THE STATE TEACHERS COLLEGE
OF COLORADO

BULLETIN

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GREELEY, COLORADO

State Examination Questions.

1902, August 20-21-22. Complete set.

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QUESTIONS

FOR

The Examination of Applicants

FOR

STATE DIPLOMAS.

DENVER, COLORADO, AUGUST 20, 21 and 22, 1902.

HELEN L. GRENFELL,
Superintendent of Public Instruction.

FIRST DAY, A. M.

ALGEBRA.

1. By the sum and difference therein, find the product of $(a+b-c)\ (a-b+c)\ (a^2+b^2+c^2-2bc)$.
2. Find two factors of $a^4+b^4-c^4-d^4-2a^2b^2-2c^2d^2$.
3. Find two factors of $a^{12}+b^{12}$.
4. Rationalize the denominator of $\frac{3}{\pm\sqrt{x^2+a^2}-x}$
5. Given $x=\frac{ay+b}{cy-a}$; solve for y, and find the value of x when $x=y$.
6. Form the quadratic equation whose roots are $1\frac{1}{3}$ and $-1\frac{1}{4}$.
7. If m and n are the two roots of $ax^2+bx+c=0$, prove that $m+n=-\frac{b}{a}$, and that $m.n=\frac{c}{a}$
8. I paid $3 for some muslin; if I had received 3 more yards for the same money, each yard would have cost me five cents less. How many yards did I buy, and what did I pay per yard?
9. Find all six roots of $x^6-1=0$.
10. Find all values of x and y in $x^2+y^2=41$, and $x+y+\sqrt{x+y}=12$.

CIVICS.

1. Give the nature of the first ten amendments to the Constitution, stating when adopted.
2. Public education is a matter of state, not national, control. Discuss and give reasons therefor.
3. Is suffrage a right, or merely a privilege? Discuss.
4. Give the main sources of national revenue.
5. Describe the method of nominating presidential candidates.

POLITICAL ECONOMY.

(Answer any seven questions.)

1. Define value, wealth, capital, rent, and price.
2. What are the factors of production? Illustrate.
3. A and B are two clerks, each receiving $1,000 a year. A spends all of his salary upon his living; B saves one-half of his and deposits it in a savings bank. Which do you consider the greater benefactor of his country from an economic standpoint?
4. What are the advantages of manufacturing on a large scale?
5. What determines the price of commodities of which the production is controlled by a trust?
6. Can there be a general rise or fall in the values of commodities? Why?
7. What is meant by the law of diminishing returns from natural agents?
8. What is inconvertible paper money? What determines its value?
9. What is the Bucklin Act? What do you think of the merits of its provisions?
10. Would it be to the advantage of the United States to remove the import duty upon sugar?

BOTANY.

1. What is an embryo? Name its parts. What conditions are necessary for germination? How do the embryos of exogenous and of endogenous plants differ?
2. What are the functions of roots? How do roots take nourishment from the soil? Contrast the edible portion of a potato plant with the root stalk of any plant with which you are familiar.
3. What are the uses of stems? Why does the cottonwood grow tall, the dandelion short and the grapevine take on its peculiar form. Compare the structure of a dicotyledonous with a monocotyledonous stem.
4. Of what use are flowers to plants? What is pollination? Fertilization? How may pollination be effected?
5. When are plants said to be monœcious? Dioecious? Describe a complete flower. Describe any flower of the order compositæ.
6. What is the test for starch? Make a diagram of a grain of potato starch.
7. What is protoplasm? Describe the movements of protoplasm in plants.
8. Describe some of the means that plants have for protection against conditions of environment. Also against insect and animal enemies.

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FIRST DAY, P. M.

PHYSICS.

1. Explain briefly capillary action as a result of surface tension.
2. Define the following: Force, work, energy, power, and acceleration.
3. How would you determine accurately the constant of gravitation?
4. Explain why the hand feels cool if moistened with alcohol. Explain how this cooling effect can be increased.
5. Explain the production of electricity by means of the electrophorus.
6. State the laws according to which the mechanical forces between two currents of electricity act.
7. State the laws connecting the electrical resistance of a wire with its length and cross-section.
8. Draw a diagram representing the wire connections of a telephone transmitter and receiver.
9. What overtones can a vibrating wire of a piano have?
10. State the laws for the reflection and refraction of light. How would you illustrate them before a class of students?

RHETORIC.

1. What relation to the theme of a piece of literature has its structure?
2. What qualities of style do you think most clearly subserved by good paragraph unity, paragraph mass (emphasis), and paragraph rhythm respectively?
3. Do you think there is advantage in teaching children the "steps" of the narrative (situation, happening, culmination, solution); if so, what advantage?
4. Discuss the relation to style of the Latin and the Saxon element in our vocabulary.
5. Give three suggestions which you would offer pupils for the management of their sentences.

