.

GEOMETRY.

(Work Nos. 5 and 6 and from the other four choose any three.)

1. An angle formed by two chords intersecting on the circumference of a circle is measured by one-half the intercepted arc. Prove.
2. Prove that the locus of the vertex of the right angle of all right triangles having a given hypotenuse is the circumference of a circle.
3. Construct a triangle equivalent to a regular hexagon.
4. Prove that as the sides of a regular polygon are indefinitely increased its area approaches the area of the circumscribed circle as a limit.
5. The angles of a spherical polygon 80° ; 100° ; 120° ; 150° . Find the area if the radius of the sphere is $3\frac{1}{2}$ feet.
6. The volume of a sphere is two-thirds the volume of a circumscribed cylinder and its surface is two-thirds the total surface of the cylinder. Prove.

CHEMISTRY.

1. What is Chemistry? Distinguish between Chemistry, Physics and Biology.
2. Give the properties of an *acid*, of a *base*, and of a *salt*; give three illustrations of each with formulæ and names; write the reaction of an acid on a base, in a specific case.
3. Describe the production and properties of sulphuric acid; and tell how you could get hydrochloric and nitric acids from their salts by the use of sulphuric acid, writing equations.
4. Describe chlorine, giving occurrence, production, physical properties, chemical properties. What is bleaching powder? How is it made and for what is it used?
5. Give the history, the production, the physical properties and the chemical properties and tests of oxygen.
6. Give the history, production, the physical properties, the chemical properties and tests of hydrogen. In a physical sense is hydrogen a metal? In a chemical sense?
7. Describe the manufacture of sodium carbonate, bicarbonate and hydroxide from common salt by the Leblanc process. Do you know of any other processes for the manufacture of these compounds from common salt?
8. If the atomic weights of sodium, oxygen and nitrogen are respectively 23, 16 and 14, how much nitric acid could be made theoretically from one pound of sodium nitrate? What is the molecular weight of sodium nitrate?
9. Tell something about the arrangement of the elements of the so-called periodic law. Give the members of the alkali metals and give the members of the halogen group.
10. Tell something about the law of definite proportions and about the law of multiple proportions. What is qualitative analysis and what is quantitative analysis? What is organic chemistry? What is an ion?

GENERAL HISTORY.

1. Discuss the effect on the civilization of the Middle Ages of the fall of Constantinople.
2. Give the causes of the comparatively peaceful development of constitutional government in England, contrasting the conditions there with those in France.
3. Sketch briefly the history of the Turanian (Yellow, Mongolian) race as it has affected civilization.
4. What importance for the civilization of Europe do you ascribe to the Persian Wars?
5. What historical conditions made the reign of Elizabeth of great moment to England?

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HELEN L. GRENFELL,
Superintendent of Public Instruction.

THIRD DAY, A. M.

PHYSICAL GEOGRAPHY.

(Answer ten questions.)

1. State the bearing of physical geography upon political geography. Illustrate with three nations or states as examples.

2. Describe the Great Plains region—origin, extent, physical characters, economic conditions. In what sense is the term incorrect?

3. Describe the origin and development of a river valley. What are the distinctive characters of the various stages. Give examples of each.

4. What is the relation of lakes, falls, flood-plains and terraces to a river's physiographic history? Illustrate with American rivers as examples.

5. What is the Japan current? What are its causes and effects? Name another similar current.

6. What are the drainage-slopes of the United States? Name the principal rivers of each.

7. What are the main physical features of the Alps Mountains? What stage of mountain development do they represent? Name two examples of other stages.

8. Define the following: Steppe, atoll, delta, plateau, flood-plain, barrier reef.

9. What are the principal processes by which all earth-forms have been produced? Through what agencies do they work? Give examples.

10. What are the principal physical features of the continent of South America? Compare with Africa and explain any striking differences.

11. What processes of physiographic development are illustrated at (1) the Yellowstone Park; (2) the Canyon of the Colorado River; (3) the Yosemite Valley?

12. What has been the political influence of (1) the Atlantic Ocean; (2) the Alps Mountains; (3) the Nile River?

LATIN.

1. Translate:

Ex his omnibus longe sunt humanissimi qui Cantium incolunt,—quæ regio est maritima omnis,—neque multum a Gallica differunt consuetudine. Interiores plerique frumenta non serunt, sed lacte et carne vivunt, pellibusque sunt vestiti. Omnes vero se Britanni vitro inficiunt, quod cæruleum efficit colorem, atque hoc horribiliores sunt in pugna aspectu; capilloque sunt promisso atque omni parte corporis rasa præter caput et labrum superius.

2. Give this in Latin:

Meanwhile, a few days afterward, he was informed by the Ubii that all the Suebi were urging their forces to one place, and were ordering those tribes which were in their power to send their infantry and cavalry as reinforcements. Learning these facts, he provides a grain supply, chooses a suitable place for a camp, and directs the Ubii to withdraw their cattle and to convey all their possessions from the country to the towns, in the hope that the barbarous and inexperienced men, led by the lack of food, could be brought to unequal terms of combat. He gives instructions to dispatch numerous scouting parties into the country of the Suebi and to find out what they were doing.