ENGLISH LITERATURE.

1. Discuss two characteristics which you regard as those of great literature (as distinguished from merely good literature).
2. Compare Elizabethan prose with Queen Anne prose.
3. Discuss two factors which you would especially emphasize in teaching the history of literature.
4. What means should you use in helping pupils to grasp a Shakespeare play *as a whole?*
5. Discuss three aspects which you think important of any one of the following pieces of literature:

Carlyle: Essay on Burns.
Wordsworth: Tintern Abbey.
Macaulay: Essay on Milton.
Shelley: Hymn to Intellectual Beauty.
Matthew Arnold: Any one of the Essays in Criticism.

ZOOLOGY.

(Select ten.)

1. Define protoplasm, cell, and tissue. Draw a cell and label all parts as fully as you can.
2. What are the three general methods of reproduction in the animal kingdom? Define each. What is conjugation?
3. Draw an amoeba and label the parts. How does an amoeba take food? How does it increase in numbers?
4. Describe the alimentary canal of a sea anemone, or any coral polype. Describe the nervous system of a jelly fish.
5. Define parthenogenesis, and alternation of generations, and give examples.
6. When is an animal oviparous? When viviparous? Define exo-skeleton and give examples.
7. How do the following animals respire? Amoeba, oyster, frog, snake, seal, and whale?
8. Name in order all the parts of the alimentary canal of a pigeon; of an ox.
9. Explain what is meant by a natural classification of animals. What would be an artificial classification?
10. What are some of the facts that support most strongly the theory of evolution or common descent?
11. Place the following animals in their proper phyla or branches of the animal kingdom: Paramoecium, jelly fish, sponge, snail, tapeworm, turtle, lizard, spider, and lobster.
12. How many chambers in the heart of each of the following: Oyster, turtle, fish, crocodile, bird, cat, man?

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SECOND DAY, A. M.

TRIGONOMETRY.

1. Define cosine, cotangent, cosecant. Assuming that $\frac{22}{7}$ is the circular measure of two right angles, express the angle A° in circular measure.

2. What relation exists between the sine and cosine of any angle (A)? The cosecant of a certain angle is 4; find the other functions.

3. Trace the changes in sign and magnitude of sine A, as (A) changes from 0° to 180°.

4. The minute hand of a clock is 3 feet 6 inches in length; find how far its point will move in 45 minutes, it being assumed that $\pi = \frac{22}{7}$

5. When one side and two adjacent angles of a triangle are given, show how to solve the triangle.

GERMAN.

1. Full declension of *mein* and *dieser*.
2. Singular and plural of German nouns meaning *man, garden, friend, house, street.*
3. Compare five German adjectives.
4. Write synopsis in third person, singular of *sein* and *haben.*
5. Two uses of subjunctive, with examples.
6. Principal parts of to *see*, to *go*, to *become*, to *eat*, to *fall.*
7. Translate into German:
   The school will begin at nine o'clock.
   Have you forgotten what was said?
8. I have written my brother a long letter. He can work rapidly if he will.
9. Pardon me. The book lies behind your chair. The dog stood before the door.
10. Children, be diligent. We do not like to write German exercises.

FRENCH.

1. Translate into English:

Personne, dans cette assemblée surhumaine, n'ent l'air de s'apercevoir de la présence de Charles et des trois personnes qui l'accompagnaient. A leur entrée, ils n'entendirent d'abord qu'un murmure confus, au milieu duguel l'oreille ne pouvait saisir des mots articulés; puis te plus âgé des juges en robe noire, celui qui parassait remplir les fonctions de président, se leva, et frappa trois fois de la main sur un in-folio ouvert devant lui. Aussitôt il se fit un profoud silence. Quelques jeunes gens de boune mine, habillés richement, et les mains liées derrière le dos, entrèrent daus la salle par une porte oppossée à celle que venait d'ouvrir Charles XI. Ils marchaient la tête haute et le regard assuré.

2. Translate into French:
   (a) I have some bread.
   (b) Have you good horses?
   (c) We shall have no water.
   (d) She has had some good meat.
   (e) If you have meat, give me some.
3. Give the principal parts of five regular verbs in the sight passage.
4. Give the principal parts of all the irregular verbs in the sight passage.
5. Inflect in French:
   (a) I go.
   (b) Shall I be able?
   (c) I have cut myself.
   (d) Do I not wish?
   (e) It is necessary for me to go. (Two ways.)
6. Translate into English:

Sire, mon père est mort; mes yeux out on son sang
Couler à gros bouillons de son généreux flanc:
Ce sang qui tant de fois garantil vos murailles,
Ce sang qui tant de fois vous gagna des batailles,
Ce sang qui tout sorti fume sucore de courroux
De se voir répandu pour d'autres que pour vous
Qu'au milieu des hasards n'osait verser la guerre,
Rodrigue en votre cour vient d'en couvrir la terre.
—Le Cid, Act II.; scene 8.