GENERAL PEDAGOGY.

(Answer any six.)

1. Specify six things which every teacher can and should do to promote hygienic conditions in her school.

2. Give the Herbartian Formal Steps of Instruction, and give your estimate of their value in the preparation of a teacher.

3. What reasons can you give for insisting on sense training in school work?

4. State specific ways which you would use to further the sense training in your school.

5. Give the psychological reasons for teaching drawing in the public schools and state how you would carry out these principles in your teaching.

6. How would you proceed to increase the vocabularies of children in the fourth grade?

7. What should be the aim of punishment in school? Which is the more important, the attitude of the teacher and pupil toward the punishment, or the nature of the punishment? Give your reasons for the ground you take.

8. What do you mean when you speak of disciplining a school?

PSYCHOLOGY.

(Answer any eight questions.)

1. Describe briefly the distribution of white and gray matter in the nervous system of man. Of what elements is the nervous tissue composed, and what are their functions?

2. What are the common defects of eyesight? To what are they due, and how may they be detected in school children?

3. Compare perception and association of ideas in respect to (1) points in which they are similar and (2) those in which they differ.

4. What is apperception? Illustrate its use in school work.

5. Describe reproductive and constructive imagination. How do they differ from memory?

6. In what respects can memory be cultivated? How can the work of the school contribute to its cultivation?

7. What are concepts and abstract ideas? Give illustrations.

8. What conditions are favorable to attention?

9. How do habits differ from instincts? Give illustrations.

10. In what way is child study related to psychology? What do you consider the value of the contribution of the former to educational work?

QUESTIONS

FOR

The Examination of Applicants

FOR

STATE DIPLOMAS.

DENVER, COLORADO, AUGUST 24, 25 and 26, 1905.

KATHERINE L. CRAIG,

SUPERINTENDENT OF PUBLIC INSTRUCTION.

SECOND DAY, P. M.

GEOMETRY.

1. Define: Inscribed angle, pentadecagon; truncated prism; cylinder of revolution; polar triangles.
 2. Theorem: The sum of the angles of a triangle is equal to two right angles.
 3. Theorem: The bisectors of the three angles of a triangle pass through a point which is equidistant from the sides of the triangle.
 4. Theorem: Between two straight lines, not in the same plane, one common perpendicular can be drawn, and only one.
 - 5 and 6. Theorem: The area of a sphere is equal to the product of its diameter by the circumference of a great circle. ($4\pi R^2$.)
 7. Problem: To divide a given line into any number of equal parts.
 8. Problem: To construct a triangle equivalent to a given hexagon.
- Exercise: Three equal circles, with a radius of twelve feet, are drawn tangent, each to each. What is the area between them?
9. What is the edge of a cube whose entire area is one square mile?
 10. How far from the surface of the earth must a man be in order that he may see one-fifth of it?
 11. A cannon ball immersed in a cylindrical tub, two feet in diameter, causes the water in the tub to rise two inches. What is the diameter of the ball?

(Answer any ten.)

CHEMISTRY.

1. Give names for the following: Fe_2O_3 , KNO_3 , $CaCl_2$, $NaHCO_3$, Na_2SO_3 , H_2S , CO , CO_2 , CS_2 , FeO .
2. Write formulæ for the following: Potassium nitrite, acid calcium carbonate, manganese dioxide, sulphuric acid, potassium chlorate.
3. How are the following made in the laboratory: Carbon dioxide, chlorine, hydrogen sulphide, oxygen, hydrogen?
4. Of what is the atmosphere composed? How can the oxygen be removed from the atmosphere?
5. Define salt, acid salt, basic salt.
6. What effect has chlorine on colored fabrics? How is this technically taken advantage of?
7. What change is made in the air by breathing? How can this be proved?
8. Give the physical and chemical properties of sulphur.
9. Give the properties of bromine?
10. How is ammonia made and what are its uses technically.

GENERAL HISTORY.

1. Discuss one prominent factor in British taxation of the American colonies from both a British and an American standpoint?
2. What do you think would have been the attitude of Alexander Hamilton and that of Thomas Jefferson toward the action of the United States in relation to the Philippines?
3. Compare the situation in Russia to-day with that in France preceding the Revolution as regards one likeness and one difference.
4. Mention three forms of government that obtained in any city—state of Greece, and say how each grew out of the preceding.
5. Discuss briefly two racial changes in the early history of England.
6. In teaching history to children, do you seek to put the class into sympathy with the early life of our ancestors and their contemporaries, and, if so, how do you interpret consistently with your purpose the constant warfare and piracy of primitive life?
7. From the standpoint of Charlemagne's purpose as a ruler, do you think his slaughter of the Saxons defensible? Give reasons for your answer.
8. What factors in the life of a nation do you make the basis of your arrangement and presentation of facts in teaching history?