7. Translate into French:
   (a) Which of these two hats do you prefer, his or mine?
   (b) I like your hat, but I do not like your brother's.
   (c) I fear that you are sick.
   (d) Do you believe that she is loved?
   (e) It was necessary for the man to go away.
   (f) Do you come from Paris? Yes, I come from there and my brother is going there soon.
8. Mention briefly a few uses of the subjunctive mood; of the imperfect indicative.
9. Mention six French authors, giving the name of some one of their works.
10. Discuss the arguments for and against the so-called "natural method" of learning French.

LOGIC.

1. Define syllogism and explain its elements.
2. Define judgment as an act, and reasoning as a process.
3. Illustrate the extension and intension of terms or concepts and deduce the general law.
4. What is a theory, and how may one be verified?
5. Discuss this reasoning:
   Some gases by compression become liquid. Air is a gas.
   Air may be changed to a liquid by compression.

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SECOND DAY, P. M.

GEOMETRY.

1. Define trapezium, rhomboid, concave polygon, sector of a circle, prism.
2. What does the sum of the interior angles of any polygon equal? Prove your statement.
3. The medians of a triangle meet at a point. Prove.
4. Discuss the "Theory of Limits."
5. Divide the line A-B into seven equal parts.
6. Between two lines not in the same plane one common perpendicular can be drawn, and only one.
7. What does the volume of a pyramid equal? Prove your statement, using a triangular pyramid.
8. The sum of the angles of a spherical triangle is greater than 180° and less than 540°. Prove.
9. Given a sphere ten feet in diameter. Find the circumference of a great circle, the area of the surface, and the volume of the sphere.
10. Find the area in square feet of a spherical triangle on the surface of the sphere in example 9 when the angles are 100°, 120°, 140°.

CHEMISTRY.

1. Define element; atom; molecule; radical; acid; base; salt.
2. What is the hypothesis of Avogadro? How may its principle be applied to the determination of molecular weights?
3. Give a description of the element Carbon and of its important compounds.
4. Name and formulate the oxides of Nitrogen, and show how they conform to the law of multiple proportions.
5. What elements are precipitated as sulphides by Hydrogen Sulphide in acid solution? What in alkaline solution? Give the formula of the sulphide in each case.
6. What is the periodic law? Describe how this law has been of value in the development of Chemistry.

GENERAL HISTORY.

1. What four kingdoms were formed from the empire of Alexander?
2. Sketch briefly the Punic wars.
3. Name the members of what is known as the First and Second Triumvirate.
4. Name the leading writers of Greece and Rome.
5. Describe Monasticism and state benefits, if any.
6. Describe the Renaissance.

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THIRD DAY, A. M.

PHYSICAL GEOGRAPHY.

(Note—Answer only ten questions.)

1. State what influence the physical geography of their country has exerted upon—first, the Greeks; second, the Jews; third, the English.

2. Define—first, a coastal plain; second, a plateau. Explain their origin and give examples in the United States.

3. Define—first, an estuary; second, a fjord. Explain their origin and give examples.

4. Compare the west coasts of Norway and France. Explain any differences.

5. Compare the coast of Maryland and Virginia with that of Florida or Texas. Explain any differences.

6. Describe the Gulf Stream. On what is its course dependent, and how does it affect the shores it washes?

7. What is meant by erosion of the land? What are the principal agents of erosion?

8. When is a river said to be at grade? Point out the relation of falls, lakes and flood-plains to a river's physiographic history.

9. What are the principal physical features of the Mississippi Valley, and how are they related to the wealth of the United States?

10. Describe the Great Basin, stating its principal physical features. How are the drainage, climate and physical features related?

11. What is—first, a volcano; second, a crater? What can you say of the distribution of volcanoes? Name an active and an extinct volcano.

12. Compare the Rocky Mountains and the Appalachian Mountains as to their main physical features. Show what differences in physical features arise from differences in geological age.

LATIN.

Translate:

"Quo *proelio* bellum Venetorum totiusque orae maritimae confectum est. Nam cum omnis juventus, omnes etiam gravioris aetatis, in quibus *aliquid* consilii aut dignitatis fuit, eo convenerant, tum *navium quod* ubique fuerat in unum locum coegerant; quibus amissis, reliqui neque quo se reciperent, neque quemadmodum oppida defenderent habebant. Itaque se suaque omnia Caesari dediderunt."

Give constructions of words underscored. Account for the mood of these: *convenerant, reciperent,* and *defenderent.*

Translate:

Haec fatus, latos umeros subjectaque colla
Veste super fulvique instemitor pelle leonis,
Succedoque oneri; dextrae se parvus Iulus
Implicuit sequiturque patrem non passibus aequis;
Pone subit conjunx. Ferimur per opaca locorum;
Et me, quem dudum non ulla injecta movebant
Tela neque adverso glomerati ex agmine Graii,
Nunc omnes terrent aurae, sonus excitat omnis
Suspensum et pariter comitique onerique timentem.

Mark the scansion of the seventh and ninth lines.

GENERAL PEDAGOGY.

(Answer any six.)

1. Explain the advantages of Manual Training from (1) a brain standpoint; (2) an ethical standpoint.

2. In any lesson or recitation in Arithmetic you may select, describe two possible aims, one of which is more concrete than the other. Show fully the effects of each on the minds of the children.

3. Describe the advantages and disadvantages of (1) the "word-method," (2) the "sentence method," in teaching Primary Reading. How would you use these methods, if at all?

4. In what way would you use Phonics? At what stage should the child know the alphabet? Give reasons.

5. Describe the advantages of a "study-recitation," and show how you would use it (1) in the primary grade; (2) in the grammar grade.

6. Explain briefly the Herbartian doctrine of Apperception.

7. To what extent is "isolation" in the school rooms beneficial? To what extent harmful? Discuss by means of illustrations.

8. To what extent and for what reason would you engage in the physical examination of the child? Discuss by means of illustrations.

9. Describe the doctrine of "Recapitulation," and show what place it has in the school room, if any.

PSYCHOLOGY.

(Answer any eight questions.)

1. What is the New Psychology?

2. Give an account of the localization of the motor functions of the cerebral cortex.

3. What is reflex action? Give examples.

4. How do you distinguish sensation from perception?

5. What is meant by eye-minded and ear-minded children?

6. How do you account for retention as an element of memory.

7. What are concepts, and how are they formed?

8. Describe inductive and deductive reasoning.

9. What are instincts?

10. What is the physiological basis of habit?

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PHYSIOLOGY.

(Choose any ten.)

1. Name ten chemical elements entering into the composition of the body; also three classes of organic compounds in the body.
2. Describe as fully as you can the white and red corpuscles of the blood. What are the functions of each?
3. What are the properties of white fibrous tissue? Where does it occur in the body? What are its functions?
4. Name the bones of the skull and give the number of each kind. What is a Haversian canal?
5. Define joint, articulation and suture. Name the different classes of joints and give examples of each.
6. What are the effects of alcohol and tobacco upon the healthy human body? Answer as fully as you can.
7. What glands furnish secretions to aid in digestion of food? What are the functions of the saliva? Locate the *appendix vermiformis.*
8. Describe a complete circulation of the blood, beginning with the left ventricle of the heart. Name in order the valves it would pass.
9. What is each of the following parts: (a) periosteum, (b) pericardium, (c) peritoneum, (d) duramater, (e) conjunctiva?
10. Describe the lymphatic system. Where does it originate? Where does it terminate? What is it for?
11. Give normal temperature, normal pulse rate and normal number of respirations per minute for adult man. What are the ways by which the air in a living room is made unfit for breathing?
12. Name all the layers of the skin. What glands occur in the skin? What are the functions of these glands?

MINERALOGY AND GEOLOGY.

1. State the characteristic properties of garnet, orthoclase, mica, hornblende and augite.
2. Define igneous, plutonic, effusive and sedimentary; state how each of these terms is applied.
3. Describe the geological structure of the Front Range in Colorado, and give the geological formations concerned.
4. Describe the general effects of erosion upon bedded rocks that are, first, horizontal; second, gently inclined; third, steeply inclined and folded.
5. Describe one type of plant or of animal life characteristic of, first, Silurian; second, Devonian; third, Carboniferous; fourth, Mesozoic; fifth, Cenozoic.
6. Write an account, not less than 200 words long, of the antiquity of man.

ASTRONOMY.

1. Explain the daily and the annual motion of the earth.
2. Explain azimuth and altitude of a star. Draw a suitable figure for illustration.
3. Describe the planetary system briefly, and give a short account of each of the planets.
4. Speak briefly of the following points in solar eclipses:
   (a) How are they caused?
   (b) Why do they not come twice a year regularly?
   (c) Have you ever seen one?
   (d) Describe the preceding and accompanying phenomena in the case of a total eclipse.
5. Explain briefly spectrum analysis, and explain how it may be used to ascertain something as to the constitution of certain heavenly bodies.